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THE FIRST PRINCIPLES OF MATHEMATICS  
in the Light of St. Thomas Aquinas

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ὅλκον ἄρα, ὧ̄ γενναῖε, ψυχῆς πρὸς ἀλήθειαν εἴη ἂν  
καὶ ἀπεργαστικὸν φιλοσόφου διανοίας  
πρὸς τὸ ἄνω σχεῖν ἢ νῦν κάτω οὐ δέον ἔχομεν.

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## **Abstract**

Already as far back as 1934, Peter Hoenen complained that the Scholastics, hardly loyal to Aristotle, had almost entirely neglected the philosophy of mathematics, while several modern schools (logicism, intuitionism, and formalism) vigorously cultivated it. What Hoenen did not know is that the moderns, too, would almost completely abandon this important branch of knowledge in the aftermath of the foundational crisis that was brewing due to the introduction of set theory. Alas, the question is yet to be settled: almost a hundred years after the catastrophe, mathematicians are unable to tell us, with any certainty, what the subject-matter of their discipline is, or what method should be used.

We propose in this dissertation that the metaphysics of Saint Thomas Aquinas is quite capable not only of accounting for the principles of ancient mathematics, but also of pointing out the principles of modern set theory—and even of supporting a thorough and realistic alternative to this problematic theory.

In the first part, we bring to light, in order to dispel entrenched modern fictions, what ancient Greek mathematicians had to say about the principles of their own discipline.

Faithfully following Saint Thomas, we devote the second and major part of this work to establishing what a principle is; what kinds of principles there are; what is required for something to be a first principle; and what should be the first principles of any science or discipline, and specifically those of mathematics.

In the third part we determine, in the light of Saint Thomas's theory, the elusive essence of algebra—the discipline that would later be identified by Descartes with universal mathematics or analysis. We follow its development until the introduction of set theory, whose principles we clarify.

Finally, we propose ancient foundations for modern so-called mathematics.

## **Keywords**

110206 Foundations of mathematics 720303 Metaphysics, ontology 110201 Analogy 720503 Philosophy of mathematics
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## **Resumen**

*Ya en 1934, Peter Hoenen se quejaba de que los escolásticos, muy poco fieles a Aristóteles, hubiesen descuidado casi por completo la filosofía de las matemáticas, mientras que varias escuelas modernas (el logicismo, el intuicionismo y el formalismo) la cultivaban vigorosamente. Lo que Hoenen no sabía es que también los modernos abandonarían casi por completo esta importante rama del saber tras la crisis fundacional que en esos mismos momentos se estaba desarrollando a raíz de la introducción de la teoría de conjuntos. Sin embargo, lo más lamentable del asunto es que la cuestión aún no ha sido zanjada: a casi cien años de la catástrofe, los matemáticos son incapaces de decirnos con certeza cuál sea el sujeto que estudia su disciplina, cuál el método que deba emplearse.*

*En esta tesis proponemos que la metafísica de santo Tomás de Aquino es capaz no solamente de dar cuenta de los principios de las matemáticas antiguas, sino también de señalar los principios de la moderna teoría de conjuntos—e incluso de sustentar una alternativa mucho más cabal y realista a esta problemática teoría.*

*En la primera parte, con el fin de disipar arraigadas ficciones, sacamos a la luz lo que los antiguos matemáticos griegos decían acerca de los principios de su propia disciplina.*

*Dedicamos la segunda parte, la mayor de esta obra, a establecer, siguiendo fielmente a santo Tomás, qué sea un principio; qué géneros de principios haya; qué se requiera para que algo sea un primer principio; y cuáles deban ser los primeros principios de cualquier ciencia o disciplina, y específicamente los de las matemáticas.*

*En la tercera parte determinamos, a la luz de la teoría de santo Tomás, qué sea el álgebra, la disciplina que luego sería identificada por Descartes con la matemática universal o análisis. Seguimos su desarrollo hasta la introducción de la teoría de conjuntos, cuyos principios esclarecemos.*

*Finalmente, proponemos antiguos fundamentos para las modernas “matemáticas.”*

## **Palabras claves**

<i>110206 Fundamentos de matemáticas 720303 Metafísica, ontología 110201 Analogía 720503 Filosofía de las matemáticas</i>
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# Introduction

## Background

EUCLID's *Elements*, with some twenty-three centuries of history, is undoubtedly the most celebrated, lasting, and influential textbook of all times. However, in the last hundred years or so, it has been rapidly supplanted in the classroom by an endless succession of short-lived works based on set theory, which is what is used today to explain not only modern mathematics, but even ancient Greek arithmetic and geometry. Indeed, since the late years of the nineteenth century, set theory had promised to become a common ground perhaps not only for all of mathematics, but even for the whole of modern science, which has been profoundly "mathematized." As Herbert B. ENDERTON puts it, "In mathematics these days, essentially everything is a set."<sup>1</sup>

1. Although the introduction of set theory was abrupt, the ground had been prepared along the span of many centuries. Modern mathematics is merely a logical consequence of the progressive dismissal of long-held principles. A famous example is the development of so-called non-Euclidean geometries, which followed upon the elimination of EUCLID's fifth postulate. Likewise, based on his work on infinity, Georg CANTOR—considered the originator of modern set theory—rejected the ancient axiom that every whole is greater than any of its parts. Bertrand RUSSELL explains this fateful episode:

Here Cantor proceeded in the only proper way. He took pairs of contradictory propositions, in which both sides of the contradiction would be usually regarded as demonstrable, and he strictly examined the supposed proofs. He found that all proofs adverse to infinity involved a certain principle, at first sight obviously true, but destructive, in its consequences, of almost all mathematics. The proofs favourable to infinity, on the other hand, involved no principle that had evil consequences. It thus appeared that common sense had allowed itself to be taken in by a specious maxim, and that, when once this maxim was rejected, all went well.

The maxim in question is, that if one collection is part of another, the one which is a part has fewer terms than the one of which it is a part. This maxim is true of finite numbers. For example, Englishmen are only some among Europeans, and there are fewer Englishmen than Europeans. But when we come to infinite numbers, this is no longer true. This breakdown of the maxim gives us the precise definition of infinity. A collection of terms is infinite when it contains as parts other collections which have just as many terms as it has. If you can take away some of the terms of a collection, without diminishing the number of terms, then there are an infinite number of terms in the collection.<sup>2</sup>

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<sup>1</sup> Herbert Bruce ENDERTON, *Elements of Set Theory* (San Diego: Elsevier Academic Press, 1977), xi.

<sup>2</sup> Bertrand RUSSELL, *Mathematics and the Metaphysicians in Mysticism and Logic, and Other Essays* (London: Longmans, 1918), 85–86. As the preface to this edition states (*ibid.*, v–vi), this essay "was written in 1901, and appeared in an American magazine, *The International Monthly*, under the title 'Recent Work in the Philosophy of Mathematics'."

Thus, what was once held to be a self-evident principle on which to erect the edifice of mathematics had to be discarded, and new foundations had to be laid. It was the dismissal of such time-honored principles that led to the formulation of early set theories. RICHARD DEDEKIND's set theory, for example, arose from the rejection of prior definitions of *number*.

Alas, early set theories were "naïve," and riddled with paradoxes. It was RUSSELL himself who informed Gottlob FREGE of a contradiction derivable from the principles that the famous German mathematician and philosopher had proposed in his *Grundgesetze der Arithmetik*. What has come to be known as *Russell's Paradox* may be formulated as follows. Consider the set of all sets that are not members of themselves. Evidently, this set must be a member of itself if and only if it is not a member of itself. Paradox.

Gladly, there remained at least one ancient principle to which the moderns loyally clung: the principle of non-contradiction. Still, they needed more than that to ensure that set theory would be free of contradictions: they needed the principles of set theory itself, which was already considered to be the underpinnings of mathematics. The brightest minds of the age set out to find them. For half a century they tried—and ultimately failed.

2. Each began from their own presuppositions concerning the nature of mathematics. But at the highpoint of the foundational revolution, they had already become entrenched in three so-called *schools* or *programs*:<sup>3</sup> (1) the *logicism* of FREGE and his followers, who consider mathematics to be a part of logic (where logic is conceived as a set of theorems); (2) the *intuitionism* of Luitzen Egbertus Jan BROUWER and his supporters, for whom mathematics consists in the carrying out, one after the other, of so-called inductive and effective mental constructions, so that—contrary to FREGE—valid logic would be a part of mathematics; and (3) the *formalism* of David HILBERT and his followers, according to whom mathematics is nothing but a syntactically-regulated manipulation of symbols that are in themselves meaningless.

It was Willard van Orman QUINE who indelibly identified these three *schools* with medieval theories of universals: "The three main mediaeval points of view regarding universals are designated by historians as *realism*, *conceptualism*, and *nominalism*. Essentially these same three doctrines reappear in twentieth-century surveys of the philosophy of mathematics under the new names *logicism*, *intuitionism*, and *formalism*."<sup>4</sup> Conspicuously missing, ironically, is the most important realist theory of medieval times: Aristotelianism.

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<sup>3</sup> We draw our account of the three "schools" from Ernst SNAPPER, "The Three Crises in Mathematics: Logicism, Intuitionism and Formalism," *Mathematics Magazine* 52, no. 4 (1979). For an update on the *status quaestionis*, see Sten LINDSTRÖM et al. (eds.), *Logicism, Intuitionism, and Formalism: What Has Become of Them?* (Dordrecht: Springer, 2010).

<sup>4</sup> Willard van Orman QUINE, "On What There Is," *Review of Metaphysics* 2, no. 5 (1948), 33.

According to QUINE,

*Realism*, as the word is used in connection with the mediaeval controversy over universals, is the Platonic doctrine that universals or abstract entities have being independently of the mind; the mind may discover them but cannot create them. *Logicism*, represented by Frege, Russell, Whitehead, Church, and Carnap, condones the use of bound variables to refer to abstract entities known and unknown, specifiable and unspecifiable, indiscriminately.<sup>5</sup>

However, *logicism* failed not because universals were shown to exist only in dependency of the mind, or not to exist at all, but because this doctrine was unable to account for some of the axioms of modern mathematics. If we consider ZF (the most successful set theory in use, named after Ernst Friedrich Ferdinand ZERMELO and Abraham Halevi FRAENKEL), two out of nine (i.e., more than 20%) of its generally acknowledged axioms are not logical propositions in the sense demanded by *logicism*. In turn,

*Conceptualism* holds that there are universals but they are mind-made. Intuitionism, espoused in modern times in one form or another by Poincaré, Brouwer, Weyl, and others, countenances the use of bound variables to refer to abstract entities only when those entities are capable of being cooked up individually from ingredients specified in advance. As Fraenkel has put it, logicism holds that classes are discovered while intuitionism holds that they are invented—a fair statement indeed of the old opposition between realism and conceptualism. This opposition is no mere quibble; it makes an essential difference in the amount of classical mathematics to which one is willing to subscribe. Logicians, or realists, are able on their assumptions to get Cantor's ascending orders of infinity; intuitionists are compelled to stop with the lowest order of infinity, and, as an indirect consequence, to abandon even some of the classical laws of real numbers. The modern controversy between logicism and intuitionism arose, in fact, from disagreements over infinity.<sup>6</sup>

Yet, mathematicians rejected *intuitionism* not because sets were shown not to be mind-made universals, but because, as QUINE says, the proposed foundations were unable to account for numerous theorems—many of which were discovered by BROUWER himself—that cannot be constructed inductively and effectively, as required by this *school*. Finally,

*Formalism*, associated with the name of Hilbert, echoes intuitionism in deploring the logicist's unbridled recourse to universals. But formalism also finds intuitionism unsatisfactory. This could happen for either of two opposite reasons. The formalist might, like the logicist, object to the crippling of classical mathematics; or he might, like the nominalists of old, object to admitting abstract entities at all, even in the restrained sense of mind-made entities. The upshot is the same: the formalist keeps classical mathematics as a play of insignificant notations. This play of notations can still be of utility—whatever utility it has already shown itself to have as a crutch for physicists and technologists. But utility need not imply significance, in any literal linguistic sense.

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<sup>5</sup> *Ibid.*, 33.

<sup>6</sup> *Ibid.*, 33–34.

Nor need the marked success of mathematicians in spinning out theorems, and in finding objective bases for agreement with one another's results, imply significance. For an adequate basis for agreement among mathematicians can be found simply in the rules which govern the manipulation of the notations—these syntactical rules being, unlike the notations themselves, quite significant and intelligible.<sup>7</sup>

Alas, Kurt GÖDEL dealt a death blow to *formalism* not by showing that there are indeed abstract entities, but by proving that mathematics—should it be based on a syntactically regulated manipulation of empty symbols—would always include formally undecidable propositions.<sup>8</sup> Consequently, demonstrating whether the discipline is entirely free of contradiction would be impossible—and mathematics would always remain incomplete.

Thus, despite QUINE's account, it is evident that universals had little to do with the downfall of the programs: every one of them failed regardless of their proposed solution to the medieval controversy. And their downfall created a foundational crisis that ultimately shattered confidence in human reason, resulting in a catastrophe that is felt still today.

3. As is only natural, in the aftermath of the foundational revolution, mathematicians have mostly turned their backs on philosophy, which appears to be impotent when it comes to answering the most basic questions concerning their discipline. Since then, the hope of resolving the foundational crisis of modern mathematics—and indeed of modern Western thought—has greatly waned. Today, many have assumed the pragmatist attitude of Hilary W. PUTNAM, who “would like to convince” us that “the various systems of mathematical philosophy, without exception, need not be taken seriously.”<sup>9</sup>

On the surface, the dismissal of philosophy seems to bring no harm to the discipline: what goes today by the name of *mathematics* has seen a vertiginous development in the last century. And, given that the alleged separation of philosophy and science—not unlike that of church and state—is often hailed as a sign of progress, there appears to be no reason for concern. In this light, PUTNAM would seem to be quite right.

However, the deeper reality is that the discipline is in a sorry state. As things stand, contemporary mathematicians are unable to tell us with any certainty what the subject of their discipline is or what method should be used. As Andrew D. IRVINE observes:

One of the most striking features of mathematics is the fact that we are much more certain about what mathematical knowledge we have than about what mathematical knowledge is knowledge

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<sup>7</sup> Ibid., 34.

<sup>8</sup> Kurt GÖDEL, “Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme,” *Monatshefte für Mathematik und Physik* 38 (1931), 173–198.

<sup>9</sup> Hilary PUTNAM, “Mathematics without foundations,” in *Philosophy of Mathematics: Selected Readings*, ed. Paul Benacerraf and Hilary Putnam, 2nd ed. (Cambridge: Cambridge University Press, 1983), 295.



of. Mathematical knowledge is generally accepted to be more certain than any other branch of knowledge; but unlike other scientific disciplines, the subject matter of mathematics remains controversial. In the sciences we may not be sure our theories are correct, but at least we know what it is we are studying.<sup>10</sup>

Many are quite content with not knowing what it is they are doing. As RUSSELL notoriously put it, “mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true.”<sup>11</sup>

Nonetheless, this does not mean that contemporary mathematicians are free from all assumptions: rather, they believe in set theory as a principle, and think from it uncritically. Although set theory is not altogether unreasonable, it certainly lacks due justification. And precisely because it is unfounded, it must be accepted—bizarrely—as a dogma of faith.

4. Even ancient Greek mathematics is taught from the set-theoretical creed. Proportion theory (whose original principles can be found in EUCLID’S *Elements*, Books V and VII) is now explained by resorting to so-called *equivalence classes*—an approach that amounts to indoctrination rather than education, as the reflections of David H. FOWLER (1937–2004) imply:

[T]he general technique of appealing to equivalence classes appeared only around the time of Dedekind, when set theory began to be introduced as a basis for mathematical theory in general, and it took some time to become established. This gives a good example of a piece of mathematics that has been popularised only recently, but which has already been retrospectively written back into the “history” of the subject, even back to Euclid, and all this has happened almost within my own lifetime, in a process that is every bit as efficient and thorough as the work of the thought police in George Orwell’s *Nineteen Eighty-Four*.<sup>12</sup>

The awkward truth is that ancient Greek theory of proportion (ἀναλογία) is not based on the notion of *equivalence class* (an infinite collection of sets representing binary relations that are reflexive, symmetric, and transitive), but on that of *ratio* (λόγος), which cannot be reduced to what any of the failed foundational programs had been proposing: that is, logical propositions, mental constructions, or meaningless symbols.

Quite the opposite, as Kurt VON FRITZ explains, what ancient Greeks ultimately understood by *logos* (λόγος) is the “communication of something essential about a thing.”<sup>13</sup> Ironically, then, rather than elucidating ancient Greek mathematics for us, set theory obfuscates its

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<sup>10</sup> Andrew D. IRVINE, “Preface” in Andrew D. IRVINE (ed.), *Philosophy of Mathematics* (Burlington; Oxford; Amsterdam: North Holland, Elsevier, 2009), ix; emphasis in the original.

<sup>11</sup> RUSSELL, *Mathematics and the Metaphysicians* in *Mysticism and Logic*, 75.

<sup>12</sup> David H. FOWLER, *The Mathematics of Plato’s Academy* (Oxford: Clarendon Press, 1999), 371.

<sup>13</sup> VON FRITZ, *Grundprobleme der Geschichte der antiken Wissenschaft* (Berlin: De Gruyter, 1971), 406.

original principles to the point of rendering the time-honored discipline thoroughly unintelligible.

5. Regrettably, the use of equivalence classes to explain ancient Greek theories of ratio and proportion, whether between numbers (*Elements*, VII) or between magnitudes (ibid., V), is neither the only nor the oldest case of forgery. Even before set theory was imposed in the classroom, it was already common to read that only positive integers (i.e., 1, 2, 3, ...) were called *numbers* by the ancient Greeks; or—paradoxically—that the ancient Greeks discovered *irrational numbers*.

In fact, ancient Greek sages would unanimously disagree with these assertions because: (a) it is impossible to treat scientifically of “whole numbers,” since this expression is but a metaphor, as ARISTOTLE says;<sup>14</sup> (b) *one* is not a number, that is, a measured multitude, but the principle and measure of all numbers;<sup>15</sup> and therefore, (c) there are no *irrational numbers*, but only ratios between incommensurable magnitudes; for *number* is not predicated of that which is incommensurable.<sup>16</sup> If these words sound unsophisticated or even ridiculous to our contemporary ear, it is only because ancient Greek mathematics has long been misrepresented by casting it in new molds.

What is more, for nearly two centuries, historians of mathematics have been presenting ancient Greek mathematical problems and theorems as solutions to algebraic equations. It is not the first time that some ancient Greek mathematical work has been identified with algebra: Qusṭā IBN LŪQĀ, the ninth-century translator of DIOPHANTUS’s *Arithmetica* into Arabic, calls this work just that. But now, it is all of ancient Greek mathematics that is identified with algebra. As early as 1842, Georg Heinrich Ferdinand NESSELMANN (1811–1881) published a work entitled *The Algebra of the Greeks*.<sup>17</sup> Then, celebrated historians, such as Hieronymus G. ZEUTHEN (1839–1920), Paul TANNERY (1843–1904), and Bartel Leendert VAN DER WAERDEN (1903–1996), have contributed to the spread of this modern fabrication. According to VAN DER WAERDEN, “Theaetetus and Apollonius were at bottom algebraists, they thought algebraically even though they put their reasoning in a geometric dress.”<sup>18</sup>

<sup>14</sup> ARISTOTLE, *Metaphysica* Δ.26, 1024a7–8: “ὅλος δ’ ἀριθμὸς [...] οὐ λέγεται, ἂν μὴ μεταφορᾷ.”

<sup>15</sup> Ibid., N.1, 1088a4–8: “σημαίνει γὰρ τὸ ἓν ὅτι μέτρον πλήθους τινός, καὶ ὁ ἀριθμὸς ὅτι πλήθος μεμετρημένον καὶ πλήθος μέτρων. διὸ καὶ εὐλόγως οὐκ ἔστι τὸ ἓν ἀριθμὸς· οὐδὲ γὰρ τὸ μέτρον μέτρα, ἀλλ’ ἀρχὴ καὶ τὸ μέτρον καὶ τὸ ἓν.” Ibid., I.6, 1057a2–4: “τὸ δὲ πλήθος οἷον γένος ἔστι τοῦ ἀριθμοῦ· ἔστι γὰρ ἀριθμὸς πλήθος ἐνὶ μετρητόν.”

<sup>16</sup> Ibid. Δ.15, 1021a5–6: “ὁ γὰρ ἀριθμὸς σύμμετρος, κατὰ μὴ συμμέτρου δὲ ἀριθμὸς οὐ λέγεται.”

<sup>17</sup> Georg Heinrich Ferdinand NESSELMANN, *Versuch einer Kritischen Geschichte der Algebra. Erster Theil: Die Algebra der Griechen* (Berlin: Reimer, 1842). The expected “zweiter Teil” never saw the light.

<sup>18</sup> Bartel Leendert VAN DER WAERDEN, *Science Awakening* (Groningen: P. Noordhoff, 1954), 265; cf. his “Defence of a ‘Shocking’ Point of View,” *Archive for History of Exact Sciences* 15 (1976).

6. While the “ancient Greek algebra” myth is largely believed by the public, among scholars it did stir a controversy (in 1975) concerning the methodological approach that should be used when writing the history of mathematics.<sup>19</sup> The traditional historiographical view, on the one hand, supposed mathematical *form* and *content* to be independent. Thus, the followers of ZEUTHEN held that the *ideas* of ancient and modern mathematicians are really the same, but it is rather the *language* that has changed: ancient Greeks merely happened to use a geometric language. Such opinions are even linked to the author’s position concerning the controversy of universals. As Jesper LÜTZEN explains:

Zeuthen’s geometric research gave him a Platonic view of mathematics that was at the very heart of his historical work. According to Zeuthen, mathematics deals with unchanging ideas which can be expressed in different forms. [...] When doing history of mathematics he wanted to uncover the ideas and motives of the ancient masters. These ideas, he argued, were usually formulated in an unusual language, but since the ideas themselves had not changed over time, it was possible for a modern mathematician to appreciate the work of a colleague 2000 years earlier.<sup>20</sup>

Following such “traditionalist” opinions, the history of mathematics would ostensibly be reduced to an account of *the development of languages expressing immutable ideas*. In contrast, at the other extreme of the controversy, rising critics contended that mathematics is but a product of culture. Thus, Sabetai UNGURU claims:

In a nutshell, the issue between traditionalists, who barge into foreign mathematical worlds through the mathematical door, and the new historians of mathematics, who insinuate themselves into ancient mathematical cultures through what one can call the historical door, is the position of the former that form and content are independent variables in the mathematical domain that can be separated arbitrarily without thereby damaging the identity and wholeness of ancient texts, while the latter question this arbitrary separation, pointing out the errors and distortions to which it necessarily leads and exposing the blatant anachronism that is its inseparable companion.<sup>21</sup>

Since *form* and *content* are—according to their opinion—inextricably entangled in any cultural product, ancient mathematics cannot be faithfully expressed in terms of its modern counterpart. Presumably, the history of mathematics should be reduced, in consequence, to an account of *the heterogeneous mathematical products of diverse cultures*.

7. The question of the relation between ancient Greek and modern mathematics, then, creates a quandary: either by *mathematics* we understand today exactly the same thing that ancient Greeks understood (its development notwithstanding), and yet we cannot

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<sup>19</sup> The gist of the controversy can be read in a collection of articles gathered by Jean CHRISTIANIDIS (ed.), *Classics in the History of Greek Mathematics* (Dordrecht: Kluwer Academic Publishers, 2004), Part 6.

<sup>20</sup> In Joseph Warren DAUBEN and Christoph J. SCRIBA (eds.), *Writing the History of Mathematics: Its Historical Development, Science Networks Historical Studies* (Basel and Boston: Birkhäuser, 2002), 574.

<sup>21</sup> Sabetai UNGURU, Introduction to Part 6 of *Classics in the History of Greek Mathematics*, 383.

even agree on what that might be; or else *mathematics* means to us something so radically diverse from what it meant to them that there is no common ground, and yet we believe that—somehow—there *has* been an evolution from ancient into modern *mathematics* (equivocally using one name for two entirely diverse things).

Scholars have striven to resolve the problem of how modern mathematics evolved from ancient Greek mathematics. A common solution, hardly faithful to ancient Greek thought, is that mathematical *concepts* have been *extended* over time. As Albert C. LEWIS explains:

Historical accounts have generally taken the extension of the number concept as a key indicator of the growth of the whole of mathematics itself. Thus, the recognition of irrational numbers [sic!] by the Classical Greeks, and the incorporation of complex numbers by European mathematicians by the middle of the nineteenth century, and of the number systems which came out of Georg Cantor's transfinite numbers of the late nineteenth century, are viewed as major signs of progress.<sup>22</sup>

There have been efforts more faithfully to account for the origins of modern mathematics out of ancient Greek arithmetic and geometry. A major work in this direction is that of Jacob KLEIN (1899–1978), *Greek Mathematical Thought and the Origin of Algebra*.<sup>23</sup> According to him, modern algebra stems from reinterpretations of ancient concepts (particularly that of *number*), in which the theories of ratio and proportion play a central role.<sup>24</sup> Many later authors have greatly contributed to further clarifying the question and accounting for the influence of non-European thought as well. For example, to name but one, Chikara SASAKI.<sup>25</sup>

While these scholars carefully consider ancient Greek mathematical thought and compare it to its modern counterpart, they do so from a peculiar modern viewpoint. Indeed, as SASAKI observes, "Klein was under the influence of Edmund Husserl's phenomenological philosophy."<sup>26</sup> But SASAKI himself is, in turn, a disciple of Thomas Samuel KUHN (1922–

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<sup>22</sup> Albert C. LEWIS, "Complex Numbers and Vector Algebra," in *Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences*, ed. Ivor GRATTAN-GUINNESS (London and New York: Routledge, 1996), 722.

<sup>23</sup> Jacob KLEIN, "Die Griechische Logistik und die Entstehung der Algebra," in *Quellen und Studien zur Geschichte der Mathematik, Astronomie und Physik*, ed. O. Neugebauer, J. Stenzel, and O. Töplitz (Berlin: Springer, 1934, 1936). We quote from the English translation carried out by Eva Brann, *Greek Mathematical Thought and the Origin of Algebra* (New York: Dover, 1968; reprinted, 1992).

<sup>24</sup> *Ibid.*, 24 (on PLATO), 26–36 (on NICOMACHUS, THEON, and DOMNINUS), 173 (on VIETA), 198 and 208 (on DESCARTES), 220–224 (on WALLIS).

<sup>25</sup> Chikara SASAKI, *Descartes's Mathematical Thought* (Dordrecht: Kluwer Academic Publishers, 2003), 357, characterizes the mathematics of VAN ROOMEN as *Eurasian*, and criticizes the work of his illustrious predecessor: "Klein's discussion has an incomparable philosophical depth, but at the same time it is still narrowly Eurocentric."

<sup>26</sup> *Ibid.*, 256 n. 172. He points to KLEIN, "Phenomenology and the History of Science," in *Philosophical Essays in Memory of Edmund Husserl*, ed. Marvin Farber (Cambridge, Mass.: Harvard University Press, 1940), 143–163. For a detailed analysis of how KLEIN depends on HUSSERL but also departs from him,

1996), a proponent of so-called post-positivism who famously introduced the controversial but very influential “paradigm shift” account of “the structure of scientific revolutions.” One such revolution, according to SASAKI, would be that of René DESCARTES in the early seventeenth century.

It was a new paradigm of mathematics that Descartes successfully constructed by replacing the classical one of Euclid, Apollonius and Pappus. With him together with his comrade mathematicians like Fermat, a revolution certainly occurred in mathematics, and with Newton and Leibniz the revolution was raised to the level of Archimedean mathematics, the highest achievement of classical Greek mathematics and completed. Thus modern mathematics took on a theoretically mature algebraically analytical form. With the mathematicians of the seventeenth century, the age of victorious analysis had begun.<sup>27</sup>

Indeed, DESCARTES identified algebra with analysis, which he claimed to be the universal science of mathematics; a science that—he believed—had been known to the ancients, but somehow lost or forgotten. SASAKI, like other authors, argues that even ARISTOTLE himself had posited just such a universal mathematics—an allegation that had already been debunked by Charles Bonaventure CROWLEY.<sup>28</sup> However, instead of countering CROWLEY with solid philosophical arguments, SASAKI dismisses him with what amounts to a very common modern prejudice:

An essential problem in his insightful interpretation is that he read the texts of Aristotle within the framework of medieval scholastic Aristotelianism, of which a representative philosopher was Thomas Aquinas.<sup>29</sup>

### **Hypothesis**

We posit that the Aristotelian-Thomistic Teaching on Principles (henceforth, ATOP) is perfectly capable of:

1. Accounting for the first principles of ancient Greek mathematics.
2. Accounting for the first principles of modern so-called mathematics, including analysis and set theory, and for the transition from the ancient to the modern discipline.
3. Proposing better, truly scientific principles for mathematical logic and replacing those established in set theory.

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see Burt C. HOPKINS, *The Origin of the Logic of Symbolic Mathematics: Edmund Husserl and Jacob Klein* (Bloomington and Indianapolis: Indiana University Press, 2011).

<sup>27</sup> SASAKI, *Descartes's Mathematical Thought*, 279–280.

<sup>28</sup> Ibid., 295. See Charles Bonaventure CROWLEY, *Universal Mathematics in Aristotelian-Thomistic Philosophy: The Hermeneutics of Aristotelian Texts Relative to Universal Mathematics* (Washington, D.C.: University Press of America, 1980).

<sup>29</sup> SASAKI, *Descartes's Mathematical Thought*, 295.

## Methodology

We follow the method prescribed by St. Thomas himself. In any inquiry, as he explains, we ought to begin from some principle.<sup>30</sup> And if the principle is prior not only in cognition (*in cognitione*) but also in being (*in esse*), then the method (*processus*) must be synthetic (*compositivus*); for causes are simpler than their effects, and to proceed from cause to effect is to proceed synthetically. But if that which is prior in cognition is posterior in being, then the process must be analytic (*resolutorius*), for we judge about evident effects by resolving them into simple causes.

In our present endeavor, this translates into three stages:

1. Resorting as much as possible to primary sources, we analyze the author's writings to determine the asserted principles.

For example, since we intend to discover *the first principles of mathematics*, we must analyze the author's writings to determine what a *principle* is, what a *first principle* is, what *mathematics* is, and what *the first principles of mathematics* are. Ideally, each of these questions should be determined by some definition, which is composed from other terms. We, therefore, analyze each of the terms in the same way until we exhaust all of them.

2. Having established the principles, we determine how they are related to each other according to the order of being and according to the order of cognition.

For example, from the preceding step, we will have determined what a *principle* is. But we still need to determine what is the first instance of principle that we come to know, and how we come to know other principles from it. Moreover, the first principle that we come to know may not be the first principle in the order of being. Therefore, we must determine the order of principles from the simplest to the more composite.

3. Having determined the principles and their mutual relations in being and in knowing, we present them in the order of teaching.

As St. Thomas says, the order of teaching (*ordo doctrinae*) proceeds from the most common to the less common.<sup>31</sup> Any one thing that is found in many must be considered

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<sup>30</sup> *STh* I-II, q. 14 a. 5 co.: "in omni inquisitione oportet incipere ab aliquo principio. Quod quidem si, sicut est prius in cognitione, ita etiam sit prius in esse, non est processus resolutorius, sed magis compositivus, procedere enim a causis in effectus, est processus compositivus, nam causae sunt simpliciores effectibus. Si autem id quod est prius in cognitione, sit posterius in esse, est processus resolutorius, utpote cum de effectibus manifestis iudicamus, resolvendo in causas simplices." References to the works of St. Thomas follow the nomenclature established in the Primary Sources section of the Second Part.

<sup>31</sup> *In De anima* 2, c. 9, 60–94: "est autem ordo doctrine, ut a communibus ad minus communia procedatur, sicut ostendit Philosophus in principio Phisicorum." Cf. *In Physic.* 1, l. 12, n. 2: "Et rationem ordinis assignat, quia necesse est primo dicere communia, et postea speculari ea quae propria sunt circa

in common (*in communi*) before descending into its multiple species; otherwise, the same would have to be said multiple times, repeating it for each singular thing.<sup>32</sup> If, in some genus, something first is found that should be the cause of the others, both the genus and that which is first in that genus belongs to its consideration. Since that first is the cause of the whole genus, it is necessary for whomever considers some genus to consider the causes of the whole genus.

*Presentation conventions.* In translations quoted, we insert angled brackets <> to enclose words or phrases that are not present in the original work and are likely to mislead the unsuspecting reader. On the other hand, we add square brackets [] to reproduce technical terms in the original language and to explain or rephrase the reading. Whenever we omit part of the text, we insert ellipses in its place, enclosed in square brackets [...]. If the original text contains brackets, we call this out in a footnote. Cross-references have a ►.

### Structure and Plan

The division of the task at hand results naturally from what has been said. First, we must clarify what ancient Greeks themselves considered mathematics and its principles to be, and to dispel modern fictions: as ARISTOTLE says, “by a fiction I mean a forced statement made to suit a hypothesis.”<sup>33</sup> Thereafter, we intend to present St. Thomas’s teaching on principles. Finally, we will examine, under the light shed by his teachings of principles, a selection of milestone texts that reveal the progressive motion from ancient Greek to modern mathematics. (Every part of this work is preceded by its own source bibliography; secondary literature is listed at the end.) Thus,

1. Part I of this work is devoted primarily to presenting ancient Greek thought as reflected in the mathematics of EUCLID’s *Elements*.
2. Part II concentrates exclusively on the exposition of St. Thomas’s doctrine about principles (what we have named ATOP).

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unumquodque, sicut in principio libri dictum est.” ARISTOTLE, *Physica* A.7, 189b30–31: “ἔστι γὰρ κατὰ φύσιν τὰ κοινὰ πρῶτον εἰπόντας οὕτω τὰ περὶ ἕκαστον ἴδια θεωρεῖν.” *In Physic.* 3, l. 1, n. 4: “Et rationem ordinis assignat, quia necesse est primo dicere communia, et postea speculari ea quae propria sunt circa unumquodque, sicut in principio libri dictum est.” ARISTOTLE, *Physica* Γ.1, 200b24–25: “ὕστερα γὰρ ἡ περὶ τῶν ἰδίων θεωρία τῆς περὶ τῶν κοινῶν ἐστίν.” References to the works of ARISTOTLE follow conventions established in the Primary Sources section of the First Part.

<sup>32</sup> *In De gen.* 1, pr., n. 2: “Est autem considerandum quod de unoquoque quod in pluribus invenitur, prius est considerandum in communi, quam ad species descendere: alioquin oporteret idem dicere multoties, ita scilicet quod in singulis id quod est commune repeteretur, sicut probat Philosophus in I *de Partibus Animalium*. Et ideo prius oportuit [...] in communi determinare, quam ad partes eius descendere. Similiter etiam considerare oportet quod, si in aliquo genere aliquod primum invenitur quod sit causa aliorum, eiusdem considerationis est commune genus et id quod est primum in genere illo: quia illud primum est causa totius generis, oportet autem eum qui considerat genus aliquod, causas totius generis considerare.” Cf. *In De sensu* 1, pr., 23–37.

<sup>33</sup> ARISTOTLE, *Metaphysica* M.7, 1082b3–4: “λέγω δὲ πλασματώδες τὸ πρὸς ὑπόθεσιν βεβιασμένον.”

3. In Part III, the last part, we examine, in light of the first principles of mathematics already unearthed (i.e., from ATOP), some of the most important works that have given rise to modern mathematics; and we account for any differences or innovations.

### Part I Summary

The first two stages of our established methodology will hardly be necessary in this first part. Being a textbook, EUCLID's *Elements* is already organized according to the order of teaching using a synthetic process, since its principles are prior not only in cognition, but also in being. Starting with definitions, postulates, and common notions, he composes propositions in such a way that the posterior always depends on the prior and more known. Hence, our exposition, which is preceded by an introductory chapter, follows directly the synthetic method.

Whenever a clarification is needed, we give precedence to ancient Greek authors over modern interpreters. These ancient sources include, notably, *A Commentary on the First Book of Euclid's Elements*, written by the Neoplatonist PROCLUS Lycaeus, known as *Diadochus*, "the last systematic philosopher in the history of ancient Greece."<sup>34</sup> And since the *Elements* is primarily a geometry textbook, we supplement this with *Introduction to Arithmetic*, a celebrated work by the Neopythagorean NICOMACHUS of Gerasa. When appropriate, we draw from the works of IAMBlichus, THEON, DIOPHANTUS, PAPPUS, and BOETHIUS; and from other ancient authors represented in fragments preserved in later writings. Finally, whenever the need arises to shed light on ancient Greek mathematics based on metaphysics and logic, we follow ARISTOTLE, the first philosopher to write methodically about these disciplines. When relevant, we moreover resort to ancient Greek commentaries on ARISTOTLE's works, as found in *Commentaria in Aristotelem Graeca* (henceforth, CAG).<sup>35</sup>

Our frame of reference when exposing modern fictions is Sir Thomas Little HEATH (1861–1940). Our intention is not to demean one of the greatest historians of ancient Greek mathematics: as Ivor BULMER-THOMAS says, "Although Heath's work would need some revision if a new edition were brought out today, by and large it still remains the best history in any language."<sup>36</sup> All merits aside, HEATH's works make an excellent model of study when it comes to unearthing modern philosophical and historiographical prejudices

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<sup>34</sup> Laurence Jay ROSAN, *The Philosophy of Proclus*, 2nd ed. (Dilton Marsh: Prometheus Trust, 2009), preface to the 1949 edition.

<sup>35</sup> *Commentaria in Aristotelem Graeca, edita consilio et auctoritate academiae litterarum Regiae Borussicae*, 23 vols. (Berlin: Reimer, 1882–1909).

<sup>36</sup> In DAUBEN and SCRIBA (eds.), *Writing the History of Mathematics*, 442. Not only that, but HEATH published *Euclid in Greek* "in the vain hope that it might lead to a revival of the teaching of EUCLID in the schools" (ibid., 441). And his, too, is the most commonly used English translation of EUCLID's *Elements*.



that have been projected onto ancient Greek authors.<sup>37</sup> Our purpose, therefore, is only to contrast these misconceptions with what the ancient Greeks actually said.

In presenting ancient Greek mathematics to our modern audience, we will not hesitate to use algebraic notation if deemed convenient, notwithstanding the anachronism. As Benno ARTMANN says, “algebraic translation does make some of Euclid’s geometrical statements more transparent to the modern reader.”<sup>38</sup> However, we do call attention on the danger that algebraic notation poses; for it is incapable of fully capturing the intention of ancient Greek mathematicians, as should become apparent to the reader along the way.

In short, Part I can be considered a continuation of the present Introduction. The objective is more deeply to explore what it was exactly that the ancients Greeks understood mathematics and its principles to be.

## **Part II Summary**

In our second part, we intend to determine, according to St. Thomas AQUINAS: (a) what *principles* are; (b) what *first principles* are; (c) what *mathematics* is; and (d) what *the first principles of mathematics* are. Alas, unlike EUCLID’s *Elements*, there is no monographic work in St. Thomas that would make our task straightforward. Hence, following the stated methodology:

1. As a preparatory analytical stage, we glean the scattered elements of the sought teaching on principles from the multiple places where St. Thomas explains or applies it.

This stage requires a painstaking classification work. It is not, however, merely an analysis of language. We are not seeking the principles of St. Thomas’s language. Nor is it a historical analysis of an alleged heterogenous evolution of the doctrine of St. Thomas (which is presupposed even by some deservedly reputed Thomists in our days). We are not seeking stratigraphic sediments of distinct archaeological contexts.

Our analytical stage is limited by the nature of this work. We cannot claim to have obtained a thorough inventory of the relevant places in the *opera omnia* of St. Thomas (a task that would probably require a lifetime). We believe, however, that due diligence has been attained thanks to the research tools available nowadays: above all, the *Index Thomisticus* created by Roberto BUSA (1913–2011) and made available online by Prof. Enrique ALARCÓN and the Author; but also the other resources that ALARCÓN has added over the

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<sup>37</sup> As IVOR GRATTAN-GUINNESS says, “Historiographically speaking, his method was anachronistic, for he rewrote the mathematics of several figures in modern notation” (in *ibid.*, 172).

<sup>38</sup> Benno ARTMANN, “Euclid’s *Elements* and Its Prehistory,” in ΠΕΡΙ ΤΩΝ ΜΑΘΗΜΑΤΩΝ (*Peri Tōn Mathēmatōn*), ed. Ian MUELLER (Edmonton: Academic Printing & Publishing, 1991), 46.

years to his *Corpus Thomisticum*, such as the web edition of Ludwig SCHÜTZ's *Thomas-Lexikon*.<sup>39</sup>

2. In the second stage, we set in order all the elements of the doctrine found in the first stage. We determine how these elements depend on each other according to the order of cognition and of being.

3. Our intention in the third stage is to present a synthesis of the thought of St. Thomas that is both faithful and intelligible.

This poses significant challenges. On the one hand, not all of his works have been translated into English. Those that have been are not always faithful to the technical terminology. And very often, the version of one work is lexically inconsistent with that of another. On the other hand, to produce a synthesis, we must seamlessly piece together multiple texts that deal with diverse subjects, span across multiple decades, and transmit the varying terminology that St. Thomas draws from multiple authors (e.g., BOETHIUS talks about *magnitudo*, *proportio*, and *proportionalitas*; but Latin translations of ARISTOTLE or of AVICENNA may call them *mensura*, *ratio*, and *proportio*, respectively).

To overcome these challenges, we have given up the approach of quoting from existing translations, since it proved impossible to harmonize such texts. Instead, we deliver our own version created by assembling the relevant fragments into paraphrases that are as literal as possible without ceasing to be English prose. We insert in parentheses any phrases necessary to make the text more intelligible or to underscore the Latin expression used by St. Thomas at that point (and, when applicable, the underlying Greek or Arabic). References to his works are given in footnotes according to the conventions established at the beginning of this second part, followed by a literal quotation of the pertinent portion of the textual unit.

When St. Thomas gives multiple accounts of the same subject, we try to use as a basis the more thorough account and then merge in the others. Oftentimes, however, it was more reasonable to use the account that was closest to the source of the doctrine, such as the works of ARISTOTLE, BOETHIUS, AVICENNA, or AVERROES.

A synthetic presentation based on a prior analysis poses yet another problem. If we were thoroughly to take apart the textual units and then produce from them a new synthesis, the source would become unrecognizable to the reader. Therefore, we have sacrificed ultimate granularity for source traceability by introducing some unwanted repetition.

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<sup>39</sup> See <http://www.corpusthomisticum.org/>.

### **Part III Summary**

Unlike the preceding parts, in Part III we must follow a historical order. The method applied is purely analytical, since we must resolve diverse doctrines into their peculiar principles before we can compare them to the teachings of St. Thomas. For each work, we present the source and our commentary based on just that comparison.

In bringing to light the first principles of modern so-called mathematics, we adhere to St. Thomas, who says that the aim of studying philosophy is not to know what men have opined, but to discover the truth of things.<sup>40</sup> Thus, our work cannot end with an account of what thinkers have said: we must moreover show how their judgments are related to the reality of things. In other words, our intent is not merely to produce a history of ideas about the foundations of mathematics, but, as ARISTOTLE typically does, to identify everything that is found to be true in any position, and to expose those claims that turn out to be false—regardless of who holds them.

Our selection of topics is limited to: (1) the introduction of algebra in the West and its ultimate identification (in DESCARTES) with the *universal mathematics* that Renaissance authors had been seeking in ancient Greek texts; (2) the development of the modern definition of *number* until the outbreak of set theory in the time of DEDEKIND; and (3) basic modern set theory as is used today, together with some of its implications.

We, therefore, leave unexamined many other topics of interest, which would overflow the purpose of our work: for example, solutions to the foundational crisis proposed more recently, such as the structuralism of Stewart SHAPIRO; or the use of category theory as a foundational replacement of set theory. As much as we would have liked to address many more topics and sources, the nature of this work allows only for a small selection.

### ***Status Quaestionis***

Although St. Thomas has much to say about principles, Thomistic scholars, occupied with seemingly more important questions, have generally overlooked those of mathematics. Peter HOENEN was the first to call their attention in 1934. He noted that the epistemology of mathematics was “vigorously cultivated by various modern schools of philosophy but neglected almost entirely by the Scholastics (hardly faithful, in this regard, to Aristotle).”<sup>41</sup> Alas, it is not only the epistemology but the whole philosophy of mathematics that has been largely ignored. There are, nonetheless, a few authors that have broken ground.

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<sup>40</sup> *In De caelo* 1, l. 22, n. 8: “studium philosophiae non est ad hoc quod sciatur quid homines senserint, sed qualiter se habeat veritas rerum.”

<sup>41</sup> Peter HOENEN, “A Field of Research for Scholasticism,” *The Modern Schoolman* (1934), 15. Brackets in the original.

1. In 1941, John F. WHITTAKER published an article entitled “The Position of Mathematics in the Hierarchy of Speculative Science,” in which he points to the “belated recognition” by Thomists of the “legitimate progress of modern mathematics.”<sup>42</sup> According to him, a re-examination by Thomists of “the hitherto unchallenged foundations of classical mathematics” found that many of the “apparent conflicts between traditional and modern concepts” had been eliminated.

WHITTAKER not only acknowledges that “all the progress made within the field of pure mathematics is real progress,” but even claims that it is “consonant with the principles of St. Thomas.” He fails, however, to offer any evidence for the alleged Thomistic re-examination of the foundations; nor does he provide an account of how traditional and modern mathematics agree with “the principles of St. Thomas.” In fact, he even quotes Jacques MARITAIN asserting that “much more preliminary work is still necessary” in relation to the principles of mathematics “before Thomistic philosophy can propound a systematic interpretation in which all the critical problems offered by modern developments in the mathematical sciences find a solution.”<sup>43</sup>

Still, WHITTAKER believes he is contributing to MARITAIN’s program when he turns his attention to what he calls “the central issue”: determining the position of mathematics among the speculative sciences. In his opinion, the only significant problem would be that of recognizing metaphysics as “the supreme regulator of all science,” for “it is in the extension of mathematics to other fields that difficulties arise.” He therefore devotes most of his article to explaining the hierarchy of the speculative sciences by summarizing the fifth and sixth questions of St. Thomas’s commentary on BOETHIUS’s *De Trinitate*.

WHITTAKER concludes that speculative science is divided according to two criteria. Firstly, through *total abstraction*, intelligible being (*esse intelligibile*) is divided into being (*ens*), quantitative being (*ens quantum*), and qualitative being (as he translates *ens mobile*).

Secondly, through *formal abstraction*, knowable being (*esse scibile*) is divided into three formalities: as immutable (*ut immutabile*), as mutable (*ut mutabile*), and as changing (*ut mobile*).

Since there are only six valid combinations of these two criteria, he divides speculative science into: (1) *metaphysics*, which would treat of being as immutable; (2) *philosophy of mathematics*, which would treat of quantitative being as immutable; (3) *philosophy of*

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<sup>42</sup> John F. WHITTAKER, “The Position of Mathematics in the Hierarchy of Speculative Science,” *The Thomist* 3, no. 3 (1941).

<sup>43</sup> WHITTAKER quotes Jacques MARITAIN, *The Degrees of Knowledge* (New York: 1938), xiii.

*nature*, which would treat of qualitative being as immutable; (4) *mathematics*, which would treat of quantitative being as mutable; (5) *physico-mathematical science*, which would treat of qualitative being as mutable; and (6) *natural science*, which would treat of qualitative being as changing.

WHITTAKER assigns to mathematics the role of “interpreting the data of physical science.” Based on the above division, he concludes that metaphysics would not directly regulate mathematics. Metaphysics would instead serve merely to limit the proper sphere of mathematics: that of quantitative being as quantified. On the other hand, mathematics would regulate philosophy of mathematics, which he calls “the intermediary science (*scientia media*) between mathematics and metaphysics.”

2. In 1952, José ÁLVAREZ LASO published his *Filosofía de las Matemáticas en Santo Tomás*, which is built around AQUINAS’s commentary on ARISTOTLE’s *Posterior Analytics* A.1, 71a11–16.<sup>44</sup> He concludes therein that there are three stages in mathematics:

The *first stage*, according to ÁLVAREZ LASO, deals with *first notions*. Although the mathematical “field of experimentation” is the imagination, “mathematical ideas,” like all ideas, have their ultimate foundation in the external senses, for unit and number, and extension and figure, are among the common sensible objects. Unit and number can be considered the first “arithmetical ideas,” while the continuum is the first “idea of geometry.”

The *second stage* is characteristic of mathematics. In it, the first notions are presupposed, while new ones are sought through demonstration. This demonstration is of the constructive kind found in the first theorem in EUCLID’s *Elements*: “on a given straight line to construct an equilateral triangle.” Mathematical existence is reduced to an “intuited, abstracted, or demonstrated possibility.” But beyond the “ideal existence” of mathematics, there is another, “vital” existence in the sensitive world, which is known through “applied mathematics,” which ÁLVAREZ LASO equates to the “middle sciences” of antiquity (e.g., harmonics and optics).

The *third stage*, that of deductive theorems, is common to all sciences. But mathematics, according to ÁLVAREZ LASO, is distinguished from the other sciences because of the “rigor” of its demonstrations. This rigor, he claims, is why St. Thomas says that mathematics is the most certain of the sciences with respect to us.

ÁLVAREZ LASO does not contrast his findings with modern mathematics, nor does he address any other principles.

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<sup>44</sup> José ÁLVAREZ LASO, *Filosofía de las Matemáticas en Santo Tomás* (Mexico: Jus, 1952).

3. In 1953, Vincent Edward SMITH delivered an Aquinas Lecture at Marquette University entitled *St. Thomas on the Object of Geometry*, which was published the following year.<sup>45</sup> Therein he confronts one question: “What does the mind envision as the speculable reality which specifies the habit of geometry?” His quest for an answer is divided into “three stages: the nature of mathematical abstraction; an analysis of quantified being first in terms of being and then in terms of quantity; and finally, the problem of the continuum.”

In his *first stage*, SMITH observes that there are two extreme views about the nature of geometry in contemporary philosophy. One, encouraged by Albert EINSTEIN, is “over-empirical.” It assumes that geometry “descends into a branch of physics and submits to experimental test.” The other is “the over-formal view of Hilbert, Russell, and the logical empiricists, where mathematics is raised into a kind of logic.” SMITH goes on to show how there is a third, overlooked position originating in PYTHAGORAS and PLATO, corrected by ARISTOTLE, and continued, clarified, and completed by St. Thomas: the theory of formal abstraction, which he summarizes.

SMITH goes on to analyze, in his *second stage*, the order in which material substance receives its accidents: first, quantity; then, sensible quality through the medium of quantity; and finally, the actions and passions of motion. This order founds the formal abstraction used in mathematics; for, based on it, the first accident to inhere substance—i.e., quantity—can be considered without any subsequent accidents. Thus, “The accidental form of quantity is where the geometer stops in his abstraction after peeling away the sense qualities of the mobile world, and as terminating the sensible matter, it has a right to be called a form and even a mathematical quality.”

In his analysis of quantified being “in terms of being,” SMITH concludes that the form considered by geometry is *sui generis*: it is neither substantial nor accidental, for the geometer does not abstract from intelligible matter, which is substance. Hence, quantity is not simple: it is a “composite form,” that is, a quantified substance. To make quantified substance the object of mathematical science is “to consider an accident defined in the concrete and therefore requiring substance as the genus and not the specifying difference in the definition.” Consequently, substance is necessary in mathematics: “Because of the progressive disregard for substance, post-Cartesian mathematics has descended into a study of predicates and tended to become logic alone.”

SMITH ends his *second stage* by highlighting the central role of imagination in mathematics.

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<sup>45</sup> Vincent E. SMITH, *St. Thomas on the Object of Geometry* (Milwaukee: Marquette University, 1954).

Finally, in his *third stage*, SMITH discusses the divisibility and measurability of the continuum. He concludes that “the geometer studies a matter-form composite, an essence or species.” This matter is the same as the intelligible matter that St. Thomas identifies with the continuum. Therefore, the object of geometry would be “continuous, quantified substance.”

4. In 1954, HOENEN (who was ÁLVAREZ LASO’s dissertation advisor) published his *De noetica geometriae*.<sup>46</sup> The first four chapters are reeditions of articles published in the *Gregorianum* journal from 1939 through 1943. They deal with the problems of the origin of geometric cognition, of necessity, and of exactness as it relates to the existence of indivisibles. To these, he adds four new chapters on axiomatic, in which he treats of the problem of exactness as it relates to figures and relations, of the modern axiomatic program, of the fundamental subject of geometry, and of extension as intelligible matter.

HOENEN is concerned primarily with cognition as it relates to geometry. He is convinced that in ARISTOTLE, especially in his *Posterior Analytics*, is to be found the light needed to solve the problems of the moderns—and vice-versa, that the problems of the moderns are a means to interpreting ARISTOTLE.<sup>47</sup>

5. In 1966, Thomas C. ANDERSON submitted to Marquette University his dissertation *The Object and Nature of Mathematical Science in Aristotle and St. Thomas Aquinas: A Comparison*.<sup>48</sup>

Briefly to summarize it, ANDERSON concludes that both ARISTOTLE and St. Thomas agree in that “the general object of mathematics is quantity which is an accident.”<sup>49</sup> And “it is a science in the highest sense since it uses definitions as its middle terms.”

As to the differences, “rather than disagreement,” between ARISTOTLE and St. Thomas, ANDERSON points to the distinction, “which is present in Aristotle,” but which St. Thomas gives in greater detail, “between virtual and categorical quantity. He explicitly states that the Stagirite implies, that pure mathematics deals only with categorical quantity.” Besides, “Aquinas has more of a development of the notion of mathematics as in a way *entia rationis*. He stresses that their proximate foundation is in the intellect itself. St Thomas explicitly states that the demonstration of the existence of mathematical objects takes

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<sup>46</sup> Peter HOENEN, *De noetica geometriae: Origine theoriae cognitionis* (Rome: Gregorian University, 1954).

<sup>47</sup> *Ibid.*, 9.

<sup>48</sup> Thomas Charles ANDERSON, “The object and nature of mathematical science in Aristotle and St. Thomas Aquinas: a comparison” (Milwaukee: Doctor of Philosophy, 1966).

<sup>49</sup> This and the immediately ensuing quotes are taken from *ibid.*, 311–319.

place by constructing them.” However, “St. Thomas does not agree with Aristotle that the sciences which apply mathematics to physical phenomena are simply mathematical sciences. Rather he refers to them as sciences which are neither just mathematical, nor just physical, but intermediate, between the two, sharing in both.”

ANDERSON gives great importance to a question that is not “explicitly stated” by St Thomas or ARISTOTLE: “the freedom of the mathematician.” As he puts it, “There is no intrinsic reason in Aquinas’s doctrine why the mathematician must restrict himself to mathematical objects which resemble physical quantities.” He does not go into great detail here, but in 1977 he published in *The Thomist* an article entitled *Aristotle and Aquinas on the Freedom of the Mathematician*, where he argues that ARISTOTLE and St. Thomas “considered mathematics to be a science of quantity [...], a quantity not found as such in real things but abstracted from such things.”<sup>50</sup> He concludes that “the mathematician is radically free in his choice of objects, and more specifically he need not consider himself limited to dealing with mathematical quantities which closely correspond to and/or resemble physical quantities.” He implies that St. Thomas would have accepted negatives and zero to be numbers. Indeed, he seems keen “to liberate mathematics from any requirement of dealing with quantities which match real quantities.”

6. In 1990, Jean W. RIOUX submitted to the Center of Thomistic Studies his dissertation *Aristotle, Aquinas, and the Foundations of Arithmetic*.<sup>51</sup> Therein, he offers a new approach to resolving the foundational crisis of mathematics (at least insofar as it affects arithmetic): that of ARISTOTLE and St. Thomas.

In Chapter One, RIOUX describes the positions of each of the three *schools* (formalism, logicism and intuitionism), calling attention to their weaknesses. He then presents the position of ARISTOTLE and St. Thomas, starting with the notions of truth, science, and arithmetic, defending the status of arithmetic as a science. Comparing the proposed approach to each of the three modern schools, he argues for the superiority of the Aristotelian position.

In Chapter Two, which is further divided into sections I–V, RIOUX determines in greater detail what it is that ARISTOTLE and St. Thomas have to say concerning the same questions. In section III(a), he turns to “a reconsideration of the subject of mathematics in general.” However, he observes that, according to St. Thomas, “there is no general

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<sup>50</sup> Thomas C. ANDERSON, “Aristotle and Aquinas on the Freedom of the Mathematician,” *The Thomist* 36 (1972), 231–255.

<sup>51</sup> Jean W. RIOUX, *Aristotle, Aquinas, and the Foundations of Arithmetic* (Houston: The Center for Thomistic Studies, 1990).



mathematical science apart from the sciences of arithmetic and geometry (which have their own distinct subjects), no universal mathematics which studies quantity considered in itself.” In view of what these philosophers say, he arrives at “a general notion of what the objects of the mathematical sciences are”:

[T]hey are ultimately in sensible matter, they are not of a single subject-genus (that is, the subject of mathematics is not quantity as such, but one science studies one species of quantity, another another,) and lastly, these objects are considered apart from those things in which they are found. This last attribute is usually expressed in saying that the objects are abstract.<sup>52</sup>

RIoux determines that “numbers might be regarded in a two-fold manner: as physical, and as abstract, in the latter of which they are something which is considered in the science of arithmetic.” However, he does not provide here a definition of the *number* that is the subject of arithmetic.

In section III(b), RIoux considers the distinction of the sciences in respect of the method. He concludes:

In summary, the mathematical sciences demonstrate *propter quid*, and prove by means of the formal cause all that they actually do prove. Further, in addition to their distinction from the other sciences in terms of subject-matter, (which we have discussed and will discuss further,) the truth of mathematical judgments is based either upon first principles or upon the evidence given by the imagination (as opposed to the senses or intellect.)<sup>53</sup>

After examining abstraction in section IV, RIoux turns his attention in section V to the problems that confront the Aristotelian approach itself. Where do physical numbers exist? Thus, he considers the question of the frame of reference when determining the number of “cows in a field.” And following some difficulties raised by FREGE, he asks, “Why should we call the unit a property of a thing when it appears to be interchangeable with being?”

Frege’s difficulty serves to emphasize our own: for if the numerical unit is not a property of existing things (as he finally concludes,) how could the numbers be based in reality? And, as we have attempted to show in our example of the cows in the field, if numbers are not based in reality, what sense does it make to speak of a science of numbers?<sup>54</sup>

Finally, among the “principal difficulties which beset the Aristotelian and Thomistic account of the science of arithmetic,” RIoux counts the fact that “the only numbers which would be admitted by Aristotle and Aquinas would be the whole numbers beginning with one.” Fractional, irrational, infinite, and transfinite “numbers” are “prohibited.”

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<sup>52</sup> Ibid., 60.

<sup>53</sup> Ibid., 81.

<sup>54</sup> Ibid., 100.

In the remaining chapters, RIOUX delves deeper into these questions: above all, whether numbers exist; for they seem to be the subject of arithmetic. Indeed, St. Thomas says that quantity exists as an accident in material substance. Hence, numbers must exist for arithmetic to be considered the science of number. However, there seems to be a problem, for how can number—an accident—be common to many individual substances?

After a lengthy discussion, RIOUX concludes that the subject of arithmetic is not *number*; for it can neither exist in a single substance, nor can it be common to multiple substances. The subject of arithmetic, according to him, is the unit. Numbers would be mere attributes that can be “constructed” from the unit. Such constructions belong to the “art of arithmetic,” as opposed to the science of the unit. This is not the only problem of the Aristotelian approach that RIOUX resolves by resorting to the distinction between science and art in mathematics: *zero*, *negative*, and *irrational numbers* are merely the subject of logical propositions with no more entity than that of Cyclops.

7. In 1993, Armand A. MAURER published an article entitled “Thomists and Thomas Aquinas on the Foundation of Mathematics,” where he scolds “some modern Thomists,” including Joseph GRETT, MARITAIN, Edward MAZIARZ, Thomas ANDERSON, and SMITH, for saying that “the objects of mathematics are real entities.”<sup>55</sup> Much like RIOUX, MAURER believes that “Numbers themselves originate through an act of our mind.” But unlike RIOUX, who reached a similar conclusion while seeking the subject in which number would have to exist in order to be an accident, MAURER believes to have found textual evidence in St. Thomas.

MAURER bases his claim on a *quaestio disputata* that he had already brought to the fore in an article, originally published in 1959, entitled “A Neglected Thomistic Text on the Foundation of Mathematics.”<sup>56</sup> The text of the *quaestio disputata*, MAURER argues, was so important to St. Thomas, that at some point between 1265 and 1267 he retroactively incorporated it to his commentary on Peter LOMBARD’s *Sentences* (*In Sent.* 1, d. 2 q. 1 a. 3 co.), written a decade earlier (1252–1256).

According to MAURER’s reading of this text, numbers are “concepts” that have their “proximate foundation” in “a constructive act of the mind.” Contrary to what St. Thomas

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<sup>55</sup> Armand MAURER, “Thomists and Thomas Aquinas on the Foundation of Mathematics,” *Review of Metaphysics* 47 (1993).

<sup>56</sup> Armand MAURER, “A Neglected Thomistic Text on the Foundation of Mathematics,” *Mediaeval Studies* 21 (1959). Reprinted in Armand MAURER, *Being and Knowing: Studies in Thomas Aquinas and Later Medieval Philosophers* (Toronto: Pontifical Institute of Mediaeval Studies, 1990).

says in other places, “real substance does not play an intrinsic role as the intelligible matter of quantity.” Thus, while RIOUX defends arithmetic as a science, MAURER claims that St. Thomas “placed logic and mathematics in the same order in relation to the real world.” He even makes of St. Thomas a precursor of modern mathematics: “Had he known modern types of mathematics, he would have seen the almost unlimited range of the mind’s mathematical inventiveness.”

8. In 2009, Alberto STRUMIA published *Il problema dei fondamenti: Un’avventurosa navigazione dagli insiemi agli enti passando per Gödel e Tommaso d’Aquino*, where he proposes a return to realism in mathematics: not, however, to the univocal Platonist realism of GÖDEL, but to a realism that is “informed by the Thomistic theory of analogy.”<sup>57</sup>

Based on formal ontology (FO) and inspired by Aristotelian-Thomistic (AT) metaphysics and epistemology, STRUMIA creates an original, analogical interpretation of the “abstract” axiomatic set theory of János (John) Lajos VON NEUMANN (1903–1957), Paul Isaac BERNAYS (1888–1977), and GÖDEL, better known as NBG, a conservative extension of ZFC (i.e., ZF plus the *axiom of choice*) capable of making statements about classes.

Thus, for example, the  $\in$  symbol, which in set-theoretical interpretations of NBG is taken to mean “belongs-to” (indicating that an object is an element or member of a set), receives from STRUMIA the AT-FO interpretation of “is *in act* in,” and is formalized following the eight ways in which “to be in” is said according to ARISTOTLE and St. Thomas.<sup>58</sup> Likewise, *Class* is interpreted as equivalent to the Latin *ens* (being), while the *axiom of replacement* is used to formalize “something more similar to the notion of ‘genus’ (AT).”<sup>59</sup>

STRUMIA also interprets the universal ( $\forall$ ) and existential ( $\exists$ ) quantifiers, giving them an analogical formalization that includes the distinction between logical and real existence, as well as participation.<sup>60</sup>

Overcoming the extensionist flaws of set theory, which treats universals (such as genera and species) as sets of individuals, he moreover formalizes the notions of *form* and *matter*.<sup>61</sup> To this, he adds a formalization of efficient and final causality, as well as of the causal order according to priority.

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<sup>57</sup> Alberto STRUMIA, *Il problema dei fondamenti: Un’avventurosa navigazione dagli insiemi agli enti passando per Gödel e Tommaso d’Aquino* (Siena: Cantagalli, 2009). We quote from the English translation, *The Problem of Foundations: An Adventurous Navigation from Sets to Entities from Gödel to Thomas Aquinas* (Charleston: Createspace, 2012), 6.

<sup>58</sup> *Ibid.*, 87–99.

<sup>59</sup> *Ibid.*, 39–42, 88, 158.

<sup>60</sup> *Ibid.*, 101–116.

<sup>61</sup> *Ibid.*, 117–125; 127–151.

9. Outside of Thomism, there are some authors who have professedly embraced Aristotelian foundations. Among them is Hippocrates George APOSTLE, who claims that quantity is the unifying subject of mathematics and estimates that “more than ninety percent of modern research in mathematics comes under Aristotle’s definition of mathematics.”<sup>62</sup>

10. Also within the Aristotelian tradition, of the greatest importance is the Sydney School in the Philosophy of Mathematics, whose members aspire to “create a complete philosophy of mathematics based directly on applied mathematics, taking the view that mathematics is not about other-worldly entities like numbers or sets, nor a mere language of science, but a direct science of structural features of the real world like symmetry, continuity and ratios.”<sup>63</sup>

Prominent among its members is James FRANKLIN, who published in 2014 a book entitled *An Aristotelian Realist Philosophy of Mathematics*.<sup>64</sup> He observes that quantity is one of ARISTOTLE’S basic categories, which the Stagirite divides into *discrete*, studied by arithmetic, and *continuous*, studied by geometry. Thus, the study of quantity originates in antiquity. But the study of structure, according to FRANKLIN, would be a completely new subject matter discovered in the eighteenth century and exemplified by Leonhard EULER’S pioneering solution to the problem of the seven bridges of Königsberg. Thus, according to FRANKLIN, mathematics studies the quantitative and structural aspects of things, and roughly speaking, the study of quantity would correspond to elementary mathematics, while that of structure, to higher mathematics.

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<sup>62</sup> Hippocrates George APOSTLE, *Mathematics as a Science of Quantities* (Grinnell, Iowa: The Peripatetic Press, 1991), 79–80.

<sup>63</sup> “Manifesto” signed in 2005 by James FRANKLIN, Adrian HEATHCOTE, and Anne NEWSTEAD, available at the website of the Sydney School, <http://web.maths.unsw.edu.au/~jim/manifesto.html>

<sup>64</sup> James FRANKLIN, *An Aristotelian Realist Philosophy of Mathematics* (London and New York: Palgrave Macmillan, 2014).

**PART I:  
ANCIENT GREEK  
MATHEMATICS  
REVISITED**



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# 1. The Mathematical Sciences

Unlike their Babylonian and Egyptian predecessors, ancient Greek arithmetic (ἀριθμητική) and geometry (γεωμετρία) are not computational arts, but demonstrative sciences.<sup>1</sup> As HEATH observes, “[the] distinction between ἀριθμητική (the theory of numbers) and λογιστική (the art of [numeric] calculation) was a fundamental one in Greek mathematics.”<sup>2</sup> Similarly, geometry, the theoretical demonstrative science of magnitude, was set apart and opposed to geodesy (γεωδαισία), the art of land-dividing or mensuration (i.e., not the branch of applied mathematics that deals with the determination of the size and the shape of the earth, which is what is commonly understood today by the same name).<sup>3</sup>

By way of comparison, the famous Plimpton 322 Babylonian tablet contains, according to a recent article, “15 rows of arithmetically complicated Pythagorean triples,” i.e., a list of calculated quantities (including some errors!), hailed as “one of the most sophisticated scientific artifacts of the ancient world” that “brings the founding assumptions of our own mathematical culture into perspective.”<sup>4</sup> So much so, that “The discovery of trigonometry is attributed to the ancient Greeks, but this needs to be reconsidered.” Alas, since it does not demonstrate a single property of triangles (let alone the Pythagorean theorem!), ancient Greeks would consider it a mere product of geodesy rather than geometry.

In contrast, EUCLID’s *Elements* does not consist in a list of concrete, calculated quantities, but in universal **propositions** (προτάσεις) that the student must demonstrate. And every single demonstration allows for nothing less than absolute rational certainty.

## 1.1. Principles of Demonstration

The name *proposition* refers specifically to the enunciation of the conclusion that must be reached.<sup>5</sup> The proof follows necessarily from principles. Hence, principles upon which the first propositions depend, such as definitions and common notions, are placed first; and propositions upon whose proof depend other propositions, are placed before the latter. PROCLUS explains this order in his *Commentary on the First Book of Euclid’s Elements*:

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<sup>1</sup> For an account of Babylonian mathematics see, e.g., JENS HØYRUP, “Babylonian Mathematics,” in *Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences*, ed. IVOR GRATTAN-GUINNESS (New York: Routledge, 1994), 23.

<sup>2</sup> THOMAS LITTLE HEATH, *A History of Greek Mathematics* (Oxford: Clarendon Press, 1921), v. 1, 13–16. However, at first λογιστική may have been a theory of ratios (see FOWLER, *The Mathematics of Plato’s Academy*, 105–13).

<sup>3</sup> ARISTOTLE, *Metaphysica* B.2, 997b26–34. Cf. KLEIN, *Greek Mathematical Thought and the Origin of Algebra*, chapters 2–3, where he provides his phenomenological, more thorough and up-to-date account.

<sup>4</sup> All quotes here are from DANIEL F. MANSFELD and N. J. WILDBERGER, “Plimpton 322 Is Babylonian Exact Sexagesimal Trigonometry,” *Historia Mathematica* (2017), <https://doi.org/10.1016/j.hm.2017.08.001>

<sup>5</sup> For a modern account of the structure of the *Elements*, see IAN MUELLER, *Philosophy of Mathematics and the Deductive Structure of Euclid’s Elements* (Mineola, New York: Dover Publications, 1981).

The general arrangement of its propositions we should explain somewhat, as follows. Since this science of geometry is based, we say, on hypothesis and proves its later propositions from determinate <first> principles—for there is only one unhypothetical [ἀνυπόθετος] science, the other sciences receiving their <first> principles from it—he who prepares an introduction to geometry should present separately the principles of the science and the conclusions that follow from the principles but only for the theorems that are derived from them. For no science demonstrates its own <first> principles or presents a reason [λόγον] for them; rather each holds them as self-<evident>, that is, as more evident than their consequences. The <science> knows them through themselves, and the later <propositions> through them.<sup>6</sup>

Ultimately, all demonstrations depend on first principles. Hence, almost every book in the *Elements* opens with **definitions** (ὅροι). In the first book, these are followed by **postulates** (αἰτήματα) and **common notions** (κοινὰ ἔννοιαι). PROCLUS explains these as well, but his terminology, influenced by ARISTOTLE, differs slightly from that of EUCLID:<sup>7</sup>

First of all then, to repeat what I said, it was incumbent on him [i.e., on EUCLID] to set apart the principles from their consequences; and this is just what Euclid does in practically every book, besides setting forth at the outset of his whole treatise the common <principles> of the science. Next he divides them into hypotheses [ὑπόθεσεις; cf. ὅροι, *definitions* in EUCLID], postulates [αἰτήματα, as in EUCLID], and axioms [ἀξιώματα = κοινὰ ἔννοιαι, *common notions* in EUCLID], for these are all different from each other. Axiom, postulate, and hypothesis are not the same thing, as the inspired Aristotle somewhere says [i.e., in *Posterior Analytics* A.10, 76a31–77a4].<sup>8</sup>

## 1.2. Axioms or Common Notions

What EUCLID calls *common notions*, PROCLUS calls **axioms** (ἀξιώματα). In fact, ARISTOTLE himself often refers to them as **the commons** (τὰ κοινὰ) and explains that they are called *axioms* by mathematicians.<sup>9</sup> He also says that theorizing about axioms belongs neither to geometry nor to arithmetic but metaphysics (which PROCLUS calls *the unhypothetical science*):

We must state whether it belongs to one or to different sciences to inquire into <the truths> which are in mathematics called axioms, and into substance. Evidently, the inquiry into these also belongs to one science, and that the science of the philosopher; for these <truths> hold good for everything that is, and not for some special genus apart from others. And all <men> use them, because they are <true> of being *qua* being and each genus <has> being. But <men> use them just so far as to satisfy their purposes; that is, as far as the genus to which their demonstrations

<sup>6</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 75.6–19.

<sup>7</sup> As KNORR observes, the literature on the Euclidean and Aristotelian divisions of first principles is rather large. For some of the major works, see Wilbur Richard KNORR, “On the Early History of Axiomatics: The Interaction of Mathematics and Philosophy in Greek Antiquity,” in *Classics in the History of Greek Mathematics*, 107 n. 55.

<sup>8</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 75.27–76.8.

<sup>9</sup> See, for example, *Analytica Posteriora* A.10, 76a38; *Metaphysica* K.4, 1061b18.

refer extends. Therefore since these truths clearly hold good for all things *qua* being (for this is what is common [τὸ κοινόν] to them), to him who studies being *qua* being belongs the inquiry [ἡ θεωρία] into these as well. And for this reason no one who is conducting a special [κατὰ μέρος] inquiry tries to say anything about their truth or falsity, neither the geometer nor the arithmetician.<sup>10</sup>

Thus, since axioms do not particularly belong to any genus, ARISTOTLE holds that they are common (to diverse genera) according to **proportion** (κατ' ἀναλογίαν): that is, according to **analogy**. Hence, common principles are applied to each genus particularly, and not in their full commonality:

Of the <basic truths> used in the demonstrative sciences some are peculiar [ἴδια] to each science, and some are common [κοινά], but common <only in the sense of> analogous [κατ' ἀναλογίαν], being of use only in so far as they fall within the genus <constituting the province> of the science <in question> [ἐν τῷ ὑπὸ τὴν ἐπιστήμην γένει].

Peculiar <truths are>, e.g., the definitions of line and straight [γραμμὴν εἶναι τοιαυδί, καὶ τὸ εὐθύ];<sup>11</sup> common <truths are> such as “take equals from equals and equals remain.” Only so much of these <common truths> is required as falls within the genus in question: for <a truth of> this <kind> will have the same force even if not used generally [κατὰ πάντων] but applied <by the geometer> only to magnitudes, or by the arithmetician only to numbers.<sup>12</sup>

The example provided here by ARISTOTLE is contained in the *Elements* as its third common notion: “If equals be subtracted from equals, the remainders are equal.”<sup>13</sup> PROCLUS, again following ARISTOTLE, explains that such axioms (whose study belongs to metaphysics) are accepted by the student because they are evident, and points to EUCLID’s first common notion as an example:

When a proposition that is to be accepted into the rank [τάξιν, *order*] of <first> principles is something both known to the learner and credible in itself, such <a proposition> is an axiom: for example, that things equal to the same thing are equal to each other.<sup>14</sup>

### 1.3. Definitions and Hypotheses

PROCLUS seems to call *hypotheses* what EUCLID calls *definitions*. About the same thing, there can be a definition, a hypothesis, or both. But since hypotheses and definitions are opposites, as PROCLUS undoubtedly knows, his usage requires further explanation. As per ARISTOTLE, a **hypothesis** (ὑπόθεσις = Lat. *suppositio*) is a **thesis** (θέσις = Lat. *positio*)

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<sup>10</sup> ARISTOTLE, *Metaphysica* Γ.3, 1005a19–31.

<sup>11</sup> ARISTOTLE is not saying that the definition of the line or of the straight is an axiom, but that the affirmation of there being such a thing as a line or a straight (line) is an axiom (i.e., to the geometrician, a hypothesis).

<sup>12</sup> ARISTOTLE, *Analytica Posteriora* A.10, 76a37–b2.

<sup>13</sup> EUCLID, *Opera Omnia*, vol. 1, 2.4–5.

<sup>14</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 76.9–12. Cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a16–17.

that posits either *that* something is, or *that* it is not.<sup>15</sup> A **definition** (ὀρισμός), on the other hand, is a thesis that posits *what* something is;<sup>16</sup> hence, it posits neither *that* something is, nor *that* it is not. For example, the arithmetician posits that the unit (μονάς, the monad) is “the quantitatively indivisible” (τὸ ἀδιαίρετον κατὰ τὸ ποσόν), but this is not a hypothesis: for “*what* a unit is” (τί ἐστὶ μονάς) and “*that* the unit is” (τὸ εἶναι μονάδα) are not the same.<sup>17</sup>

ARISTOTLE explains that definitions and hypotheses are kinds of preexistent knowledge, and that both are necessary in the mathematical sciences.<sup>18</sup> Thus, “as regards ‘unit’ <we have to make> the double <assumption of> the meaning of the word [τί σημαίεν, “*what* it signifies,” i.e., its definition] and the existence of the thing [ὅτι ἔστιν, “*that* it is,” i.e., its hypothesis].”<sup>19</sup>

EUCLID’s definitions only tell us *what* a thing is. For example, “a point is that which has no part,” and “a line is breadthless length.”<sup>20</sup> *That* a point is, or *that* a line is, are *hypotheses*—not indeed in the modern sense of a “working hypothesis,” but in the sense used by PLATO and ARISTOTLE: namely, “an assumption not calling for proof within the sphere of the special science in which it functions.”<sup>21</sup>

When PROCLUS calls such definitions *hypotheses*, he means (in keeping with ARISTOTLE) that the things defined by EUCLID are moreover posited *to be*, and thus received by the student without proof:

When the student does not have a self-evident notion of the assertion proposed but nevertheless posits it and thus concedes the <point> [τῷ λαμβάνοντι] to his teacher, such an assertion is a hypothesis [i.e., relatively to the student, according to ARISTOTLE].<sup>22</sup> That a circle is [τὸ εἶναι τὸν κύκλον] a figure of such-and-such a sort we do not know by a common <notion> [κατὰ κοινήν] in advance of being taught, but upon hearing it we accept it without a demonstration.<sup>23</sup>

EUCLID himself calls some definitions ὑποκείμενα, “those supposed” or “those taken as hypotheses,” when he says, immediately after stating them, “With these hypotheses [τούτων ὑποκειμένων], it is proved that...”<sup>24</sup>

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<sup>15</sup> ARISTOTLE, *Analytica Posteriora* A.2, 72a18–21.

<sup>16</sup> Ibid., B.10, 93b29. See Marguerite DESLAURIERS, *Aristotle on Definition*, Philosophia Antiqua (Leiden; Boston: Brill, 2007), 25 and passim.

<sup>17</sup> ARISTOTLE, *Analytica Posteriora* A.2, 72a21–24.

<sup>18</sup> Ibid., A.1, 71a1–26.

<sup>19</sup> Ibid., 71a15–16.

<sup>20</sup> EUCLID, *Opera Omnia*, vol. 1, 2.1–2.

<sup>21</sup> ROSS, *The Works of Aristotle*, v. 1, 72a21, n. 2.

<sup>22</sup> ARISTOTLE, *Analytica Posteriora* A.10, 76b30–34.

<sup>23</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 76.12–17.

<sup>24</sup> EUCLID, *Opera Omnia*, vol. 3, 2.9 (Book x, definitions 1–2; 3). See Henry George LIDDELL and Robert SCOTT, *A Greek-English Lexicon* (Oxford: Clarendon Press, 1996), entry for ὑπόκειμαι.

#### 1.4. Postulates

Based again on ARISTOTLE,<sup>25</sup> PROCLUS explains EUCLID's **postulates** (αἰτήματα) thus:

Whenever, on the other hand, the statement is unknown and nevertheless is taken as true without the student conceding it, then, he [i.e., ARISTOTLE] says, we call it a postulate: for example, that all right angles are equal. This characteristic of postulates is evident by the strenuous efforts that have been made to establish one of them, as though nobody could concede it without more ado.<sup>26</sup>

PROCLUS is undoubtedly referring here to EUCLID's notorious fifth postulate, whose obviation centuries later gave rise to so-called non-Euclidian geometries: namely, "That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than the two right angles."<sup>27</sup> PROCLUS himself believes that this is a theorem looking for a proof, rather than a first principle.<sup>28</sup> But EUCLID's other postulates are not quite as contentious. They merely state that a straight line can be drawn from any point to any point; that a finite straight line can be produced (ἐκβαλεῖν) continuously in a straight line; that a circle can be described with any center and interval (διάστημα); and, as PROCLUS points out in this passage, that all right angles are equal to one another.<sup>29</sup>

#### 1.5. Types and Parts of Propositions

PROCLUS divides propositions into two kinds: **problems** and **theorems** (EUCLID himself does not mention—let alone give an account of—this distinction):<sup>30</sup>

[T]he propositions that follow from the <first> principles he divides into problems [προβλήματα] and theorems [θεωρήματα], <the former including> the construction of figures, the division <of them> into sections, subtractions from and additions to them, and in general the characters [παθήματα, *affections*] that result from such <procedures, and the latter concerned with> demonstrating inherent properties [συμβεβηκότα, *accidents*] belonging to each <figure>. Just as the productive sciences have some theory in them, so the theoretical ones take on problems in a way analogous [ἀνάλογον] to production.<sup>31</sup>

Turning to the structure of propositions, PROCLUS provides an analysis of their parts: **enunciation** (πρότασις), **exposition** (ἐκθεσις), **specification** (διορισμός), **construction**

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<sup>25</sup> See ARISTOTLE, *Analytica Posteriora* A.10, 76b27–30.

<sup>26</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 76.17–23.

<sup>27</sup> EUCLID, *Opera Omnia*, vol. 1, 8.15–19. See discussion in HEATH, *The Thirteen Books of Euclid's Elements*, vol. 1, 202–220.

<sup>28</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 191.21–22.

<sup>29</sup> EUCLID, *Opera Omnia*, vol. 1, 8.7–14.

<sup>30</sup> AS MUELLER, *Philosophy of Mathematics and the Deductive Structure of Euclid's Elements*, 11, says, "At some point, perhaps after Euclid, the Greeks developed a terminology to mark this distinction."

<sup>31</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 77.7–15.

(κατασκευή), **proof** (ἀπόδειξις), and **conclusion** (συμπέρασμα).<sup>32</sup> With these types and parts in mind, let us analyze a problem and a theorem contained in the *Elements*.

### 1.6. Parts of a Problem

The very first proposition is a problem in which the student is required to demonstrate that an equilateral triangle can be erected (συστήσασθαι) on any given straight line. Thus, the **enunciation** reads, “On a given <finite> straight line to construct an equilateral triangle.”<sup>33</sup>

This is followed by the **exposition**, “Let AB be the given <finite> straight line,”<sup>34</sup> where AB is a symbol that stands for any straight line as defined by its extreme points A and B. Note that geometry, as a theoretical science, deals with universal (as opposed to singular or individual) magnitudes. Likewise, arithmetic demonstrates using universal numbers.

Next, we find the **specification**, which applies the enunciation to the determined line: “Thus it is required to construct an equilateral triangle on the straight line AB.”<sup>35</sup>

This is followed by the **construction**, which begins thus: “With center A and distance [διαστήματι] AB let the circle BCD be described.”<sup>36</sup> This part of the construction, and the next one, “again, with center B and distance BA let the circle ACE be described,”<sup>37</sup> depend on the third postulate: “To describe a circle with any center and distance.”<sup>38</sup> The last part of the construction, “and from the point C, in which the circles cut one another, to the points A, B let the straight lines CA, CB be joined,”<sup>39</sup> depends on the first postulate: “To draw a straight line from any point to any point”<sup>40</sup> (► Figure 1).

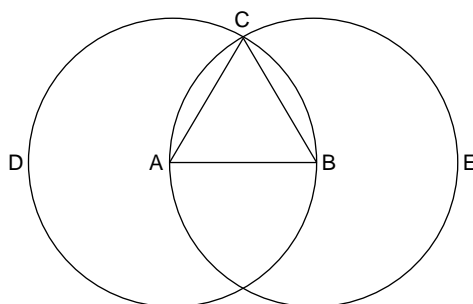


Figure 1: Construction required in a problem.

<sup>32</sup> Ibid., 203.1–5.

<sup>33</sup> EUCLID, *Opera Omnia*, vol. 1, 10.14–15. Note that HEATH adds “finite.” As we will see, for the Greeks all lines are finite (sections, in the modern sense).

<sup>34</sup> Ibid., 10.16.

<sup>35</sup> Ibid., 10.17–18.

<sup>36</sup> Ibid., 10.19–12.1.

<sup>37</sup> Ibid., 12.1–2.

<sup>38</sup> Ibid., 8.11–12.

<sup>39</sup> Ibid., 12.2–5.

<sup>40</sup> Ibid., 8.7–8.

All the postulates used above, in turn, depend on definitions such as that of *circle*, *figure*, *surface*, *straight line*, *line*, and *point* (on which there will be more to say below).

The construction is followed by the **proof**, in which the first common notion is used: “Things which are equal to the same <thing> are also equal to one another.”<sup>41</sup>

Now, since the point A is the centre of the circle CDB, AC is equal to AB. Again, since the point B is the centre of the circle CAE, BC is equal to BA. But CA was also proved equal to AB; therefore each of the straight lines CA, CB is equal to AB. And things which are equal to the same thing are also equal to one another; therefore CA is also equal to CB. Therefore the three straight lines CA, AB, BC are equal to one another.<sup>42</sup>

The problem then reaches its **conclusion**: “Therefore the triangle ABC is equilateral; and it has been constructed on the given <finite> straight line AB,” adding the standard ending for a problem, “which is what had to be done” (ὅπερ ἔδει ποιῆσαι = *quod erat faciendum*).<sup>43</sup>

### 1.7. Parts of a Theorem

Let us now turn to the sixth proposition in the first book of EUCLID’s *Elements*, which is a theorem. The **enunciation** reads, “If in a triangle two angles be equal to one another, the sides which subtend the equal angles will also be equal to one another.”<sup>44</sup>

This is followed by the **exposition**, “Let ABC be a triangle having the angle ABC equal to the angle ACB,”<sup>45</sup> where ABC is a symbol that indicates the extreme points of the lines that contain any triangle and ultimately define the triangle itself. Moreover, ABC serves also to indicate the angle formed by lines AB and BC as they meet at point B. Something similar can be said of ACB, which denotes the angle formed by AC and CB.

Next comes the **specification**, which applies the enunciation to the lines of a *determined* triangle: “I say that the side AB is also equal to the side AC.”<sup>46</sup> Note that, instead of requiring a construction, as in the above problem, the specification of a theorem states an assertion: “I say that [λέγω, ὅτι].”

The specification is immediately followed by the **proof**, constructing an additional line DC, thus forming triangle DBC, which is assumed to be smaller than ABC. Using *reductio ad absurdum*, the proof determines that, contrary to the initial assumption, AB is equal to AC:

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<sup>41</sup> Ibid., 10.2.

<sup>42</sup> Ibid., 12.6–13.

<sup>43</sup> Ibid., 12.14–17.

<sup>44</sup> Ibid., 22.19–21.

<sup>45</sup> Ibid., 22.22–23.

<sup>46</sup> Ibid., 22.23–24.

For, if AB is unequal to AC, one of them is greater. Let AB be greater; and from AB the greater let DB be cut off equal to AC the less; let DC be joined.<sup>47</sup>

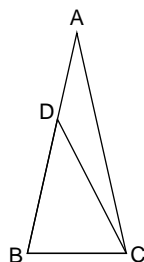


Figure 2: Construction created in support of the proof of a theorem.

Then, since DB is equal to AC, and BC is common, the two sides DB, BC are equal to the two sides AC, CB respectively; and the angle DBC is equal to the angle ACB; therefore the base DC is equal to the base AB, and the triangle DBC will be equal to the triangle ACB, the less to the greater: which is absurd. Therefore AB is not unequal to AC; it is therefore equal to it.<sup>48</sup>

Finally, the theorem reaches its **conclusion**, which merely repeats the enunciation: “Therefore if in a triangle two angles be equal to one another, the sides which subtend the equal angles will also be equal to one another,” adding the standard ending for a theorem, “which is what had to be demonstrated” (ὅπερ ἔδει δεῖξαι = *quod erat demonstrandum*).<sup>49</sup>

As HEATH observes commenting on this proposition, “Euclid assumes that, because D is between A and B, the triangle DBC is less than the triangle ABC. Some postulate is necessary to justify this tacit assumption.”<sup>50</sup> True, EUCLID does not always provide all the principles necessary for the demonstration at hand when they are evident. But this is in line with what ARISTOTLE says when he explains the principles of scientific demonstration:

Yet some sciences may very well pass over some of these <elements>; e.g. we might not expressly posit the existence of the genus if its existence were obvious (for instance, the existence of hot and cold is more evident than that of number); or we might omit to assume expressly the meaning of the attributes [πάθη “affections”] if it were well understood. In the way the meaning of axioms, such as “Take equals from equals and equals remain,” is well known and so not expressly assumed. Nevertheless, in the nature <of the case> the essential <elements> of demonstration are three: the subject [ὃ δέικνυσι “that of which something is demonstrated,” i.e., τὸ γένος τὸ ὑποκείμενον, the subject-genus: e.g., *number*], the attributes [ἃ δέικνυσι “those that are demonstrated,” i.e., the affections πάθη of the subject: e.g., odd or even], and the basic premises [ἐξ ὧν “(those) from which (demonstration proceeds),” i.e., the ἀξιώματα or κοινά].<sup>51</sup>

<sup>47</sup> Ibid., 22.25–28.

<sup>48</sup> Ibid., 24.1–7.

<sup>49</sup> Ibid., 24.8–10.

<sup>50</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 1, 256.

<sup>51</sup> ARISTOTLE, *Analytica Posteriora* A.10, 76b16–22.



## 2. Multitude (πλήθος) vs. Magnitude (μέγεθος)

As noted above, ancient Greek mathematics comprises two distinct but closely related disciplines: arithmetic, the science of *measurable multitude* (ordinarily called ἀριθμός, *number*); and geometry, the science of *measurable magnitude*. (The plurality of these sciences is somehow preserved in the English name of *mathematics*.)

The basis for distinguishing between **multitude** (also called **plurality**) and **magnitude** is quite simple. As cognitivists have rediscovered, *many* has to do with “a large number of similar items,” while *much* has to do with “a large quantity of substance.”<sup>1</sup> Evidently, being many or few is not the same as being great or small. While both pairs of opposites are **affections** (πάθη = Lat. *passiones*), that is, **properties** or **per se accidents** of quantity, nonetheless, the former pair pertains only to multitude, while the latter belongs only to magnitude. In fact, multitude and magnitude were named after their most prominent affections: *many* and *great*, respectively. Thus, just as our *multitude* comes from the Latin *multus* (many), and *magnitude* derives from *magnus* (great, large), so the Greek πλήθος (multitude) originally had the sense of *great number*, while μέγεθος (magnitude) was derived from μέγας (big, large).<sup>2</sup>

### 2.1. Number (ἀριθμός) and Unit (μονάς)

EUCLID defines *unit* and *number* at the beginning of Book VII of his *Elements*. He says **number** (ἀριθμός) is “a multitude [πλήθος] composed of units”; and **unit** (μονάς, *monad*), “that by virtue of which each of the things that exist is called *one*.”<sup>3</sup> For his part, IAMBlichus reports that EUDOXUS, whom he calls “the Pythagorean,” defined it as a “determinate multitude [πλήθος ὠρισμένον].”<sup>4</sup> And ARISTOTLE registers that some other philosophers defined *number* as a “composition of units [σύνθεσις μονάδων].”<sup>5</sup>

Ancient Greeks agree, then, in defining *number* in terms of a determinate or measured multitude of units.<sup>6</sup> ARISTOTLE himself defines it as a “determinate multitude [πλήθος πεπερασμένον]”;<sup>7</sup> a “multitude of units [πλήθος μονάδων]”;<sup>8</sup> and a “multitude of

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<sup>1</sup> Douglas R. HOFSTADTER and Emmanuel SANDER, *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking* (New York, NY: Basic Books, 2013), 83.

<sup>2</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entries for πλήθος and μέγεθος; Charlton T. LEWIS and Charles SHORT, *A Latin Dictionary* (Oxford: Clarendon Press, 1879), entries for *multus* and *magnus*.

<sup>3</sup> EUCLID, *Opera Omnia*, vol. 2, 184.2–5.

<sup>4</sup> IAMBlichus, *In Nicomachi Arithmetica introductionem*, 10.17–18.

<sup>5</sup> ARISTOTLE, *Metaphysica* Z.3, 1039a12.

<sup>6</sup> See HEATH, *The Thirteen Books of Euclid's Elements*, v. 2, 280; KLEIN, *Greek Mathematical Thought and the Origin of Algebra*, Ch. 6.

<sup>7</sup> ARISTOTLE, *Metaphysica* Δ.13, 1020a13.

<sup>8</sup> *Ibid.*, I.1, 1053a30.

indivisibles [πληθος ἀδιαιρέτων];<sup>9</sup> but, above all, as a “multitude measurable by one [πληθος ἐνὶ μετρητόν],” for *multitude* (πληθος) is, as it were, *the genus of number*.<sup>10</sup>

As will be further discussed, the unit is a measure for all numbers. However, ARISTOTLE carefully distinguishes between the *one* that is the principle of number and the *one* that is convertible with being. According to the former sense, every *being* is a *one* and every *one* is a *being*. According to the latter, however, not every *being* is a measure for numbers.<sup>11</sup>

It is not difficult to realize, then, that *one* is not a number because, simply put, it is not a multitude, as ARISTOTLE explains:

“The one” [τὸ ἓν] means [σημαίνει] the measure [μέτρον] of some plurality [πλήθους], and “number” [ἀριθμός] <means> a measured plurality [πλήθος μεμετρημένον] and a plurality of measures. (Thus it is natural [εὐλόγως, *reasonable*] that one is not a number; for the measure is not measures, but both the measure and the one are starting-points [ἀρχή, *a principle*].)<sup>12</sup>

For the puzzled modern reader of the *Elements*, this also explains why EUCLID repeats a proof applied to a single unit when he has sufficiently demonstrated a (seemingly) identical proposition that applies only to *number*.<sup>13</sup>

## 2.2. Magnitude

A search for a definition of *magnitude* in the *Elements* would prove quite disappointing, as it could only yield the unsuitable one with which Book v opens. The name, having never been used in the preceding books, appears there suddenly: “A magnitude is a part of a magnitude, the less of the greater, when it measures the greater.”<sup>14</sup> If this definition seems intricate, it is essentially because the noun *magnitude* is used both in the definition and in the definiendum. Indeed, EUCLID is not defining here *magnitude* as such. Nor is he even defining *part of a magnitude* in the general sense of *that into which something is* (in any way) *divisible or divided*.<sup>15</sup> What he *is* defining here, as discussed below, is rather an *aliquot part* of a magnitude: that is, a part that measures the whole magnitude exactly.<sup>16</sup>

In determining what EUCLID means by *magnitude*, it is misleading to read Book v of the *Elements* under the spell of illustrations that accompany many editions (both old and new);

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<sup>9</sup> Ibid., M.9, 1085b22.

<sup>10</sup> Ibid., I.6, 1057a2–4.

<sup>11</sup> Ibid., 6–7.

<sup>12</sup> Ibid., N.1, 1088a4–8.

<sup>13</sup> See Proposition VII.15 in EUCLID, *Opera Omnia*, vol. 2, 220.5–222.8; cf. VII.9 in idem, 210.6–212.9.

<sup>14</sup> Ibid., 2.2–3.

<sup>15</sup> See ARISTOTLE, *Metaphysica* Δ.25, 1023b12–15; cf. Δ.13, 1020a7–12.

<sup>16</sup> See Ibid., Δ.25, 1023b15–17.

for one could inadvertently be induced into identifying it with a *straight line*. Nowhere in this book is there any mention of a straight line or a line, even though they are clearly defined at the outset of the *Elements*. Only a thorough examination of the whole work will reveal that whenever EUCLID explicitly identifies something as a **magnitude**, it is always a **line**, a **surface**, a **solid** (which we will call **body** elsewhere), or an **angle**.<sup>17</sup>

As far as EUCLID is concerned, a magnitude is neither a multitude nor a number nor a unit. In the *Elements*, as in the whole of ancient Greek mathematics, again, the distinction between multitude and magnitude is an essential one. Thus, for example, the definition of *equal and similar solid figures* in Book XI would be unintelligible without it, for such figures are described as contained by similar planes “equal in multitude and in magnitude.”<sup>18</sup> Therefore, numbers cannot be reduced to magnitudes, nor the latter to the former. Alas, modern authors have claimed (falsely, as we will show; ►7.3) that *number* was subsumed under *magnitude*.

Although *magnitude* in general is never defined in the *Elements*, the definitions of the first three species of magnitude (line, surface, and solid) are stated in the first and eleventh books. Thus, at the very outset of the *Elements* we learn that a **line** is “breadth-less length,”<sup>19</sup> and that a **surface** is “that which has length and breadth only,”<sup>20</sup> while in the beginning of Book XI we find that a **solid** is “that which has length, breadth, and depth.”<sup>21</sup>

EUCLID does not provide a definition of *angle* (as such) either. From the definitions of plane and solid angles, however, we can infer with certainty that **angle** is *the inclination* (κλίσις) *to one another of two lines*.<sup>22</sup>

The angle, being a property of related lines, is evidently heterogeneous or diverse from the other species of magnitude. But that certainly does not make it “a social construct originating from the needs of Seleucid astronomy rather than a necessary and intrinsic aspect of geometry,” as the authors of the recent Plimpton 322 article suggest.<sup>23</sup> Such assertions tell us more about postmodern thought than about ancient Greek mathematics.

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<sup>17</sup> See Ivor GRATTAN-GUINNESS, “Numbers, Magnitudes, Ratios, and Proportions in Euclid’s *Elements*: How Did He Handle Them?”, *Historia Mathematica*, no. 23 (1996). Note, however, that GRATTAN-GUINNESS adds to this list *region*, which is not distinguished as a species of magnitude in the *Elements*. In fact, EUCLID does not even have a distinct name for it.

<sup>18</sup> EUCLID, *Opera Omnia*, vol. 4, 4.7–9.

<sup>19</sup> *Ibid.*, vol. 1, 2.2. EUCLID immediately adds that a straight line is “a line which lies evenly with the points on itself” in 2.4–5.

<sup>20</sup> *Ibid.*, 2.6–7.

<sup>21</sup> *Ibid.*, vol. 4, 2.2–3.

<sup>22</sup> See *ibid.*, vol. 1, 2.11–3.

<sup>23</sup> MANSFELD and WILDBERGER, “Plimpton 322 Is Babylonian Exact Sexagesimal Trigonometry,” 2.

### 2.3. Priority of Arithmetic Over Geometry

At some point in history, arithmetic and geometry came jointly to be called *disciplines* (μαθηματική, Lat. *disciplinae*),<sup>24</sup> whence the originally plural English noun *mathematics*.<sup>25</sup> As HEATH reports, “According to Anatolius, the followers of Pythagoras are said to have applied the term μαθηματική more particularly to the two subjects of geometry and arithmetic, which had previously been known by their own separate names only and not by any common designation covering both.”<sup>26</sup>

The name *mathematics* was extended also to the so-called subaltern, or middle, physical sciences. These are, for example, harmonics (also known as *music*), which takes its principles from arithmetic; perspective, which takes its principles from geometry; and astronomy (then called ἀστρολογία, literally, *astrology*), which takes its principles from both. As explained in the next part, these sciences study things that, unlike number and magnitude abstractly considered, involve sensible matter and motion. Thus, harmonics studies arithmetic relations between sounds; perspective applies to visual lines what is demonstrated in geometry concerning abstract lines; and astronomy treats of the motion of visible celestial bodies. This clearly contrasts with abstract arithmetic and geometry.

ARISTOTLE and other authors refer to multitude and magnitude as being the first species of a *category* or highest genus: namely, **quantity** or **quantum** (ποσόν).<sup>27</sup> Motion, time, and place are considered *quanta* by extension, insofar as they are measurable. For reasons explained in the last chapter of this part (►7.4), ancient Greeks did not develop a universal mathematical science (i.e., above and beyond arithmetic and geometry) that would demonstrate propositions about the quantum in general. Nor did they have any art of calculation that would use quantities that are neither multitudes nor magnitudes. There is, nonetheless, a prevailing modern fiction claiming that ARISTOTLE (and other ancient Greeks) did possess a mathematical science of quantity as such. We will deal with this myth after discussing proportion theory, which is what underpins most of the assumptions. For now, let us examine the relationship between arithmetic and geometry according to NICOMACHUS, the most influential arithmetician of antiquity.

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<sup>24</sup> Armand A. MAURER notes in his translation of Thomas AQUINAS, *The Divisions and Methods of the Sciences: Questions V and VI of his Commentary on the De Trinitate of Boethius* (Toronto: The Pontifical Institute of Mediaeval Studies, 1953), 49, n. 11: “the English word ‘mathematics’ is derived from the Greek *mathēma*, which means knowledge in general, and in particular mathematical knowledge. The corresponding Latin word is *disciplina*.”

<sup>25</sup> See *Merriam-Webster Dictionary* (2017 ed.), entry for *mathematics*.

<sup>26</sup> HEATH, *A History of Greek Mathematics*, v.1, 11. HEATH is referring here to a passage collected from an anonymous source and published in Friedrich Otto HULTSCH (ed.), *Heronis Alexandrini Geometricorum et stereometricorum reliquiae* (Berlin: Weidmann, 1864), 277.4–8.

<sup>27</sup> See, for example, *Metaphysics* Δ.13, 1020a7–32.

NICOMACHUS raises the question of which of the following four mathematical *methods* should be learned first: arithmetic, music, geometry, or astronomy (the Platonic group of sciences that in the Latin West would be called *quadrivium*, and which flourished under the influence of BOETHIUS). He answers that arithmetic should be learned first. Being the Neoplatonist that he is, NICOMACHUS justifies his answer firstly by resorting to the Platonic Demiurge, who fashions the sensible world in the likeness of eternal, archetypal ideas by impressing them in matter:

Which then of these four methods must we first learn? Evidently, the one which naturally exists before them all, is superior and takes the place of origin and root and, as it were, of mother to the others. And this is arithmetic, not solely because we said that it existed before all the others in the mind of the creating God like some universal and exemplary plan, relying upon which as a design and archetypal example the creator of the universe sets in order his material creations and makes them attain to their proper ends.<sup>28</sup>

However, NICOMACHUS immediately adds another Platonic reason—a natural and logical order of dependence, which he painstakingly explains. Thus, the posterior depends on the prior according to an order that is both logical and natural or ontological:

But also because it is naturally prior in birth, inasmuch as it abolishes other sciences with itself, but is not abolished together with them. For example, “animal” is naturally antecedent to “man,” for abolish “animal” and “man” is abolished; but if “man” be abolished, it no longer follows that “animal” is abolished at the same time. And again, “man” is antecedent to “schoolteacher,” for if “man” does not exist, neither does “schoolteacher,” but if “schoolteacher” is nonexistent, it is still possible for “man” to be. Thus since it has the property of abolishing the other ideas with itself, it is likewise the older.

Conversely, that is called younger and posterior which implies the other thing with itself, but is not implied by it, like “musician,” for this always implies “man.” Again, take “horse”; “animal” is always implied along with “horse,” but not the reverse; for if “animal” exists, it is not necessary that “horse” should exist, nor if “man” exists, must “musician” also be implied.<sup>29</sup>

Platonists and Peripatetics, despite their differences concerning the ontological status of ideas, would agree in that individual men subsist; and that some of them are musicians; and that there would be no musicians if there were no men. They would moreover agree in that *animal* is not only logically but also naturally prior to horse: for horses would not subsist if they were not animals. They would, of course, disagree on whether *animal itself* (that is, the immaterial form) subsists. Still, Peripatetics would avow an intrinsic, natural order of dependence that is reflected in our rational understanding of reality.

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<sup>28</sup> NICOMACHUS, *Introductio arithmeticae*, I.4.1–2, 9.5–15.

<sup>29</sup> *Ibid.*, I.4.2–3, 9.15–10.9.

NICOMACHUS next shows how arithmetic is prior to geometry; for the latter depends on the former, since without numbers there would be neither ratios nor figures:

So it is with the foregoing sciences; if geometry exists, arithmetic must also needs be implied, for it is with the help of this latter that we can speak of triangle, quadrilateral, octahedron, icosahedron, double, eightfold, or one and one-half times, or anything else of the sort which is used as a term by geometry, and such things cannot be conceived of without the numbers that are implied with each one. For how can “triple” exist, or be spoken of, unless the number 3 exists beforehand, or “eightfold” without 8? But on the contrary 3, 4, and the rest might be without the figures existing to which they give names. Hence arithmetic abolishes geometry along with itself, but is not abolished by it, and while it is implied by geometry, it does not itself imply geometry.<sup>30</sup>

Hence, geometry takes some of its principles from arithmetic, and therefore depends upon it—but the opposite is not true. Thus, a line has two points, and two is a number: if we remove two, we remove the line. And the same thing can be said of the other figures contained by a measurable multitude of boundaries.

Conversely, we can treat of numbers without dealing with magnitude or figure. Thus, being great or small, or being configured according to a certain positional pattern, is extrinsic and accidental to numbers and units. Likewise, commensurable and incommensurable magnitudes are defined in dependence of numerical ratios; for, as we will show, the former have to one another the ratio which a number has to a number. Therefore, ratios between numbers have priority over ratios between magnitudes. To know about ratios between magnitudes, we must first know about ratios between numbers.

Finally, NICOMACHUS shows that so-called subaltern, or middle, physical sciences also depend on arithmetic:

And once more is this true in the case of music; not only because the absolute is prior to the relative, as “great” to “greater” and “rich” to “richer” and “man” to “father,” but also because the musical harmonies, diatessaron, diapente, and diapason, are named for numbers; similarly all of their harmonic ratios are arithmetical ones, for the diatessaron is the ratio of 4 : 3, the diapente that of 3 : 2, and the diapason the double ratio; and the most perfect, the di-diapason, is the quadruple ratio.

More evidently still astronomy attains through arithmetic the investigations that pertain to it, not alone because it is later than geometry in origin—for motion naturally comes after rest—nor because the motions of the stars have a perfectly melodious harmony, but also because risings, settings, progressions, retrogressions, increases, and all sorts of phases are governed by numerical cycles and quantities.<sup>31</sup>

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<sup>30</sup> Ibid., I.4.4-5, 10.9-22.

<sup>31</sup> Ibid., I.5.1-2, 10.22-11.18.

#### **2.4. Fiction: “Ancient Greeks gave precedence to geometry over arithmetic”**

From what has been said, it is evident that ancient Greeks considered arithmetic to be more foundational than geometry. Therefore, we should not be misled by the famous report that a motto over the entrance to the Academy read, “Let no one untrained in geometry enter” (ἀγεωμέτρητος μηδεὶς εἰσίτω).<sup>32</sup> PLATO himself speaks of the importance of arithmetic in order to come to know the One itself through numbers; and he reduces magnitudes to numbers.<sup>33</sup>

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<sup>32</sup> CAG 18.1, 118.18–19.

<sup>33</sup> See, for example, PLATO, *Republic* 7, 525d–e.





### 3. Divisibility and Measurability

As hinted above, we tend to call *part* anything into which something is divisible. However, not everything into which something is divisible is its part in a *proper* sense. In the *Elements*, *part* is always a *proper* or *aliquot* part; and a proper part of a number or of a magnitude is that which measures it exactly: for example, one half, one third, or one fifth.

As already noted, EUCLID defines **part of a magnitude** in the opening words of Book V: “A magnitude is a part of a magnitude, the less of the greater, when it measures the greater.”<sup>1</sup> Immediately after this definition, he offers its correlative, that is, the definition of **multiple of a magnitude**: “and the greater [magnitude] is a multiple of the less when it is measured by the less.”<sup>2</sup>

Similarly, after defining *number* in Book VII, EUCLID defines its *numerical part* by stating that “a number is a **part of a number**, the less of the greater, when it measures the greater; but **parts** when it does not measure it.”<sup>3</sup> Again, he also defines the correlative of a numerical part of a number, that is, the **multiple of a number**: “the greater number is a multiple of the less when it is measured by the less.”<sup>4</sup>

What EUCLID means by *part of a magnitude* should be clear. For example, a greater line is measured by its half, which is the less; and the former (i.e., the greater) is a multiple of the latter (i.e., the less): its double. The same can be said of the proper parts of any other species of magnitude: a surface (e.g., a circle: ► Figure 3), a solid, or an angle.

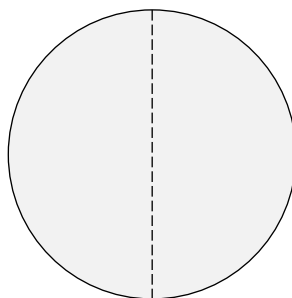


Figure 3: Half parts of a circle (semicircles).

Likewise, what EUCLID means by a numerical *part of a number* should be apparent from what has been said so far. Thus, the number two (the less) is a part of the number four (the greater) because two measures exactly one half of four; and the number four (the greater) is a multiple of the number two (the less) because four is twice two. Similarly, two

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<sup>1</sup> EUCLID, *Opera Omnia*, vol. 1, 2.2–3.

<sup>2</sup> *Ibid.*, 2.4–5.

<sup>3</sup> *Ibid.*, vol. 2, 184.6–8.

<sup>4</sup> *Ibid.*, 184.9–10.

is a part of six because two measures exactly one third of six; and six is a multiple of two because thrice two makes six (► Figure 4).



**Figure 4: Two is a part (one half) of four, and a part (one third) of six. Four is a multiple (double) of two; and six is a multiple (triple) of two.**

More puzzling to the modern mind is exactly what EUCLID means by *parts* of a number. There is a fiction that would make *parts of a number* the equivalent of a proper fraction. We will deal with it at the end of this chapter (► 3.5). Meanwhile, we will show how taking EUCLID’S words at face value makes the expression *parts of a number* sufficiently clear.

As EUCLID says, “A number is said to multiply a number when that which is multiplied is added to itself as many times as there are units in the other, and thus some number is produced.”<sup>5</sup> Thus, twice four makes eight, which is less than nine; and thrice four makes twelve, which exceeds nine (► Figure 5). But there is no multitude between two and three by which we could multiply four in order exactly to produce the number nine.



**Figure 5: Twice four makes eight, which is less than nine. Thrice four makes twelve, which exceeds nine.**

Hence, if we faithfully apply EUCLID’S definitions, we must conclude that the number four is *parts* of the number nine. Indeed, four (the less) does not measure nine (the greater), nor is nine (the greater) a multiple of four (the less). Still, what does it mean for the number four to be *parts* of the number nine?

Manifestly, *parts* is the plural of *part*, and the grammatical plural signifies a plurality or multitude of things. Thus, *parts* signifies a *multitude* of parts, as opposed to *one part*. Now, each of the things that come into the composition of the multitude that we call *parts of a number* is evidently *one part* of a number. Hence, each of these parts is either a *unit*; for the unit measures every number-multitude; or else it is a *numerical part* of the number; for every numerical part of a number measures the number as a multitude.

Thus, absolutely speaking, the parts of the number four are the unit and the number two. Indeed, the unit is a (non-numerical) part of any number; and it measures the number four because the unit is exactly one fourth of four (► Figure 6). Likewise, the number two measures the number four because two is exactly one half of four. And the parts of the number nine are the unit and the number three, each of which measures the number nine. Indeed, one is one ninth of nine; and three is one third of nine.

<sup>5</sup> Ibid., 186.14–16.



**Figure 6: The parts of the number four are the unit and the number two.  
The unit is one fourth of four. Two is one half of four.  
One measures four. Two measures four.**

It is in this sense that EUCLID defines **perfect number** in Book VII as “that which is equal to its own *parts*.”<sup>6</sup> For example, the parts of the number six are the unit, the number two, and the number three. Hence, six is a perfect number because it is a number composed by adding these parts (i.e., the unit, which is one sixth of six; the number two, which is one third of six; and the number three, which is one half of six). And the same can be said of the perfect number twenty-eight: for the parts of twenty-eight are the unit, and the numbers two, four, seven, and fourteen, each of which measures the number twenty-eight; and together they add up to twenty-eight.

On the other hand, relatively speaking (that is, in the sense that a number is parts of another number), to say that the number four is *parts* of the number nine is to say that some of the parts into which the number four is divisible are also parts of the number nine. Thus, in Proposition 4 of Book VII, EUCLID demonstrates that “any number is either a part or parts of any number, the less of the greater.”<sup>7</sup> And he does so by showing that there are only three possible cases:

1. Either there is no common number that measures both numbers, in which case the less is *parts* of the greater; for if the less be divided into the units in it, each unit of those in it will be some part of the greater. This is the case posed in our example; for there is no common number that measures the numbers four and nine: the only numerical part of four is two, and the only numerical part of nine is three. However, each of the units that compose the number four is a measure for the number nine; for each unit is one fourth of four and one ninth of nine; therefore, four is four *parts* of nine (►Figure 7).



**Figure 7: Four is four *parts* of nine. Each of the fourth parts of four is one ninth of nine.**

2. Or else the less measures the greater, in which case it is *a part* of the greater. Thus, for example, the number two (the less) measures the number six (the greater); for two is one third of six. Therefore, two is *a part* of six (►Figure 8).



**Figure 8: Two is *a part* of six.**

<sup>6</sup> Ibid., 188.10–11; emphasis added to HEATH’s English version.

<sup>7</sup> Ibid., 198.15–200.15.

3. Or else there is a number that measures both the greater and the less, in which case the less is *parts* of the greater; for if the less be divided into numbers equal to the common measure, then each of the numbers resulting from the division, being a part of the less, is also a part of the greater. For example, the number that measures both six and eight is two; for two is one third of six and one fourth of eight. If we divide the number six (the less) into numbers equal to two (i.e., equal to the common measure), then each of the three twos resulting from this division is a fourth part of the number eight (the greater). Therefore, six is three *parts* of eight (► Figure 9).



Figure 9: Six is three *parts* of eight.

### 3.1. The Even and the Odd

Having defined *part* and *parts* of a number based on its measurability, EUCLID then proceeds in Book VII to define the first properties that numbers have in respect of their compared divisibility. Thus, he says that **even number** (ἄρτιος ἀριθμός) is “that which is divisible in (equal) halves;” and its opposite, **odd number** (περισσός [ἀριθμός]), is “that which is *not* divisible in halves,” or “that which differs by a unit from an even number.”<sup>8</sup>

Evidently, since a number is a multitude *composed* of units, it is also *divisible* into its components. And the first possible division is bisection, the result of which is two—equal or unequal—portions, each of which is either a lesser number or a unit.

Let us apply these definitions to the smallest four numbers. Thus, since the least number is *two* (for it is a multitude composed of the fewest possible units), and it is divisible in two halves (i.e., into two singular units, each of which is neither more nor less than the other), then two is an *even* number. In contrast, no matter how we bisect *three*, we will always be left with a multitude of two units and an individual unit. Since any multitude is unequal to the unit (for it exceeds the unit), then three is an odd number; and it is an odd number also because it differs by a unit from two. *Four* can be divided into two equal halves, each of which is a multitude composed of two units. Hence, four is an even number. Finally, *five*, which is the fourth number, can be divided into either a multitude of four units and a single unit, or else a multitude of three units and another multitude of two units. In either case the halves are unequal; therefore, five is an odd number. We would reach the same conclusion by noting that five differs by a unit from four, which is an even number. Evidently, it is mathematically certain that the same properties hold true of any number

<sup>8</sup> Ibid., 184.11–13. We depart here from HEATH’s translation of δίχα διαιρούμενος as “divisible into two equal parts,” for EUCLID does not explicitly use the name *parts*, which is a technical term. See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for δίχα.

greater than these without having to turn to sensible things for confirmation: again, mathematics abstracts from sensible matter and motion.

Combining the properties of intrinsic measurability and divisibility used above, EUCLID also provides definitions of numbers that are measured by even or odd numbers, which come into their composition even- or odd- times. Thus, he defines the **even-times even number** as “that which is measured by an even number according to an even number”; the **even-times odd number** as “that which is measured by an even number according to an odd number”; and the **odd-times odd number** as “that which is measured by an odd number according to an odd number.”<sup>9</sup>

Note that if an even number is added to an even number, the result is even; but if an odd number is added to an even number, the result is odd; and if a unit is added to an even number, the result is odd too. As THEON reports, some concluded from these observations that the unit is odd.<sup>10</sup> Clearly, however, the unit is neither even nor odd. Indeed, not only is it not divisible in halves but—as will be abundantly established—it is not divisible at all. Hence, according to THEON, ARISTOTLE explains (in *The Pythagorean*, a work lost to us)<sup>11</sup> that the unit “participates in both natures, namely odd and even”; for adding it to an even number produces an odd number; but adding it to an odd number produces an even number.<sup>12</sup> THEON says, then, that the unit is “odd-even” (ἄρτιοπέριπτον).<sup>13</sup> Be that as it may, odd and even are contrary affections of number; and the unit is the principle of number but not a number itself. Nonetheless, when ARISTOTLE opposes ratios to one another, he assumes that the unit can be taken as odd.<sup>14</sup>

### 3.2. Divisibility of Number and of Magnitude Compared

The properties of magnitude patently differ from those of number in respect of divisibility. Thus, there is no opposition between odd and even in magnitude; for every magnitude is divisible into two equal halves.

And there is no such thing as an *odd-times odd magnitude*: not only are all magnitudes exactly divisible in halves, but—more fundamentally—they are not composed of indivisible units. The same can be said of an *even-times odd* or *even-times even* magnitude; for, strictly speaking, there is no even or odd in magnitude, as has been established.

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<sup>9</sup> Ibid., 184.14–186.5.

<sup>10</sup> THEON, *Expositio rerum mathematicarum...*, 21.24–22.5.

<sup>11</sup> Cf. ARISTOTLE, *Metaphysica* A.5, 986a15–21 (cf. AQUINAS, *In Metaph.* 1, l. 7, §124).

<sup>12</sup> THEON, *Expositio rerum mathematicarum...*, 22.5–9.

<sup>13</sup> Ibid., 22.9.

<sup>14</sup> ARISTOTLE, *De sensu* 7, 448a8–13 (cf. AQUINAS, *In De sensu* 1, c. 17, 6–62).

### 3.3. Prime and Composite Numbers

In Book VII, EUCLID defines **prime number** (πρῶτος ἀριθμός) as “that which is measured by a unit alone,” while **composite number** (σύνθετος ἀριθμός) is “that which is measured by some number.”<sup>15</sup>

The adjective *prime* (πρῶτος) means *first* or *prior*.<sup>16</sup> Prime numbers are prior in the order of measure and in the order of composition. NICOMACHUS explains how prime numbers are first in these two ways:

It has received this name [i.e., πρῶτος ἀριθμός “prime number”] because it can be measured only by that which is first and common to all number, unity, and by nothing else;<sup>17</sup> moreover, because it is produced by no other number combined with itself, but by unity alone; for 5 is  $5 \times 1$ , and 7 is  $7 \times 1$ , and the others in accordance with their own quantity [προσότητα, i.e., *delimited multitude*]. To be sure, when combined [συντεθέντων] with them, other numbers are produced [γενέσθαι], springing from them as from a root [ρίζης], wherefore they are called “prime,” because they exist beforehand as the beginnings [ἀρχαί, *principles*] of the others. For every origin [ἀρχή, *principle*] is elementary and incomposite, into which everything is resolved and out of which everything is made, but the origin itself cannot be resolved into anything or constituted out of anything.<sup>18</sup>

In turn, numbers **prime to one another** (πρὸς ἀλλήλους) are “those which are measured by the unit alone as a common measure.”<sup>19</sup> And numbers **composite to one another** are “those which are measured by some number as a common measure.”<sup>20</sup>

### 3.4. Measurability of Number and of Magnitude Compared

Clearly, EUCLID’s definition of *numerical part of a number* is virtually identical, *mutatis mutandis*, to that of *part of a magnitude*: both numbers and magnitudes are measurable by their proper, aliquot parts. And something similar can be said of the definition of *multiple of a number* when compared to that of *multiple of a magnitude*. Despite these manifest similarities, a careful comparison of the respective properties of number and magnitude reveals profound differences.

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<sup>15</sup> EUCLID, *Opera Omnia*, vol. 2, 186.6–7; 10–11. It should be noted that “composite” here translates σύνθετος, while in the definition of number “composed” translates συγκείμενον. This distinction will be kept when discussing the *Elements*.

<sup>16</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entries for πρῶτος, πρότερος.

<sup>17</sup> We have altered D’OUGE’s translation because it thoroughly obscures what NICOMACHUS is saying here. D’OUGE renders “τῷ κοινῷ πάντων ἀριθμῷ καὶ πρωτίστῳ μονάδι μόνῃ δύναται μετρεῖσθαι” as “it can be measured only by the number which is first and common to all, unity.” However, as NICOMACHUS explains immediately after, a prime number is first because it is produced by no other number. Indeed, the monad is the principle of number and therefore not a number. Hence, the unit is not the first number, but prior to all numbers; and prime numbers are therefore the first numbers, as the name indicates.

<sup>18</sup> NICOMACHUS, *Introductio arithmeticae*, I.11.3, 26.20–27.11.

<sup>19</sup> EUCLID, *Opera Omnia*, vol. 2, 186.8–9.

<sup>20</sup> *Ibid.*, 12–13.

Thus, the unit is always *some part* of every number: it is *one half* of two, *one third* of three, and *one fifth* of five. But there is no such thing as a *prime magnitude*; for magnitudes are not composed of indivisible units (again, there is no such thing as a magnitude that can measure all magnitudes, as we will see; ►5.5). Conversely, we could say that all magnitudes are, in a sense, *composite*, for every part of a magnitude (e.g., one third of a line, or one half of a surface) is itself a magnitude. However, not every part of a number is a number. Indeed, none of the parts of a prime number is itself a number; for a prime number is measured by the unit alone. On the other hand, the unit, despite being some part of every number, is not itself a number, for it is not a multitude—as has been abundantly noted.

### 3.5. Fiction: “*Parts of a number means proper fraction*”

According to HEATH,

By the expression *parts* (μέρη, the plural of μέρος) Euclid denotes what we should call *proper fraction*. That is, a *part* being a submultiple, the rather inconvenient term *parts* means any number of such submultiples making up a fraction less than unity.<sup>21</sup>

What HEATH understands by fraction is any “number” of parts of “unity,” all of them presumably equal in magnitude. For example, let us imagine that our “unity” is a circle. And, since it is divisible it into four parts equal in size, let us further imagine that we sever one of them. Thus, the remainder is the fraction  $\frac{3}{4}$ , and the part removed is  $\frac{1}{4}$  (► Figure 10). Fractions such as  $\frac{3}{4}$  and  $\frac{1}{4}$  are moreover called “proper” because every one of them is less than “unity,” which is also to say that in each of them the *numerator* (that is, the 3 in  $\frac{3}{4}$ , and the 1 in  $\frac{1}{4}$ ) is less than the *denominator* (the 4 in  $\frac{3}{4}$  and  $\frac{1}{4}$ ).

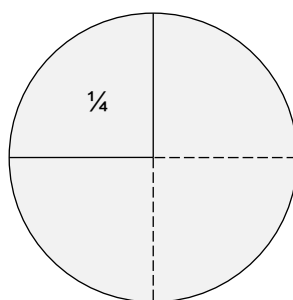


Figure 10: So-called fractions.

There should be no need to say that EUCLID would certainly object to the “1” in “ $\frac{1}{4}$ ” being called a *number*. But HEATH’s misrepresentation of ancient Greek mathematics is even more problematic for other reasons. Indeed, what is “rather inconvenient” is not EUCLID’s term *parts*, as HEATH would have us believe, but the claim that “unity” (that is, the unit)

<sup>21</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 280.

can in any way be “fractioned,” for the notion of fractioning the arithmetical unit—properly or otherwise—is completely foreign to ancient Greek arithmetic.<sup>22</sup>

HEATH does acknowledge being unable to find the noun *parts* used anywhere else in the special sense of a proper fraction, “except in one place in Theon,” referring us to THEON’s *Mathematics Useful for Understanding Plato*.<sup>23</sup> But in the place in question THEON treats of ratios. Ratios, as we will see below (►5), are relations—not “proper fractions.” And, ironically, in the very work where HEATH claims to see fractions, THEON unambiguously explains that the unit is altogether without parts and indivisible:

As for the unit, it is the terminating quantity [the principle and element of numbers],<sup>24</sup> which once decreased in multitude by subtraction and deprived of all number, remains firm and fixed: for it is impossible to further the division. If the sensible *one* [τὸ ἓν ἐν αἰσθητοῖς] is divided into parts, that which was *one* becomes a multitude; and the subtraction of each of its parts would terminate in *one*; and if this is divided again into parts, a multitude is produced; and removing each part returns us to *one*, so the one—insofar as it is one—is without parts and indivisible.<sup>25</sup>

What is worse, as PLATO reports through the persona of Socrates, the mere mention of “fractions” would have sounded laughable to ancient Greek arithmeticians:

I mean, as I was saying, that arithmetic has a very great and elevating effect, compelling the soul to reason [διαλέγεσθαι] about <abstract> number [περὶ αὐτῶν τῶν ἀριθμῶν, *about numbers themselves*], and rebelling against the introduction of visible or tangible [ὄρατὰ ἢ ἀπτά] objects [σώματα, *bodies*] into the argument. You know how steadily the masters of this <art> repel and ridicule anyone who attempts to divide <absolute> unity [αὐτὸ τὸ ἓν, *the one itself*] when he is calculating, and if you divide, they multiply, taking care that *one* shall continue *one* and not become lost in fractions [μὴ ποτε φανῆ τὸ ἓν μὴ ἓν ἀλλὰ πολλὰ μόρια, i.e., to prevent *the one* from appearing to be, instead of *one*, many parts].<sup>26</sup>

From these quotes, we should observe the distinction between the *sensible* one or number (e.g., visible or tangible bodies) and the one or the number *itself* (i.e., the abstract one or number). Ancient Greek mathematics does treat of numbers or magnitudes that exist in

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<sup>22</sup> See KLEIN, *Greek Mathematical Thought and the Origin of Algebra*, 39 and chapter 7; FOWLER, *The Mathematics of Plato’s Academy*, §7.4(a), 262.

<sup>23</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 280, with reference to HILLER’s edition, 79.26.

<sup>24</sup> Brackets in the original.

<sup>25</sup> THEON, *Expositio rerum mathematicarum*..., 18.5–15: “μονὰς δὲ ἐστὶ περαίνουσα ποσότης [ἀρχὴ καὶ στοιχεῖον τῶν ἀριθμῶν], ἥτις μειουμένου τοῦ πλήθους κατὰ τὴν ὑφαίρεσιν τοῦ παντὸς ἀριθμοῦ στερηθεῖσα μονὴν τε καὶ στάσιν λαμβάνειν. οὐ γὰρ οἶόν τε περαιτέρω γενέσθαι τὴν τομὴν· καὶ γὰρ ἓάν εἰς μόρια διαιρῶμεν τὸ ἓν ἐν αἰσθητοῖς, ἔμπαλιν πλήθος γενήσεται τὸ ἓν καὶ πολλὰ, καὶ καταλήξει εἰς ἓν κατὰ τὴν ὑφαίρεσιν ἐκάστον τῶν μορίων· κἄν ἐκεῖνο πάλιν εἰς μόρια διαιρῶμεν, πλήθος τε τὰ μόρια γενήσεται καὶ ἡ κατάληξις καθ’ ὑφαίρεσιν ἐκάστου τῶν μορίων εἰς ἓν. ὥστε ἀμέριστον καὶ ἀδιαίρετον τὸ ἓν ὡς ἓν.” The translation is ours; cf. Jean DUPUIS, *Théon de Smyrne, Philosophe Platonicien: Exposition des Connaissances Mathématiques Utiles pour la Lecture de Platon* (Paris: Librairie Hachette, 1892), 29.

<sup>26</sup> PLATO, *Republic* 7, 525d–e.



nature, but only insofar as they are understood without sensible matter and motion. Thus, the geometrician is not interested in whether a surface is black or white, but, for example, in whether it is triangular, or whether its sides are equal in length.

Likewise, the arithmetician deals with numbers not as they appear to our senses but as they are understood by our intellect. Such abstract numbers are not long or short (in magnitude), black or white, fast or slow, heavy or light, rough or smooth. Whether many or few, they are simply and always a multitude measurable by the unit. In the mind of the arithmetician, all units are the same; for—abstractly speaking—they are all indivisible. It is this abstraction to which PLATO is referring when he says that “arithmetic has a very great and elevating effect.” And because of the failure to think abstractly, master arithmeticians would ridicule those who, like HEATH, attempt to divide *the one itself*.

Pace HEATH, then, EUCLID’s arithmetic has nothing to do with “proper fractions” involving the alleged division of the unit; for, as far as the arithmetician is concerned, a unit is altogether indivisible. In contrast, HEATH’s “unity” is really a magnitude, which is always divisible by the geometer—but never by the arithmetician.

It is tempting to suppose that what HEATH calls “proper fraction” could perhaps be better expressed as “parts of a magnitude,” the study of which would presumably belong more to geometry than to arithmetic. However, unlike numbers (all of which have a common measure, since the unit is some part of every number), magnitudes do not have a universally common measure. Thus, EUCLID never says, for example, that a magnitude is “parts” of a magnitude, the less of the greater, when it does not measure the greater.

Finally, that ratios are not fractions will shortly become evident because, unlike a “proper fraction,” a ratio is a *relation* that a number or unit has *to another* number or unit (►5).



## 4. Terminus (πέρας, ὄρος) and Figure (σχῆμα)

EUCLID specifies the **termini** (πέρατα, or **extremities, extremes, terms**) of the first three species of magnitude in close connection with their respective definitions. Thus, we learn in the first book that “the extremities of a line are points,” and that “the extremities of a surface are lines”; and, in Book XI, that “an extremity [πέρας] of a solid is a surface.”<sup>1</sup>

The termini of surfaces and solids, then, are magnitudes of a prior species: the line is simpler than the surface in that it lacks width; and the surface, lacking depth, is simpler than the solid. Strictly speaking, however, the termini of the line (that is, the extremities of the simplest species of magnitude) are not magnitudes: every magnitude is divisible because it has parts; but, as EUCLID’s definition clearly states, the **point** (σημεῖον) is “that which has no part.”<sup>2</sup>

### 4.1. Unit and Point Compared

The point and the unit are alike in that neither of them is divisible or measurable, and in that both are principles of measuring. Likewise, both the point and the unit terminate a quantity. Thus, EUCLID symbolizes both numbers and magnitudes using either a single letter or two letters, ostensibly indicating one or both termini of the quantity.<sup>3</sup>

On the other hand, there are fundamental differences between the point and the unit. While a unit is a part of every number, a point is not a part of any line; for it does not measure it (yet, a line is measured from a point to a point; whence, it is somehow a principle of measuring). Moreover, ARISTOTLE demonstrates that lines are not composed of points, nor surfaces of lines, nor solids of surfaces.<sup>4</sup> Finally, the point has a position, while the unit does not. It was apparently the Pythagoreans, or at least their followers, who first defined the point as a “unit having position.”<sup>5</sup>

### 4.2. The Infinite

We should carefully distinguish the ancient Greek notion of *infinite* from the modern use of the same name.<sup>6</sup> It is said today that there are (actually) infinite—and even transfinite—so-called *numbers*. Likewise, an (actually) infinite length is modernly called *line*, while a finite one is considered merely a *segment* of it.

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<sup>1</sup> EUCLID, *Opera Omnia*, vol. 1, 2.3.

<sup>2</sup> *Ibid.*, 2.1.

<sup>3</sup> Compare, for example, Proposition 4 of Book VII to Proposition 1 of Book V in *ibid.*, vol. 2, 200; 6.

<sup>4</sup> ARISTOTLE, *Physica* Z.6, 231a21–b18.

<sup>5</sup> See ARISTOTLE, *Metaphysica* Δ.1, 1016b24–31. Rather inconveniently, the unit itself was defined by some as a “point without position,” as ARISTOTLE says in *Metaphysica* M.8, 1084b26–27.

<sup>6</sup> See Norman KRETZMANN (ed.), *Infinity and Continuity in Ancient and Medieval Thought* (Ithaca and London: Cornell University Press, 1982).

According to the ancient Greek understanding, something is infinite if it does not have a terminus: that is, if it is *indeterminate*. ARISTOTLE distinguishes between *multitude*, which is quantitatively indefinite, from *number*, which is a finite multitude; between *length*, which is indefinite in size, from *line*, which is a finite length; between *breadth* and *surface*, and *depth* and *body* (i.e., solid), setting them apart in precisely the same way.<sup>7</sup> Likewise, NICOMACHUS reserves the name ποσόν (which in ARISTOTLE signifies the quantum in general) for the finite multitude, and the name πηλίκον for the finite magnitude.<sup>8</sup>

The distinction between determinate and indeterminate is essential to ancient Greek wisdom, for there is no science of the indeterminate or infinite (τὸ ἄπειρον). Thus, as PROCLUS relates, the mathematical sciences, according to the Pythagoreans, exclude the infinite from multitude and magnitude.<sup>9</sup> NICOMACHUS explains this thus:

Wisdom [τὴν σοφίαν], then, must be considered to be the knowledge [ἐπιστήμην = Lat. *scientia*] of these two forms [i.e., multitude and magnitude]. Since, however, all multitude and magnitude are by their own nature of necessity infinite [ἄπειρα, i.e., indefinite]—for multitude starts from a definite root and never ceases increasing; and magnitude, when division beginning with a limited whole is carried on, cannot bring the dividing process to an end, but proceeds therefore to infinity—and since sciences are always sciences of limited things, and never of infinities, it is accordingly evident that a science dealing either with magnitude, per se, or with multitude, per se, could never be formulated, for each of them is limitless in itself, multitude in the direction of the more, and magnitude in the direction of the less. A science, however, would arise to deal with something separated from each of them, with quantity [ποσόν, i.e., finite multitude], set off from multitude, and size [πηλίκον, i.e., finite magnitude], set off from magnitude.<sup>10</sup>

As PROCLUS observes, although numbers are susceptible of never-ending increase, yet any given number is delimited (πεπερασται).<sup>11</sup> Likewise, magnitudes are divisible indefinitely (ἐπ' ἄπειρον); yet, all divided magnitudes have boundaries (ὠρισται); and the actual parts of the whole are delimited (πεπερασται).

The importance of having limited quantities in science becomes evident in the act of measuring. We come to know the quantity of a line by measuring it from one point to the other. Likewise, the quantity of a number is known by counting, which begins in a unit and ends in a unit. It is impossible to come perfectly to know the quantity of a number that has no ending unit; or of a straight line that has no limiting point. For what is indeterminate cannot be perfectly known.

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<sup>7</sup> ARISTOTLE, *Metaphysica* Δ.13, 1020a13–14.

<sup>8</sup> See NICOMACHUS, *Introductio arithmeticae*, I.2.4, 4.13–20.

<sup>9</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 37.11–16.

<sup>10</sup> NICOMACHUS, *Introductio arithmeticae*, I.2.5, 4.20–5.12.

<sup>11</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 6.15–19.

Whenever we find the adjective *infinite* in the *Elements*, EUCLID is invariably referring to something indeterminate, whether it is the indefinite length of a line, or its indefinite augmentation or division, or the indefinite measurement of a number.<sup>12</sup> For example, when he requires the student to draw a perpendicular straight line to a given *infinite straight line* (εὐθεῖα ἄπειρος), the latter is specified by the symbol AB, which ostensibly indicates the indeterminate but limiting points.<sup>13</sup> Likewise, he defines **parallel straight lines** as “straight lines which, being in the same plane and being produced *infinitely* [εἰς ἄπειρον] in both directions, do not meet one another in either direction.”<sup>14</sup> And he demonstrates that “from a medial straight line are produced infinite [ἄπειροι] irrational straight lines [in multitude],<sup>15</sup> and none of them is the same as any of the preceding.”<sup>16</sup>

On the other hand, ancient Greeks sometimes call magnitudes “infinite.” For example, the circumference of a circle is said to be infinite because it has no end—nor does it have a beginning. Clearly, the quantity of such magnitudes is not actually infinite, and can be known based on its relation to another magnitude (e.g., the circumference and the radius); but this relation is not a number, as we shall see (► 5.6).

### 4.3. Figure

A **figure** (σχήμα) is “that which is contained by any boundary or boundaries,”<sup>17</sup> where a **boundary** (ὄρος, also called **term** in other contexts) is “that which is an extremity [πέρας] of anything.”<sup>18</sup> Clearly, having termini is what makes geometrical figures possible. But it should be further observed that, since a figure is first specified by its boundaries, ultimately the boundaries of a figure enter its definition.

Note also that the verb *to define* comes from the Latin *definire*, from *de-* + *finire*, to limit, from *finis*, boundary, end.<sup>19</sup> The same happens with the Greek ὀρισμένον, *definition*, from the verb ὀρίζω “to divide, separate from, as a border or boundary.” To define, then, is to *delimit*, to *determine* the principles that make a thing what it is, distinguishing it from others. It should not be surprising, then, that EUCLID defines figures in terms of their boundaries first; and thereafter, he distinguishes them by other intrinsic characteristics.

<sup>12</sup> See Wilbur Richard KNORR, “Infinity and Continuity: The Interaction of Mathematics and Philosophy in Antiquity,” in *Infinity and Continuity in Ancient and Medieval Thought*, ed. Norman KRETZMANN (Ithaca and London: Cornell University Press, 1982).

<sup>13</sup> Proposition 12 in EUCLID, *Opera Omnia*, vol. 1, 34.5.

<sup>14</sup> *Ibid.*, 8.3–5.

<sup>15</sup> HEATH adds “in number,” which is not in the Greek.

<sup>16</sup> The last Proposition (115) of Book x in *ibid.*, vol. 3, 370.6–7. Replacing HEATH’s “there arise” with “are produced,” for γίνονται.

<sup>17</sup> *Ibid.*, vol. 1, 4.7–8.

<sup>18</sup> *Ibid.*, 4.6.

<sup>19</sup> See *Merriam-Webster Dictionary*, entry for *define*.

From the above definition, it is evident that a line is a figure; for “the extremities of a line are points.”<sup>20</sup> But besides lines, there are also superficial and solid figures.

#### 4.4. Plane Figures

1. Among the superficial figures, it is plane figures that are primarily considered by EUCLID. They consist in plane surfaces with linear boundaries: for example, the triangle and the circle. A **plane surface** is “a surface which lies evenly with the straight lines on itself,” just as a **straight line** is “a line which lies evenly with the points on itself.”<sup>21</sup>

2. EUCLID defines the **circle** as “a plane figure contained by one line [called **circumference**]<sup>22</sup> such that all the straight lines falling upon it from one point amongst those lying within the figure are equal to one another. And the point is called the **center** of the circle.”<sup>23</sup>

3. A **diameter of the circle** is “any straight line drawn through the centre and terminated in both directions by the circumference of the circle, and such a straight line also bisects the circle.”<sup>24</sup> A **semicircle** is “the figure contained by the diameter and the circumference cut off by it. And the centre of the semicircle is the same as that of the circle.”<sup>25</sup> Note that the semicircle is defined in terms of the circle, and not the other way around.

4. Based on their boundaries, **rectilinear figures** are “those which are contained by straight lines, **trilateral figures** being those contained by three, **quadrilateral** those contained by four, and **multilateral** those contained by more than four straight lines.”<sup>26</sup> Thus, a triangle is first defined as a *trilateral* (τρίπλευρα) figure based on the species (i.e., line), quality (i.e., straight), and number (i.e., three) of its boundaries, and only later distinguished by its internal angles insofar as it is *triangular* (τρίγωνον).

5. The species of triangle are first distinguished by the comparative size of their sides: “an **equilateral triangle** is that which has its three sides equal, an **isosceles triangle** that which has two of its sides alone equal, and a **scalene triangle** that which has its three sides unequal.”<sup>27</sup>

6. Then, triangles are distinguished by their internal angles: “a **right-angled triangle** is that which has a right angle, an **obtuse-angled triangle** that which has an obtuse angle,

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<sup>20</sup> EUCLID, *Opera Omnia*, vol. 1, 2.3.

<sup>21</sup> Ibid., 2.9–10.

<sup>22</sup> Bracketed text in HEIBERG’s critical edition; omitted by HEATH.

<sup>23</sup> Ibid., 4.9–14.

<sup>24</sup> Ibid., 4.15–18.

<sup>25</sup> Ibid., 4.19–6.2.

<sup>26</sup> Ibid., 6.3–6.

<sup>27</sup> Ibid., 6.7–10.

and an **acute-angled triangle** that which has its three angles acute.”<sup>28</sup> Angles are defined by comparison to the right angle, which constitutes the unit for their measurement.

7. In turn, the **right angle** is defined based on the *equality* found in a perpendicular line: “When a straight line set up on a straight line makes the adjacent angles equal to one another, each of the equal angles is right, and the straight line standing on the other is called a perpendicular to that on which it stands.”<sup>29</sup> Thus, an **obtuse angle** is “an angle greater than a right angle,” and an **acute angle** is “an angle less than a right angle.”<sup>30</sup>

8. Finally, some plane figures with equal number of boundaries are further specified by both the relative equality or inequality of their boundaries and the angles that their contiguous boundaries (i.e., sides) make. Thus, of **quadrilateral figures**, “a **square** is that which is both equilateral and right-angled; an **oblong** that which is right-angled but not equilateral; a **rhombus** that which is equilateral but not right-angled; and a **rhomboid** that which has its opposite sides and angles equal to one another but is neither equilateral nor right-angled. And let quadrilaterals other than these be called **trapezia**.”<sup>31</sup>

#### 4.5. Solid Figures

Solid figures are solids that have surface boundaries. This includes the pyramid and the sphere. Although all solid figures are determined by surface boundaries, not all are defined in the same way; for only some solid figures are directly definable by their boundaries.

Among those that can be defined directly by their boundaries, a **pyramid** is “a solid figure, contained by planes, which is constructed from one plane to one point.”<sup>32</sup> A **prism** is “a solid figure contained by planes two of which, namely those which are opposite, are equal, similar and parallel, while the rest are parallelograms.”<sup>33</sup> A **cube** is “a solid figure contained by six equal squares.”<sup>34</sup> An **octahedron** is “a solid figure contained by eight equal and equilateral triangles.”<sup>35</sup> An **icosahedron** is “a solid figure contained by twenty equal and equilateral triangles.”<sup>36</sup> And a **dodecahedron** is “a solid figure contained by twelve equal, equilateral, and equiangular pentagons.”<sup>37</sup>

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<sup>28</sup> Ibid., 6.15–8.2.

<sup>29</sup> Ibid., 2.16–4.3.

<sup>30</sup> Ibid., 4.4–5.

<sup>31</sup> Ibid., 6.15–8.2.

<sup>32</sup> Ibid., vol. 4, 4.16–17.

<sup>33</sup> Ibid., 4.18–20.

<sup>34</sup> Ibid., 8.1–2.

<sup>35</sup> Ibid., 8.3–4.

<sup>36</sup> Ibid., 8.5–6.

<sup>37</sup> Ibid., 8.7–9.

#### 4.6. Constructive Definitions

Sometimes the boundaries must be somehow constructed for the figure to be defined. In such cases, what is constructed is not the figure itself, but a solid that “comprehends” it (the verb used is περιλαμβάνω). For example, a sphere does not have a beginning or an end. Therefore, properly speaking, it cannot be generated. But its container can be constructed thus: “when, the diameter of a semicircle remaining fixed, the semicircle is carried round and restored again to the same position from which it began to be moved,” the figure so comprehended [τὸ περιληφθὲν σχῆμα] is a **sphere**.<sup>38</sup>

Likewise, “when, one side of those about the right angle in a right-angled triangle remaining fixed, the triangle is carried round and restored again to the same position from which it began to be moved,” the figure so comprehended is a **cone**.<sup>39</sup> And similarly, “When, one side of those about the right angle in a rectangular parallelogram remaining fixed, the parallelogram is carried round and restored again to the same position from which it began to be moved,” the figure so comprehended is a **cylinder**.<sup>40</sup>

#### 4.7. Magnitude and Number Figures Compared

Unlike magnitudes, numbers do not as such constitute figures, even if they are limited, because their units have no position, as underscored above. Thus, the number three is always the number three regardless of whether its units are arranged in succession, like a line, or one on top of the others, like a triangle. Evidently, for units to constitute a specific figure, they must be extrinsically arranged in some configuration that is determined by their relative position, which is not essential to them.

However, depending on the properties of a number, the units that constitute it may or may not be extrinsically positioned in a way such that they resemble a geometrical figure: for example, a square or a triangle. Thus, all numbers can be arranged linearly, but not every number is susceptible of being configured in such a way that its units describe a square or a rectangle. Each number has specific properties that determine the geometric-like configurations it can take when its units are positioned relative to each other. Thus, numbers can in a way have *sides* (analogous to what we nowadays call *roots*, which is how BOETHIUS, based on PLATO, translated δυνάμεις).<sup>41</sup> For example, the side of the cubically arranged number twenty-seven is the linearly arranged number three; and the side of sixteen configured as a square is four (in linear disposition).

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<sup>38</sup> Ibid., 4.21–23.

<sup>39</sup> Ibid., 6.4–7.

<sup>40</sup> Ibid., 6.16–20.

<sup>41</sup> See Wilbur Richard KNORR, *The Evolution of Euclidean Mathematics* (Dordrecht: Reidel, 1975), 222.



In the *Elements* we read that “when two numbers having multiplied one another make some number, the number so produced is called **plane**, and its **sides** are the numbers which have multiplied one another.”<sup>42</sup> Likewise, “when three numbers having multiplied one another make some number, the number so produced is **solid**, and its **sides** are the numbers which have multiplied one another.”<sup>43</sup>

Such numbers have “boundaries” in which they are said to be “contained.” Thus, EUCLID defines **square number** as “equal multiplied by equal, or a number which is contained by two equal numbers.”<sup>44</sup> And the **cube number** is defined as “equal [number] multiplied by equal and again by equal, or a number which is contained by three equal numbers.”<sup>45</sup>

In NICOMACHUS we moreover read:

The point, then, is the beginning [ἀρχή “principle”] of dimension, but not itself a dimension [διδόστημα], and likewise the beginning of a line, but not itself a line; the line is the beginning of surface, but not surface; and the beginning of the two-dimensional, but not itself extended in two directions. Naturally, too, surface is the beginning of body, but not itself body, and likewise the beginning of the three-dimensional, but not itself extended in three directions. Exactly the same in numbers, unity [μονάς “monad”] is the beginning of all number that advances unit by unit in one direction; linear number is the beginning of plane number, which spreads out like a plane in one more dimension; and plane number is the beginning of solid number, which possesses a depth in the third dimension, besides the original ones.<sup>46</sup>

It was the Pythagoreans who first studied the properties that determine what figures a number can take, as Walter BURKERT explains:

[T]here is one remarkable type of arithmetic that appears exclusively in the Pythagorean tradition, in which numbers are represented by figures made with counters or pebbles, ψηφοί. [...] Aristotle knows the ψηφοί numbers, which reappear in Nicomachus and Theo[n]; [...] Aristotle speaks of triangular numbers, Euclid only of “plane” (that is, rectangular) and “solid” numbers.<sup>47</sup>

Observing the different dispositions of such pebbles is undoubtedly what allowed the Pythagoreans to research not only the quantitative properties of numbers, such as their measurability and divisibility, but also their *qualitative* properties, such as whether they are odd or even, square or rectangular.

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<sup>42</sup> EUCLID, *Opera Omnia*, vol. 2, 186.17–20.

<sup>43</sup> *Ibid.*, 186.21–24.

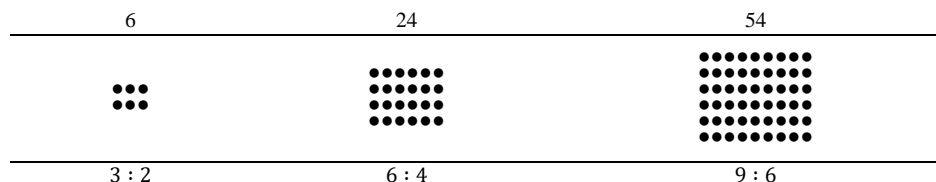
<sup>44</sup> *Ibid.*, 188.1–2.

<sup>45</sup> *Ibid.*, 188.3–4.

<sup>46</sup> NICOMACHUS, *Introductio arithmeticae*, II.7.1–3, 86.9–21.

<sup>47</sup> Walter BURKERT, *Lore and Science in Ancient Pythagoreanism* (Cambridge, Massachusetts: Harvard University Press, 1972), 427. THEON devotes several chapters to all sorts of polygonal numbers, including pyramidal ones: see *Expositio rerum mathematicarum...*, 26.14ff.

Beyond the intrinsic properties of numbers, these observations also enabled them and their successors to study *quantitative relations* between numbers (►5), as well as their *qualitative similarities* or proportions (►Figure 11; 6).



**Figure 11: Three geometrically proportional “rectangular numbers” (6, 24, and 54) expressed as multitudes of pebbles (ψηφοί) according to the Pythagorean practice.**

Eventually, through the application of principles that are analogically common to both number and magnitude, a geometric theory of relation and proportion would emerge. Such relations will be treated in the next two chapters (►5; 6).

#### **4.8. Figure and Infinity**

Evidently, since a figure is determined by its boundaries, there is no such thing as an (actually) infinite figure. Thus, an “infinite circle” is an oxymoron: it would have to be a magnitude at once *unlimited* (i.e., without a boundary), since it is (actually) infinite, and limited (bounded) by a line having the characteristics required by the definition of the circle. Such an “infinite circle” could not even have a center.

On the other hand, a figure can be infinite in the sense of being indeterminate: that is, susceptible of never-ending production or division. Thus, a line can be made indefinitely longer, or it can be divided indefinitely.

Finally, we should observe that the circumference, unlike the circle, is not a figure; for it has no boundaries. In this sense, as already noted, the circumference was often called *infinite*.

## 5. Ratio (λόγος)

As explained above, every number has specific properties arising from the different intrinsic relations it holds to its own parts, whether such parts are numbers or units: for example, absolutely speaking, a perfect number is equal to its parts added together. But beyond the examination of its properties in isolation, a number can moreover be found to be related in specific ways to other numbers or to the unit: for example, we have already considered how a number can be a part or parts of *another* number.

The relation of one number or unit to *another* number or unit, or of one magnitude to *another* of the same kind, is called λόγος by the Greeks. In Latin, this *logos* would at first be rendered as *ratio*, which the English language borrowed *literatim ca.* 1660.<sup>1</sup> However, BOETHIUS introduced a different translation that became dominant for many centuries: *proportio*, which is at the origin of the English *proportion*, first used in the fourteenth century—that is, about three centuries before *ratio*.<sup>2</sup> In English, as in Latin, the names *ratio* and *proportion* have been used interchangeably, albeit with varying prevalence.

As VON FRITZ explains, originally λόγος was not a technical term in Greek. Long before acquiring the restricted meaning of some “relation of one number or unit to another,” it had the general sense of “that which is meant in the discourse,” or the “communication of something essential about a thing.”<sup>3</sup> Hence, λόγος often refers also to the communicating verbal expression itself, which could run from a single word to a whole speech (e.g., a treatise).<sup>4</sup> However, in ancient times λόγος was rarely used in the sense of a *single word*. In fact, as BURKERT points out, “the sense ‘calculation’ comes from the basic meaning of the root λεγ- almost more directly than the sense ‘word’.”<sup>5</sup>

As BURKERT further observes, ancient Greeks used the noun λόγος, qualifying it with adjectives, to express specific interest rates in the loaning business. Thus, if the loaner expected back a payment of the principal plus a third part, the interest was called ἐπίτριτος

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<sup>1</sup> See *Merriam-Webster Dictionary*, entry for *ratio*.

<sup>2</sup> *Ibid.*, entry for *proportion*. See BOETHIUS, *De institutione arithmetica*, II.40, 137.

<sup>3</sup> VON FRITZ, *Grundprobleme der Geschichte der antiken Wissenschaft*, 406: “Der Sinn des Gesagten ist in dem, der es sagt und meint; aber sofern das, was er meint, sich doch auch auf etwas außerhalb dessen, der es meint, bezieht, ist der Sinn des Gesagten doch auch wiederum diese Sache oder deren Struktur oder Wesen selbst. [...] Von dieser Bedeutung des Wortes λόγος als *einer Mitteilung von etwas Wesentlichem an einem Gegenstand* ist die Übertragung auf das Zahlenverhältnis in seiner Funktion in der Musik nicht allzuschwer begreiflich.” The emphasis is ours; “communication of something essential about a thing” is the English rendering of the emphasized words, taken from BURKERT, *Lore and Science in Ancient Pythagoreanism*, 438.

<sup>4</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for λόγος.

<sup>5</sup> BURKERT, *Lore and Science in Ancient Pythagoreanism*, 440 and n. 79. Cf. LEWIS and SHORT, *A Latin Dictionary*, entry for *ratio*.

λόγος, literally “a ratio of one third over,” which is equivalent to a relation of four-to-three: that is, for every three of anything loaned, four are to be paid back. It was an ἐπίτεμπος λόγος “a ratio of one fifth over,” or a relation of six-to-five, if only a fifth part was expected to be added. Even interest calculation itself was called λόγος;<sup>6</sup> and the officials who calculated the interest on temple loans, λογισταί.<sup>7</sup> As BURKERT adds,

It is certain that the practice of loaning money at interest went back before the time of Solon [ca. 638–558 BC]; and, though there is no direct evidence, it can hardly be doubted that the expressions mentioned were in use that early—long before the day of Pythagoras. Thus when terms like this turn up in a musicological context—ἐπίτριτον and ἐπόδοον in Philolaus (fr. 6) and the general ἐπιμόριος λόγος in Archytas (A19)—they are borrowed from everyday speech.<sup>8</sup>

The names of such ratios would have been borrowed by the Pythagoreans to signify the numerical relations that correspond to musical intervals in the science of harmonics; for ratio and proportion were found—quite literally—to *account for* not only musical harmony but even astronomy (whence, the “harmony” or “music” of the spheres).

Both senses of λόγος converge in what most scholars, following ARISTOTLE, take to be a fundamental tenet of the Pythagoreans: that all things are numbers.<sup>9</sup> According to IAMBlichus, who is very likely reading from a now-lost work on the doctrines of the Pythagoreans written by ARISTOTLE, they believed that “Whoever wishes to contemplate the causes of beings should turn his attention to these things, the numbers and ratios [λόγων], because it is by them that everything is made clear.”<sup>10</sup> In other words, the ratios of numbers express the nature of things; and proportion, the order of the universe.

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<sup>6</sup> See BURKERT, *Lore and Science in Ancient Pythagoreanism*, 439.

<sup>7</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for λογιστής, where the function is explained as “auditor, esp. at Athens, in pl., a board which audited the accounts of magistrates going out of office = Lat. *curator rei publicae*, an Imperial commissioner and inspector of accounts.”

<sup>8</sup> BURKERT, *Lore and Science in Ancient Pythagoreanism*, 439.

<sup>9</sup> Some modern scholars, however, having unsuccessfully sought indisputable confirmation of this tenet in the extremely scarce, unquestionably Pythagorean sources at our disposal, believe that the consideration of numbers as principles of things is “the fruit of Aristotle’s tendentious interpretation,” his own “retrospective projection.” E.g., Leonid ZHMUD, *Pythagoras and the Early Pythagoreans* (Oxford: University Press, 2012), §11.2; Carl A. HUFFMAN, *Philolaus of Croton: Pythagorean and Presocratic* (Cambridge: Cambridge University Press, 1993), 63, and especially n. 12. In a personal communication, Prof. Thomas A. SZLEZÁK pointed me to the unfounded rejection of PLATO’s esoteric doctrines as the root cause of this preposterous belief. Indeed, not only ARISTOTLE possessed sources now lost to us, but, more importantly, the greatest philosopher of antiquity undoubtedly had a better understanding of what the tenets of those called *Pythagoreans* (οἱ καλούμενοι Πυθαγόρειοι: ARISTOTLE, *Metaphysica* A.5, 985b23) really were and what they implied—certainly much better than any historian, two and a half millennia later, can presume to have attained. By the same token, there are no sources confirming ARISTOTLE’s alleged distortion of this Pythagorean doctrine. On the contrary, ancient Greeks—including those who considered themselves to be the rightful successors of the Pythagoreans—generally follow him without objection: and they too had more sources at their disposal than we can begin to enumerate.

<sup>10</sup> BURKERT, *Lore and Science in Ancient Pythagoreanism*, 50; see especially n. 112, where BURKERT explains how he reconstructed what he takes to be ARISTOTLE’s text from IAMBlichus, *De communi mathematica scientia*, 78.8–21.

As Andrew BARKER explains, Pythagoreans of different ages and persuasions endorsed, at least for the most part, precisely the same common metaphysical conviction:

[I]n the majority of “Pythagorean” writers, the study of harmonics is part of a much larger enterprise, designed to show how the same principles govern “harmonious” relations between the elements of all significant structures in the cosmos. The universe and its parts are all subject to the same perfect patterns of intelligible mathematical order. This programme was pursued in many different ways and with different preconceptions about the nature and source of that order, but the projects undertaken by Philolaus, Archytas, Plato, Theon, Nicomachus, Ptolemy and Aristides Quintilianus all stem from a similar aspiration. In mathematics, and especially in mathematical harmonics, lies the key to the rational organisation of the universe.<sup>11</sup>

It is not difficult to see how someone impressed by the explanatory power of mathematics could place it on the pedestal of the highest science. Indeed, as ARISTOTLE implies, those who were called *Pythagoreans* would have turned mathematics into metaphysics, the science that studies the principles common to all beings:

[T]he <so->called Pythagoreans, who were the first to take up mathematics, not only advanced this study, but also having been brought up in it they thought its principles were the principles of all things [τῶν ὄντων ἀρχὰς... πάντων]. Since of these principles numbers are by nature the first, and in numbers they seemed to see many resemblances to the things that exist and come into being [...]; since, again, they saw that the modifications [πράθη “affections”] and the ratios [λόγους] of the [musical] harmonies were expressible in numbers; since, then, all other things seemed in their whole nature to be modelled on numbers, and numbers seemed to be the first things in the whole of nature, they supposed the elements of numbers to be the elements of all things, and the whole heaven to be a harmony and a number.<sup>12</sup>

To summarize: the λόγος or *ratio* of a thing was understood by the ancient Greeks to be an expression of its nature. The Pythagoreans then discovered that some relations between numbers express the nature of musical intervals, and unsurprisingly called such relations λόγους. They then proceeded to mathematically research such relations.

### 5.1. Ratio of a Number or Unit to Another

In arithmetic, λόγος must have originally been understood as “any kind of relation between two numbers,” as Árpád SZABÓ suggests.<sup>13</sup> Only later would its use have been narrowed down “by a process of specialization” to a specific type of relation. To be more precise, λόγος originally denoted the “relation of a number or unit to another number or unit”; but,

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<sup>11</sup> Andrew BARKER, *Greek Musical Writings: II Harmonic and Acoustic Theory* (Cambridge: Univ. Press, 1989), 8.

<sup>12</sup> ARISTOTLE, *Metaphysica* A.5, 985b23–986a3; replacing “musical scale” with “harmony” for ἁρμονία.

<sup>13</sup> Árpád SZABÓ, *The Beginnings of Greek Mathematics*, trans. A. M. UNGAR (Dordrecht: Reidel, 1978), 167. SZABÓ fails, however, to discover the true reasons for what he calls the “specialization” of λόγος, which will be extricated below.

as we shall see, it was later narrowed down to only one kind: namely, the ratio that founds geometric proportion; for this relation was discerned to be naturally more fundamental than the others, and therefore absolutely prior and more deserving of the name λόγος. This narrowed-down understanding of λόγος is what we find in the *Elements*.

EUCLID does not define *numerical ratio*, but he does define **proportional numbers**: “Numbers are [geometrically] proportional when the first is the same multiple, or the same part, or the same parts, of the second that the third is of the fourth.”<sup>14</sup> Hence, **numerical ratio** (according to geometric proportion) is, certainly, “the relation of a number or unit to another number or unit such that one of them is a part or parts of the other.”<sup>15</sup>

Note that the greater term of a ratio is called πρόλογος, *antecedent*, by the ancient Greeks; and the less, υπόλογος, *consequent*.<sup>16</sup> We will use these names in the ensuing discussion. BOETHIUS, on the other hand, calls them *duces* and *comites*, respectively.<sup>17</sup>

## 5.2. Species of Numerical Ratio

The relation between two numerical terms can be of different species. But the first, fundamental distinction, according to NICOMACHUS (along with the other ancient authors known to us), is that between the equal and the unequal:

Of relative quantity [τοῦ πρὸς τι ποσοῦ], then, the highest generic divisions are two, equality and inequality; for everything viewed [θεωρούμενον] in comparison with another thing is either equal or unequal, and there is no third <thing> besides these.<sup>18</sup>

NICOMACHUS is not the first to highlight the importance of *the ratio of equality*, nor is this an exclusively Pythagorean theme. It is found in PLATO and ARISTOTLE.<sup>19</sup> THEON mentions it under the authority of the Peripatetic ADRASTUS:

[ADRASTUS] shows that the ratio of equality [ὁ τῆς ἰσότητος λόγος] is fundamental [ἀρχηγὸς] and first [πρώτος], and is the element of the aforesaid ratios [i.e., the ones that give rise to arithmetic, geometric, and harmonic proportions], and of the proportions that fall under them, for from it are first composed [συνίσταται], and in it are resolved [ἀναλύεται], all ratios and proportions.<sup>20</sup>

<sup>14</sup> EUCLID, *Opera Omnia*, vol. 2, 188.5–7.

<sup>15</sup> Confront EUCLID, *Opera Omnia*, vol. 2, 2.6–7, where a ratio between magnitudes is defined, with *ibid.*, 296.19–23, where a unit is said to be in continued proportion and is compared in the same way that a number is to a number in any ratio. Therefore, every term in a relation is either a number or a unit.

<sup>16</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entries for πρόλογος and υπόλογος.

<sup>17</sup> See MASI, *Boethian Number Theory*, 103 n. 45.

<sup>18</sup> NICOMACHUS, *Introductio arithmeticae*, I.17.2, 44.10–13.

<sup>19</sup> See, for example, ARISTOTLE, *Metaphysica* Γ.2, 1004b10–13.

<sup>20</sup> THEON, *Expositio rerum mathematicarum...*, 107.10–14: “δείκνυσι δὲ [ὁ Ἄδραστος] ὅτι ὁ τῆς ἰσότητος λόγος ἀρχηγὸς καὶ πρώτος ἐστὶ καὶ στοιχεῖον πάντων τῶν εἰρημένων λόγων καὶ τῶν κατ’ αὐτοὺς ἀναλογιῶν· ἐκ πρώτου γὰρ τούτου πάντα συνίσταται εἰς τοῦτον ἀναλύεται τὰ τε τῶν λόγων καὶ τὰ τῶν

While equality is of one species only, there are multiple species of the unequal, which is first divided into *the greater* and *the less*. NICOMACHUS offers the following division of *ratio* (i.e., the ratio found in geometric proportion) into its first species (this division, as Frank E. ROBBINS and Louis C. KARPINSKI observe, “was no doubt the ordinary scientific one”):<sup>21</sup>

[T]here is no such thing as this kind of equality and that kind, but the equal exists in one and the same manner. [...] The unequal, on the other hand, is split up by subdivisions, and one part of it is the greater, the other the less, which have opposite names and are antithetical to one another in their quantity and relation. For the greater is greater than some other thing, and the less again is less than another thing in comparison, and their names are not the same, but they each have different ones [...]. Moreover, of the greater, separated by a second subdivision into five species, one kind is the multiple [πολλαπλάσιον], another the superparticular [ἐπιμόριον], another the superpartient [ἐπιμερές], another the multiple superparticular [πολλαπλασιεπιμόριον], and another the multiple superpartient [πολλαπλασιεπιμερές]. And of its opposite, the less, there arise similarly by subdivision five species, opposed to the foregoing five varieties of the greater, the submultiple [ὑποπολλαπλάσιον], subsuperparticular [ὑπεπιμόριον], subsuperpartient [ὑπεπιμερές], submultiple-superparticular [ὑποπολλαπλασιεπιμόριον], and submultiple-superpartient [ὑποπολλαπλασιεπιμερές]; for as whole answers to whole, smaller to greater, so also the varieties correspond, each to each, in the aforesaid order, with the prefix sub- [ὑπο-].<sup>22</sup>

1. NICOMACHUS goes on to present an account of each of these ten species of the unequal, i.e., five of the greater, and the corresponding five of the less. Thus, the **multiple** (πολλαπλάσιον), which by nature is the first species of the greater, occurs when a number contains the whole of another number multiple times.<sup>23</sup> For example, four is the *double* (διπλάσιος) of two; for it contains the whole of two twice. And six is the *triple* (τριπλάσιος) of two; for it contains the whole of two thrice. To this ratio of the greater corresponds the first species of ratio of the less, called **submultiple** (ὑποπολλαπλάσιον), in which a number completely measures multiple times a greater number (or, in other words, a number is wholly contained in another number multiple times). For example, two is *half* (ὑποδιπλάσιος “subdouble,” as he calls it here)<sup>24</sup> of four; for it measures four twice. And it is also a *third* (ὑποτριπλάσιος “subtriple”) of six; for two measures six thrice (► Figure 12).

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ἀναλογιών.” The translation is ours; cf. Jean DUPUIS (tr.), *Théon de Smyrne, Philosophe Platonicien: Exposition des Connaissances Mathématiques Utiles pour la Lecture de Platon* (Paris: Librairie Hachette, 1892), 177: “Adraste montre que la raison d’égalité est la première en ordre, et que c’est l’élément de toutes les raisons dont nous avons parlé précédemment et de toutes les proportions qu’elles donnent. Car c’est d’elle que naissent toutes les autres et c’est en elle qu’elles se résolvent toutes.”

<sup>21</sup> In NICOMACHUS, *Introduction to Arithmetic*, trans. Martin Luther D’OOGÉ, 213 n. 1.

<sup>22</sup> NICOMACHUS, *Introductio arithmeticae*, I.17.4–8, 45.3–46.8.

<sup>23</sup> *Ibid.*, I.18, 46.9ff. Most of the English terms used here have fallen in disuse. They come from the Latin tradition that originated in BOETHIUS, *De institutione musica*, I.4, 191–2.

<sup>24</sup> Elsewhere, NICOMACHUS instead uses ἡμισυς (half), τρίτος (third), etc., as observed in D’OOGÉ’s version. It should be noted, however, that D’OOGÉ (or his posthumous editors, ROBBINS and KARPINSKI) calls these ratios “fractions,” following the widespread fiction already noted.



Figure 12: Multiple and submultiple.  
Six is a multiple (the triple) of two.  
Two is a submultiple (the third) of six.

2. The second species of the greater, “both naturally and in order,” is the **superparticular** (ἐπιμόριος), which occurs when a number contains within itself the whole of the number compared with it, and one part of it.<sup>25</sup> It takes different names according to the part that is added. For example, three is the *sesquialter* (ἡμιόλιος) of two; for three contains within itself the whole of two and one half of two. And nine is the sesquialter of six because nine contains within itself the whole of six and one half of six. Likewise, four is the *sesquitercian* (ἐπίτριτος) of three because four contains within itself the whole of three and one third of three. Corresponding to this species of the greater, is the second species of the less, called **subparticular** (ὑπεπιμόριος; in IAMBlichus, ὑποεπιμόριος), which occurs when the less and one part of it is contained by the greater. Thus, two is the *subsesquialter* (ὑφημιόλιος) of three because two and one half of two are contained in three. And three is the *subsesquitercian* (ὑπεπίτριτος) of four because three and one third of three are contained in four (► Figure 13).



Figure 13: Superparticular and subparticular.  
Three is a superparticular (the sesquialter) of two.  
Two is a subparticular (the subsesquialter) of three.

3. The **superpartient** (ἐπιμερής), which is the third species of the greater, occurs when a number contains within itself the whole of the number compared and in addition more than one part of it.<sup>26</sup> It takes different names according to the parts added. Thus, five is the *superbipartient* (ἐπιδιμερής) of three because five contains within itself the whole of three and two thirds of three. And ten is the *supertripartient* (ἐπιτριμερής) of six because ten contains within itself the whole of six and in addition two thirds of six. To this species of the greater relates the **subsuperpartient** (ὑπεπιμερής), the third species of the less (► Figure 14).



Figure 14: Superpartient and subsuperpartient.  
Five is a superpartient (the superbipartient) of three.  
Three is a subsuperpartient (the subsuperbipartient) of five.

4. The fourth species of the greater is the **multiple superparticular** (πολλαπλασι-επιμόριος), which occurs when the greater of the compared terms contains within itself

<sup>25</sup> NICOMACHUS, *Introductio arithmeticae*, I.19, 49.1ff.

<sup>26</sup> *Ibid.*, I.20, 55.12ff.



the lesser term more than once and in addition some one part of it.<sup>27</sup> Being a compound (σύνθετος), this species “is doubly diversified after the peculiarities of nomenclature of its components on either side; for inasmuch as the multiple superparticular is composed of the multiple and superparticular generically, it will have in its subdivisions according to species a sort of diversification and change of names proper both to the first part of the name and to the second.”<sup>28</sup> For example, five is the *double sesquialter* (διπλασιεφήμισυς) of two because five contains two twice within itself and, in addition, one half of two. And seven is the *triple sesquialter* (τριπλασιεφήμισυς) of two because seven contains two thrice within itself and, in addition, one half of two. Corresponding to this species of greater is the fourth species of less, called **submultiple subparticular** (► Figure 15).



**Figure 15: Multiple subparticular and submultiple subparticular.**  
**Five is a multiple superparticular (the double sesquialter) of two.**  
**Two is a submultiple subparticular (the subdouble subsesquialter) of three.**

5. The final species of the greater is the **multiple superpartient** (πολλαπλασιεπιμερής), which occurs when a number contains the whole of the number compared more than once (that is, twice, thrice, or any number of times) and some parts of it.<sup>29</sup> Thus, for example, eight is the *double superbipartient* (διπλασιεπιδιμερής) of three because eight contains the whole of three twice and two thirds of three. To this species of the greater corresponds the fifth species of the less, the **submultiple subsuperpartient** (► Figure 16).



**Figure 16: Multiple superpartient and submultiple subsuperpartient.**  
**Eight is a multiple superpartient (the double superbipartient) of three.**  
**Three is a submultiple subsuperpartient (the subdouble subsuperbipartient) of eight.**

◀ All the above ratios are defined in terms of the antecedent containing the consequent, or of the consequent being contained in the antecedent. But even more importantly, these ratios are defined also in terms of *part* or *parts* of a whole, which are technical terms, as discussed above (► 3). Therefore, properly to understand these species of ratios, we should be careful not let ourselves be carried away by useful but oversimplified algebraic and set-theoretic explanations, such as the following one offered by ROBBINS and KARPINSKI:

The fundamental relations of number, as the Greek *arithmetica* states, are equality and inequality, and the latter is further divided into two classes, the greater and the less. Furthermore, each of these latter has five subdivisions, those of the greater being multiples, as,  $mn : n$ ;

<sup>27</sup> Ibid., I.22, 59.7ff.

<sup>28</sup> Ibid., I.22.2, 59.10ff.

<sup>29</sup> Ibid., I.23, 63.22ff.

superparticulars, as  $n + 1 : n$ ; superpartients, as  $n + k : n, k > 1$ ; multiple superparticulars, as  $mn + 1 : n, m > 1$ ; multiple superpartients, as  $mn + k : n$ , both  $m$  and  $k$  being greater than 1.<sup>30</sup>

NICOMACHUS not only provides an exhaustive division of the genus of numerical ratio, but also explains how all ratios are generated from the “logos of equality.” He does so by applying the so-called “method of the three rules,” which is capable of “proving that all the complex species of inequality and the varieties of these species are produced [γεννᾶσθαι] out of equality, first and alone [μονωτέτης καὶ πρωτίστης], as from a mother and root.”<sup>31</sup> A discussion of this method is beyond our scope, but its importance, at least from a viewpoint inspired by the Pythagoreans, should not be neglected, as we learn from NICOMACHUS:

There is, however, a method [ἔφοδος] very exact and necessary for all discussion of the nature of the universe which very clearly and indisputably presents to us the fact that that which is fair and limited, and which subjects itself to knowledge, is naturally prior to the unlimited, incomprehensible, and ugly, and furthermore that the parts and varieties of the infinite and unlimited are given shape and boundaries by the former, and through it attain to their fitting order and sequence, and like objects brought beneath some seal or measure all gain a share of likeness to it and similarity of name when they fall under its influence. For thus it is reasonable that the rational part of the soul will be the agent which puts in order the irrational part, and passion and appetite, which find their places in the two forms of inequality, will be regulated by the reasoning faculty as though by a kind of equality and sameness. And from this equalizing process there will properly result for us the so-called ethical virtues, sobriety, courage, gentleness, self-control, fortitude, and the like.<sup>32</sup>

### 5.3. Ratio of a Magnitude to Another

There are two definitions of λόγος in the *Elements*. Both occur in Book V and apply only to magnitudes. The first one states that a **ratio** is “a sort of relation [σχέσις] in respect of size [κατὰ πηλικότητα] between two homogeneous magnitudes.”<sup>33</sup> Thus, according to this definition, a ratio is any relation in respect of size of a line to another line; or, of a surface to another surface; or, of a solid to another solid; or, of an angle to another angle.

The second definition of **ratio** found in the *Elements* is more specific. It states that “magnitudes are said to have a ratio to one another which are capable, when multiplied, of exceeding one another.”<sup>34</sup> Although, like the first one, this definition applies exclusively to magnitudes, it is moreover delimited to only one kind of relation between magnitudes: that found in geometric proportion, which is the most fundamental kind of λόγος, as we

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<sup>30</sup> NICOMACHUS, *Introduction to Arithmetic*, trans. Martin Luther D’Ooge, 52.

<sup>31</sup> NICOMACHUS, *Introductio arithmeticae*, I.23.6, 65.18–21.

<sup>32</sup> *Ibid.*, I.23.4–5, 64.23–65.16.

<sup>33</sup> EUCLID, *Opera Omnia*, vol. 2, 2.6–7.

<sup>34</sup> *Ibid.*, 8–9.

shall see. Provided we correctly understand what is meant by *number* and *magnitude*, we can express this definition in modern algebraic notation thus: a magnitude  $a$  has a ratio to a homogeneous magnitude  $b$  if  $ma > b$  and  $nb > a$ , for some numbers  $m$  and  $n$ .

#### 5.4. Ratios of Numbers and of Magnitudes Compared

Number and magnitude agree in that each is measured by its homogeneous parts. Thus, every number—even a prime one—is measured by the homogeneous unit-parts of which it is composed; and composite numbers are measured by their homogeneous number-parts. Likewise, a line is measured by its half, which is homogeneous; for every part of a line is a line. A surface is measured by its third, which is homogeneous; for every part of a surface is a surface. Likewise, a solid is measured by any of its parts, each of which is also a solid—that is, a homogeneous magnitude. And the same can be said, of course, of angles, even if they are not *magnitudes* in the same sense as the other three species.

On the other hand, two magnitudes do not necessarily have a common measure. For example, it is impossible to find a line that can measure both the side and the diameter of a square, as the ancients discovered (►5.5). Likewise, there is no common measure of the circumference of the circle and its diameter. Indeed, EUCLID scientifically demonstrates in Propositions 5–8 of Book x that “commensurable magnitudes have to one another the ratio which a number has to a number,” but incommensurable magnitudes do not.<sup>35</sup>

Thus, the commensurability of magnitudes can only be known by comparison to that of numbers. This comes to show that ratio is, in a way, prior in numbers than in magnitudes (►2.3; 2.4).

#### 5.5. Rationality and Irrationality

Commensurability and incommensurability of magnitudes is at the basis of rationality and irrationality in geometry. EUCLID defines these terms in the beginning of Book x:

Those magnitudes are said to be commensurable [σύμμετρα] which are measured by the same measure, and those incommensurable [ἄσύμμετρα] which cannot have any common measure.

Straight lines are commensurable in square [δυνάμει, lit., *virtually, in potency*; cf. Lat. *potentiā*] when the squares [τετράγωνα] on them are measured by the same area, and incommensurable in square when the squares on them cannot possibly have any area as a common measure.

With these hypotheses, it is proved that there exist straight lines infinite in multitude [πλήθει ἄπειροι] which are commensurable and incommensurable respectively, some in length [μήκει] only, and others in square [δυνάμει] also, with an assigned straight line. Let then the assigned straight line be called rational [ῥητή], and those straight lines which are commensurable with it,

<sup>35</sup> EUCLID, *Opera Omnia*, vol. 3, 16.11–12.

whether in length and in square or in square only, rational, but those which are incommensurable with it irrational [ἄλογοι].

And let the square on the assigned straight line be called rational and those areas which are commensurable with it rational, but those which are incommensurable with it irrational, and the straight lines which produce [δυνάμεναι] them irrational, that is, in case the areas are squares, the sides themselves, but in case they are any other rectilinear figures, the straight lines on which are described squares equal to them.<sup>36</sup>

### 5.6. Fiction: “Classical Greeks recognized irrational numbers”

From the last quote, we can readily observe that it is not to denote *numbers* but *ratios between magnitudes* that the names *rational* and *irrational* were first used. Properly speaking, then,  $\sqrt{2}$  does not signify a number (i.e., a measurable multitude), but *the relation of one magnitude to another*: that is, *the ratio of the diameter to the side of the square*. Likewise,  $\pi$  is not properly the symbol of a number, but of *the ratio of the circumference to the diameter of the circle*.

To use the name *number*, as we do today, to signify both a *measurable multitude* and *the relation of one magnitude to another*, is to equivocate. This equivocation does have—quite literally—some rational grounds; for it is by analogy that we call ratios *numbers*. But this analogy, as we will see (► 68.1), does not belong itself to mathematics as understood by the ancient Greeks; for their mathematics strictly speaking consist in two distinct sciences: one dealing with number, called *arithmetic*; and another, with magnitude, called *geometry*. And, in this sense, there is no other mathematical science above or apart from these two (► 7.4).

### 5.7. Fiction: “The discovery of incommensurability led to a foundational crisis”

As Wilbur Richard KNORR explains, Heinrich SCHOLZ and Helmut HASSE created a “modern fiction” when they claimed that there had been a “foundational crisis” in the wake of the discovery of incommensurability by the Pythagoreans in the fifth century BC.<sup>37</sup>

The notion of “foundational crisis” was already present in TANNERY’s study of Greek geometry but was developed and extended by SCHOLZ and HASSE.<sup>38</sup> KNORR’s assessment should be enough to dispel this myth:

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<sup>36</sup> Ibid., 2.2–4.3.

<sup>37</sup> See Helmut HASSE and Heinrich SCHOLZ, *Die Grundlagenkrisis der griechischen Mathematik* (Berlin: Pan-Verlag, 1928). On the dating and known impact of the discovery of incommensurability, see KNORR, *The Evolution of Euclidean Mathematics*, 36–49.

<sup>38</sup> See Paul TANNERY, *La Géométrie Grecque* (Paris: Gauthier-Villars, 1887), 98: “La découverte de l’incommensurabilité par Pythagore dut donc causer, en Géométrie, un véritable scandale logique, et, pour y échapper, on dut tendre à restreindre autant que possible l’emploi du principe de similitude, en attendant qu’on fût arrivé à l’établir sur une théorie de la proportionnalité indépendante de l’hypothèse de la commensurabilité.”

To be sure, this discovery [i.e., the discovery of incommensurability] was held to be significant: late writers suggest it was maintained as a secret of the school—but was it a challenge? Consider that the Pythagoreans based their natural philosophy on the conception of the world in terms of number and other mathematical categories, that is, in terms of certain abstract, rather than material principles.<sup>39</sup> The discovery of incommensurability might well *support* this view: for there is a property of certain lines, for instance, the side and the diameter of the square, which we can appreciate through a sequence of deductions to be necessarily true of these lines: yet no effort of practical measurement, no perception or procedure of an empirical character, could bring us to an awareness of this fact or of its certainty. Thus, the Pythagorean insistence on number as a fundamental principle could be *affirmed*: and we should note that the school never did relinquish its adherence to this principle.

When Tannery and Hasse and Scholz jump to the conclusion that the incommensurable was a counter-example to Pythagorean geometric method, they are thus already assuming the thesis of the foundations crisis.<sup>40</sup>

### 5.8. Fiction: “Euclid’s first definition of *ratio* is metaphysical”

Because of its perceived “logical uselessness,” some moderns have concluded that EUCLID’S first definition of *ratio* (λόγος), “a sort of relation in respect of size between two homogeneous magnitudes,” despite being attested unanimously by the manuscript tradition, must be an interpolation.<sup>41</sup> Alas, this definition cannot be so easily dismissed based only on logical utility. Such an argument is less revealing of ancient science than of modern beliefs, which can be illustrated by quoting HEATH’S romantically inspired opinion (which is based on BARROW’S):

The true explanation of its presence would appear to be substantially that given by [Isaac] Barrow (*Lectiones Cantabrig.*, London, 1684, Lect. III. of 1666), namely that Euclid inserted it for completeness’ sake, more for ornament than for use, intending to give the learner a general notion of ratio by means of a metaphysical, rather than a mathematical definition; “for metaphysical it is and not, properly speaking, mathematical, since nothing depends on it or is deduced from it by mathematicians, nor, as I think, can anything be deduced.”<sup>42</sup>

According to HEATH and BARROW, then, EUCLID’S first definition of λόγος is metaphysical. But this claim is contradictory: for if the definition were metaphysical, it would apply, as do all common notions, not only to the genus of magnitude but to every genus analogically (► 1.2).

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<sup>39</sup> Although KNORR’S wording seems closer to Platonic rather than Pythagorean tenets, the conclusion is the same: magnitudes can only be determined to be incommensurable by comparing their ratios to those of numbers; therefore, numbers are first and most fundamental.

<sup>40</sup> Wilbur Richard KNORR, “The Impact of Modern Mathematics on Ancient Mathematics,” in *Classics in the History of Greek Mathematics*, 245–253; italics in the source. This paper was originally delivered as a lecture at the Annual Convention of the History of Science Society in Atlanta on December 28, 1975.

<sup>41</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 117.

<sup>42</sup> *Ibid.*

Ironically, on the other hand, HEATH and BARROW do not seem to object to common notions being clearly metaphysical. Indeed, their sole concern with this definition is rather its impracticality from a logician's point of view. In other words, they view mathematics as a logical deductive system, rather than as a science in the ancient Greek sense: and if something fails to serve the purpose of logical deduction, they see no place for it in mathematics. Yet, the purpose of including a λόγος that expresses the nature of another λόγος is evidently not the mere ornamentation of a work—not, certainly, to an ancient Greek scientist.

## 6. Proportion (ἀναλογία)

As observed above (►5), the English *proportion* originates in the Latin *proportio*, which was used by BOETHIUS to render λόγος, *ratio*. However, *proportio* already had in classical Latin an established use with a different but closely related meaning. Five centuries before BOETHIUS, Marcus Tullius CICERO (106–43 BC) introduced *proportio* as a substitute for *analogia*, a noun that had been borrowed literatim from the Greek ἀναλογία.<sup>1</sup> But by then, *analogia* had long been “admitted to citizen rank by Latin scholars,” as SENECA the Younger (4 BC–AD 65) remarks,<sup>2</sup> and would remain the prevalent term until BOETHIUS.

BOETHIUS, in turn, uses *proportionalitas* (proportionality) to translate ἀναλογία. Since his texts on arithmetic, music, and geometry (the latter, for the most part, by attribution) were the “standard” in the middle ages, this use became widespread.<sup>3</sup> Even versions of Arabic manuscripts that began flowing into the Latin West since the eleventh century (notably, all translations of EUCLID’s *Elements*)<sup>4</sup> follow the same convention. As an effect of this choice, the English *proportion* suffers from the same ambiguity: it means either *ratio* or *analogy* (the noun *analogy* itself having been introduced in the fifteenth century).<sup>5</sup>

### 6.1. Etymology

The Greek ἀναλογία derives from ἀνάλογον, which in English is generally rendered as *proportional* or *proportionate* (these forms were introduced in the fourteenth century, while *analogous* has been in use since 1646).<sup>6</sup> The derivation of ἀναλογία from ἀνάλογον

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<sup>1</sup> Marcus Tullius CICERO, *Opera rhetorica et philosophica*, vol. IV (London: Rodwell and Martin, et al., 1820), *Timaeus sive De universitate*, IV in fine, 433: “Id optime assequitur, quae Graece Αναλογία, Latine (audendum est enim, quoniam haec primum a nobis novantur), *comparatio*, *proportio*-ve, dici potest.”

<sup>2</sup> SENECA, *Ad Lucilium epistulae morales*, trans. Richard M. GUMMERE, 3 vols., vol. 3 (Cambridge, Massachusetts: Harvard University Press, 1971), CXX.4, 382: “Nobis videtur observatio collegisse et rerum saepe factarum inter se conlatio, per analogian nostri intellectum et honestum et bonum indicant. Hoc verbum cum Latini grammatici civitate donaverint, ego damnandum non puto, puto in civitatem suam redigendum. Utar ergo illo non tantum tamquam recepto, sed tamquam usitato.”

<sup>3</sup> See BOETHIUS, *De institutione arithmetica*, II.40, 137; *De institutione musica*, II.12, 241; Menso FOLKERTS, “Boethius” *Geometrie II: Ein Mathematisches Lehrbuch des Mittelalters* (Göttingen: Georg-August University, 1967, for the Dissertation; Wiesbaden: Franz Steiner Verlag GMBH, 1970, for the later edition), 189. On the influence of BOETHIUS in the Latin West, see Olaf PEDERSEN, *The First Universities*, trans. Richard NORTH (Cambridge: Cambridge University Press, 1997; reprinted, 2009), 64–65; 42–43; Menso FOLKERTS, “The Importance of the Pseudo-Boethian Geometria during the Middle Ages,” in *Essays on Early Medieval Mathematics* (Aldershot and Burlington: Ashgate, 2003).

<sup>4</sup> See ANARITIUS, *In decem libros priores Elementorum Euclidis commentarii*, (Leipzig: Teubner, 1899), 154; Hubert L. L. BUSARD, *The Translation of the Elements of Euclid from the Arabic into Latin by Hermann of Carinthia (?)* (Leiden: E. J. Brill, 1968), 95; *The First Translation of Euclid’s Elements Commonly Ascribed to Adelard of Bath* (Toronto: Pontifical Institute of Mediaeval Studies, 1983), 145; BUSARD and FOLKERTS, *Robert of Chester’s (?) Redaction of Euclid’s Elements, the So-Called Adelard II Version* (Basel: Birkhäuser, 1992), 161; *Johannes de Tinemue’s Redaction of Euclid’s Elements, the So-Called Adelard III Version* (Stuttgart: Franz Steiner, 2001), 127; BUSARD, *Campanus of Novara and Euclid’s Elements* (Stuttgart: Franz Steiner, 2005), 160–61.

<sup>5</sup> See *Merriam-Webster Dictionary*, entries for *analogy* and *proportion*.

<sup>6</sup> See *ibid.*, entries for *proportionate*, *proportional*, and *analogous*.

follows a regular procedure in Greek: by the addition of the suffix -ία, abstract nouns that signify qualities, such as σοφ-ία (wisdom), are formed from adjectives, such as σοφ-ός (wise).<sup>7</sup> Thus, ἀναλογία is an abstract noun that denotes the quality of being ἀνάλογον: just as wisdom is that which makes someone wise, so ἀναλογία (*analogy, proportion*) is that which makes something ἀνάλογον (*analogous, proportional, proportionate*).

In turn, ἀνάλογον originates in the prepositional phrase ἀνά λόγον. In its most general sense, this phrase is taken to mean “according to a [due] λόγος,”<sup>8</sup> that is, according to some specific *ratio* (or “in accordance with an intelligible structure,” as some would say today). Better to understand why this would be the general sense, we will analyze the different uses of the preposition ἀνά, and how λόγος was utilized in other prepositional phrases in a way that is somewhat akin to ἀνά λόγον.

Like most other Greek prepositions, ἀνά was originally an adverb.<sup>9</sup> It meant *up*, as opposed to κατά, *down*, although it also acquired other derived senses.<sup>10</sup> As an adverb, it commonly appears in composition with verbs, sometimes adding the nuance of repetition, as in ἀναβίωσις, *re-surrection*, and ἀνάγνωσις, *re-cognition*.<sup>11</sup> But when ἀνά functions as a preposition, it is used as an independent word to connect nouns with other parts of the sentence: then, it usually governs the noun in the accusative case and implies motion upwards (as opposed to κατά, downwards).<sup>12</sup> It has other senses too, but before we examine more of its peculiarities, it is convenient to consider how other prepositions are used in conjunction with λόγος to signify something similar to ἀνά λόγον.

When the prepositions εἰς, κατά, and πρὸς govern λόγος (and it seems they did so long before ἀνά; ►6.2), they may convey a meaning akin to ἀνά λόγον. Thus, we read in HERACLITUS, “[Earth] is liquefied as sea and measured into the same proportion it had before it became earth,” where “into the same proportion [i.e., ratio]” is a translation of εἰς τὸν αὐτὸν λόγον.<sup>13</sup> Similarly, we read in HERODOTUS, “she bricked with baked bricks, like

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<sup>7</sup> See William Watson GOODWIN, *A Greek Grammar* (London: St. Martin's Press, 1991), n. 842. These derivations are also underlined by SZABÓ, *The Beginnings of Greek Mathematics*, 148. See Marcus Terentius VARRO, *De lingua latina*, ed. Leonard Spengel (Berlin: Weidmann, 1885), X.37, 248.19–249.2.

<sup>8</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἀνάλογος. SZABÓ argues instead that this is “both erroneous and widely accepted,” and suggests the translation “(taken) *in logoi*,” just like ἀνά μέρος is “(taken) *in parts*” (*The Beginnings of Greek Mathematics*, 151).

<sup>9</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἀνά, which is used throughout the ensuing discussion; GOODWIN, *A Greek Grammar*, n. 1199.

<sup>10</sup> *Ibid.*, n. 1203.

<sup>11</sup> See *ibid.*, 882.1. Most of these examples are taken from RAMÍREZ, *De analogia*, 56, reference below.

<sup>12</sup> Only in epic and lyric texts does ἀνά govern a noun in the dative. See GOODWIN, *A Greek Grammar*, n. 1203.1–2.

<sup>13</sup> Daniel W. GRAHAM, *The Texts of Early Greek Philosophy: The Complete Fragments and Selected Testimonies of the Major Presocratics* (Cambridge: Cambridge University Press, 2010), I, 155. Cf. SZABÓ, *The Beginnings of Greek Mathematics*, 154.



those of the wall,” where “like those” is a rendering of κατὰ τὸν αὐτὸν λόγον.<sup>14</sup> And in AESCHYLUS we read, “according to their blazon,” where “according to” translates πρὸς λόγον.<sup>15</sup>

For its part, the preposition ἀνά is peculiar in that it can also take a distributive sense. We find this in expressions such as ἀνὰ πᾶσαν ἡμέρην, “day by day.”<sup>16</sup> And this is especially manifest when used with numerals, being akin to the preposition *at* in expressions such as κρέα εἴκοσιν ἀν’ ἡμιωβολιαῖα, “20 pieces of meat at half an obol [each]”;<sup>17</sup> and ἀνὰ πέντε παρασάγγας τῆς ἡμέρας, “[they marched] at [the rate of] five parasangs a day.”<sup>18</sup> Similarly, we find its distributive sense in the New Testament’s ἐλαβον ἀνὰ δηνάριον, “[each workman] received a denarius” (Mt. 20:9), and χωροῦσαι ἀνὰ μετρητὰς δύο ἢ τρεῖς, “holding [each water jar] two or three measures” (Jn. 2:6). Finally, it is also used in the expression ἀνὰ μέρος “in turn(s).”<sup>19</sup>

Considering that other prepositions were already in use for a similar purpose, RAMÍREZ concludes that the coinage of ἀνά λόγον and ἀναλογία would find its most likely explanation in the intention to add the nuance of a comparison with the aim of distributing portions (*pro-portio*) according to some rule, measure or law.<sup>20</sup>

## 6.2. Historical Origins of the Theory

According to SZABÓ, the form ἀνάλογον would be “archaic,” having its origin in the sixth century BC.<sup>21</sup> However, as he readily acknowledges, there is no textual evidence to support this claim (the fiction that Pythagoras discovered the “theory of proportionals” is exposed below; ► 6.13). And SZABÓ’s reconstructions are sometimes built on shaky ground. For example, to show that “ἀνάλογον was at one time written as two words (ἀνὰ λόγον),” he points to a crucial document for the history of ancient Greek mathematics:

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<sup>14</sup> Alfred Denis GODLEY, *Herodotus* (London: William Heinemann, 1975), I, 232–233, I.186; I, 226–227, I.182; I, 174–175, I.134. Cf. Santiago María RAMÍREZ, *De analogia*, ed. Victorino RODRÍGUEZ, 4 vols. (Madrid: CSIC, 1970–1972), 56 n. 6; n. 9; SZABÓ, *The Beginnings of Greek Mathematics*, 152.

<sup>15</sup> Heinrich WEIL (ed.), *Aeschylus: Septem ad Thebas* (Leipzig: Teubner, 1922), 65. Cf. RAMÍREZ, *De analogia*, 56 n. 10.

<sup>16</sup> GODLEY, *Herodotus*, 318, II.37.3–4. Cf. RAMÍREZ, *De analogia*, 56.

<sup>17</sup> Frederick William HALL and William M. GELDART (eds.), *Aristophanes Comoediae* (Oxford: Clarendon Press, 1906), II, Βάτραχοι, 553–554.

<sup>18</sup> Carleton L. BROWNSON (ed.), *Xenophon: Anabasis* (Edinburgh: St. Edmundsbury Press, 1922), 312, 4. Cf. SZABÓ, *The Beginnings of Greek Mathematics*, 153.

<sup>19</sup> Gilbert MURRAY (ed.), *Euripidis Fabulae* (Oxford: Clarendon, 1937), 99, 486. Cf. SZABÓ, *The Beginnings of Greek Mathematics*, 153.

<sup>20</sup> RAMÍREZ, *De analogia*, 56: “Praepositio enim ἀνά, cum in compositionem venit prout revera accidit in verbo ἀνα-λογία, iterationem quamdam et quasi duplicationem importat aliquando; et quidem per modum collationis seu comparationis ut in aequa distributione contingit, ita ut una pars pro alia vel sicut alia haberi possit. [...] Nimirum ἀνὰ importat comparationem in ordine ad aequam distributionem, ita ut tantumdem sit una portio sicut alia.”

<sup>21</sup> SZABÓ, *The Beginnings of Greek Mathematics*, 105; 153; 158.

ARCHYTAS's Fragment B2.<sup>22</sup> This is not only the oldest extant witness to the use of ἀναλογία and ἀνάλογον (or ἀνὰ λόγον), but as TÖPLITZ affirms, it “represents perhaps the only surviving, authentic mathematical text from the time before Autolycus and Euclid.”<sup>23</sup> Thus, this text is of great importance when it comes to tracing the origins of the theory and terminology of proportion.

Alas, ARCHYTAS's Fragment B2 brings no value to SZABÓ's argument when it comes to showing that in the most ancient texts ἀνάλογον was written as two words (ἀνὰ λόγον). Indeed, it is no secret that from the earliest times down to at least the seventh century AD, characters in Greek manuscripts were very rarely grouped into individual words, and that diacritical marks were usually not indicated.<sup>24</sup> The separation in printed editions of ΑΝΑΛΟΓΟΝ into ΑΝΑ ΛΟΓΟΝ, and the addition of diacritical marks to render ἀνάλογον or ἀνὰ λόγον, are evidently the work of editors. Not surprisingly, the available editions of ARCHYTAS's Fragment B2 fluctuate between ἀνάλογον and ἀνὰ λόγον.<sup>25</sup>

The remnant textual evidence seems in fact to militate against SZABÓ's claim that the term ἀνάλογον is archaic. PLATO, our next reliable source after ARCHYTAS, uses ἀνάλογον, ἀνὰ λόγον, and ἀναλογία only in works that belong to either a middle or a late period of his life, and in any case, after his purported first journey to Magna Graecia, where he would have personally met ARCHYTAS.<sup>26</sup> Thus, his *Timaeus* contains the form ἀνάλογα, which is

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<sup>22</sup> The designation “Fragment B2” comes from the classification used in the celebrated collection of Pre-Socratic fragments edited by DIELS and KRANZ, *Die Fragmente der Vorsokratiker*. The editions examined by us are Carl A. HUFFMAN, *Archytas of Tarentum: Pythagorean, Philosopher and Mathematician King* (Cambridge: Cambridge University Press, 2005), 162; Hermann Alexander DIELS and Walther KRANZ, *Die Fragmente der Vorsokratiker* (Berlin: Weidmann, 1951), ARCHYTAS, B2; Friedrich Wilhelm August MULLACH, *Fragmenta philosophorum graecorum* (Paris: Didot, 1860–1861), II, 119; Friedrich Wilhelm BLASS, “De Archytae Tarentini fragmentis mathematicis,” in *Mélanges Graux*, ed. Ernest THORIN (Paris: Librairie du Collège de France, de l'École Normale Supérieure des Écoles Françaises d'Athènes et de Rome, 1884), 162; Ingemar DÜRING, *Kommentar zur Harmonielehre des Ptolemaios* (Göteborg: Elanders, 1932). See also the emendations made to DÜRING's edition by Bengt ALEXANDERSON, *Textual Remarks on Ptolemy's Harmonica and Porphyry's Commentary* (Göteborg: *Studia Graeca et Latina Gothoburgensia*, 27, 1969).

<sup>23</sup> Quoted in SZABÓ, *The Beginnings of Greek Mathematics*, 148. The consensus on the authenticity of Fragment B2 is practically unanimous.

<sup>24</sup> See Edward Maunde THOMPSON, *An Introduction to Greek and Latin Palaeography* (Oxford: Clarendon, 1912), 55ff.; 66ff.

<sup>25</sup> Thus, at least three editions have ἀνάλογον: HUFFMAN's, BLASS's, and DÜRING's; while at least two others have ἀνὰ λόγον: MULLACH's and that of DIELS and KRANZ. In a similar case, HEATH claims that ἀνάλογον is “usually written in one word” (*The Thirteen Books of Euclid's Elements*, vol. 2, 129). And he concludes thence that ἀνάλογον “comes however in Greek mathematics to be used practically as an indeclinable adjective,” pointing to definition 6 of Book V in EUCLID's *Elements* as a sample; see EUCLID, *Opera Omnia*, vol. 2, 2.17–18: “Τὰ δὲ τὸν αὐτὸν ἔχοντα λόγον μεγέθη ἀνάλογον καλεῖσθω.” Others follow him uncritically; for example, HUFFMAN, *Archytas of Tarentum*, 179: “ἀνάλογον – This word has its origin in the phrase ἀνὰ λόγον (‘according to a due λόγος’) but comes to be written as one word and to be used ‘practically as an indeclinable adjective.’”

<sup>26</sup> See *Phaedo* (ἀνὰ λόγον: 110d3, 5); *Republic* (ἀνάλογον: 508b13; ἀνὰ λόγον: 509d7, 511e2; ἀναλογίαν: 534a6); *Epinomis* (ἀναλογίαν: 990e4), which is of doubtful authenticity; *Statesman* (ἀναλογίαν: 257b3); *Timaeus* (ἀνὰ λόγον: 29c2, 37a4, 53e4, 56c7, 82b3; ἀνὰ τὸν αὐτὸν λόγον: 32b6–7; ἀνάλογα: 69b6; ἀναλογία: 31c3; ἀναλογίας: 32c2; ἀναλογιών: 56c3); and *Laws* (ἀνὰ λόγον: 893d1).

unquestionably the plural form of the adjective ἀνάλογον, and seemingly of more recent coinage.<sup>27</sup> But a few pages earlier the presumably archaic prepositional phrase ἀνά λόγον is certainly found in the expression ἀνά τὸν αὐτὸν λόγον, “according to the same ratio.”<sup>28</sup>

ARCHYTAS, the last of the three most important philosophers in the Pythagorean tradition (after PYTHAGORAS himself and PHILOLAUS of Croton) was a friend of PLATO, whose life he is reported to have saved (at least according to the *Seventh Letter*).<sup>29</sup> He was not only an accomplished geometrician (the first to resolve the notorious problem of doubling the cube), but also contributed notably to the development of harmonics. In fact, fragment B2 consists of an excerpt on *means* taken from his *On Music* (or possibly *On Harmonics*) preserved by PORPHYRY in his work *On Ptolemy’s Harmonics*.<sup>30</sup> ARCHYTAS was almost certainly a disciple of PHILOLAUS and a teacher to EUDOXUS, who is commonly credited with the theory of proportion reflected in Book V of EUCLID’s *Elements*. In turn, EUDOXUS is reported to have studied not only under ARCHYTAS but also under PLATO.

All these facts align well with the conclusion drawn by Reviel NETZ from his investigation into the structure of the *Elements*, as well as into social, political, and cultural aspects of ancient Greek life: that the characteristically Greek mathematical form emerged “in the period roughly corresponding to Plato’s lifetime.”<sup>31</sup> It would seem, then, that the theory of analogy was born to Pythagorean philosophers and grew in Athens. But it would very soon be applied beyond the scope of mathematics (►7).

### 6.3. Proportion in Numerical Means

Ancient Greeks used forms such as μεταξύ, μεσότης, μέσος, μέση, and μέσον to convey the sense of being “in the midst, the middle, in the middle, a middle term, a mean.”<sup>32</sup> In music, μέση was used strictly to denote the middle string of the seven-string (or of an earlier three-stringed) lyre.<sup>33</sup> It came to be considered, more generally, the middle of the three strings that formed the framework of the musical scale, standing between νεάτη (or νήτη), the lowest of the three strings (but the highest in pitch), and ὑπάτη, the highest of them (but the lowest in pitch), thus giving their names to the standard notes in Greek scales. This use is already attested in a fragment by PHILOLAUS (who, as noted above,

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<sup>27</sup> PLATO, *Timaeus*, 69b6.

<sup>28</sup> *Ibid.*, 32b6–7.

<sup>29</sup> HUFFMAN, *Archytas of Tarentum*, 4–8; 32–44; 169; 342ff. Most scholars, including Prof. Thomas A. SZLEZÁK, are of the opinion that this letter is authentic.

<sup>30</sup> *Ibid.*, 167.

<sup>31</sup> Reviel NETZ, *The Shaping of Deduction in Greek Mathematics* (Cambridge: Cambridge University Press, 1999), 311.

<sup>32</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entries for μεταξύ, μεσότης, and μέσος.

<sup>33</sup> See *ibid.*, entries for μέση, ὑπάτη, and νεάτη.

almost certainly was ARCHYTAS's teacher) from the second half of the fifth century BC, where μέση is shown to be a mean within the octave.<sup>34</sup>

As Carl A. HUFFMAN observes, ARCHYTAS's Fragment B2 may well be the first text in which the arithmetic, geometric, and harmonic means were "set out as a group and defined carefully."<sup>35</sup> These are the same means that ARCHYTAS's predecessors had discovered while researching the ratios that bring about musical harmony.<sup>36</sup> HUFFMAN, who personally carried out an improved collation of the challenging "hodgepodge of Attic, Doric and even Lesbian or Epic forms"<sup>37</sup> in the manuscript tradition, translates the fragment thus:

There are three means [μέσαι] in music: one is the arithmetic, the second geometric and the third sub-contrary [, which they call "harmonic"].<sup>38</sup> The mean is arithmetic, whenever three terms [ῥοι] are in proportion [ἀνάλογον or ἀνὰ λόγον] by exceeding one another in the following way: by that which the first exceeds the second, by this the second exceeds the third. And in this proportion [ἐν ταύτῃ <τῷ><sup>39</sup> ἀναλογίᾳ] it turns out that the interval [διάστημα] of the greater terms is smaller and that of the smaller greater. The mean is geometric, whenever they [the terms]<sup>40</sup> are such that as the first is to the second so the second is to the third. Of these [terms]<sup>41</sup> the greater and the lesser make an equal interval. The mean is sub-contrary, which we call harmonic, whenever they [the terms]<sup>42</sup> are such that, by which part of itself the first term [ῥος] exceeds the second, by this part of the third the middle [ὁ μέσος] exceeds the third. It turns out [γίνεται] that, in this proportion [ἐν ταύτῃ τῇ ἀναλογίᾳ], the interval of the greater terms is greater and that of the lesser is less.

According to ARCHYTAS, then, in every mean the first term (let us call it  $a$ ) exceeds the second or **middle term** ( $b$ ), which in turn exceeds the third ( $c$ ): i.e.,  $a > b > c$ .<sup>43</sup> Now let us consider each of the three means specifically in respect of its corresponding ἀναλογία.

In the case of the **arithmetic mean**,  $a$  exceeds  $b$  by some unit or number (say,  $N$ ), which is the same unit or number by which  $b$  exceeds  $c$ .<sup>44</sup> Thus, the terms are in proportion (ἀνάλογον) because just as  $a$  exceeds  $b$  by  $N$ , so  $b$  exceeds  $c$  by  $N$ . In other words,  $a$  has

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<sup>34</sup> See Carl A. HUFFMAN, *Philolaus of Croton: Pythagorean and Presocratic* (Cambridge: Cambridge University Press, 1993), 145–7; BARKER, *Greek Musical Writings II*, 46ff.

<sup>35</sup> HUFFMAN, *Archytas of Tarentum*, 167.

<sup>36</sup> See BARKER, *Greek Musical Writings II*, 28ff.

<sup>37</sup> HUFFMAN, *Archytas of Tarentum*, xiii.

<sup>38</sup> Bracketed in HUFFMAN's Greek text and in his translation.

<sup>39</sup> Angular brackets in HUFFMAN's Greek text.

<sup>40</sup> Bracketed in HUFFMAN's translation.

<sup>41</sup> Idem.

<sup>42</sup> Idem.

<sup>43</sup> Some later authors list proportional terms from the less to the greater. All the terms are numbers (i.e., measurable multitudes), although, based on its use in later sources, the least can be a unit.

<sup>44</sup> THEON explains that the arithmetic proportion is that which exceeds and is exceeded according to the same number: see *Expositio rerum mathematicarum...*, 85.10–11.

the same λόγος (in the generic sense of *relation*) to  $b$  as  $b$  has to  $c$ , for in either case the antecedent exceeds the consequent by some number or unit  $N$ :

$$a = b + N$$

$$b = c + N$$

In the **geometric mean**, however, the terms “are such that as the first is to the second so the second is to the third.” Thus, the proportion of the geometric mean  $a : b :: b : c$  is based on the **sameness of the λόγοι**  $a : b$  and  $b : c$ , in the sense of *equivalence of ratios* as found specifically in geometric proportion.

Note, again, that later Greek authors usually reserve the name λόγος exclusively for the relation found in geometric proportion. Thus, as NICOMACHUS explains:

It is an arithmetic proportion [μεσότης “mean”], then, whenever three or more terms are set forth in succession [ἐφεξῆς, *consequently*; ►39.4], or are so conceived, and the same quantitative [κατὰ ποσότητα, i.e., *according to multitude*] difference is found to exist between the successive <numbers>, but not the same ratio [λόγος] among the terms, one to another.<sup>45</sup>

Quoting THRASYLLUS, THEON explains this kind of mean by saying that the geometric proportion is that in which the middle term “exceeds and is exceeded: like twice or thrice.”<sup>46</sup>

However, we should not understand by this that the geometric mean is reduced to the first species of the greater: that is, the multiple (►5.2). In fact, THEON adds that “the geometric mean [μεσότης], and proportion properly said [ἡ ἀναλογία κυρίως λεγομένη], is that which exceeds and is exceeded according to the same ratio [τῷ αὐτῷ λόγῳ]: for example [οἶον], multiple or superparticular.”<sup>47</sup> In other words, it is *a relation of whole to part or parts*.

Similarly, NICOMACHUS explains that “the continuous geometric mean [μεσότης] is the only one [μόνη] in the strict sense of the word [κυρίως] to be called a proportion [ἀναλογία], because its terms are seen to be in the same ratio [ἀνὰ τὸν αὐτὸν λόγον]”; and he adds that “geometric proportions come about not only among the multiples, but also among all

<sup>45</sup> NICOMACHUS, *Introductio arithmeticae*, II.23.1, 124.1–5.

<sup>46</sup> THEON, *Expositio rerum mathematicarum...*, 85.11–12: “<[...] γεωμετρικὴν δὲ τὴν ταύτῳ λόγῳ ὑπερέχουσαν καὶ ὑπερεχομένην,> οἶον διπλασίῳ ἢ τριπλασίῳ, ὡς γ' ἑβ'.” The translation is ours. Cf. DUPUIS, *Théon de Smyrne*, 139: “la proportion géométrique est celle dont le terme moyen contient autant de fois un terme extrême qu’il est contenu dans l’autre, comme 2 fois, 3 fois, telle est la proportion 3, 6, 12.”

<sup>47</sup> THEON, *Expositio rerum mathematicarum...*, 114.1–3: “γεωμετρικὴ δὲ ἐστὶ μεσότης ἢ καὶ ἀναλογία κυρίως λεγομένη ἢ τῷ αὐτῷ λόγῳ ὑπερέχουσα καὶ ὑπερεχομένη, οἶον πολλαπλασίῳ ἢ ἐπιμορίῳ.” The translation is ours. Cf. DUPUIS, *Théon de Smyrne*, 189: “La médiété géométrique, appelée aussi proprement proportion, est celle dont le moyen terme surpasse un extrême et est surpassé par l’autre dans la raison, multiple ou superpartielle (du premier terme au second ou du second au troisième).”

the superparticular, superpartient, and mixed <forms>.”<sup>48</sup> These are, of course, the proper species into which the ratio found in geometric proportion is scientifically divided (►5.2).

Finally, in the **harmonic mean** (originally called *sub-contrary*),  $a$  exceeds  $b$  by some part (say,  $\frac{1}{q}$ ) of  $a$ ; and  $b$  exceeds  $c$  by the same part ( $\frac{1}{q}$ ) of  $c$ ; or:

$$a = b + a \cdot \frac{1}{q}$$

$$b = c + c \cdot \frac{1}{q}$$

Clearly, in the ἀναλογία of the harmonic mean, the relation (λόγος in its generic sense) that  $a$  has to  $b$  is not the same relation that  $b$  has to  $c$ . In fact, the relation that  $a$  has to  $b$  is not any of the species into which the ratio found in geometric proportion is scientifically divided (i.e., a relation of whole to part or parts; ►5.2), while the relation that  $b$  has to  $c$  is specifically one of them: the superparticular. There is, however, a **similarity of λόγοι**: for in either case the antecedent exceeds the consequent by the same part, even though the part by which the antecedent exceeds the consequent belongs in the former case to the antecedent itself ( $a$ ), while in the latter, it belongs to the consequent ( $c$ ).

#### 6.4. The Means Compared

ARCHYTAS compares these proportions to one another in respect of the intervals they produce: in the ἀναλογία of the arithmetic mean, “the interval of the greater terms is smaller and that of the smaller greater”; in the geometric mean, “the greater and the lesser [terms] make an equal interval”; and in the ἀναλογία of the harmonic mean, “the interval of the greater terms is greater and that of the lesser is less.”

Later authors, such as NICOMACHUS and PORPHYRY, tend to identify διάστημα (interval) and λόγος (ratio).<sup>49</sup> NICOMACHUS, for example, explains the comparison between the different means thus:

[A] thing which all previous writers also have noted [is that in the arithmetic mean] the ratios [λόγοι] between the smaller terms are larger, as compared to those between the greater terms. It will be shown that in the harmonic [mean], on the contrary, the ratios between the greater terms are greater than those between the smaller; for this reason, the harmonic proportion [μεσότης “mean”] is sub-contrary to the arithmetic, and the geometric is midway between them, as it were, between

<sup>48</sup> NICOMACHUS, *Introductio arithmeticae*, II.24.1, 126.12–15; 24.4, 128.12–14.

<sup>49</sup> For a discussion of how PORPHYRY justifies the identification of διάστημα and λόγος, see HUFFMAN, *Archytas of Tarentum*, 166–7. Note that διάστημα is used by EUCLID in his third postulate, “that a circle can be described with any center and interval,” to refer to the distance between the center of the circle and the circumference; see EUCLID, *Opera Omnia*, vol. 1, 8.11–12: “Καὶ παντὶ κέντρῳ καὶ διαστήματι κύκλον γράφεσθαι.”

extremes, for this [mean] has the ratios [λόγους] between the greater terms and those between the smaller equal, and we have seen that the equal is in the middle between the greater and the less.<sup>50</sup>

Modern historians, too, tend to identify διάστημα and λόγος. For example, HUFFMAN explains thus that the geometric mean is like a “mean” between the others:

In the arithmetic mean the ratio of the second and third terms is excessively big, in the harmonic mean it is the ratio between the first and second terms that is excessively big. The arithmetic and harmonic means are thus the “reversal” of each other and the geometric mean is in the middle. Archytas’s presentation underlines this point, insofar as he discusses the geometric mean second, between the arithmetic and harmonic mean.<sup>51</sup>

However, as BARKER observes, διάστημα refers most probably to the sensible musical interval we *hear*, as opposed to the intelligible numerical λόγος we *understand*.<sup>52</sup> Indeed, as is well known, our perception of musical intervals is approximately logarithmic with respect to fundamental frequency. For example, according to sense, the octave between  $A_4$  and  $A_3$  is an interval equal to the octave between  $A_3$  and  $A_2$ . And this is so because just as the frequency of  $A_4$  (set by convention to 440 Hz) is twice the frequency of  $A_3$  (220 Hz), so the latter is twice the frequency of  $A_2$  (110 Hz). Hence, what we *sense* as equal (or unequal) *intervals* we *understand* as equal (or unequal) *geometric ratios*. This means that numerical ratios are compared—and therefore measured—in geometric proportion.

### 6.5. Priority of the Geometric Mean

We find, from our preceding remark, that in the geometric mean the ratio that  $a$  has to  $b$  is not only the same that  $b$  has to  $c$ , but is also the same ratio that the difference between the greater terms ( $a - b$ ) has to the difference between the lesser terms ( $b - c$ ), or:

$$a - b : b - c :: a : b :: b : c$$

Thus, the ἀναλογία found in the geometric mean has a special place in that it is more perfect because there is no excess or defect in it. This explains why the geometric ἀναλογία and its λόγος are considered to be (and indeed are) prior to—and therefore the measure of—all others.

NICOMACHUS explains that in the geometric mean the terms do not differ from one another “by the same quantity [πρoσότητι, *by the same multitude*], but rather “by the same quality of ratio [λόγου ποιότητι], the opposite of what is seen to be the case with the arithmetic

<sup>50</sup> NICOMACHUS, *Introductio arithmeticae*, II.23.1, 124.1–5.

<sup>51</sup> HUFFMAN, *Archytas of Tarentum*, 170.

<sup>52</sup> This suggestion was personally transmitted by BARKER to HUFFMAN (*ibid.*, 181).

proportion.”<sup>53</sup> Indeed, according to EUCLID, numbers that are (geometrically) proportional are *similar* according to figure; for, “similar plane and solid numbers are those which have their sides proportional.”<sup>54</sup>

### 6.6. Priority of the Arithmetic Mean

The ἀναλογία of the arithmetic mean is peculiar in that the middle term exceeds and is exceeded by the same number or unit, and its terms are not similar in quality (i.e., figure). Nonetheless, NICOMACHUS considers this mean to be first insofar as arithmetic precedes geometry in the order of natural dependence (► 2.3):

Now, however, we must treat from the beginning, first, that form of proportion which by quantity [κατὰ τὸ ποσόν, i.e., *according to multitude*] reconciles and binds together the comparison of the terms, which is a quantitative [κατὰ τὸ ποσόν, i.e., *according to multitude*] equality as regards the difference of the several terms to one another. This would be the arithmetic <proportion>, for it was previously reported that quantity [τὸ ποσόν, i.e. *multitude*] is its peculiar belonging. What, then, is the reason that we shall treat of this first, and not another? Is it not clear that Nature shows it forth before the rest? For in the natural series of simple numbers [τοῦ ἀπλοῦ ἀριθμοῦ], beginning with one, with no term passed over or omitted, the definition [λόγος, *ratio*] of this proportion alone is preserved; moreover, in our previous statements, we demonstrated that the *Arithmetical Introduction* itself is antecedent to all the others, because it abolishes them together with itself, but is not abolished together with them, and because it is implied by them, but does not imply them. Thus it is natural that the mean which shares the name of arithmetic will not unreasonably [ἀλόγως] take precedence of the means which are named for the other sciences, the geometric [i.e., *geometry*] and harmonic [i.e., *harmonics, music*]; for it is plain that all the more will it take precedence over the subcontraries, over which the first three hold the leadership. As the first and original, therefore, since it is most deserving of the honor, let the arithmetic proportion have its discussion at our hands before the others.<sup>55</sup>

Indeed, the relation that the difference between the greater terms ( $a - b$ ) has to the difference of the lesser terms ( $b - c$ ) in the arithmetic ἀναλογία is none other than the λόγος of equality, which is the root of all ratios and proportions, as noted above:

$$a - b : b - c :: a : a :: b : b :: c : c$$

### 6.7. Priority of the Harmonic Mean

NICOMACHUS does not explicitly say in what way the harmonic mean may be prior to the others. However, as quoted above, he does claim that it is named after the science of harmonics. This, of course, would be of great importance to the Pythagorean thinkers who

<sup>53</sup> NICOMACHUS, *Introductio arithmeticae*, II.24.1, 126.19–21.

<sup>54</sup> EUCLID, *Opera Omnia*, vol. 2, 188.8–9 (Book VII, definition 21).

<sup>55</sup> NICOMACHUS, *Introductio arithmeticae*, II.22.2–4, 123.3–26.



believed that the whole universe was harmony and number;<sup>56</sup> but even PLATO himself devotes part of his *Timaeus* to the “harmony” of the World-Soul.<sup>57</sup>

The ἀναλογία of the harmonic mean is diverse from the others in two ways. On the one hand, the relation of the greater term to the middle term is not the same as the relation of the middle term to the less, though these relations are somewhat similar, as already noted. This results in a rather peculiar interval, as NICOMACHUS explains:

The mean [μεσότης] that is placed in the third order is one called the harmonic, which exists whenever among three terms the mean on examination is observed to be neither in the same ratio [ἐν λόγῳ τῷ αὐτῷ] to the extremes, antecedent of one and consequent of the other, as in the geometric proportion, nor with equal intervals [ἐν διατήμασι ἴσοις], but an inequality of ratios [ἐν λόγων ἐτερότητι, *in heterogeneity of ratios*], as in the arithmetic, but on the contrary, as the greatest term is to the smallest, so the difference between greatest and mean terms is to the difference between mean and smallest term. For example, take 3, 4, 6, or 2, 3, 6. For 6 exceeds 4 by one third of itself, since 2 is one third of 6, and 3 falls short of 4 by one third of itself, for 1 is one third of 3. In the first example, the extremes are in double ratio and their differences with the mean term are again in the same double ratio to one another; but in the second they are each in the triple ratio.<sup>58</sup>

Thus, according to the ἀναλογία of the harmonic mean, the relation that the difference between the greater terms ( $a - b$ ) has to the difference between the lesser terms ( $b - c$ ) is the same ratio (according to geometrical proportion) that the greatest term has to the least, or:

$$a - b : b - c :: a : c$$

On the other hand, having a middle term is essential to the harmonic proportion, which, therefore, cannot be divided to constitute what the ancients called *discrete*—as opposed to *continuous*—*proportion*. Since this peculiarity of the harmonic mean is not explained by NICOMACHUS, we will add our own observations after explaining the latter opposition.

### 6.8. Continuous and Discrete Proportion

A proportion in the form “ $a$  is to  $b$  as  $b$  is to  $c$ ,” where the consequent ( $b$ ) of the first relation ( $a$ -to- $b$ ) is the antecedent ( $b$ ) of the second relation ( $b$ -to- $c$ ), was called συνεχής, i.e., *continuous* (or συνημμένη, *continued*), ἀναλογία, *proportion*. In contrast, a proportion in the form “ $a$  is to  $b$  as  $c$  is to  $d$ ,” in which the two relations do not share a common middle

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<sup>56</sup> ARISTOTLE, *Metaphysica* A.5, 986a2–3.

<sup>57</sup> PLATO, *Timaeus*, 35b–36b. See FRANCIS M. CORNFORD, *Plato's Cosmology, the Timaeus of Plato* (London: Routledge, 1937), 66ff.

<sup>58</sup> NICOMACHUS, *Introductio arithmeticae*, II.25.1, 131.13–132.10.

term, was called διηρημένη, *discrete*, *discontinuous* (or διεξευγμένη, *disjoint*, *disjunct*).<sup>59</sup>

As THEON explains,

Proportion [ἀναλογία] is a similarity [ὁμοιότης] or identity [ταυτότης] of multiple ratios [πλειόνων λόγων], that is, a similarity of ratios in multiple terms, such that the ratio that the first has to the second is the same that the second has to the third, or any others to any others. The former is called continuous proportion; the latter, discrete: the continuous is of at least three terms; the discrete, of at least four.<sup>60</sup>

Thus, arithmetic and geometric proportions can be either continuous or discrete. For example, the continuous proportion  $7 : 5 :: 5 : 3$  and the discrete proportion  $7 : 5 :: 4 : 2$  share a relation in which the antecedent exceeds the consequent by the number two and are therefore *arithmetic* proportions.

Likewise, the continuous proportion  $16 : 8 :: 8 : 4$  and the discrete  $16 : 8 :: 4 : 2$  have in common a relation in which the antecedent is twice the consequent and are therefore *geometric*.

In contrast, the harmonic proportion does not involve the same relation but two different yet similar ones. Thus, while in the arithmetic and geometric proportions the antecedent is identically defined in relation to the consequent (or the consequent, in terms of the antecedent), in the harmonic proportion the common middle term is more readily defined as having diverse but determined relations to the extreme terms—or, indeed, the extreme terms, as having diverse but determined relations to the middle term (*ab uno vel ad unum*).

This is so because in the harmonic mean the common middle term is exceeded by one extreme, and exceeds the other, by the same part of an extreme term.<sup>61</sup> Thus,

$$b = a \cdot \left(1 - \frac{1}{q}\right)$$

$$b = c \cdot \left(1 + \frac{1}{q}\right)$$

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<sup>59</sup> See *ibid.*, II.21.5–6, 121.15; THEON, *Expositio rerum mathematicarum...*, 82.10.

<sup>60</sup> *Ibid.*, 82.6–12: “ἀναλογία δ’ ἐστὶ πλειόνων λόγων ὁμοιότης ἢ ταυτότης, τουτέστιν ἐν πλείοσιν ὄροις λόγων ὁμοιότης, ὅταν ὄν ἔχει λόγον ὁ πρῶτος πρὸς τὸν δεύτερον, τοῦτον ὁ δεύτερος πρὸς τὸν τρίτον ἢ ἄλλος τις πρὸς ἄλλον. λέγεται δὲ ἡ μὲν συνεχῆς ἀναλογία, ἡ δὲ διηρημένη, συνεχῆς μὲν ἡ ἐν ἐλαχίστοις τρισὶν ὄροις, διηρημένη δὲ ἡ ἐν ἐλαχίστοις τέσσαρσιν.” The translation is ours. Cf. DUPUIS, *Théon de Smyrne*, 133: “La proportion est une similitude ou identité de plusieurs rapports, c’est-à-dire une similitude des raisons dans plusieurs termes, ce qui a lieu quand le rapport du premier terme au second est égal au rapport du second au troisième ou au rapport de deux autres termes. La première proportion est appelée continue et la seconde discontinue. Il faut trois termes au moins pour une proportion continue, la discontinue suppose au moins quatre termes.”

<sup>61</sup> Paraphrasing *ibid.*, 114.21–23: “συμβέβηκε δὲ ταύτη τῇ ἀναλογίᾳ, τὸν μέσον ὄρον τῷ αὐτῷ μέρει κατὰ τοὺς ἄκρους ὑπερέχειν τε καὶ ὑπερέχεσθαι.” Cf. DUPUIS, *Théon de Smyrne*, 189: “Cette proportion jouit de la propriété, que le moyen terme surpasse un extrême et est surpassé par l’autre de la même partie des extrêmes.”

Although the antecedent-to-consequent pairs of the harmonic proportion do not hold the same relation, yet they necessarily share a common middle term—a mean—to which they are related similarly. In this sense, the harmonic mean is more a mean than the others.

### 6.9. The Ten (or Eleven) Means

Apart from the arithmetic, geometric, and harmonic, other specific means would be distinguished later in antiquity, building up the traditional Pythagorean list to ten—or, strictly speaking, eleven—in all.<sup>62</sup> Late authors do not define the means by comparing *the relation that the greater term has to the middle term* with *the relation that the middle term has to the lesser term*. Instead, they define them by determining the ratio of the intervals: that is, the λόγος (according to geometric proportion) that the difference between two terms has to the difference between two terms. This is then compared to the relation that the single terms have among themselves, as shown below (► Table 1).

Based on this scientific division, the total number of species of numerical means comes to eleven rather than ten. Apparently, both PAPPUS and NICOMACHUS intended the list to be of exactly ten means because ten is to the Pythagoreans a *perfect number* for reasons other than those given by EUCLID (► 3).<sup>63</sup>

No.	Nicomachus	Pappus	Proportion	
1	1	1	$a - b : b - c :: a : a :: b : b :: c : c$	<i>arithmetic</i>
2	2	2	$a - b : b - c :: a : b :: b : c$	<i>geometric</i>
3	3	3	$a - b : b - c :: a : c$	<i>harmonic</i>
4	4	4	$a - b : b - c :: c : a$	
5	5	5	$a - b : b - c :: c : b$	
6	6	6	$a - b : b - c :: b : a$	
7	7	-	$a - c : b - c :: a : c$	
8	8	9	$a - c : a - b :: a : c$	
9	9	10	$a - c : b - c :: b : c$	
10	10	7	$a - c : a - b :: b : c$	
11	-	8	$a - c : a - b :: a : b$	

**Table 1: The numerical means discovered by the ancient Greeks**

<sup>62</sup> See NICOMACHUS, *Introductio arithmeticae*, II.28. After the sixth mean, there is a slight inconsistency in the tradition, where PAPPUS omits one, and NICOMACHUS, another. See HEATH, *A History of Greek Mathematics*, v.1, 86ff.

<sup>63</sup> See ARISTOTLE, *Metaphysica* A.5, 986a8–12 (cf. AQUINAS, *In Metaph.* 1, l. 7, §123).

## 6.10. Proportion Summarized

Let us summarize some of the most important points already noted concerning proportion by resorting to NICOMACHUS:

After this it would be the proper time to incorporate the nature of proportions, a thing most essential for speculation [θεωρήματα] about the nature of the universe and for the propositions of music, astronomy, and geometry, and not least for the study of the works of the ancients; and thus to bring the *Introduction to Arithmetic* to the end that is at once suitable and fitting. A proportion [ἀναλογία], then, is in the proper sense [κυρίως], the combination [σύλληψις] of two or more ratios [λόγων], but by the more general definition the combination of two or more relations [σχέσεων], even if they are not brought under the same ratio [λόγω τῷ αὐτῷ], but rather a difference, or something else. Now a ratio [λόγος] is the relation [σχέσις] of two terms [ὄρων] to one another, and the combination [σύνθεσις] of such is a proportion [ἀναλογία], so that three is the smallest number of terms of which the latter is composed, although it can be a series of more, subject to the same ratio [κατὰ τὸν αὐτὸν λόγον] or the same difference [κατὰ τὸ αὐτὸ διάστημα]. [...] Now if the same term [ὄρος], one and unchanging, is compared to those on either side of it, to the greater as consequent [ὑπόλογος] and to the lesser as antecedent [πρόλογος], such a proportion [ἀναλογία] is called continued [συνημμένη]. [...] If, however, one term answers to the lesser term, and becomes its antecedent and a greater term, and another, not the same, takes the place of consequent and lesser term with reference to the greater, such a mean [μεσότης] and such a proportion is called no longer continued, but disjunct [διεξευγμένη].<sup>64</sup>

## 6.11. Magnitudes in Proportion

The mathematical discoveries that would lead to the formulation of the *arithmetical* theory of proportion reflected in Book VII of the *Elements* should most likely be associated with THEAETETUS, the main character in the eponymous dialogue by PLATO and contemporary with ARCHYTAS.<sup>65</sup> EUCLID treats only of the discrete numerical proportions found in the definition we have already quoted. These are used primarily to demonstrate theorems in geometry (notably those related to incommensurability). As explained earlier, there is no definition of numerical λόγος in the *Elements*. However, EUCLID supposes its definition; for he often makes use of numerical ratios. Thus, Proposition 17 in the same book requires the student to prove the theorem that “If a number by multiplying two numbers make certain numbers, the numbers so produced will have the same ratio [τὸν αὐτὸν λόγον] as the numbers multiplied.”<sup>66</sup>

In turn, the mathematical discoveries that would lead to the formulation of the *geometrical* theory of proportion reflected in Book V are often attributed to EUDOXUS. KNORR postulates the following stages of groundwork before such a theory could be developed:

<sup>64</sup> NICOMACHUS, *Introductio arithmeticae*, II.21.1–3.5–6, 119.19–120.10; 120.20–121.1; 121.11–16.

<sup>65</sup> KNORR, *The Evolution of Euclidean Mathematics*, 238–244. Others ascribe them to the Pythagoreans.

<sup>66</sup> EUCLID, *Opera Omnia*, vol. 2, 224.4–6.

(1) [THEAETETUS] provided a formal structure for number theory, prefiguring Elements VII, from which the theorems on relative primes could be drawn to establish the arithmetic criteria of incommensurability. (2) Generalizing to geometry the arithmetic procedure of *anthyphairesis*,<sup>67</sup> Theaetetus was able to develop the theorems on the proportions of lines and rectangular planes and solids which he required for constructions of incommensurable lines. (3) From the definitions of the means (geometric, arithmetic and harmonic) he formulated three classes of irrational lines, corresponding to the Euclidian medial, binomial and apotome, and began the investigation of their properties.<sup>68</sup>

1. In Book v, EUCLID offers more definitions concerning ratios between magnitudes set in proportion. Thus, he explains that the expression **corresponding magnitudes** (ὁμόλογα μεγέθη, *homologous magnitudes*) is said “of antecedents in relation to antecedents, and of consequents in relation to consequents.”<sup>69</sup> Hence, in  $a : b :: c : d$ , magnitudes  $a$  and  $c$  are homologous; for  $a$  corresponds to  $c$ ; and so are  $b$  and  $d$ . Therefrom, **alternate ratio** (ἐναλλάξ λόγος) is “taking the antecedent in relation to the antecedent and the consequent in relation to the consequent.”<sup>70</sup> Thus, if  $a : b :: c : d$ , then, by alternation  $a : c :: b : d$ .
2. An **inverse ratio** (ἀνάπαλιν λόγος) is “taking the consequent as antecedent in relation to the antecedent as consequent.”<sup>71</sup> Thus, if  $a : b :: c : d$ , then, by inversion,  $b : a :: d : c$ .
3. The **composition of a ratio** (σύνθεσις λόγου) is “taking the antecedent together with the consequent as one in relation to the consequent by itself.”<sup>72</sup> Thus, if  $a : b :: c : d$ , then, by composition,  $a + b : b :: c + d : d$ .
4. The **separation of a ratio** (διαίρεσις λόγου) is “taking the excess by which the antecedent exceeds the consequent in relation to the consequent by itself.”<sup>73</sup> Thus, if  $a : b :: c : d$ , then, by separation,  $a - b : b :: c - d : d$ .
5. The **conversion of a ratio** (ἀναστροφή λόγου) is “taking the antecedent in relation to the excess by which the antecedent exceeds the consequent.”<sup>74</sup> Thus, if  $a : b :: c : d$ , then, by conversion,  $a : a - b :: c : c - d$ .

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<sup>67</sup> *Anthyphairesis* is a primitive procedure to determine the relation between two numbers by reciprocal subtraction. It received great attention after Oskar BECKER pointed in 1933 to a passage in ARISTOTLE where *antanairesis* (identical with *anthyphairesis* according to ALEXANDER of Aphrodisias) is mentioned as the definition of ratio. See FOWLER, *The Mathematics of Plato's Academy*, 30ff.

<sup>68</sup> KNORR, *The Evolution of Euclidean Mathematics*, 273.

<sup>69</sup> EUCLID, *Opera Omnia*, vol. 2, 4.15–16.

<sup>70</sup> *Ibid.*, 17–18.

<sup>71</sup> *Ibid.*, 19–20.

<sup>72</sup> *Ibid.*, 21–22.

<sup>73</sup> *Ibid.*, 6.1–3.

<sup>74</sup> *Ibid.*, 4–6.

6. A **ratio ex aequo** or **ex aequali** (δι' ἴσου) happens “when, there being several magnitudes and another <set> equal to them in multitude which taken two and two are in the same proportion, as the first is to the last among the first magnitudes, so is the first to the last among the second magnitudes.”<sup>75</sup> That is, “taking the extreme terms by virtue of the removal of the intermediate terms.”<sup>76</sup> Thus, if  $a_1 : a_2 :: b_1 : b_2$ , and  $a_2 : a_3 :: b_2 : b_3$ , and  $a_3 : a_4 :: b_3 : b_4$ , and ...  $a_{n-1} : a_n :: b_{n-1} : b_n$ , then, *ex aequo*,  $a_1 : a_n :: b_1 : b_n$ .

7. Finally, a **perturbed proportion** (τεταραγμένη ἀναλογία) occurs “when, there being three magnitudes and another <set> equal to them in multitude, as antecedent is to consequent among the first magnitudes, so is antecedent to consequent among the second magnitudes, while, as the consequent is to a third among the first magnitudes, so is a third to the antecedent among the second magnitudes.”<sup>77</sup> Thus, there is a perturbed proportion if  $a_1 : a_2 :: b_2 : b_3$  and  $a_2 : a_3 :: b_1 : b_2$ .

### 6.12. Proportion of Numbers and of Magnitudes Compared

Even a superficial comparison of the arithmetical theory of proportion in Book VII in EUCLID'S *Elements* to the geometrical theory in Book V immediately reveals that there is much in common between them. Many of the definitions provided for magnitudes seem straightforwardly applicable to numbers.

In fact, sometimes a definition equivalent to one found in Book V is presupposed in the arithmetical books, where an equivalent definition is not provided specifically for numbers. For example, Proposition 13 in Book VII is a theorem that states, “If four numbers be proportional, they will also be proportional alternately [ἐναλλάξ ἀνάλογον].”<sup>78</sup>

What is more, in Book X we find multitudes and magnitudes being compared together in proportion. Thus, as per Proposition 9, “The squares on straight lines commensurable in length have to one another the ratio which a square number has to a square number; and squares which have to one another the ratio which a square number has to a square number will also have their sides commensurable in length.”<sup>79</sup>

Moderns are typically puzzled as to why EUCLID would not come up with a unified theory of mathematical proportion. We shall deal with this question in the next chapter (►7.3). For now, let us point out that their particular principles (►Table 2) are not the same, and that this has implications.

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<sup>75</sup> Ibid., 7–12.

<sup>76</sup> Ibid., 12–13.

<sup>77</sup> Ibid., 14–20.

<sup>78</sup> Ibid., 216.24–25.

<sup>79</sup> Ibid., vol. 3, 24.2–7.

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<p>7.1. A unit is that by virtue of which each of the things that exist is called <i>one</i>.</p> <p>7.2. A number is a multitude composed of units.</p> <p>7.3. A number is a part of a number, the less of the greater, when it measures the greater;</p> <p>7.4. But parts when it does not measure it.</p> <p>7.5. The greater number is a multiple of the less when it is measured by the less.</p> <p>7.11. A prime number is that which is measured by a unit alone.</p> <p>7.12. Numbers prime to one another are those which are measured by a unit alone as a common measure.</p> <p>7.13. A composite number is that which is measured by some number.</p> <p>7.20. Numbers are proportional when the first is the same multiple, or the same part, or the same parts, of the second that the third is of the fourth.</p>	<p>5.1. A magnitude is a part of a magnitude, the less of the greater, when it measures the greater.</p> <p>5.2. The greater [magnitude] is a multiple of the less when it is measured by the less.</p> <p>10.1. Those magnitudes are said to be commensurable which are measured by the same measure, and those incommensurable which cannot have any common measure.</p> <p>5.3. A ratio is a sort of relation in respect of size between two magnitudes of the same kind.</p> <p>5.4. Magnitudes are said to have a ratio to one another which are capable, when multiplied, of exceeding one another.</p> <p>5.5. Magnitudes are said to be in the same ratio, the first to the second and the third to the fourth, when, if any equimultiples whatever be taken of the first and third, and any equimultiples whatever of the second and fourth, the former equimultiples alike exceed, are alike equal to, or alike fall short of, the latter equimultiples respectively taken in corresponding order.</p> <p>5.6. Let magnitudes which have the same ratio be called proportional.</p>
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**Table 2: Comparison of proportion theory definitions in EUCLID's *Elements*.**

Indeed, as already noted (► 2.3), geometry depends on arithmetic in many ways. Whence, it would be impossible for a geometer to demonstrate without measurable multitudes. For example, EUCLID proves in his *Elements* (x.5) that commensurable magnitudes have to one another *the ratio which a number has to a number*. Such a demonstration necessarily depends on the use of *parts of numbers* (that is, parts of measurable *multitudes*), which are always commensurable because they are composed of indivisible units:

Let A, B be commensurable magnitudes; I say that A has to B the ratio which a number has to a number. For, since A, B are commensurable, some magnitude will measure them. Let it measure them, and let it be C. And, as many times as C measures A, so many units let there be in D [i.e., a number]; and, as many times as C measures B, so many units let there be in E [another number]. Since then C measures A according to the units in D, while the unit also measures D according to the units in it, therefore the unit measures the number D the same number of times as the magnitude C measures A; therefore, as C is to A, so is the unit to D [as per 7.20, 7.4, and 7.3 in **Table 2**]; therefore, inversely, as A is to C, so is D to the unit. Again, since C measures B

according to the units in E, while the unit also measures E according to the units in it, therefore the unit measures E the same number of times as C measures B; therefore, as C is to B, so is the unit to E. But it was also proved that, as A is to C, so is D to the unit; therefore, ex aequali, as A is to B, so is the number D to E. Therefore the commensurable magnitudes A, B have to one another the ratio which the number D has to the number E. Q.E.D.<sup>80</sup>

### 6.13. Fiction: “Pythagoras discovered the theory of proportionals”

A modern edition of PROCLUS’s *Commentary on the First Book of Euclid’s Elements* would have PYTHAGORAS himself be the discoverer of the “theory of proportionals”:

Following these men [namely, THALES, MAMERCUS, and HIPPIAS of Ellis], Pythagoras transformed mathematical philosophy into a scheme of liberal education, surveying its principles from the highest downwards and investigating its theorems in an immaterial and intellectual manner. He it was who discovered the doctrine of proportionals [ἀναλόγων] and the structure of the cosmic figures.<sup>81</sup>

According to the best manuscript tradition, however, what PROCLUS would be saying here is that PYTHAGORAS discovered the theory ἀλόγων, of *irrationals*—not ἀναλόγων, of *proportionals*. But ever since Gustav JUNGE and Heinrich VOGT subjected the “geometry of Pythagoras” to a “critical examination” early in the twentieth century, “the attribution of this discovery to Pythagoras himself, made by Proclus, has not been seriously defended.”<sup>82</sup> Therefore, HEATH and others “corrected” the text by resorting to an extremely weakly attested variant that more closely matched their preconceptions. Thus, they came to attribute directly to PYTHAGORAS the theory “of proportionals” because they assumed that the word in question was an integral part of the so-called *Catalogue of Geometers* (a neighboring, authentic fragment that PROCLUS extracted from a history of mathematics written by EUDEMUS, one of ARISTOTLE’s disciples).

Ironically, both PROCLUS and HEATH were subsequently proven wrong. As BURKERT has shown, the evidence in favor of preserving the unreasonable but better attested reading ἀλόγων, of *irrationals*, is irrefutable: “the sentence in question is taken word for word from Iamblichus’s *De communi mathematica scientia*—a work that Proclus copies sometimes by the page in his commentary on Euclid.”<sup>83</sup> And so, “There is no occasion to reject the

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<sup>80</sup> Ibid., 16.13–18.9.

<sup>81</sup> PROCLUS, *A Commentary on the First Book of Euclid’s Elements*, 52–3; cf. PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 65.15–21: “ἐπὶ δὲ τούτοις Πυθαγόρας τὴν περὶ αὐτὴν φιλοσοφίαν εἰς σχῆμα παιδείας ἐλευθέρου μετέστησεν, ἄνωθεν τὰς ἀρχὰς αὐτῆς ἐπισκοπούμενος καὶ αὐλῶς καὶ νοερῶς τὰ θεωρήματα διερευνώμενος, ὃς δὴ καὶ τὴν τῶν ἀλόγων [\*] πραγματείαν καὶ τὴν τῶν κοσμικῶν σχημάτων σύστασιν ἀνεῦρεν.” The critical apparatus has: “[\*] ‘alii ἀναλόγων’ A.” The “A.” refers us to Ernest Ferdinand AUGUST, *Εὐκλείδου Στοιχεῖα: Euclidis Elementa ex optimis libris* (Berlin: Trautwein, 1826), 290.4. See HEATH, *A History of Greek Mathematics*, v.1, 84–5, who fails cite his sources.

<sup>82</sup> BURKERT, *Lore and Science in Ancient Pythagoreanism*, 404.

<sup>83</sup> Ibid., 409–12.



reading ἀλόγων in favor of the weakly attested ἀναλόγων.”<sup>84</sup> Still, the damage was done—and the error has been repeatedly cloned until our days.

FOWLER describes this case as “a good and clear illustration of how history can sometimes be manufactured by commentators, late and modern, who may adjust a text to fit with their own interpretations.”<sup>85</sup> Indeed, Neoplatonic writers are not only celebrated for having preserved precious fragments of ancient Greek works now lost to us, but also notorious for retrofitting their own ideas into the history of mathematics—a practice that, shamefully, is just as common in our days.

#### 6.14. Fiction: “Originally only geometric proportion was called ἀναλογία”

Another widespread fiction, initiated by NESSELMANN and reiterated by HEATH, states that “Originally [only] the geometric proportion was called ἀναλογία, the others, the arithmetic, the harmonic, etc., μεσότητες; but later usage had obliterated the distinction.”<sup>86</sup>

1. The starting point for NESSELMANN is his observation that, in its modern use, ἀναλογία designates proportion in general, while the Greek μεσότης (mean) denotes continuous proportion.<sup>87</sup> But he is surprised to find no confirmation that the ancients used the words in this way. After examining many testimonies from antiquity, including those bequeathed by EUCLID, NICOMACHUS, THEON, PAPPUS, IAMBlichUS, and BOETHIUS, but not ARCHYTAS, he claims that ancient Greeks used ἀναλογία and μεσότης in the way described above, although the terminology seemed not to be completely fixed (yet another myth; ► 6.15).<sup>88</sup>

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<sup>84</sup> Ibid.

<sup>85</sup> FOWLER, *The Mathematics of Plato's Academy*, 361.

<sup>86</sup> NESSELMANN, *Die Algebra der Griechen*, 212 n. 49: “Ursprünglich hieß die geometrische Proportion ἀναλογία, die übrigen, die arithmetische, die harmonische u. s. w. μεσότητες; aber der spätere Sprachgebrauch hat diesen Unterschied beider Termini verwischt.” Translation quoted from HEATH, *The Thirteen Books of Euclid's Elements*, vol. 2, 293.

<sup>87</sup> *The Algebra of the Greeks*, 210 n. 49.

<sup>88</sup> In *ibid.*, 210–2 n. 49, a footnote that spans more pages than this one, NESSELMANN begins researching the question in NICOMACHUS, his most ancient source after EUCLID. However, observing that NICOMACHUS defines ἀναλογία but not μεσότης, he immediately passes on to his next source in chronological order. Thus, he calls upon THEON as his first witness, noting that μεσότης seems to be used by him in the general sense of a *middle term* in *Expositio rerum mathematicarum...*, 84.15–18: “A mean differs from a proportion, since if something is a proportion [ἀναλογία], it is a mean [μεσότης]; but if something is a mean, it is not straightaway a proportion. For it is possible for something that is a middle term [μέσον] according to an order [κατὰ τάξιν] not to be in proportion [ἀναλόγως] with respect to the extremities [πρὸς τὰ ἄκρα].” NESSELMANN argues from this that μεσότης must have originally been a generic term; and ἀναλογία, a specific kind of μεσότης: “Es scheint, als wenn Theon den Ausdruck μεσότης ganz allgemein von dem Dazwischenliegen gebraucht wissen will. [...] Demnach ist μεσότης der allgemeinere, ἀναλογία der speciellere Begriff, wie es auch aus den ersten Worten Theon's einleuchtet.” He believes to have found support for his opinion in PAPPUS, who says (quoting the translation from HEATH, *The Thirteen Books of Euclid's Elements*, vol. 2, 293), “A mean [μεσότης] differs from a proportion [ἀναλογία] in this respect that, if anything is a proportion, it is also a mean, but not conversely; for there are three means, of which one is arithmetic, one geometric and one harmonic.” In fact, NESSELMANN quotes PAPPUS in Latin: “Differt autem medietas (μεσότης) ab analogia, nam si quid est analogia, hoc et medietas est; sed non contra. Medietates enim tres sunt, arithmetica, geometrica, et harmonica, etc.” Cf. the critical edition from the Greek in Friedrich Otto HULTSCH (ed.), *Pappi Alexandrini Collectionis quae supersunt*, 3 vols.

2. HEATH arrives at the same conclusion via a different route. Unlike NESSELMANN, who is concerned with the relation between μεσότης and ἀναλογία, he turns his attention to the relation between ἀναλογία and λόγος. Having observed that THEON, NICOMACHUS, and

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(Berlin: Weidmann, 1877–1878), Γ.30, vol. 1, 70.17–20. Not only that, NESSELMANN argues, but the geometric proportion was the only one originally called ἀναλογία, while all proportions, “the geometric not excluded,” were called “means.” He trusts there is support for this opinion in IAMBlichUS, who says, “It is to be premised that it was the geometrical (proportion) which the ancients called proportion *par excellence* [κυρίως], but in common all the remaining ones means [μεσότητος] generically [γενικῶς],” adapting the translation of HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 292, who follows Ermenegildo PISTELLI, *Iamblichi in Nicomachi Arithmeticae introductionem* (Leipzig: Teubner, 1894), 100.15–17. NESSELMANN quotes instead from a text identical to that of Samuel TENNULIUS, *Jamblichus Chalcidensis In Nicomachi Geraseni Arithmeticae introductionem, et De fato* (Arnhem: Wier, 1668), 141c, which we use to adapt HEATH’s reading. Returning to NICOMACHUS, NESSELMANN addresses a potential objection to his claim, for the more ancient author seems to use ἀναλογία as a generic term. Says NICOMACHUS, *Introductio arithmeticae*, II.22.1, 122.11–14: “The first three proportions [ἀναλογίαι], then, which are acknowledged by all the ancients, [...] are the arithmetic, geometric, and harmonic.” NESSELMANN quotes instead from the slightly different text of Friedrich AST, *Theologumena arithmeticae* (Leipzig: Weidmann, 1817), 138.21–24. However, as NESSELMANN observes, “in the same chapter [NICOMACHUS] uses the term μεσότητες in exactly the same sense [as ἀναλογία] for all three [means].” Moreover, he notes that NICOMACHUS thereafter uses exclusively μεσότης, instead of ἀναλογία, when writing about means. On the other hand, as NESSELMANN observes, NICOMACHUS says in *Introductio arithmeticae*, II.24.1, 26.12–15: “the geometric [proportion] is the only one [μόνη] properly [κυρίως] to be called a proportion [ἀναλογία], because its terms are seen to be according to the same ratio [ἀνά τὸν αὐτὸν λόγον].” NESSELMANN quotes from AST, *Theologumena arithmeticae*, 141.13–17. And IAMBlichUS “almost literally” says the same thing: “The second, the geometric, mean is the only one [μόνωσ] that has been called proportion because the similars [ὄμοιοι] contain the same ratio, being separated according to the same proportion [ἀνά τὸν αὐτὸν λόγον],” adapting the translation of HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 293. NESSELMANN quotes from TENNULIUS, *In Nicomachi Geraseni Arithmeticae introductionem*, 147b. That IAMBlichUS sounds exactly like NICOMACHUS should not come as a surprise to us, for he often copies literally or paraphrases him (no less than other authors, as pointed out above). Incidentally, the major differences between IAMBlichUS and NICOMACHUS could be accounted for by the fact that NESSELMANN is reading from a flawed text. In the edition of the *Codex Florentinus* used by HEATH, IAMBlichUS comes even closer to NICOMACHUS: “The second, the geometric, mean has been called proportion *par excellence* [κυρίως] because the terms [ὄροι] contain the same ratio, being separated according to the same proportion (ἀνά τὸν αὐτὸν λόγον διεστῶτες).” NESSELMANN also calls upon BOETHIUS, who had “long been the only source for the study of mathematics,” and from whom “these false notions” could not have been derived: “Aus Boethius, der allerdings lange einzige Quelle für das mathematische Studium gewesen ist, können diese falschen Begriffe nicht hergeleitet sein.” He finds two neighboring places that are almost literal translations of Nicomachus, “Beide Stellen sind fast wörtlich aus Nikomachus übersetzt.” In these we read that “if three terms come into consideration, this is called a continuous proportion [*continua proportionalitas*]; if, however, this [term] precedes one [term], and another follows, and one and the other are here different, this is called a disjunctive mean. [...] The geometric mean is extricated, which alone is most aptly called a proportion.” The translation is ours. NESSELMANN quotes from Samuel TENNULIUS, *Notae in Arithmeticae Jamblichi Chalcidensis* (Deventer: Wilhem Wier, 1667), 198c–d: “Si igitur in tribus terminis consideratio sit, continua proportionalitas dicitur. Sin vero hic alius dux & alius comes, illic vero utriusque sint alii, vocabitur disjuncta medietas. [...] Geometrica medietas expediatur, quae sola vel maxime proportionalitas appellari potest.” Cf. MASI, *Boethian Number Theory*, 166: “If one considers three terms, a continual proportion may be remarked; yet one of these is the leader and another the follower. Here indeed are two terms in relation to a middle one, and this is called a disjunct medial proportion”; *ibid.*, 169: “the geometric medial proportion is set straight, which alone is most able to be called proportionality.” See BOETHIUS, *De institutione arithmetica*, II.43, 140.29–141.3; II.44, 144.26–28. Observing that EUCLID, too, uses ἀναλογία only in the sense of geometric proportion, he gives his notorious final sentence: “Originally [only] the geometric proportion was called ἀναλογία, the others, the arithmetic, the harmonic, etc., μεσότητες; but later usage had obliterated the distinction.” Finally, NESSELMANN brings his arguments to a close by pointing to other places in NICOMACHUS and IAMBlichUS where he thinks additional evidence—reliable albeit inconclusive—can be found: “Sichere Belege aber dafür, daß μεσότης nicht ausschließlich die stetige Proportion bedeute, finden wir bei Nikomachus z. B. noch Kap. 21, worüber weiter unten im Text, und Kap. 29, wo die immer aus vier Gliedern bestehende vollkommenste Proportion dennoch, ebenso wie bei Jamblichus stets μεσότης heißt.”

EUCLID do not give “any substantially different definition of a ratio between numbers,” HEATH finds discord only when it comes to defining ἀναλογία.<sup>89</sup> First, he quotes THEON’s definition: “similarity or sameness of more ratios than one,”<sup>90</sup> and calls it “unobjectionable if it is previously understood what a ratio is.” But he blames “people like Thrasyllus” for introducing confusion (presumably due to their misunderstanding of what a ratio is) by using *proportion* when referring to *means*. Hence, according to HEATH, it is necessary to explain, as did ADRASTUS, that the geometric mean was called *proportion* “*par excellence* [κυρίως] and *primary* [πρώτην],” although the other means were also commonly called *proportions* “by some writers.”<sup>91</sup>

HEATH then criticizes NICOMACHUS’s definition of ἀναλογία (which NESSELMANN neglects to quote), according to which “Proportion, *par excellence* (κυρίως), is the bringing together (σύλληψις) to the same (point) of two or more ratios; or, more generally, (the bringing together) of two or more relations (σχέσεων), even though they be subjected not to the same ratio but to a difference or some other (law).”<sup>92</sup> He objects to this definition arguing that NICOMACHUS is “trying to extend the term ‘proportion’ to cover the various means as well as a proportion in three or four terms in the ordinary sense.”<sup>93</sup> HEATH finally counters NICOMACHUS by bringing up the same places used by NESSELMANN. Believing that these establish “plainly enough” that “there is only one proportion in the proper sense,” namely geometric proportion, he agrees with NESSELMANN, and quotes the latter’s conclusion.

**3.** Even a cursory examination of ARCHYTAS’s Fragment B2 will straightway show that the conclusion drawn by NESSELMANN and HEATH is unreasonable. Our oldest and most reliable source clearly states that, in both the arithmetic and the harmonic means, the three terms are proportional (ἀνάλογον), and that in every proportion (ἐν ταύτα τῶ ἀναλογίᾳ) the interval has characteristics peculiar to it. Ironically, on the other hand, ARCHYTAS uses neither ἀνάλογον nor ἀναλογία when referring to the geometric mean. Of course, it is not as though ARCHYTAS altogether denies that the geometric mean is in some proportion. Far from it, every one of the means he discusses is found to be in some kind of ἀναλογία. But ARCHYTAS’s omission certainly demolishes this modern myth.

The errors of NESSELMANN and HEATH are easily disentangled, for these authors fail to distinguish two kinds of priority. On the one hand, there is an order of eminence, according

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<sup>89</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 292.

<sup>90</sup> *Ibid.*

<sup>91</sup> *Ibid.* Cf. THEON, *Expositio rerum mathematicarum...*, 106.15.

<sup>92</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 292. See NICOMACHUS, *Introductio arithmeticae*, II.21.2, 120.2.

<sup>93</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 2, 292.

to which only some relations and proportions are respectively called λόγος and ἀναλογία “par excellence,” as HEATH translates the Greek κυρίως. On the other hand, there is an order of discovery and naming, according to which, at first, any relation was called λόγος (as explained above), and any kind of unity of relations was called ἀναλογία. Depending on the order, we can either affirm or deny that the same relations constitute a proportion.

4. NESSELMANN erroneously believes that, in the same way that a horse is a kind of animal, either a mean is a kind of proportion or else a proportion is a kind of mean. And he concludes that in ancient times an ἀναλογία was considered a kind of μεσότης. But by *mean* we can understand either a middle term (whether it is in proportion or not, as THEON and PAPPUS observe) or a proportion in which there is a middle term: and if we understand by *mean* a proportion in which there is a middle term, then the proportion can be either geometric (which is called ἀναλογία first in the order of eminence because it is thoroughly based on the relation of whole to part or parts), or else it can be a proportion based on some other relations affecting the three terms, as NICOMACHUS observes.

5. HEATH rightly points out that an accurate understanding of ἀναλογία depends on a correct understanding of λόγος. But, blinded by Augustus DE MORGAN’s articles on *proportion* and *ratio* published in the *Penny Cyclopaedia of the Society for the Diffusion of Useful Knowledge*,<sup>94</sup> he retrofits the ancient λόγος with a modern construct.

It should not come as a surprise, then, that HEATH fails to call ARCHYTAS to the stand. In fact, when he does excerpt from Fragment B2 in his *A history of Greek mathematics*, HEATH expunges from the key source every reference to ἀνάλογον and ἀναλογία:

A fragment of Archytas’s work On Music actually defines the three [means]; we have the *arithmetic* mean when, of three terms, the first exceeds the second by the same amount as the second exceeds the third; the *geometric* mean when, of the three terms, the first is to the second as the second is to the third; the “*subcontrary*, which we call *harmonic*,” when the three terms are such that “by whatever part of itself the first exceeds the second, the second exceeds the third by the same part of the third.”<sup>95</sup>

Thus, HEATH conceals the most important piece of evidence against his own prejudices. Ironically, what he conceals is most revealing—revealing of “a forced statement made to suit a hypothesis,” or of “how history can be manufactured by commentators who may adjust a text to fit with their own interpretations,” as ARISTOTLE and FOWLER would say.

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<sup>94</sup> Ibid., 116: “The best explanation of the definitions of *ratio* and *proportion* that I have seen is that of De Morgan, which will be found in the articles under those titles in the *Penny Cyclopaedia*, Vol. XIX. ([London: Charles Knight,] 1841).”

<sup>95</sup> HEATH, *A History of Greek Mathematics*, v.1, 85.

### 6.15. Fiction: “The terminology (ἀναλογία, μεσότης) was not fixed”

Another widespread myth is that the use of ἀναλογία and μεσότης was not completely fixed in ancient times. This is, however, an assumption made by NESSELMANN to justify why NICOMACHUS (his earliest source after EUCLID) and IAMBlichus (his latest source before BOETHIUS) sometimes call the three means *proportions*. NESSELMANN argues that the terminology *seems* not to have been quite fixed (as late as the fourth century AD!): “Jedoch scheint der Sprachgebrauch darin nicht ganz fest gewesen zu sein.”<sup>96</sup>

This assumption is thereafter repeated as a definite fact by TANNERY and many others.<sup>97</sup> Thus, Michael MASI wonders why BOETHIUS would say that “A proportion [*proportio*] is a certain relationship [*habitus*] to each other of two terms, as it were, that are contained on one <concept>, and that which their joining together will produce is a proportion [*proportionale est*].”<sup>98</sup> He answers his own question thus:

It is clear that at this point Boethius is not going to speak of a proportion between two terms, or what is normally called a ratio, but of a relation between three and, later, four elements. This inconsistency of terminology derives from an uncertainty in the terminology of Nicomachus. Boethius uses the terms *proportionalitas* and *medium* interchangeably here, as his Greek source did the comparable terms ἀναλογία and μεσότης.<sup>99</sup>

On the contrary, if we examine our oldest testimony, we will see that, from the beginning, proportion has been spoken of in terms practically identical to those of BOETHIUS and NICOMACHUS. In the three means analyzed by ARCHYTAS, something *one* is produced—an analogy or proportion—from multiple ratios. And, although the ratios that constitute each kind of analogy are not necessarily identical, in such ratios one term (the antecedent) always contains another (the consequent) in a certain way that is specific to that kind of proportion.

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<sup>96</sup> *The Algebra of the Greeks*, 211 n. 49.

<sup>97</sup> For example, DUPUIS, *Théon de Smyrne*, 137, translates “διαφέρει ἀναλογίας μεσότης” as “Un nombre moyen diffère du moyen proportionnel” instead of “Une médiété diffère d’une analogie,” and justifies his decision in a footnote in *ibid.*, n. 23: “La langue mathématique n’est pas encore fixée. Nous croyons que, par μεσότης, il faut entendre, dans ce paragraphe, non pas une médiété, mais un nombre moyen compris entre deux autres, et que, par ἀναλογία il faut entendre, non pas une analogie, c’est-à-dire une proportion continue, mais un terme moyen proportionnel. Cela paraît résulter de l’explication de Théon et des deux exemples qu’il donne.”

<sup>98</sup> MASI, *Boethian Number Theory*, 164. Cf. BOETHIUS, *De institutione arithmetica*, II.40, 137.8: “Est igitur proportionalitas duarum vel trium vel quotlibet proportionum adsumptio ad unum atque collectio. Ut etiam communiter definiamus: proportionalitas est duarum vel plurium proportionum similis habitudo, etiamsi non eisdem quantitibus et differentiis constitutae sint. Differentia vero est inter numeros quantitas. Proportio est duorum terminorum ad se invicem quaedam habitudo et quasi quodammodo continentia, quorum compositio quod efficit, proportionale est. Ex iunctis enim proportionibus proportionalitas fit.”

<sup>99</sup> MASI, *Boethian Number Theory*, 164 n. 40.



## 7. From Mathematics to Metaphysics and Logic

As already noted, ARISTOTLE distinguishes between the *one* that is convertible with *being* (for every *one* is a *being* and every *being* is a *one*) from the *one* that is the principle of number (i.e., the arithmetical unit or monad; ►2.1). Let us examine each of them in turn.

The *one* that is convertible with *being* adds the notion of *non-division* to *being*. In this sense, *one*—like *being*—is said in multiple ways, for whatever is indivisible or undivided is said to be *one*. Thus, ARISTOTLE says that the λόγος of *one* is *to be undivided*.<sup>1</sup> Now, things can be said to be *one* for different reasons:

[S]ome things are one in number [κατ' ἀριθμόν], others in species [κατ' εἶδος], others in genus [κατὰ γένος], others by analogy [κατ' ἀναλογίαν]; in number those whose matter is one, in species those whose definition is one, in genus those to which the same figure of predication applies, by analogy those which are related as a third thing is to a fourth. The latter kinds of unity are always found when the former are; e.g. things that are one in number are also one in species, while things that are one in species are not all one in number; but things that are one in species are all one in genus, while things that are so in genus are not all one in species but are all one by analogy; while things that are one by analogy are not all one in genus.<sup>2</sup>

For example, Socrates is **one in number** because his matter is one (and this triangle is one in number because its surface is one). Socrates and Plato are **one in species** because both are rational animals (and the isosceles and the scalene are one in species because both are triangles). Socrates and Bucephalus are **one in genus** because both are animals (and the triangle and the square are one in genus because both are plane figures). And all these things (including animals and plane figures) are **one by analogy**.

It should not surprise us, then, to find that multiple things are often given a common name: whether they are the same or they are diverse, they are always *one by analogy*. Even the name *analogy* itself was used initially in the science of arithmetic, but was thereafter transferred to geometry, metaphysics, logic, and every science and art. Although it was discovered while researching numerical ratios in musical harmony, it soon became manifest that analogy is common (κοινά) not only to arithmetic but to all sciences and arts. For example, just as there is a middle-term (mean) in numbers, there is also a middle-term in syllogisms. Hence, we find analogy applied in PLATO, and throughout ARISTOTLE's works, to diverse, non-mathematical subjects.<sup>3</sup>

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<sup>1</sup> ARISTOTLE, *Metaphysica* Δ.6, 1015b16–1016b31; I.1, 1052a15–b18.

<sup>2</sup> *Ibid.*, Δ.6, 1016b31–1017a3.

<sup>3</sup> For example, ARISTOTLE, *Poetics* 21, 1457b16; *Nicomachean Ethics* E.6, 1131a31; *Meteorology* A.3, 340a4.

In turn, the *one* that is the principle of number adds the λόγος of *measure* to the *one* that is convertible with *being*. Thereafter, the λόγος of *measure* is analogically transferred to all the other genera because of a similarity in knowledge-based relations:

<[“One”] means> especially [μάλιστα] “to be the first measure of a kind” [ἐκάστου γένους, of each *genus*], and most strictly of quantity [ποσοῦ]; for it is from this that it has been extended <to the other categories>.<sup>4</sup> For measure [μέτρον] is that by which quantity is known; and quantity *qua* quantity [τὸ ποσὸν ἢ ποσόν] is known either by a “one” [ἐνί] or by a number [ἀριθμῶ], and all number is known by a “one.” Therefore all quantity *qua* quantity is known by the one [τῷ ἐνί], and that by which quantities are primarily [πρῶτω, *first*] known is the one itself [τοῦτο αὐτὸ ἔν]; and so the one is the starting-point [ἀρχή, *principle*] of number *qua* number. And hence in the other <classes> too measure means [λέγεται] that by which each is first known, and the measure of each is a unit [ἔν, *one*]*—*in length, in breadth, in depth, in weight, in speed. [...] In all these, then, the measure and starting-point [ἀρχή, *principle*] is something one and indivisible, since even in lines we treat as indivisible the line a foot long. For everywhere we seek as the measure something one and indivisible; and this is that which is simple [τὸ ἀπλοῦν] either in quality [τῷ ποιῶ] or in quantity [τῷ ποσῶ]. Now where it is thought impossible to take away or to add, there the measure is exact [ἀκριβές] (hence that of number is most exact; for we posit the unit as indivisible in every respect); but in all other cases we imitate [μιμοῦνται] this sort of measure.<sup>5</sup>

Thus, the first measure of quantity (ποσόν) is the numerical unit. And the measure of magnitude imitates the measure of number. Thereafter, likewise, that by which things are first known, in every genus, is the measure and principle of everything in that genus.

Since ARISTOTLE considers multitude and magnitude to be the first species in the genus of quantity (►2.3), this raises a fundamental question: if arithmetic demonstrates the properties of measurable multitude; and geometry, those of measurable magnitude; and both multitude and magnitude are species of quantity; it would therefore seem that there is a higher mathematical science that demonstrates the properties of quantity in general. Indeed, ARISTOTLE even states (above) that quantity *qua* quantity (τὸ ποσὸν ἢ ποσόν) is ultimately known by *the one*, and that all quantities are first known by the one itself, which is the principle of number—and number (i.e., measurable multitude) is what arithmetic considers. However, he rejects the possibility of proving geometrical truths by arithmetic:

[W]e cannot <in demonstrating> pass from one genus to another. We cannot, for instance, prove geometrical <truths> by arithmetic. For there are three <elements> in demonstration: (1) what is proved, the conclusion an attribute inhering [τὸ ὑπάρχον] essentially [καθ’ αὐτό, *per se*] in a genus [γένει τι]; (2) the axioms, i.e. axioms which are premises [ἐξ ὧν] <of demonstration>; (3) the subject-genus [τὸ γένος τὸ ὑποκείμενον] whose attributes [πάθη, *affections*], <i.e.> essential

<sup>4</sup> As will be clear soon enough, ARISTOTLE is not at all talking about categories but about subject-genera.

<sup>5</sup> ARISTOTLE, *Metaphysica* I.1, 1052b18–27; b31–1053a2.



properties [καὶ τὰ καθ' αὐτὰ συμβεβηκότα, *and the per se accidents*], are revealed by the demonstration. <The axioms which are> premises [ἐξ ὧν] of demonstration may be identical [τὰ αὐτὰ, *the same*] <in two or more sciences>: but in the case of <two> different [ἕτερον, *diverse*] genera such as arithmetic and geometry you cannot apply arithmetical demonstration to the properties [συμβεβηκότα] of magnitudes unless the magnitudes <in question> are numbers.<sup>6</sup>

Again, the properties of multitude and magnitude are diverse, as noted throughout the preceding chapters. Therefore, the only way in which arithmetical demonstration can be applied to magnitudes is if magnitudes are numbers: that is, if multiple magnitudes are measured insofar as they make up multitudes, rather than insofar as they are magnitudes.

Still, could not the properties that are common to quantity *qua* quantity be applied in mathematical demonstration to all quantities regardless of whether they are multitudes or magnitudes, since both are species of the same genus? To answer this question, we must note that *genus* is predicated equivocally.<sup>7</sup> ARISTOTLE explains the multiple ways in which *genus* is said:

<The term “race” or “genus” [γένος] is used [λέγεται] (1) if generation [ἡ γένεσις] of <things> which have the same form [εἶδος] is continuous [συνεχῆς], e.g. “while the race [γένος] of men lasts” means “while the generation of them goes on continuously.” (2) It is used with reference to that which first brought things into existence; for it is thus that some are called Hellenes <by> race [γένος] and others Ionians, because the former proceed from Hellen and the latter from Ion as their first begetter. [...] (3) <There is genus in the sense> in which “plane” [τὸ ἐπίπεδον] is the genus of plane figures and “solid” of solids; for each of the figures is in the one case a plane of such and such a kind [τοιονδί], and in the other a solid of such and such a kind; and this is what underlies [τὸ ὑποκείμενον] the differentiae. Again (4), in definitions [ἐν τοῖς λόγοις] the first constituent <element> [ἐνυπάρχον, the subject of a quality],<sup>8</sup> which is included in the what [ἐν τῷ τί ἐστι, *in the quiddity, essence*], is the genus, whose differentiae the qualities are said to be.<sup>9</sup>

Evidently, from these four modes in which *genus* is said, only the third one, τὸ ὑποκείμενον “that which underlies,” is τὸ γένος τὸ ὑποκείμενον, the *subject-genus* that ARISTOTLE includes among the requirements of demonstration. Thus, the plane surface is the proper subject of all plane figures, which in turn are differentiated by their boundaries: a square is a plane surface that is delimited by four straight lines, while a triangle is a plane surface that is delimited by three straight lines. What both square and triangle have in common is the underlying plane surface, which is their subject-genus; and the difference between them is given by the difference of boundaries. Such linear boundaries *per se* belong to

<sup>6</sup> ARISTOTLE, *Analytica Posteriora* A.7, 75a38–75b6.

<sup>7</sup> For its important implications, see REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 2, Ch. 3.

<sup>8</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ὑπάρχω, III.3.

<sup>9</sup> ARISTOTLE, *Metaphysica* Δ.28, 1024a28–34; 36–b6.

surface figures (►4.3). Similarly, demonstrations in geometry involve the affections and *per se* accidents of magnitude; and demonstrations in arithmetic, those of number. In this sense, number and magnitude do not belong to the same genus: for multitude, as pointed out earlier, is the genus of number; and a magnitude is not made out of a multitude. Consequently, the affections and *per se* accidents of multitude are not those of magnitude. Again, the units in a number are not *per se* positioned; and magnitude can be neither even nor odd. To summarize, then, this *genus* refers to a subject-genus; and multitude and magnitude do not have a common underlying subject-genus; for a magnitude is not composed of indivisible units, while a multitude is not made up of continuous quantities.

According to the fourth mode, *genus* refers to the generic term of a definition (λόγος). For example, *man* is defined in terms of *animal*; for *man* is a *rational animal*. Thus, *animal* is the genus of *man* (but *animal* is not the subject in which rationality exists as an affection or *per se* accident). In this sense, *quantity* is the genus of measurable multitude and of measurable magnitude; for *number* is defined in terms of *quantity* as *discrete quantity*, and *magnitude*, as *continuous quantity*. Thus, just as *animal* is the genus of *man*, so is *quantity* the genus of *number* and *magnitude*. And *rationality* or *irrationality* is to *animal* what *continuity* or *discontinuity* is to *quantity* (but *quantity* is not the subject in which *discreteness*—i.e., *discontinuity*—and *continuity* exist as affections or *per se* accidents).

Hence, *quantity* is univocal to the logician (who is concerned only with the λόγος), but analogical to the scientist-philosopher (who is concerned with a subject-genus). The definition of *measurable multitude* and of *measurable magnitude* can be univocally subsumed under the definition of *quantity* because both have in common a λόγος: that of *measurable*. Such definitions are sufficient to *reason* tentatively regardless of the subject-genus, but not enough to *demonstrate* anything concerning a subject-genus; for defining the measurable (and reasoning about it) is not the same as measuring it. The scientist-philosopher, who seeks to make known the necessary properties of things, “measures,” as it were, those very things using the principle and measure of their corresponding subject-genus. Thus, that by which number is first made known (that is, the unit, which is the measure and principle of everything in the genus of measurable multitude) is not the same as that by which magnitude is first known. The measure of multitude is, of its own nature, altogether indivisible; that of magnitude is only *used* as indivisible, in imitation of the arithmetical unit. Thus, just as a multitude is measured by a unit-one, so is a magnitude measured by a magnitude-one. Therefore, these two subject-genera are analogous.

It turns out, then, that the principles of all things are one by analogy. ARISTOTLE says as much: “The causes and the principles of different [ἄλλων, *diverse*] <things> are in a sense

different [ἄλλα, *diverse*], but in a sense, if one speaks universally [καθόλου < καθ' ὅλου] and analogically [κατ' ἀναλογίαν], they are the same for all."<sup>10</sup>

One question remains unanswered. If the principles of harmonics are not the principles of arithmetic, how can arithmetic be used to demonstrate the properties of sound intervals? Or, more generally, how is it that the principles that belong *primo et per se* to one subject-genus can be used to demonstrate the properties of another subject-genus? For, indeed, the same question could be asked of geometry with respect to optics; and of arithmetic and geometry with respect to astronomy. This question will be answered more fully in the next part (►64). For now, let us consider the following quote from ARISTOTLE:

[T]here is another way too in which the fact [τὸ ὄτι = *quia*] and the reasoned fact [τὸ διότι = *propter quid*] differ, and that is when they are investigated [θεωρεῖν] respectively by different sciences. This occurs in the <case of problems> related to one another as subordinate and superior, as when optical <problems> are subordinated to geometry, mechanical <problems> to stereometry, harmonic <problems> to arithmetic, the data of observation [φαινόμενα] to astronomy. (Some of these sciences bear almost the same name; e.g. mathematical and nautical astronomy, mathematical and acoustical harmonics.) Here it is the business of the empirical observers to know the fact, of the mathematicians to know the reasoned fact; for the latter are in possession of the demonstrations giving the causes, and are often ignorant of the fact: just as we have often a clear insight into a universal, but through lack of observation are ignorant of some of its particular instances. These connexions have a perceptible existence though they are manifestations of forms. For the mathematical sciences concern forms: they do not demonstrate properties of a substratum [καθ' ὑποκειμένου τινός], since, even though the geometrical subjects are <predicable as properties of> a perceptible substratum, it is not as thus <predicable> that the mathematician demonstrates properties of them. As optics is related to geometry, so another <science> is related to optics, namely the theory of the rainbow. Here knowledge of the fact is within <the province of> the natural <philosopher>, knowledge of the reasoned fact within that of the optician, either <qua optician> or qua mathematical optician. Many sciences not standing in this mutual relation enter into it at points; e.g. medicine and geometry: it is the physician's business to know that circular wounds heal more slowly, the geometer's to know the reason why.<sup>11</sup>

Thus, there is a subordination such that the principles of a more abstract science are used by—but not demonstrated in—a more concrete one. This happens even in geometry; for geometry uses the principles of arithmetic when defining figures (which have a delimited *multitude* of termini) and when measuring a *multitude* of parts of a magnitude. And the measure of multitude has priority over the measure of magnitude insofar as the latter imitates the former. In this sense, there is also a kind of analogy, for every measure is somehow related to the first measure of number. While relations vary depending on the

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<sup>10</sup> ARISTOTLE, *Metaphysica* Λ.4, 1070a31–33.

<sup>11</sup> ARISTOTLE, *Analytica Posteriora* A.13, 78b34–79a16.

subject-genus, the *relatum* is always *the one*. And this is, in a way, what happens in the proportions of numerical means—and more so in the ἀναλογία of the harmonic mean—where the extremes are related to the middle-term in diverse ways, as already noted.

### 7.1. Mathematics, Metaphysics, and Logic Related

To bring the first part of this work to its logical conclusion, there is one last question we must introduce: that of the relation between ancient Greek mathematics, metaphysics, and logic.

Let us first consider how ARISTOTLE compares mathematics to metaphysics:

[N]umber *qua* number [ἀριθμοῦ ἢ ἀριθμὸς] has peculiar [ἴδια] attributes [πάθη, *affections*], such as oddness and evenness, commensurability and equality, excess and defect, and these belong to numbers either in themselves [καθ' αὐτούς] or in relation to one another [πρὸς ἀλλήλους]. And similarly the solid and the motionless and that which is in motion and the weightless and that which has weight have other [ἕτερα, *diverse*] peculiar <properties>. So too there are certain <properties> peculiar [ἴδια] to being as such [τῷ ὄντι ἢ ὄν], and it is about these that the [first] philosopher has to investigate [ἐπισκέψασθαι] the truth.<sup>12</sup>

Thus, just as number *qua number* (ὁ ἀριθμὸς ἢ ἀριθμός) has peculiar affections, such as oddness and evenness; and, in respect to another, excess and defect, commensurability and equality; and different kinds of means and discrete proportions (all of which are studied by the arithmetician); so, too, magnitude *qua magnitude* has affections peculiar to its genus (which are studied by the geometrician); and so, too, being *qua being* (τὸ ὄν ἢ ὄν) has peculiar affections (which are studied by the metaphysician).

Hence, being (τὸ ὄν) *per se* (καθ' αὐτό) may be one or multiple, actual or potential. And in respect to another (πρὸς ἀλλήλους), it may be prior or posterior; or opposite in any of four modes: contradiction, possession-privation, contrariety, or relation. Finally, beings are proportional (ἀνάλογον) if their multiple relations somehow constitute something one; and this can happen in one of two ways: either multiple beings are diversely related to the one itself (αὐτὸ τὸ ἓν), as quantity and quality are related to substance; or else, one being is related to another in the same way that a third is related to a fourth—analogously.

Immediately after analogically comparing the mathematical sciences to metaphysics, ARISTOTLE distinguishes metaphysics from sophistic and dialectic:

An indication [σημείον, *sign*] <of this may be mentioned>: dialecticians and sophists assume the same guise as the philosopher, for sophistic is Wisdom which exists only in semblance, and dialecticians embrace all <things> in their dialectic, and being [τὸ ὄν] is common to all things; but

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<sup>12</sup> ARISTOTLE, *Metaphysica* Γ.2, 1004b10–17.

evidently their dialectic embraces these subjects because these are proper to philosophy. For sophistic and dialectic turn on the same class [γένος] <of things> as [first] philosophy, but this differs from dialectic in the nature [τρόπῳ, *in the mode*] of the faculty [δυνάμει] required and from sophistic in respect of the purpose of the philosophic life. Dialectic is merely critical [πειραστική] where [first] philosophy claims to know [γνωριστική], and sophistic is what appears to be <philosophy> but is not.<sup>13</sup>

Leaving aside sophistic, which is wisdom only in appearance, let us examine the relation between metaphysics and dialectic. Thus, ARISTOTLE says first that metaphysics and dialectic deal with the same genus: τὸ ὄν, *being*. Of course, he is not saying here that *being* is a logical genus (a πρῶτον ἐνυπάρχον, the generic part of a λόγος or definition).<sup>14</sup> In fact, as is well known, ARISTOTLE emphatically denies that *being* is a genus in this sense.<sup>15</sup> He is therefore saying that being is like a subject-genus (γένος ὑποκείμενον). To clarify, then, metaphysics and dialectic agree in the subject-genus: *being*.

Secondly, according to ARISTOTLE, metaphysics and dialectic differ in the method of the faculty. Thus, dialectic is merely πειραστική, *fitted for trying or testing*;<sup>16</sup> while metaphysics is γνωριστική, *capable of apprehending, of knowing*.<sup>17</sup> While dialecticians try to inquire about the affections of being, beginning their investigation “from probable premises only,”<sup>18</sup> metaphysicians already know the principles of being with certainty.

Thirdly, as ARISTOTLE also says, although metaphysics and dialectic have the same (subject) genus (for they both treat of *being*), only metaphysics theorizes of being *qua being*. Dialectic, in turn, treats of contingent accidents rather than proper affections. In this respect, metaphysics is like geometry; for geometry treats of magnitude *qua magnitude*, and of the proper affections of magnitude as such:

As the mathematician investigates [τὴν θεωρίαν ποιῆται] abstractions [ἐξ ἀφαιρέσεως, *by abstraction*] (for <before beginning his investigation> he strips off [περιελών] all the sensible qualities, e.g. weight and lightness, hardness and its contrary, and also heat and cold and the other sensible contraries, and leaves only the quantitative and continuous, sometimes in one, sometimes in two, sometimes in three <dimensions>, and the attributes [πάθη, *affections*] of these <*qua*> quantitative and continuous [τὸ ποσὸν καὶ συνεχές, *the quantum and continuum*], and does not consider them in any other respect, and examines the relative positions [τάς πρὸς ἄλληλα θέσεις, *the positions one in respect of another*] of some and the attributes [ὑπάρχοντα, *the intrinsic*

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<sup>13</sup> ARISTOTLE, *Metaphysica* Γ.2, 1004b17–26.

<sup>14</sup> ARISTOTLE, *Metaphysica* Δ.28, 1024b4.

<sup>15</sup> See ARISTOTLE, *Analytica Posteriora* B.7, 92b14; *Metaphysica* B.3, 998b22.

<sup>16</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for πειραστικός.

<sup>17</sup> *Ibid.*, entry for γνωριστικός.

<sup>18</sup> ARISTOTLE, *Metaphysica* B.1, 995b20–25.

*qualities in the subject*<sup>19</sup> of these, and the commensurabilities and incommensurabilities of others, and the ratios of others; but yet we posit one and the same science of all these things—geometry), the same is true with regard to being. For the attributes [συμβεβηκότα, *accidents*] of this in so far as it is being, and the contrarities in it *qua* being, it is the business of no other science than philosophy to investigate [θεωρησαι]; for to physics one would assign the study of things not *qua* being, but rather *qua* sharing in movement; while dialectic and sophistic deal with the attributes [συμβεβηκότων, *accidents*]<sup>20</sup> of things that are [i.e., *of beings*], but not <of things> *qua* being, and not with being itself in so far as it is being; therefore it remains that it is the philosopher who studies [θεωρητικόν] the things we have named, in so far as they are being.<sup>21</sup>

As to the relation between mathematics and dialectic, PROCLUS, nonetheless, considers dialectic, which he calls “the purest part of philosophy” (he is, after all a Neoplatonic), to be “the capstone of the mathematical sciences”:<sup>22</sup>

[D]ialectic [ἡ διαλεκτική], the purest part of philosophy, hovers attentively over mathematics, encompasses its whole development, and of itself contributes to the special sciences their various perfecting, critical, and intellectual powers—the procedures, I mean, of analysis, division, definition, and demonstration. Being thus endowed and led towards perfection, mathematics reaches some of its results by analysis, others by synthesis, expounds some matters by division, others by definition, and some of its discoveries binds fast by demonstration, adapting these methods to its subjects and employing each of them for gaining insight into mediating ideas [τῶν μέσων λόγων]. Thus, its analyses are under <the control of> dialectic, and its definitions, divisions, and demonstrations are of the same family and unfold in conformity with the way of mathematical understanding [γνώσεως]. It is reasonable, then, to say that dialectic is the capstone [θριγκός] of the mathematical sciences [τῶν μαθημάτων].<sup>23</sup>

Indeed, no science can exist without trying or testing. Without logic (of which dialectic is a part), there would be no demonstration in mathematics—or in metaphysics. On the other hand, the only science that can establish the principles of logic is metaphysics, as ARISTOTLE says: “it belongs to the [first] philosopher, i.e. to him who is studying the nature of all substance, to inquire also into the principles of syllogism.”<sup>24</sup>

Dialectic, then, has a very important role to play in mathematical research: especially when it uses the analytic and synthetic methods, which are like tools or instruments that logicians use to carry out their investigations by trying possible solutions. But that does not mean that mathematics is the same as dialectic or logic—at least not ancient Greek

<sup>19</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ὑπάρχω.

<sup>20</sup> Ibid., entry for συμβαίνω.

<sup>21</sup> ARISTOTLE, *Metaphysica* K.3, 1061a28–b11.

<sup>22</sup> In calling dialectic “the capstone of the mathematical sciences” he follows PLATO, *Republic* VII, 534e.

<sup>23</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 42.15–43.11.

<sup>24</sup> ARISTOTLE, *Metaphysica* Γ.3, 1005b5–8.

mathematics. As Jaako HINTIKKA and Unto REMES say, “[dialectical] analysis is after all a method of discovery, not one of proof.”<sup>25</sup> Regrettably, as they moreover add:

In spite of the importance of the method of analysis and synthesis for Greek geometry, ancient mathematicians are remarkably reticent about its nature. [...] Although the method was known already to Aristotle—some sources ascribe its discovery to Plato—the only extensive explanation of the concepts of analysis and synthesis is due to as late a writer as Pappus. Fortunately Pappus can be considered a reliable witness. Besides being a competent mathematician in general, he was an accomplished practitioner of the analytical method in particular and also had a thorough knowledge of the history of the method, as his *Collectio* shows.

Let us, therefore, resort to PAPPUS, who provides, in Book 7 of *Collectio*, a description of the methods of analysis and synthesis:

Now analysis [ἀνάλυσις] is <the> way [ὁδός, *method*] from what is sought [ζητούμενου], as if it were admitted [ὀμολογουμένου, *granted*], through its concomitants [ἀκολουθῶν, *consequents*]<sup>26</sup> <in order> to something [ἐπί τι] admitted [ὀμολογούμενον] in synthesis. For in analysis we suppose that which is sought to be already done, and we inquire from what it results, and again what is the antecedent of the latter, until we on our backward way [ἀναποδίζοντες] light upon something already known and <being> first in order [τάξιν ἀρχῆς, *an order of a principle*]. And we call such a method analysis, as being a solution [λύσιν] backwards [ἔφοδον, *method of reasoning*]. In synthesis, on the other hand, we suppose that which was reached last in analysis to be already done, and arranging in their natural [κατὰ φύσιν] order as consequents the former antecedents and linking them one with another, we in the end arrive at the construction [κατασκευῆς] of the thing sought. And this we call synthesis.<sup>27</sup>

PAPPUS then goes on to explain that the methods of analysis and synthesis apply to theorems and problems (the same distinction that PROCLUS makes; ► 1.5). Thus, analysis and synthesis are either θεωρητικόν, *theoretical*, or προβληματικόν, *problematical*. And he gives a list of ancient Greek works that use these methods.<sup>28</sup> We will, therefore, examine a basic sample of mathematical dialectic at work. But instead of drawing from a book on geometry, we will resort to the arithmetic of DIOPHANTUS, who is (inaccurately) said to be the first to have recognized fractions as numbers (► 7.2), and to have been “the father of [modern] algebra” (a claim that we shall disprove; ► 67.3).<sup>29</sup>

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<sup>25</sup> Jaako HINTIKKA and Unto REMES, *The Method of Analysis: Its Geometrical Origin and Its General Significance* (Boston: Reidel, 1974), 7.

<sup>26</sup> In the original translation, a note is added in brackets: “the usual translation reads: consequences.”

<sup>27</sup> PAPPUS, *Collectio* Z.1, vol. 2, 634.11–23. The translation is from HINTIKKA and REMES, *The Method of Analysis*, 8–9.

<sup>28</sup> PAPPUS, *Collectio* Z.3, vol. 2, 636. This includes EUCLID’s *Data* (one book), *Porisms* (3), and *Surface Loci* (2); APOLLONIUS of Perga’s *Cutting-off of a Ratio* (2), *Cutting-off of an Area* (2), *Determinate Section* (2), *Contacts* (2), *Vergings* (2), *Plane Loci* (2), *Conics* (8); ARISTAEUS’s *Solid Loci* (5); and ERATOSTHENES’S *On Means* (2). “In all, thirty-three books.” Only some of these works have survived.

<sup>29</sup> See KLEIN, *Greek Mathematical Thought and the Origin of Algebra*, 130ff.

First, we should observe that DIOPHANTUS uses a symbology that is more developed than that of EUCLID. Thus, the unit, which DIOPHANTUS calls τὸ ἀμετάθετον τῶν ὠρισμένων, “the immutable of the determinates,” is signified by  $\acute{\mu}$  (after the first two letters in μονάς, *monad, unit*).<sup>30</sup> (TANNERY’s critical edition renders ἀμετάθετον using the Latin *constans*, which means *constant*, rather than *unalterable, immutable*, inducing a modern reading.)<sup>31</sup>

In turn, that which has a πλήθος μονάδων ἀόριστον, *indeterminate multitude of units*, DIOPHANTUS calls ἀριθμός, *number*, and assigns to it the symbol ζ (in modern notation typically denoted using an  $x$ ).<sup>32</sup> This is the number being sought in analysis. Next, an indeterminate square number ( $x^2$ ) is signified by Δ<sup>Υ</sup> (after the first two letters in δύναμις, *power; square*);<sup>33</sup> likewise, Κ<sup>Υ</sup> (for κύβος, *cube*) signifies a cubic number ( $x^3$ );<sup>34</sup> and in the same fashion are assigned the symbols Δ<sup>Υ</sup>Δ ( $x^4$ ), ΔΚ<sup>Υ</sup> ( $x^5$ ), and Κ<sup>Υ</sup>Κ ( $x^6$ ).<sup>35</sup>

DIOPHANTUS also specifies the names of determinate μόρια, *parts* of numbers (TANNERY reinterprets this technical term as *fractiones*, i.e., *fractions*: more on this, below; ►7.2). The names of such parts, DIOPHANTUS explains, are derived from the name of the number that has as many unit-parts.<sup>36</sup> Thus, τρίτον, *third* (1/3) from τρία, *triad, three* (3); τέταρτον, *fourth* (1/4) from τέσσαρα, *four* (4); and so on.<sup>37</sup> But he moreover introduces analogously derived names for indeterminate parts of numbers. Thus, ἀριθμοστόν, *numberth* (1/ $x$ ) from ἀριθμός, *number* ( $x$ ); δυναμοστόν, *squareth* (1/ $x^2$ ) from δύναμις, *square* ( $x^2$ ); and so on.<sup>38</sup> And he provides a superscript sign <sup>x</sup> that indicates such parts.<sup>39</sup> For example, γ<sup>x</sup> signifies *third* (1/3), where the letter γ is the Greek sign for 3. Likewise, Δ<sup>Υx</sup> signifies *squareth* (1/ $x^2$ ). Thus, the names of such parts are also derived from the homonymous indeterminate numbers (TANNERY names such numbers using the Latin *denominator*, even though there is nothing in the original Greek that corresponds to this word).

DIOPHANTUS then observes that multiplying a number by its homonymous part makes a unit (again, TANNERY reinterprets this as fractions of a unit).<sup>40</sup> He also says that, since the unit is immutable and always fixed (ἔστωσα), any species (εἶδος) that is multiplied by it

<sup>30</sup> DIOPHANTUS, *Arithmetica* A, 6.6–8.

<sup>31</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἀμετάθετος.

<sup>32</sup> DIOPHANTUS, *Arithmetica* A, 6.3–5.

<sup>33</sup> *Ibid.*, 4.12–16.

<sup>34</sup> *Ibid.*, 17–18.

<sup>35</sup> *Ibid.*, 19–26; 6.1–2.

<sup>36</sup> *Ibid.*, 6.9–10.

<sup>37</sup> *Ibid.*, 10–13.

<sup>38</sup> *Ibid.*, 14–19.

<sup>39</sup> *Ibid.*, 20–21.

<sup>40</sup> *Ibid.*, 8.11–12.



remains the same.<sup>41</sup> And that homonymous parts multiplied make a part homonymous to the numbers multiplied: for example, ἀριθμοστόν, *numberth* ( $1/x$ ) multiplied by itself makes a δύνάμοστόν, *squareth* ( $1/x^2$ ). On the other hand, a *numberth* ( $1/x$ ) multiplied by its *square* ( $x^2$ ) makes a *number* ( $x$ ), and so on.<sup>42</sup>

Finally, DIOPHANTUS also says that λείψις, *lack* (whose sign is Ϸ, an inverted and truncated Ψ) multiplied by λείψις, *lack*, makes ὑπαρξις, *existence in a subject* (TANNERY reinterprets these as the Latin *minus*, i.e., *negative*, and *plus*, i.e., *positive* numbers respectively).<sup>43</sup>

These symbols are put to work in the concrete problems that DIOPHANTUS proposes, which he resolves using problematical analysis. Thus, the very first proposition requires, “To divide a given number into two having a given difference.”<sup>44</sup> DIOPHANTUS begins by supposing that which is sought to be already done. Hence, he poses a lesser number ζ ( $x$ ); a greater number having the given difference of 40; and the given number 100 as being equal to the sum of the greater and the less. He then proceeds to inquire by working his way backward, applying common notions (e.g., subtracting equals to equals), until he finds that the lesser number is equal to 30; and the greater, equal to 70. These are the concrete principles sought. The demonstration then becomes corroborated by synthesis; for the difference between 70 and 30 is 40; and their addition gives 100.

DIOPHANTUS also tackles complex problems in which the reduction to first principles fails. He then backtracks and attempts something else.<sup>45</sup> This is how dialectic works. In the end, the proof always consists in synthesizing, *solely from first principles known in arithmetic’s subject-genus of multitude*, that which was resolved through the method of analysis.

As noted above, DIOPHANTUS is characterized as being “the father of algebra.”<sup>46</sup> HEATH even wrote a work entitled *Diophantus of Alexandria: A Study in the History of Greek Algebra*.<sup>47</sup> We cannot examine this claim before discussing AL-KHWARIZMI’s algebra, but we will dispel some other myths presently. For now, let us consider what KLEIN has to say:

With respect to the “latent algebraic component in classical Greek mathematics” and the incisive difference between external structure and internal motivation which is implied by this, Neugebauer himself emphasized the “necessity of formulating the question in terms which might almost be

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<sup>41</sup> Ibid., 13–15.

<sup>42</sup> Ibid., 10.1–18; 12.1–18.

<sup>43</sup> Ibid., 12.19–21.

<sup>44</sup> Ibid., 16.9–10.

<sup>45</sup> See, for example, *Arithmetica* Δ, 208.7.

<sup>46</sup> See KLEIN, *Greek Mathematical Thought and the Origin of Algebra*, 126.

<sup>47</sup> Thomas Little HEATH, *Diophantus of Alexandria: A Study in the History of Greek Algebra* (Cambridge: University Press, 1910). This is the second edition; the first one was published in 1885.

said to belong to stylistic history.” Such a formulation presupposes a certain independence of the material mathematical content from the “external” form, which amounts, in the final analysis, to taking for granted that the content is to be understood “algebraically.” But our task consists precisely in bringing the content of Greek mathematics to light not by externally transporting it into another mode of presentation but rather by comprehending it in the one way which seemed comprehensible to the Greeks. Only then can we determine what kind of conceptual means Greek, in distinction from modern, mathematics employs.<sup>48</sup>

## 7.2. Fiction: “Diophantus was the first to recognize fractions as numbers”

As noted above, DIOPHANTUS says that multiplying a number by its homonymous part makes a unit (i.e.,  $x \cdot \frac{1}{x} = 1$ ). Hence, the underlying assumption is, clearly, that—contrary to what has been established—the unit is not only multipliable, but also divisible. In fact, turning to propositions in DIOPHANTUS’s *Arithmetic*, we find multiple cases in which the unit is explicitly said to be divided.<sup>49</sup> Thus, problem 30 in the fourth book requires, “To divide [διελείν] the unit [τὴν μονάδα] into two numbers, to add to each a given number, and to make a square of them.”<sup>50</sup> The exposition even uses the symbol  $\dot{M}$  to refer to the unit that is to be divided. It therefore seems that DIOPHANTUS, as TANNERY and others would have it, treats fractions of the unit as numbers.

However, at closer inspection this illusion quickly vanishes; for the division of the unit does not result in a “number” less than the unit. In fact, what is produced is a number—i.e., a *multitude*—greater than the unit. And the resulting units are then used in the same way that any indivisible unit would be used. This corresponds precisely to what THEON says, i.e., that the unit—as such—is altogether without parts and indivisible (► 3.5):

If the sensible *one* [τὸ ἐν ἐν αἰσθητοῖς, *in sensible (things)*] is divided [διαίρωμεν] into parts [μύρια], that which was *one* becomes a multitude [πλήθος]; and the subtraction of each of its parts would terminate in *one*; and if this is divided again into parts, a multitude is produced; and removing each part returns us to *one*, so the one—insofar as it is one—is without parts and indivisible.<sup>51</sup>

Thus, in DIOPHANTUS as in THEON, the one—insofar as it is one—is without parts and indivisible. And if something one is divided, what is produced is not a fraction of the unit, but a multitude of units. As PLATO says (► 3.5), if you divide, the masters of arithmetic multiply. This explains why DIOPHANTUS characterizes the unit as immutable and fixed.

That DIOPHANTUS applies his analysis only to the subject-genus of *measurable multitude* is evident from his rejection of incommensurable quantities. For example, in proposition

<sup>48</sup> KLEIN, *Greek Mathematical Thought and the Origin of Algebra*, 127–8.

<sup>49</sup> Most are in Book 5, Prop. 9–12: DIOPHANTUS, *Arithmetica* A, 332.15; 336.12; 342.13; 346.14.

<sup>50</sup> *Ibid.*, 266.7–9.

<sup>51</sup> THEON, *Expositio rerum mathematicarum...*, 18.9–15.

10 of Book 4, he reaches an apparent solution of the form  $35x^2 = 5$ , where  $x$  would be what we modernly call an *irrational number*.<sup>52</sup> However, he rejects the solution because “ $x$  is not rational” (ὁ ζ οὐ ρητός). This is as close as he gets to calling a number *irrational*; but he evidently rejects the solution because all numbers are commensurable multitudes; and, therefore, that which is signified by ζ cannot possibly be a number in this case.

Evidently, what we call *negative numbers* and *irrational numbers* result from dialectical analysis. Again, this is merely a method of discovering the principles from which a thing, which is supposed to belong to a genus, could be synthesized. Thus, *lacking multitudes*, and *incommensurable multitudes*, even if they are useful, rational tools of dialectical analysis, cannot be principles of any demonstration in arithmetic’s subject-genus; for they are contradictory. Every science treats of a subject-genus *as such* (e.g., arithmetic, of number *qua number*). Dialectic, on the other hand, treats of any being indistinctly; and it, therefore, assumes both ends of a contradictory choice as probable.

### 7.3. Fiction: “Ancient Greeks understood number to be a kind of magnitude”

1. Deceived by numerical figures such as linear or square numbers, and misled by diagrams found in some ancient works, many modern authors believe that Greek mathematicians understood numbers to be magnitudes.<sup>53</sup> HEATH, for his part, claims that PLATO and EUCLID signify numbers “by straight lines proportional in length to the numbers they represent.”<sup>54</sup> But this is demonstrably absurd. Thus, in EUCLID’s *Sectio canonis*, lines (whether they were included in the autograph or not) are used merely to depict the string of a monochord and its potential division in ratios of numbers.<sup>55</sup> Length and position are—absolutely speaking—irrelevant. What matters is that the string (as a continuum) is divided into parts *in accordance with numerical ratios*, so that concordant intervals may be produced. Thus, we read in the introduction to *Sectio canonis* that musical notes “are composed of parts,” and that “all things that are composed of parts are spoken of in a ratio of number [ἀριθμοῦ λόγῳ] with respect to one another, so that notes, too, must be spoken of in a ratio of number with respect to one another.”<sup>56</sup> Clearly, this is not always true of magnitudes—but it is always true of measurable multitudes (► 5.4; 6.12).

2. The issue is that having separate theories of proportion for numbers (*Elements*, VII) and for magnitudes (V) seems superfluous to the modern mind. Thus, HEATH contends

<sup>52</sup> DIOPHANTUS, *Arithmetica* Δ, 208.7.

<sup>53</sup> For a criticism of such claims, see KNORR, *The Evolution of Euclidean Mathematics*, 171–4.

<sup>54</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, v.2, 288. See EUCLID, *Opera Omnia*, vol. 8, 158ff.

<sup>55</sup> See Andrew BARKER, “Three Approaches to Canonic Division,” in *ΠΕΡΙ ΤΩΝ ΜΑΘΗΜΑΤΩΝ (Peri Tōn Mathēmatōn)*, ed. Ian MUELLER (Edmonton: Academic Printing & Publishing, 1991).

<sup>56</sup> EUCLID, *Opera Omnia*, vol. 8, 158.18–20.

that EUCLID could “save himself so much repetition and treat numbers merely as a particular case of magnitude” simply by “referring back to the corresponding more general propositions of Book V instead of proving the same propositions over again for numbers.”<sup>57</sup>

To the ancient Greek mathematician, in contrast, there is no scientific demonstration without a common subject-genus—and arithmetic and geometry simply do not have one. Evidently, metaphysics, which studies analogy universally insofar as it belongs to *being as such*, would consider all proportions to be in a way the same—that is, analogically. But mathematical theories of proportion are not metaphysical; and mathematicians do not need to be metaphysicians to develop their theories. As MAURER explains:

Of course the other sciences have their own proper principles, which can be known without an explicit knowledge of the principles of metaphysics. Hence these sciences do not directly depend on metaphysics; they are autonomous in their own spheres. Yet the principles of metaphysics are the absolutely universal and primary principles. All the others can be resolved into them. It is in this sense that all the other sciences are said to take their principles from metaphysics, and that this science is said to explain the principles of all the sciences.<sup>58</sup>

Nonetheless, disdain for metaphysics often leads to sophistry. Thus, after rebuking EUCLID for not treating *number* as “a particular case of magnitude,” HEATH contradicts himself by appealing to precisely the opposite proposition: namely, that magnitudes are “evidently” numbers.<sup>59</sup> This is like arguing that all men are animals because—evidently—all animals are men. And he attempts to support this paradoxical claim by referring us to ARISTOTLE’S saying, quoted above, that we cannot prove geometrical truths by arithmetic “unless the magnitudes in question are numbers.” HEATH evidently takes this to mean that ARISTOTLE *does* grant that magnitudes *are* numbers. But here, again, ARISTOTLE is merely implying that any *multitude* of magnitudes (for example, two lines) is a number (see, for example, *Physica* Δ.12, 220a27–32).<sup>60</sup> The only explanation that HEATH can come up with to justify EUCLID’S decision to keep the arithmetical and geometrical theories of proportion separate, is that the author of the *Elements* was “following tradition” out of “fairness to others and his readiness to give them credit for their work.”<sup>61</sup> Ironically, HEATH’S sentimentalist justification would undoubtedly seem not only unscientific to ancient Greeks, but also ludicrous; for EUCLID does not even attribute either theory of proportion to anyone.

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<sup>57</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, v.2, 113.

<sup>58</sup> AQUINAS, *The Divisions and Methods of the Sciences*, 8, n. 21.

<sup>59</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, v.2, 113.

<sup>60</sup> For a refutation of similar places that would seem to support such a reduction, see KNORR, *The Evolution of Euclidean Mathematics*, 310.

<sup>61</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, v.2, 113. HEATH contrives this explanation based on a vague reference to EUCLID’S character in PAPPUS, *Collectio* Z.35, vol. 2, 678.8–15.

3. According to Ian MUELLER, “Euclid’s failure to establish a correlation between his two treatments of proportionality before developing the material in Book x is probably the greatest foundational flaw in the *Elements*.”<sup>62</sup> His criticism is based on mixed proportions:

We have seen that, although Euclid presupposes some definitions from Book v in the arithmetic books, he proves laws of proportion separately for numbers, and he does not appear to intend to apply any laws from Book v to numbers. [...] Thus, it seems quite certain that, for Euclid, magnitudes do not include numbers. Certainty would seem to me complete if Euclid did not introduce proportionalities involving magnitudes and numbers together in Book x.<sup>63</sup>

Therefrom, all evidence to the contrary notwithstanding, and despite any remaining doubts, MUELLER and others “assume that at least by the time of Book x Euclid includes numbers among magnitudes.”<sup>64</sup> This assumption is based, as MUELLER himself indicates, upon cases in Book x where EUCLID uses proportions involving both ratios between magnitudes and ratios between numbers. Thus, the argument goes, if both magnitudes and numbers can be mixed in the same proportion, does that not mean that number is indeed subsumed under magnitude?

MUELLER’s assumption is perfectly logical. Indeed, as explained above, dialectic concerns itself with *being*—and so does logic, of which dialectic is a part. In this sense, logic extends to as many things as metaphysics. But when logic is not applied to a subject-genus as such (e.g., being *qua being*, number *qua number*), it is on its own. And on its own, logic cannot deal with anything beyond indistinct reasons. It is not by accident that modern logic is characterized as “mathematical”; for it ultimately imitates the way in which ancient Greek mathematicians reasoned—except when it comes to applying metaphysical principles to a subject-genus. We should not be surprised, then, when the modern mind, confined to its logical cave, casts its own shadows onto ancient Greek mathematics. Thus, MUELLER resorts to purely logical reasons when claiming that EUCLID “overlooked the shortcoming” he believes to have found in the *Elements*, its “greatest foundational flaw”:

I suggest that a major reason why he did so lies in his conception of definitions as characterizations of independently understood notions. For us a definition gives a term its sense, so that the same term can be given two definitions only if those definitions are proved equivalent. For Euclid proportionality is an independently understood concept of which he gives two characterizations for two different kinds of objects. The fact that both of those characterizations enable one to prove the ordinary laws of proportionality is a sufficient indication of their correctness. Although Euclid

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<sup>62</sup> MUELLER, *Philosophy of Mathematics and the Deductive Structure of Euclid’s Elements*, 138.

<sup>63</sup> *Ibid.*, 136.

<sup>64</sup> MUELLER, “Greek Arithmetic, Geometry and Harmonics: Thales to Plato,” in *From the Beginning to Plato*, ed. C.C.W. Taylor (London: Routledge, 2008), 285; ARTMANN, “Euclid’s *Elements* and Its Prehistory,” 6.

characterizes proportionality when applied to geometric magnitudes and proportionality applied to numbers, he overlooks his failure to characterize it for proportionalities involving numbers and magnitudes together.<sup>65</sup>

The truth of the matter is much simpler. What is peculiar to proportion is that, through it, relations can be directly compared even if the terms of one relation are not directly comparable to those of another. Indeed, analogy is classically defined as identity, equality, or similarity of relations. For example, the relation *double*, considered *in se*, is the same whether we are speaking of numbers or of lines. Hence, it is legitimate for the geometrician to compare a ratio between magnitudes to a ratio between numbers, as EUCLID does (► 6.12). And this is so even if we cannot directly compare a multitude to a magnitude, since the principle-measure of each subject-genus is diverse. Evidently, when the terms of such relations are heterogenous, alternation can only be applied to them *qua beings*.

Again, a relation of incommensurability can exist only between magnitudes. And that is precisely how we can define and distinguish incommensurable magnitudes: because their relation is comparable to that between numbers. PROCLUS explains this plainly:

The theory of commensurable <magnitudes> [τῶν συμμέτρων, *of commensurables*] is developed [θεωρεῖ, i.e., *theorized*] primarily [πρῶτως, *firstly*] by arithmetic and then by geometry in imitation [μιμουμένη] <of it>. This is why both sciences define commensurable <magnitudes> [σύμμετρα, *commensurables*] as those which have to one another the ratio of a number to a number, and this implies that commensurability exists primarily in numbers. For where there is number there also is commensurability, and where commensurability, there also number.<sup>66</sup>

4. Be that as it may, let us consider a scholium to Book V of EUCLID's *Elements* that would ostensibly support this fiction better than any other ancient source. This unattributed marginal note, or rather its source, is probably what ultimately misled medieval Arab translators of the *Elements* into believing that number is but a specific kind of magnitude. Explicit references to this text are so infrequent today—and so persistent the influence of the fiction it represents—that we are compelled to reproduce the relevant section here:

The purpose of the fifth Book is the treatment of proportions; and this book is common to geometry, arithmetic, music, and all mathematical sciences simply [ἀπλῶς = *simpliciter*], for in it are demonstrated theorems applicable not only to the geometrical but even to all the mathematical sciences, as has been said. This is, thus, its purpose. And some say that this book is the discovery of Eudoxus, Plato's teacher.<sup>67</sup>

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<sup>65</sup> MUELLER, *Philosophy of Mathematics and the Deductive Structure of Euclid's Elements*, 138.

<sup>66</sup> PROCLUS, *In Primum Euclidis Elementorum Librum Commentarii*, 60.26–61.5.

<sup>67</sup> EUCLID, *Opera Omnia*, vol. 5, 280.1–9: “Σκοπὸς τῷ πέμτῳ βιβλίῳ περὶ ἀναλογιῶν διαλαβεῖν κοινὸν γὰρ τοῦτο τὸ βιβλίον γεωμετρίας τε καὶ ἀριθμητικῆς καὶ μουσικῆς καὶ πάσης ἀπλῶς τῆς μαθηματικῆς

This scholium, incidentally, is a key document for ascribing to EUDOXUS the discoveries reflected in Book V, despite the vague reference.<sup>68</sup> In terms of its trustworthiness, it is problematic for two reasons. On the one hand, the most reliable traditions relate that EUDOXUS was PLATO's student—not his teacher.<sup>69</sup> And more crucially, on the other hand, it contradicts the incontestable fact that there is no universal magnitude in EUCLID, as KNORR has exhaustively shown; for “number theory was always recognized as a discipline entirely separate from geometry.”<sup>70</sup>

HEATH names PROCLUS as the probable author of the scholium (though he does not cite any sources or provide a reasoned account).<sup>71</sup> But this conclusion is clearly untenable; for PROCLUS explicitly rejects the opinion of ERATOSTHENES that would make proportion (ἀναλογία) the unifying bond of “all the mathematical sciences.”<sup>72</sup> And the reason for this rejection is that “proportion is said to be, and is, to the mathematical [sciences] one of the commons [τῶν κοινῶν].”<sup>73</sup> In other words, proportion is *common to all the sciences*.

As mentioned above, theorizing about the commons (i.e., about the common notions or axioms) belongs neither to geometry nor to arithmetic, but to metaphysics. Thus, PROCLUS distinguishes, beneath the whole and all-inclusive mathematics (discussed in the next section; ► 7.4, ¶4), two species of mathematical science: one that treats of the *how-much* (ποσόν), that is, arithmetic; and another one that treats of the *how-great* (πηλίκον), that is, geometry.<sup>74</sup> Yet, as PROCLUS explains, each of these sciences applies proportion particularly; that is, in accordance with its own principles:

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ἐπιστήμης. τὰ γὰρ ἐν αὐτῷ ἀποδεικνύμενα οὐ μόνον γεωμετρικοῖς ἀρμόζει θεωρήμασιν, ἀλλὰ καὶ πᾶσι τοῖς ὑπὸ μαθηματικῆν τεταγμένοις, ὡς προείρηται, ἐπιστήμην. ὁ μὲν οὖν σκοπὸς οὗτος, τὸ δὲ βιβλίον Εὐδόξου τινὲς εὑρεσιν εἶναι λέγουσι τοῦ Πλάτωνος διδασκάλου.” The translation is ours.

<sup>68</sup> KNORR thinks that there are good reasons for doubting this ascription. See KNORR, “On the Early History of Axiomatics...,” 98. His reconstruction of the theory can be found in KNORR, “Archimedes and the Pre-Euclidean Proportion Theory,” *Archives internationales d'histoire des sciences* 28 (1978).

<sup>69</sup> See DIOGENES LAËRTIUS, who follows the (now lost) *Successions* of SOTION of Alexandria (fl. ca. 200–170 BC) in *De vitis, dogmatis et apophthegmatis clarorum philosophorum*, 2 vols. (Leipzig: Karl Francis Koehler, 1831), v. 2, 318. English version in *The Lives and Opinions of Eminent Philosophers*, trans. C. D. Yonge (London: G. Bell and Sons, 1915), 373.

<sup>70</sup> KNORR, *The Evolution of Euclidean Mathematics*, 308–10.

<sup>71</sup> HEATH, *The Thirteen Books of Euclid's Elements*, vol. 2, 112. The only known ascription to PROCLUS of a scholium to EUCLID's *Elements* (in this case, to Book X, Proposition 9) is found in an entirely different manuscript. See Johan Ludvig HEIBERG, “Paralipomena zu Euklid,” *Hermes* 38, no. 3–5 (1903), 341, no. 17: “Σχόλιον εἰς τὸ θ' θεωρήμα σχόλιον τοῦ Πρόκλου πρὸς τὸ τέλος.” The discussion is found in idem, 345–6. On these scholia, see Jaap MANSFELD, *Prolegomena Mathematica: From Apollonius of Perga to Late Neoplatonism*, Philosophia Antiqua (Leiden, Boston, Köln: Brill, 1998), 26ff.

<sup>72</sup> See PAPPUS, *Collectio* Γ.47, v.1, 86.19–88.2: “λέγει γὰρ [ὁ Πλάτων] ἓνα δεσμὸν εἶναι τῶν μαθημάτων ἀπάντων, αἰτία δὲ γενέσεως καὶ δεσμὸς πᾶσι τοῖς γενομένοις ἢ τῆς ἀναλογίας θεία φύσις.” These is what ERATOSTHENES (as quoted by PAPPUS) puts in PLATO's mouth, undoubtedly inspired in the *Timaeus* (31b–32c). An excerpt in English can be found in VAN DER WAERDEN, *Science Awakening*, 231–32.

<sup>73</sup> PROCLUS, *In Primum Euclidis Elementorum Librum Commentarii*, 43.22–25: “ἢ γὰρ ἀναλογία τῶν κοινῶν τοῖς μαθήμασιν ἐν τι καὶ λέγεται εἶναι καὶ ἔστιν.” The translation is ours.

<sup>74</sup> *Ibid.*, 35.17ff.

Let the geometer state that if four magnitudes are proportional [ἀνάλογον] they will also be proportional alternately and prove it by its own principles, which the arithmetician would not use; and again let the arithmetician lay it down that if four numbers are proportional they will also be proportional alternately and establish this from the principles of his own science.<sup>75</sup>

That PROCLUS, like ARISTOTLE, considers proportion to be common to all sciences (and therefore a metaphysical principle) is certain; for he also includes the study of its nature (along with that of *sameness* and *otherness*, and of the *essential* and the *accidental*, which clearly are metaphysical) as a requisite for judging properly of mathematical reasoning; and he states, with ARISTOTLE, that it is not the office of the mathematician to make distinctions concerning these.<sup>76</sup> Hence, the mathematician can legitimately *use* or *apply* proportion theory to compare diverse ratios of homogeneous quantities, but it is not a competence of the mathematician to *theorize* about proportion *as such*.

In fact, a more likely author of the scholium would be MARINUS (PROCLUS's successor), who says, in a commentary on the *Data*, that EUCLID therein applies *common* ratios to magnitudes *peculiarly*, adding that Book v (of the *Elements*) treats of such *universal* ratios.<sup>77</sup> Unfortunately, MARINUS does not delve any deeper on the subject.

5. Be that as it may, among the Arabs, as hinted above, there is a tradition that subsumes عدد *'adad*, *number*, under مقدار *miqdār*, *magnitude*, even though the names كمية *kammīyah*, *quantity*, and كم *kamm*, *quantum*, already signified in Arabic what ARISTOTLE calls ποσόν, *quantity* (the genus of which multitude and magnitude are the first species).<sup>78</sup> Explaining EUCLID's notion of ratio, AL-JAYYĀNĪ (989–1079) writes:

The things that come under the quantity [الكمية *al-kammīyah*] used in the art of geometry are five, viz. the number [العدد *al-'adad*], which is the first and simplest of them, the line, the surface, the angle and the solid. Let us use the term "magnitude" [المقدار *al-miqdār*] in general to denote any of these things, to which it is a name for the species [الجنس *al-jins*] comprising all of them.<sup>79</sup>

<sup>75</sup> Ibid., 9.2–8.

<sup>76</sup> Ibid., 34.20–35.6; cf. ARISTOTLE, *Metaphysica* Γ.2, 1005a11–13.

<sup>77</sup> EUCLID, *Opera Omnia*, vol. 6, 254.23–27: "γεωμετρικός δὲ ὢν ὁ ἀνὴρ διαφερόντως τοὺς κοινούς περὶ τοῦ δεδομένου λόγους τοῖς μεγέθεσιν ἰδίως ἐφήρμοσεν, ὃν τρόπον ἐποίησε καὶ ἐπὶ τῶν καθόλου λόγων ὡς ἐπὶ μεγεθῶν ἰδίως αὐτοὺς πραγματευσάμενος ἐν τῷ πέμπτῳ βιβλίῳ τῆς ἐπιπέδου."

<sup>78</sup> Thus, the Arabic translation of ARISTOTLE's *Categories* (6, 4b20) from the Syriac carried out between 865 and 910 by Ishāq IBN HUNAYN renders the original Greek ποσόν as الكم (*al-kamm*), of which one species is منفصل (*munfaṣil* = διωρισμένον), and another, متصل (*muttaṣil* = συνεχής). See 'Abd al-Rahmān BADAWĪ, *Manṭiq Aristū, al-ḡuz' al-awwal* (Cairo: Maṭba'at Dār al-kutub al-miṣrīya, 1948), 14. Likewise, the Arabic translation of NICOMACHUS's *Introductio arithmeticae* (I.2.5, 4.21–22; I.3.2, 5.13) from the Greek carried out between 860 and 901 by Ṭābit IBN QURRA renders πλήθος as العدد (*al-'adad*), μέγεθος as المقدار (*al-miqdār*), and ποσόν as الكمية. See Wilhelm KUTSCH, *Ṭābit b. Qurra's arabische Übersetzung der Αριθμητική Εισαγωγή des Nikomachos von Gerasa* (Beirut: Imprimerie Catholique, 1959), 13.

<sup>79</sup> Edward Bernard PLOOIJ, *Euclid's conception of ratio and his definition of proportional magnitudes as criticized by Arabian commentators (including the text in facsimile with translation of the commentary on ratio of Abū 'Abd Allāh Muḥammad ibn Mu'ādh al-Djajjānī)* (Rotterdam: W. J. van Hengel, 1950), A25–



This tradition accounts for a peculiarity found in extant medieval Latin versions of EUCLID'S *Elements* assembled from Arabic manuscripts, beginning with that of ADELARD of Bath (1116–1142): they all render مقدار *miqdār*, *magnitude*, as *quantitas*, *quantity*.<sup>80</sup> According to a commentary on EUCLID'S *Elements* by ANARITIUS, this *quantitas* would include not only lines, surfaces, and bodies, but also numbers, discourses, times, and places.<sup>81</sup>

However, when ANARITIUS explains that a ratio (*proportio* < نسبة *nisbah* < λόγος) is a relation of one quantity (*quantitas* < مقدار *miqdār* < μέγεθος) to another quantity, he adds that both quantities “are of one genus: namely, a relation of line to line, or a relation of surface to surface, or of body to body, or of number to number...”<sup>82</sup> This agrees with EUCLID in that a ratio is defined as a relation μεγεθῶν ὁμογενῶν, of *homogeneous magnitudes*.<sup>83</sup> Thus, even if Latin versions of Arabic manuscripts wrongly render the original μέγεθος as *quantitas*, it was clear enough to medieval scholars—as it was to ancient Greeks—that numbers do not have the same subject-genus as magnitudes. In this sense, MUELLER comes closer to the truth (without fully grasping it) when he says:

Presumably Euclid thinks of a proposition of the theory of proportion as a unified formulation of a number of analogous propositions concerning various particular kinds of magnitudes, straight lines, plane figures, etc. rather than as a single proposition about more abstract objects called magnitudes.<sup>84</sup>

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B2. The truth, again, is of course that “Neither Euclid nor any other Greek mathematician would have considered ‘number’ as a geometrical magnitude,” as, commenting on this text, say J. J. O’CONNOR and E. F. ROBERTSON, “Abu Abd Allah Muhammad Ibn Muadh Al-Jayyani,” *MacTutor History of Mathematics* (1999), <http://www-history.mcs.st-andrews.ac.uk/Biographies/Al-Jayyani.html>.

<sup>80</sup> See ANARITIUS, *In decem libros priores Elementorum Euclidis commentarii*, 156; BUSARD, *The First Translation of Euclid’s Elements Commonly Ascribed to Adelard of Bath*, 145; *The Translation of the Elements of Euclid from the Arabic into Latin by Hermann of Carinthia (?)*, 95; BUSARD and FOLKERTS, *Robert of Chester’s (?) Redaction of Euclid’s Elements, the So-Called Adelard II Version*, 161; *Johannes de Tinemue’s Redaction of Euclid’s Elements, the So-Called Adelard III Version*, 127; BUSARD, *Campanus of Novara and Euclid’s Elements*, 160. See Gregg DE YOUNG, “The Latin Translation of Euclid’s Elements Attributed to Gerard of Cremona in Relation to the Arabic Transmission,” *Suhayl*, no. 4 (2004): “there are at least two traditions (Ḥajjāj and Iṣḥāq-Thābit) that constitute the primary Arabic transmission of the Elements. [...] The currently known manuscripts of the Arabic primary transmission all fall within the broadly defined Iṣḥāq-Thābit tradition.” The IṢHĀQ-THĀBIT tradition consistently renders μέγεθος as مقدار (ibid., 370), which is the term used by mathematicians such as Ibn AL-HAYTHAM, *Kitāb Fī Ḥall Ṣukūk Kitāb Uqlīdis Fīl-Uṣūl Waṣarḥ Ma’Ānīhi* (on the Resolution of Doubts in Euclid’s Elements and Interpretation of Its Special Meanings), Facsimile Editions (Frankfurt am Main: Institute for the History of Arabic Islamic Science at the Johann Wolfgang Goethe University, 1985), and the Pseudo-Nasir al-Din Tusi, *kitāb taḥrīr ‘uṣūl li’uqlīdis (Euclidis Elementorum geometricorum libri tredecim)* (Rome, 1594). See also Gregg DE YOUNG, “The Arabic Textual Traditions of Euclid’s Elements,” *Historia Mathematica* 11 (1984). In his translation of EUCLID’S *Elements* (ca. AD 500), BOETHIUS uses *magnitudo* instead.

<sup>81</sup> ANARITIUS, *In decem libros priores Elementorum Euclidis commentarii*, 156. Angles are not mentioned.

<sup>82</sup> Ibid.: “Et cum dicit ‘inter duas quantitates’ voluit [EUCLIDES] intelligi instantiam [i.e., *relationem*], quam una duarum quantitatum habet ad aliam, quia proportio est instantia unius quantitatis ad aliam quantitatem, que sunt unius generis; scilicet instantia lineae ad lineam, aut instantia superficiei ad superficiem, aut corporis ad corpus, aut numeri ad numerum, <aut> orationis ad orationem, aut temporis ad tempus, aut loci ad locum.” Angled brackets in the original. The translation is ours.

<sup>83</sup> EUCLID, *Opera Omnia*, vol. 2, 2.6–7.

<sup>84</sup> MUELLER, *Philosophy of Mathematics and the Deductive Structure of Euclid’s Elements*, 136.

#### 7.4. Fiction: “Aristotle posited a universal mathematics”

1. Instead of arguing that ancient Greeks considered *number* to be a kind of *magnitude*, as the preceding fiction would have it, many modern authors claim that ARISTOTLE posited a single science, called *universal mathematics*, that treats of *quantity* as such (i.e., an alleged generic quantity that is neither continuous nor discrete).

This fiction seems to have had its first manifestation in a translation of ARISTOTLE’s works carried out early in the twentieth century under the editorship of Sir William David ROSS. His celebrated edition, which we are using throughout this work, contains two instances of the expression *universal mathematics*. In one place, ARISTOTLE is made to say that “geometry and astronomy deal with a certain particular kind of thing, while universal mathematics applies alike to all.”<sup>85</sup> And in another place, the Stagirite would say that “Each of the mathematical sciences deals with some one determinate class of things, but universal mathematics applies alike to all.”<sup>86</sup>

Alas, the expression *universal mathematics* is never found in ARISTOTLE’s works—at least not in Greek. And this is not the only peculiarity of ROSS’s edition that raises eyebrows; for it also renders γένος very often as *class* instead of *genus*, suggesting to the modern reader that what ARISTOTLE really meant by γένος is a *set* or a *collection of sets*. Ironically, in the place where ARISTOTLE does explain precisely the diverse ways in which γένος is said (i.e., the passage quoted above), ROSS’s edition renders it as *race* or *genus*, instead of *class*, preventing the unsuspecting reader from making any sense of ARISTOTLE’s words. And as if things were not bad enough, ROSS’s edition often inserts the words “concept of” (inexistent in the Greek), suggesting a logical reading.

Seemingly, ROSS and his team are more content retrofitting ARISTOTLE’s words with modern dogma than unravelling the principles of ancient Greek mathematics. As the Stagirite himself would put it, “they state hypotheses peculiar <to themselves> and not those of mathematics.”<sup>87</sup> In their misguided love for the greatest philosopher of antiquity, they seem to endeavor to turn him into a precursor of modern mathematics.

2. The fiction of *universal mathematics* is subsequently found in many authors, including HEATH, APOSTLE, John J. CLEARY, Zev BECHLER, and FRANKLIN.<sup>88</sup> It should have been

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<sup>85</sup> *The Works of Aristotle*, v. 8, *Metaphysics* E.1, 1026a26–27.

<sup>86</sup> *Ibid.*, *Metaphysics* K.7, 1064b8–9.

<sup>87</sup> ARISTOTLE, *Metaphysica* M.9, 1086a10–11: “ἰδίᾳς γὰρ καὶ οὐ μαθηματικὰς ὑποθέσεις λέγουσιν.”

<sup>88</sup> See HEATH, *Mathematics in Aristotle*, 222–224; Hippocrates George APOSTLE, *Aristotle’s Philosophy of Mathematics* (Chicago: The University of Chicago Press, 1952), chapter I; *Mathematics as a Science of Quantities* (Grinnell: The Peripatetic Press, 1991), 79; John J. CLEARY, *Aristotle & Mathematics: Aporetic Method in Cosmology & Metaphysics* (Leiden: Brill, 1995), 290; Zev BECHLER, *Aristotle’s Theory*

abandoned at least since 1980, when CROWLEY thoroughly debunked the leading modern interpretations of ARISTOTLE's texts relative to "universal mathematics."<sup>89</sup> Alas, inattentive scholars still believe in it.<sup>90</sup> Undoubtedly, the quest for a mythical *mathesis universalis*, which humanist celebrities thought to have found in ancient Greek authors (a fiction examined below; ►67.5; 67.6), plays a significant role in modern interpretations. Realists should heed the words of Henry MENDELL, who points to the fact that an *Aristotelian universal mathematics* does not square at all with the available evidence:

Ironically, extant Greek mathematics shows no traces of an Aristotelian universal mathematics. The theory of ratio for magnitudes in EUCLID, *Elements* v is completely separate from the treatment of ratio for number in *Elements* vii and parts of viii, none of which appeals to v, even though almost all of the proofs of v could apply straightforwardly to numbers. For example, EUCLID provides separate definitions of proportion (v def. 5, and vii def. 20). Compare the rule above (*alternando*), which is proved at v.16, while the rule follows trivially for numbers from the commutivity of multiplication and vii.19:  $ad = bc \Leftrightarrow a : b :: c : d$ .<sup>91</sup>

3. On the other hand, it is true that some places in ARISTOTLE are difficult to interpret when read in isolation. One of them, often quoted in support of a *universal mathematics*, would seem to suggest that mathematics (i.e., neither arithmetic nor geometry, but some generic science of quantity as such) is apt to carry out demonstrations on both numbers and magnitudes indistinctly:

Alternation [τὸ ἀνάλογον ὅτι ἐναλλάξ, *the proportional in alternando*] used to be demonstrated separately of [ἢ, *qua*] numbers, lines, solids, and durations, though it could have been proved of them all by a single demonstration. Because there was no single name <to denote> that in which numbers, lengths, durations, and solids are identical [πάντα ταῦτα ἔν], and because they differed specifically [εἶδει, *as to form, species*] from one another, <this property> was proved <of each of them> separately. To-day, however, the proof is <commensurately> universal [καθόλου], for they

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*of Actuality* (Albany: State University of New York Press, 1995), 186–9; James FRANKLIN, *An Aristotelian Realist Philosophy of Mathematics* (London and New York: Palgrave Macmillan, 2014), Ch. 3.

<sup>89</sup> Charles Bonaventure CROWLEY, *Universal Mathematics in Aristotelian-Thomistic Philosophy: The Hermeneutics of Aristotelian Texts Relative to Universal Mathematics* (Washington, D.C.: University Press of America, 1980).

<sup>90</sup> For example, SASAKI devotes the second part of his *Descartes's Mathematical Thought* (Dordrecht: Kluwer Academic Publishers, 2003), to a historical perspective of the concept of *mathesis universalis*. Therein he includes a whole chapter (6) on "universal mathematics" in ARISTOTLE, where he examines the interpretations given by ancient, medieval and Renaissance translators and commentators to the first two passages quoted above, in which modern authors read "universal mathematics." Disregarding the evidence, however, and based primarily on the merit of a doubtful interpretation of ASCLEPIUS's *Commentary* on ARISTOTLE's *Metaphysics* (CAG vol. 6.2, 364.11–19), SASAKI finds more probable the opinion that there is in ARISTOTLE a "universal mathematics." He dismisses CROWLEY because "he read the texts of Aristotle within the framework of medieval scholastic Aristotelianism, of which a representative philosopher was Thomas Aquinas." However, SASAKI does not provide an account to justify why CROWLEY's would be, from a philosophical perspective, an interpretation that is not entirely based on ARISTOTLE's metaphysical principles (which SASAKI does not even examine).

<sup>91</sup> Henry MENDELL, "Aristotle and Mathematics," *The Stanford Encyclopedia of Philosophy* (Spring 2017 Edition), <https://plato.stanford.edu/archives/spr2017/entries/aristotle-mathematics/>.

do not possess this attribute *qua* lines or *qua* numbers, but *qua* manifesting this <generic character> which they are postulated [ὑποτίθενται] as possessing universally.<sup>92</sup>

From this text alone, one could easily rush to the conclusion that the “generic character” of “numbers, lengths, durations, and solids” is that they all are quantities. ARISTOTLE is not, however, speaking here of quantities as such. He is speaking of quantities that are proportional. Indeed, alternation does not belong to numbers, lengths, durations, or solids insofar as they are quantities, but insofar as they are in proportion. Stating the opposite is like saying that the number three is a random number; for it does not *per se* belong to the number three to be random—it is said to be random in (lack of) relation to other numbers.

On the other hand, being proportional (ἀνάλογον, *analogous*) does not belong only to quantities such as numbers, lengths, and durations. As explained above, the principles of diverse things are, universally and analogically speaking, the same for all. Hence, all finite beings can—in a sense—be called *quantities*; for they are “measured” by the principle of their respective genus. Therefore, the property of alternation is common to all beings insofar as they are analogous. And it belongs to the science of being *qua being* (not to a fictional *universal mathematics*) to theorize about alternation from non-hypothetical (i.e., evident) principles. Alternation, universally considered, is based on relations between opposites (e.g., the antecedent and the consequent), and, as ARISTOTLE says:

<It belongs> to one science to examine [θεωρῆσαι, *to theorize*] being *qua* being [τὸ ὄν ἢ ὅν]. For all <things> are either contraries or <composed> of contraries, and unity [τὸ ἓν, *the one*] and plurality [πλήθος, *multitude*] are the starting-points [ἀρχαί, *principles*] of all contraries. And these <belong> to one science. [...] And for this <reason> it does not <belong> to the geometer to inquire [θεωρῆσαι] what is contrariety or completeness [τέλειον, *perfect*] or unity [ἓν, *one*] or being [ὄν]<sup>93</sup> or the same [ταυτόν] or the other [ἕτερον], but only to presuppose [ἀλλ’ ἢ ἐξ ὑποθέσεως] <these concepts and reason from this starting-point>. Obviously then it is <the work> of one science to examine [θεωρῆσαι, *theorize*] being *qua* being, and the attributes [ὑπάρχοντα] which <belong> to it *qua* being, and the same science will examine not only substances [τῶν οὐσιῶν] but also their attributes [τῶν ὑπαρχόντων], both those above named and <the concepts> “prior” and “posterior,” “genus” and “species,” “whole” and “part,” and the others of this sort.<sup>94</sup>

Believers in the fiction of *universal mathematics* fail to contrast their cherrypicked texts against the professed metaphysical principles of ARISTOTLE, who states plainly enough that it belongs to metaphysics to theorize about the first principles of mathematics—those that are common to all kinds of quantity (and therefore, to being *qua being*):

<sup>92</sup> ARISTOTLE, *Analytica Posteriora* A.5, 74a17–25; cf. AQUINAS, *In Post. an.* 1, l. 12, n. 4; n. 8.

<sup>93</sup> Note that BEKKER’s edition has the order reversed: “ἢ ὄν ἢ ἓν.”

<sup>94</sup> ARISTOTLE, *Metaphysica* Γ.2, 1005a2–5; 11–18.

Since even the mathematician uses the common <axioms> [τοῖς κοινοῖς] <only> in a special [ἰδίως] <application>, it <must> be <the business> of first philosophy to examine [θεωρῆσαι] the principles of mathematics also. That when equals are taken from equals the remainders are equal, is common to all quantities [ποσῶν], but mathematics studies [πιοιῖται τὴν θεωρίαν] a part [μέρος] of its proper matter [τῆς οἰκείας ὕλης] which it has detached [ἀπολαβοῦσα, *cut off*], e.g. lines or angles or numbers or some other <kind of> quantity not, however, *qua* being but in so far as each of them is continuous in one or two or three <dimensions>; but [first] philosophy does not inquire [σκοπεῖ] <about> particular [ἐν μέρει, *in particular*] <subjects> in so far as each of them has some attribute [τι συμβέβηκεν] <or other> but speculates [θεωρεῖ] about being [περὶ τὸ ὄν], in so far as each <particular thing> *is*. Physics is in the same position as mathematics; for physics studies [θεωρεῖ] the attributes [τὰ συμβεβηκότα] and the principles of the <things> that are, *qua* moving and not *qua* being (whereas the primary [πρώτην] science, we have said, deals with these, only in so far as the underlying <subjects> [τὰ ὑποκείμενά] are existent [ὄντα ἔστιν, *are beings*], and not in virtue of any other <character>); and so both physics and mathematics must be classed as [θετέον, *counted as*] parts [μέρη] of Wisdom.<sup>95</sup>

Hence, each of the mathematical sciences cuts off a part of being to theorize about it. And there is no quantitative part of being that is neither a multitude nor a magnitude. That is why axioms cannot be applied in their full commonness to quantity *qua* quantity unless we understand by *quantity* some *being*. Otherwise, ARISTOTLE would say that the axioms of mathematics, including “when equals are taken from equals the remainders are equal,” are studied by the alleged *universal mathematics* rather than by metaphysics.

This comes to show, again, that the category-genus of *quantity* is univocal to logic; but the diverse, quantifiable subject-genera are analogical to metaphysics. The modern mind, having forgotten the metaphysical principles that originally founded mathematics, fails to make this distinction. The more metaphysical principles are removed from mathematics, the more logic remains. But the ancient Greek masters would not have any of that.

**4.** PROCLUS, who (like his precursor IAMBlichus) does write at great length about ἡ μία καὶ ὅλη μαθηματική, *the single and whole mathematics*,<sup>96</sup> shows that common principles apply particularly to each subject-genus, even if they belong to the same logical category:

[T]here are many things that have the same name [κατηγορίαν, *category*] yet <whose> common [κοινόν] <character> differs in different [ἐφ’ ἐκάστων] species [κατ’ εἶδος]; for example, similarity in figures and in numbers. We should not therefore demand of the mathematician a single demonstration in such cases, for the principles of figures and numbers are not the same but vary with the underlying genera [κατὰ τὸ ὑποκείμενον γένος, *according to the subject-genus*].<sup>97</sup>

<sup>95</sup> ARISTOTLE, *Metaphysica* K.4, 1061b17–33.

<sup>96</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 43.22–44.23.

<sup>97</sup> *Ibid.*, 33.4–10.

As PROCLUS says, “Differences in subject-matter [τὰ ὑποκείμενα] at once produce differences in the sciences and arts that are concerned with them.”<sup>98</sup> In contrast, “the single and whole mathematics” he writes about “embraces alike all forms of mathematical knowledge.”<sup>99</sup> And, like ARISTOTLE’s metaphysics, knowledge of its theorems “takes precedence over the particular sciences and furnishes to them their principles; that is, these several sciences are based upon this prior science and refer back to it.”<sup>100</sup>

Therefore, the science that PROCLUS calls “the single and whole mathematics” can be no other than metaphysics or one of its parts. Granted, he does describe it as being somehow between the particular sciences and metaphysics, as his Neoplatonism demands. Perhaps all he means by *the single and whole mathematics* is arithmetic and geometry taken together. After all, PROCLUS describes the ascent from the particular sciences to what ARISTOTLE calls *first philosophy* (i.e., the science of being *qua* being) without delimiting precisely where *the single and whole mathematics* would begin or end:<sup>101</sup>

Then whose <function> is it to know [γνωρίζων, *make known*] <the principle of> alternation alike in magnitudes and in numbers and the principles governing the division of compound magnitudes or numbers and the compounding of separate ones? It cannot be that we have sciences of particular <areas> of being and knowledge <of them> but have no single science of the immaterial objects that stand much closer to intellectual inspection [τῆς νοεῖας θεωρίας, *to intellectual theories*]. Knowledge of these <objects> is by far the prior science, and from it the several sciences get their common propositions [τοὺς κοινούς λόγους], our knowledge ascending from the more partial [ἀπὸ τῶν μερικωτέρων] to the more general [ἐπὶ τὰς ὀλικωτέρας] until at last we reach the science of being as being. This <science> does not consider it its province to study the properties that belong intrinsically [ὑπάρχοντα] to numbers, nor those that are common to all quantities; rather it contemplates that single form [οὐσίαν, *substance*] of being <or existence> [ὑπαρξιν] that belongs to all things [τῶν ὄντων ἀπάντων], and for this reason it is the most inclusive of the sciences, all of which derive [λαμβάνουσι] their principles from it. [...] One science [...] must stand above [προτετάχθω] the many sciences [ἐπιστημῶν] and branches of knowledge [μαθημάτων, *mathematical disciplines*], that <science> which knows the common <principles> [τὰ κοινὰ] that pervade all kinds [γενῶν, *genera*] <of being> and furnishes to all the mathematical sciences <their> starting-points [τὰς ἀρχάς, *the principles*].<sup>102</sup>

Whatever is made of PROCLUS’s *single and whole mathematics*, clearly, if we faithfully follow ARISTOTLE’s metaphysics, there has never been nor can there ever be such thing as an *Aristotelian universal mathematics* distinct from metaphysics itself (or a part of it).

<sup>98</sup> Ibid., 34.8–9; cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a38–b4.

<sup>99</sup> Ibid., 7.17–19.

<sup>100</sup> Ibid., 8.25–9.2.

<sup>101</sup> Cf. ARISTOTLE, *Metaphysica* E.1, 1026a31–2; K.7, 1064a2–4; 28–30; b6–9.

<sup>102</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 9.8–25; 10.10–14.

**PART II:  
THE LIGHT OF  
ST. THOMAS AQUINAS**





## Primary Sources

The following abbreviations refer to the works of St. Thomas used here. The code in bold indicates the edition (**L**eonine, **M**arietti, **P**arma, **O**ther; see below). Date of composition (mostly according to the chronology of Jean Pierre TORRELL) in parentheses.

<i>Ad Bernardum</i> <b>L</b> <sup>42</sup> (1274)	<i>De perf.</i> <b>L</b> <sup>41</sup> (1269)	<i>In De Trin.</i> <b>L</b> <sup>50</sup> (c. 1261)
<i>Ad Ducissam</i> <b>L</b> <sup>42</sup> (1270–1271)	<i>De potentia</i> <b>M</b> <sup>5</sup> (1259–1268)	<i>In Ethic.</i> <b>L</b> <sup>47</sup> (1271–1272)
<i>Comp. th.</i> <b>L</b> <sup>42</sup> (c. 1273?)	<i>De prin. nat.</i> <b>L</b> <sup>43</sup> (1255)	<i>In Metaph.</i> <b>M</b> <sup>2</sup> (1270–1272)
<i>Contra err. Graec.</i> <b>L</b> <sup>40</sup> (1263)	<i>De prop. mod.</i> <b>L</b> <sup>43</sup> (c. 1251)	<i>In Meteor.</i> <b>L</b> <sup>3</sup> (c. 1269–1273)
<i>Contra imp.</i> <b>L</b> <sup>41</sup> (1256)	<i>De rat. Fidei</i> <b>L</b> <sup>40</sup> (1261–1264)	<i>In Peri.</i> <b>L</b> <sup>1</sup> (1269–1272)
<i>Contra retr.</i> <b>L</b> <sup>41</sup> (1270)	<i>De regno</i> <b>L</b> <sup>42</sup> (1267)	<i>In Physic.</i> <b>L</b> <sup>2</sup> (1268–1271)
<i>De 108 art.</i> <b>L</b> <sup>42</sup> (c. 1266)	<i>De secreto</i> <b>L</b> <sup>42</sup> (c. 1269)	<i>In Polit.</i> <b>L</b> <sup>48</sup> (1271–1272)
<i>De 36 art.</i> <b>L</b> <sup>42</sup> (c. 1271)	<i>De sortibus</i> <b>L</b> <sup>43</sup> (1269–1272)	<i>In Post. an.</i> <b>L</b> <sup>1</sup> (c. 1268)
<i>De 43 art.</i> <b>L</b> <sup>42</sup> (1271)	<i>De spirit. creat.</i> <b>M</b> <sup>5</sup> (1266–1269)	<i>In Sent.</i> <b>P</b> <sup>1</sup> (1252–1256)
<i>De 6 art.</i> <b>L</b> <sup>42</sup> (1271)	<i>De sub. sep.</i> <b>L</b> <sup>40</sup> (c. 1268)	<i>Q. d. de anima</i> <b>M</b> <sup>5</sup> (1267)
<i>De aet. mundi</i> <b>L</b> <sup>43</sup> (1271)	<i>De unione Verbi</i> <b>M</b> <sup>5</sup> (1269–1272)	<i>Quodlibet</i> <b>M</b> <sup>6</sup> (1256–1272)
<i>De art. fidei</i> <b>L</b> <sup>42</sup> (c. 1261)	<i>De unit. intel.</i> <b>L</b> <sup>43</sup> (1270)	<i>STh</i> <b>L</b> <sup>4–12</sup> (1265–1273)
<i>De emptione</i> <b>L</b> <sup>42</sup> (1262)	<i>De veritate</i> <b>L</b> <sup>22</sup> (1256–1259)	<i>ScG</i> <b>M</b> <sup>7</sup> (1261–1263)
<i>De ente</i> <b>L</b> <sup>43</sup> (1252–1256)	<i>De virtutibus</i> <b>M</b> <sup>5</sup> (1269–1272)	<i>Super Cor.</i> <b>M</b> <sup>4</sup> (c. 1259–1273)
<i>De fallaciis</i> <b>L</b> <sup>43</sup> (1245–1246)	<i>In De anima</i> <b>L</b> <sup>45,1</sup> (c. 1268)	<i>Super Decr.</i> <b>L</b> <sup>40</sup> (1259–1268)
<i>De forma abs.</i> <b>L</b> <sup>40</sup> (1269–1272)	<i>In De caelo</i> <b>L</b> <sup>3</sup> (1272–1273)	<i>Super Gal.</i> <b>M</b> <sup>4</sup> (c. 1259–1273)
<i>De iud. astr.</i> <b>L</b> <sup>43</sup> (1269–1272?)	<i>In De causis</i> <b>O</b> <sup>1</sup> (c. 1270)	<i>Super Heb.</i> <b>M</b> <sup>4</sup> (c. 1259–1273)
<i>De malo</i> <b>L</b> <sup>43</sup> (1269–1272)	<i>In De div. nom.</i> <b>M</b> <sup>1</sup> (c. 1268)	<i>Super Io.</i> <b>M</b> <sup>3</sup> (1269–1272)
<i>De mix. elem.</i> <b>L</b> <sup>43</sup> (c. 1271)	<i>In De ebdo.</i> <b>L</b> <sup>50</sup> (c. 1260)	<i>Super Ps.</i> <b>P</b> <sup>2</sup> (1272–1273)
<i>De motu cordis</i> <b>L</b> <sup>43</sup> (1270–1271)	<i>In De gen.</i> <b>L</b> <sup>3</sup> (1272–1273)	<i>Super Rom.</i> <b>M</b> <sup>4</sup> (c. 1259–1273)
<i>De op. occ.</i> <b>L</b> <sup>43</sup> (1269–1272)	<i>In De sensu</i> <b>L</b> <sup>45,2</sup> (c. 1268)	<i>Tab. Ethic.</i> <b>L</b> <sup>48</sup> (1271–1272)

## Editions Used

### Leonine Edition (*Opera omnia iussu Leonis XIII P. M.*)

<b>L</b> <sup>1</sup>	<i>Commentaria in Aristotelis libros Peri hermeneias et Posteriorum analyticorum</i> , 2nd ed. (Rome-Paris: Commissio Leonina-J. Vrin, 1989) <i>In Peri.</i> <i>Expositio libri Peryermeneias</i> (I* 1) <i>In Post. an.</i> <i>Expositio libri Posteriorum</i> (I* 2)
<b>L</b> <sup>2</sup>	<i>Commentaria in octo libros Physicorum Aristotelis</i> (Rome: T. Polyglotta, 1884) <i>In Physic.</i> <i>In octo libros Physicorum Aristotelis expositio</i>
<b>L</b> <sup>3</sup>	<i>Commentaria in libros Aristotelis</i> (Rome: T. Polyglotta, 1886) <i>In De caelo</i> <i>In libros Aristotelis De caelo et mundo expositio</i> (pp. 1–257) <i>In De gen.</i> <i>In librum primum Aristotelis De generatione et corruptione expositio</i> (pp. 259–322) <i>In Meteor.</i> <i>In libros Aristotelis Meteorologicorum expositio</i> (pp. 323–421)
<b>L</b> <sup>4–5</sup>	<i>Pars prima Summae theologiae</i> (Rome: T. Polyglotta, 1888–1889) <i>STh</i> I <b>L</b> <sup>4</sup> (1888) qq. 1–49; <b>L</b> <sup>5</sup> (1889) qq. 50–119
<b>L</b> <sup>6–7</sup>	<i>Prima secundae Summae theologiae</i> (Rome: T. Polyglotta, 1891–1892) <i>STh</i> I-II <b>L</b> <sup>6</sup> (1891) qq. 1–70; <b>L</b> <sup>7</sup> (1892) qq. 71–114
<b>L</b> <sup>8–10</sup>	<i>Secunda secundae Summae theologiae</i> (Rome: T. Polyglotta, 1895–1899) <i>STh</i> II-II <b>L</b> <sup>8</sup> (1895) qq. 1–56; <b>L</b> <sup>9</sup> (1897) qq. 57–122; <b>L</b> <sup>10</sup> (1899) qq. 123–189
<b>L</b> <sup>11–12</sup>	<i>Tertia pars Summae theologiae</i> (Rome: T. Polyglotta, 1903–1906) <i>STh</i> III <b>L</b> <sup>11</sup> (1903) qq. 1–59; <b>L</b> <sup>12</sup> (1906) qq. 60–90
<b>L</b> <sup>22</sup>	<i>Quaestiones disputatae de veritate</i> , 3 vol. 5 fasc. (Rome: Editori di San Tommaso, 1970–1976) <i>De veritate</i> <b>L</b> <sup>22.1.1</sup> (1975) pr.; <b>L</b> <sup>22.1.2</sup> (1970) qq. 1–7; <b>L</b> <sup>22.2.1</sup> (1970) qq. 8–12; <b>L</b> <sup>22.2.2</sup> (1972) qq. 13–20; <b>L</b> <sup>22.3.1</sup> (1973) qq. 21–29
<b>L</b> <sup>23</sup>	<i>Quaestiones disputatae de malo</i> (Rome-Paris: Commissio Leonina-J. Vrin, 1982)

- L<sup>40</sup> *Opuscula I* (Rome: Ad Sanctae Sabinae, 1969)  
*Contra err. Graec.* L<sup>40A</sup> (1967) *Contra errores Graecorum ad Urbanum papam*  
*De rat. Fidei* L<sup>40B</sup> (1968) *De rationibus Fidei ad cantorem Antiochenum*  
*De forma abs.* L<sup>40C</sup> (1968) *De forma absolutionis*  
*De sub. sep.* L<sup>40D</sup> (1968) *De substantiis separatis*  
*Super Decr.* L<sup>40E</sup> (1968) *Super Decretalem*
- L<sup>41</sup> *Opuscula II* (Rome: Ad Sanctae Sabinae, 1970)  
*Contra imp.* L<sup>41A</sup> (1970) *Contra impugnantes Dei cultum et religionem*  
*De perf.* L<sup>41B</sup> (1969) [*Liber*] *De perfectione spiritualis vitae*  
*Contra retr.* L<sup>41C</sup> (1969) *Contra doctrinam retrahentium a religione*
- L<sup>42</sup> *Opuscula III* (Rome: Editori di San Tommaso, 1979)  
*Comp. th.* *Compendium theologiae*  
 [Brevis compilatio theologiae ad fratrem Raynaldum] (pp. 75–191)  
*De art. fidei* *De articulis fidei et Ecclesiae sacramentis*  
 [ad Archiepiscopum Panormitanum] (pp. 207–257)  
*De 108 art.* *Responsio [ad Magistrum Ioannem de Vercellis] de 108 articulis*  
 (pp. 259–294)  
*De 43 art.* *Responsio [ad Magistrum Ioannem de Vercellis] de 43 articulis*  
 (pp. 297–335)  
*De 36 art.* *Responsio [ad Lectorem Venetum] de 36 articulis* (pp. 337–346)  
*De 6 art.* *Responsio [ad Lectorem Bisuntinum] de 6 articulis* (pp. 347–356)  
*Ad Ducissam* *Epistola ad Ducissam Brabantiae* (pp. 357–378)  
*De emptione* *De emptione et venditione ad tempus* (pp. 379–394)  
*Ad Bernardum* *Epistola ad Bernardum abbatem Casinensem* (pp. 395–415)  
*De regno* *De regno ad Regem Cypri* (pp. 417–471)  
*De secreto* *De secreto* (pp. 473–488)
- L<sup>43</sup> *Opuscula IV* (Rome: Editori di San Tommaso, 1979)  
*De prin. nat.* *De principiis naturae [ad Fratrem Sylvestrum]* (pp. 1–47)  
*De aet. mundi* *De aeternitate mundi* (pp. 49–89)  
*De motu cordis* *De motu cordis*  
 [ad Magistrum Philippum de Castro Caeli] (pp. 91–130)  
*De mix. elem.* *De mixtione elementorum*  
 [ad Magistrum Philippum de Castro Caeli] (pp. 131–157)  
*De op. occ.* *De operationibus occultis naturae*  
 [ad quendam Militem Ultramontanum] (pp. 159–186)  
*De iud. astr.* *De iudiciis astrorum* (pp. 187–201)  
*De sortibus* [*Liber*] *De sortibus [ad dominum Iacobum de Tonengo]*  
 (pp. 203–238)  
*De sortibus\** [*Liber*] *De sortibus [\*Brevior recensio]* (pp. 239–241)  
*De unit. intel.* *De unitate intellectus [contra averroistas]* (pp. 243–314)  
*De ente* *De ente et essentia* (pp. 315–381)  
*De fallaciis* *De fallaciis* (pp. 383–418)  
*De prop. mod.* *De propositionibus modalibus* (pp. 419–422)
- L<sup>45,1</sup> *Sententia libri De anima* (Rome–Paris: Commissio Leonina–J. Vrin, 1984)  
*In De anima* *Sententia libri De anima*
- L<sup>45,2</sup> *Sententia libri De sensu et sensato cuius secundus tractatus est De memoria et reminiscencia* (Rome–Paris: Commissio Leonina–J. Vrin, 1985)  
*In De sensu 1* *Sententia libri De sensu et sensato* (pp. 1–101)  
*In De sensu 2* *De memoria et reminiscencia* (pp. 103–133)
- L<sup>47</sup> *Sententia libri Ethicorum* (Rome: Ad Sanctae Sabinae, 1969)  
*In Ethic.* L<sup>47.1</sup> pr., 1–3; L<sup>47.2</sup> 4–10
- L<sup>48</sup> *Sententia libri Politicorum. Tabula libri Ethicorum* (Rome: Ad Sanctae Sabinae, 1971)  
*In Polit.* L<sup>48A</sup> *Sententia libri Politicorum*  
*Tab. Ethic.* L<sup>48B</sup> *Tabula libri Ethicorum*
- L<sup>50</sup> *Super Boetium De Trinitate. Expositio libri Boetii De ebdomadibus*  
 (Rome–Paris: Commissio Leonina–Éd. du Cerf, 1992)  
*In De Trin.* *Super Boetium De Trinitate* (pp. 75–171)  
*In De ebd.* *Expositio libri Boetii De ebdomadibus* (pp. 265–282)

### Marietti Edition

- M<sup>1</sup>**     *In librum Beati Dionysii De divinis nominibus expositio*, ed. C. PERA, P. CARAMELLO, C. MAZZANTINI (Turin-Rome: Marietti, 1950)  
*In De div. nom.*     *In librum Beati Dionysii De divinis nominibus expositio*
- M<sup>2</sup>**     *In Metaphysicam Aristotelis commentaria*, ed. M. R. CATHALA (Turin-Rome: Marietti, 1950)  
*In Metaph.*     *In Metaphysicam Aristotelis commentaria* (Turin-Rome: Marietti, 1935)
- M<sup>3</sup>**     *Super Evangelium S. Ioannis lectura*, ed. R. CAI (Turin-Rome: Marietti, 1952)  
*Super Io.*     *Super Evangelium S. Ioannis lectura*
- M<sup>4</sup>**     *Super Epistolas S. Pauli lectura*, ed. R. CAI, 2 vols., 8th ed. (Turin-Rome: Marietti, 1953)  
*Super Cor.*     *Super primam/secundam Epistolam ad Corinthios lectura*  
*Super Gal.*     *Super Epistolam ad Galatas lectura*  
*Super Heb.*     *Super Epistolam ad Hebraeos lectura*  
*Super Rom.*     *Super Epistolam ad Romanos lectura*
- M<sup>5</sup>**     *Quaestiones disputatae*, ed. M. CALCATERRA & T. CENTI, vol. 2 (Turin-Rome: Marietti, 1953)  
*De potentia*     *Quaestiones disputatae de potentia*  
*Q. d. de anima*     *Quaestiones disputatae de anima*  
*De spirit. creat.*     *Quaestio disputata de spiritualibus creaturis*  
*De unione Verbi*     *Quaestio disputata De unione verbi incarnati*  
*De virtutibus*     *Quaestiones disputatae de virtutibus in communi*  
                              *Quaestio disputata de caritate*  
                              *Quaestio disputata de correctione fraterna*  
                              *Quaestio disputata de spe*  
                              *Quaestiones disputatae de virtutibus cardinalibus*
- M<sup>6</sup>**     *Quaestiones de quodlibet*, ed. R.M. SPIAZZI (Turin-Rome: Marietti, 1956)  
*Quodlibet*     *Quaestiones de quodlibet*
- M<sup>7</sup>**     *Liber de veritate catholicae Fidei contra errores infidelium seu Summa contra Gentiles*, ed. C. PERA, P. CARAMELLO, C. MAZZANTINI (Turin-Rome: Marietti, 1961)  
*ScG*     *Summa contra Gentiles*

### Parma Edition

- P<sup>1</sup>**     *Commentum in quator libros Sententiarum magistri Petri Lombardi*, 2 vols. (Parma: Petri Fiaccadori, 1856–8)  
*In Sent.*     *Scriptum super libros Sententiarum*
- P<sup>2</sup>**     *In psalmos Davidis expositio*, in *Opera Omnia*, vol. 14 (Parma: Typis Petri Fiaccadori, 1863)  
*Super Ps.*     *In psalmos Davidis expositio*

### Other Editions

- O<sup>1</sup>**     *Super librum De Causis expositio*, ed. H.D. SAFFREY (Fribourg-Louvain: Société Philosophique-Nauwelaerts, 1954)  
*In De causis*     *Super librum De Causis expositio*



## 8. Principle

*Drawing directly from the works of St. Thomas, in this chapter we begin our inquiry to determine what principles are, what kinds of principles there are, what constitutes first principles, and how they are related both among themselves and, particularly, to mathematics. But before we establish what it is that St. Thomas understands by principle, it is convenient to introduce the notion of ratio, which he frequently uses.*

*As noted in the first part, ratio is one of the Latin equivalents of the Greek λόγος (logos), which originally had the general sense of “that which is meant in the discourse,” the “communication of something essential about a thing,” as VON FRITZ observes (► 5). Many authors prefer to use nature, idea, or other terms to translate the Latin ratio, or resort to explanatory expressions such as intelligible structure. For the sake of clarity and brevity, we will instead use ratio (customarily reserved in English for mathematical relations) as the literatim equivalent of its Latin precursor. Thus, to state the ratio of  $x$  is to express what is meant by  $x$ —that is, to communicate something essential about  $x$ .*

### 8.1. Ratio

By **ratio** we understand here *that which the intellect apprehends from the signification of a name*.<sup>1</sup> The name *ratio* does not signify the conception of the intellect itself, for this is signified by the name of the thing (for example, the name *quantity* signifies the intellectual conception of quantity). Rather, *ratio* signifies the intention (*intentio*) of that conception (e.g., the *ratio of quantity* signifies the intention of the intellectual conception of quantity), as also happens with the name *definition* and other such second-imposition names.

The *ratio* of a thing is taken from its principles.<sup>2</sup> Therefore, those things that agree only in name but differ in their *ratio* cannot have common principles. It is impossible to find the principles of something that is said in multiple modes unless the multiplicity is divided (► 20.12); it is impossible to assign distinct principles to those things that have in common only the name, unless principles are assigned necessarily to the things that are diverse.

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<sup>1</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “Quantum ad primum pertinet [sc., *quid sit ratio secundum quam dicimus attributa ratione differre*], sciendum est, quod ratio, prout hic sumitur, nihil aliud est quam id quod apprehendit intellectus de significatione alicujus nominis [...]. Nec tamen hoc nomen ratio significat ipsam conceptionem, quia hoc significatur per nomen sapientiae vel per aliud nomen rei; sed significat intentionem hujus conceptionis, sicut et hoc nomen definitio, et alia nomina secundae impositionis.” This textual unit (i.e., the whole of *In Sent.* 1, d. 2 q. 1 a. 3 co.) is the same place from which MAURER draws his peculiar conclusions in “Thomists and Thomas Aquinas on the Foundation of Mathematics” and “A Neglected Thomistic Text on the Foundation of Mathematics,” as discussed in our Introduction.

<sup>2</sup> *In Metaph.* 1, l. 17, §265: “Impossibile est invenire principia alicuius multipliciter dicti, nisi multiplicitas dividatur. Ea enim quae solo nomine convenientia sunt et differunt ratione, non possunt habere principia communia, quia sic haberent rationem eandem, cum rei cuiuscumque ratio ex suis principiis sumatur. Distincta autem principia his, quibus solum nomen commune est, assignari impossibile est, nisi his quorum principia sunt assignanda adinvicem diversis.”

In things that have a definition, the definition itself is their *ratio*, “for the definition is the *ratio* that the name signifies,” as ARISTOTLE says.<sup>3</sup> Properly speaking, what is signified by the definition is the essence or quiddity of the thing (*quidditas rei, essentia, substantia* = οὐσία, *quod quid erat esse* = τὸ τί ἦν εἶναι, i.e., the *what* that the thing is, its “whatness”; ►16).<sup>4</sup> However, the definition comprehends only the principles of the species—not the individual principles (e.g., not the principles of *this triangle* but of the universal *triangle*).<sup>5</sup> A definition is said (to be) a *terminus* (►8.8) because it includes the totality of the thing in such a way that nothing of the thing is outside the definition, and nothing else is under the definition: that is, it excludes anything with which the definition should not agree (*non conveniat*), and includes only those things with which the definition does agree.<sup>6</sup> However, diverse definitions may be given of the same thing when taken from diverse principles—that is, unless all the thing’s principles are comprehended in the definition.<sup>7</sup> This is called the *definitive ratio* (*ratio definitiva*), which signifies what is said *according to itself* (►17).<sup>8</sup>

There are, however, some things that properly speaking cannot be defined (notably, first principles; ►45): for example, *quantity* and *quality* do not have a definition because they are among the highest genera.<sup>9</sup> Yet, it has no bearing whether those things that are said to have a *ratio* do or do not have a definition: the *ratio of quantity*, for example, is simply *that which is signified* by the name *quantity*, which is what makes quantity what it is (*hoc est illud ex quo <quantitas> habet quod sit <quantitas>*).<sup>10</sup>

<sup>3</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “et hoc [sc., *ratio*] in his quae habent definitionem, est ipsa rei definitio, secundum quod Philosophus dicit: ratio quam significat nomen est definitio.” Cf. ARISTOTLE, *Metaphysica* Γ.7, 1012a23–24: “ὁ γὰρ λόγος οὗ τὸ ὄνομα σημεῖον ὀρισμὸς ἔσται.”

<sup>4</sup> *STh* I, q. 29 a. 2 ad 3: “essentia proprie est id quod significatur per definitionem.” *Ibid.*, co.: “Uno modo dicitur substantia quidditas rei, quam significat definitio, secundum quod dicimus quod definitio significat substantiam rei, quam quidem substantiam Graeci usiam vocant, quod nos essentiam dicere possumus.”

<sup>5</sup> *Ibid.*, ad 3: “Definitio autem complectitur principia speciei, non autem principia individualia.”

<sup>6</sup> *In Peri.* 1, l. 4, 27–32: “diffinitio ideo dicitur terminus quia includit totaliter rem, ita scilicet quod nichil rei est extra diffinitionem, cui scilicet diffinitio non conueniat, nec aliquid aliud est infra diffinitionem, cui scilicet diffinitio conueniat.”

<sup>7</sup> *In Sent.* 3, d. 23 q. 2 a. 1 ad 8: “si definitio de re aliqua daretur quae complete comprehenderet omnia principia rei, non esset unius rei nisi una definitio. Sed quia in quibusdam definitionibus ponuntur quaedam principia sine aliis, ideo contingit variari definitiones de una et eadem re.” *In Post. an.* 1, l. 16, 62–63: “contingit diffinitiones diuersas dari eiusdem rei, sumptas ex diuersis causis.”

<sup>8</sup> *In Metaph.* 7, l. 3, §§1324–5 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a6–9): “quod quid erat esse non est omnium quae habent qualemcumque rationem notificantem nomen, sed eorum solum, quorum ratio est definitio [*< τὸ τί ἦν εἶναι ἔστιν ὅσων ὁ λόγος ἔστιν ὀρισμὸς >*]. Ratio autem alicuius definitiva non est solum, si sit talis ratio, quae significat idem cum nomine; [...] quia sic sequeretur, quod omnes rationes essent termini [*< ὀρισμὸς >*], idest definitiones. [...] sed solum est definitio [...] si significet aliquid per se dictum.”

<sup>9</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “quaedam dicuntur habere rationem sic dictam, quae non definiuntur, sicut quantitas et qualitas et huiusmodi, quae non definiuntur, quia sunt genera generalissima.” Since a thing’s ratio is taken from its principles, the ratio of a *first* principle cannot be taken from others. Thus, a perfect definition requires both a proximate genus and a specific difference (see *In Metaph.* 5, l. 4, §805; cf. *ScG* 1, 25 n. 7); but this is impossible in the case of the highest genera, such as quantity and quality.

<sup>10</sup> *Ibid.*: “non refert, utrum illa quae dicuntur habere rationem, habeant vel non habeant definitionem.” We mention here *quantity* instead of *quality* because of its relevance to our purpose. St. Thomas (*ibid.*), on

## 8.2. Principle

The name **principle** (*principium* = ἀρχή, *beginning, origin*)<sup>11</sup> is imposed to signify that from which something is, proceeds, originates, begins (*illud a quo est aliquid, id a quo aliquid procedit, ex quo incipit aliquid*).<sup>12</sup> It is a common name, which—unlike special names—signifies something indefinitely, and therefore does not express the species of a thing in a definite way: anything from which (*a quo*) something proceeds in whatever mode is said to be its principle; and conversely.<sup>13</sup>

What the name *principle* indefinitely conveys (*dicit, importat*) in absolute, not determining some (specific) mode, is an *order of origin*.<sup>14</sup> And order is a relation.<sup>15</sup> Thus, *principle* names (*nominat*) only a relation.<sup>16</sup> Whence, the *ratio* of *principle* is in the genus of *relation*, and the name *principle* is said relatively (*relative dicitur*).<sup>17</sup>

*Principle* is said relatively *to that which is from the principle (relative ad principiatum)*.<sup>18</sup> Everything that is not a principle must be from principles.<sup>19</sup> Hence, it is necessary to understand some relation between a principle and the things that are from the principle: and not only a relation of origin—insofar as those things that are from a principle originate from the principle—but also a relation of diversity, for it is necessary to distinguish the former from the latter, since nothing is a principle of itself.<sup>20</sup>

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the other hand, speaks of *quality* rather than *quantity* because he is resolving the question of how the name *wisdom* can be said of God, for wisdom is a quality, and yet in God there are no accidents (such as quantity and quality). Thus, he explains that the ratio of *wisdom* that is said of God is simply that which is conceived from the signification of the name *wisdom* when it is said of God, even if divine wisdom cannot be defined: “Et tamen ratio qualitatis est id quod significatur nomine qualitatis; et hoc est illud ex quo qualitas habet quod sit qualitas. [...] Et sic patet quod ratio sapientiae quae de Deo dicitur, est id quod concipitur de significatione hujus nominis, quamvis ipsa sapientia divina definiri non possit.” Unlike quantity and quality, divine wisdom cannot be defined because it is identical with God, and God, transcending all genera, cannot be defined (see, e.g., *Comp. th.* 1, c. 26, 8–10).

<sup>11</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἀρχή.

<sup>12</sup> *In Sent.* 1, d. 29 q. 1 a. 1 ad 1: “nomen principii [...] imponitur ad significandum illud a quo est aliquid.” *Ibid.*, d. 12 q. 1 a. 2 ad 1: “principium importat originem quamdam, secundum quod dicitur principium, ex quo incipit aliquid.” *STh I*, q. 33 a. 1 ad 1: “hoc nomen principium nihil aliud significat quam id a quo aliquid procedit.”

<sup>13</sup> *STh I*, q. 33 a. 1 ad 1: “omne enim a quo aliquid procedit quocumque modo, dicimus esse principium; et e converso.” *De potentia*, q. 10 a. 1 ad 9: “nomina communia [...] indefinite aliquid significant, [...] nomina specialia [...] definite rei species exprimunt.”

<sup>14</sup> *In Sent.* 3, d. 11 q. 1 a. 1 ad 5: “nomen principii importat relationem originis absolute.” *In Sent.* 1, d. 29 q. 1 a. 1 co.: “principium dicit ordinem originis absolute, non determinando aliquem modum [...]”

<sup>15</sup> *In Physic.* 5, l. 3, n. 3: “ordo vero relatio est.” From this, St. Thomas shows (in *ibid.*; cf. ARISTOTLE, *Physica* E.2, 225b10–11) that there is no motion in the category of *position* because the latter involves an order that is reduced to the category of relation: “Situs autem ordinem quendam partium demonstrat.”

<sup>16</sup> *In Sent.* 1, d. 11 q. 1 a. 4 ad 3: “principium [...] nominat [...] tantum relationem.”

<sup>17</sup> *De potentia*, q. 2 a. 2 co.: “principium [...] relative dicitur [...]; ratio principii [...] in genere relationis est.”

<sup>18</sup> *ScG 2*, 11 n. 1: “principium autem relative ad principiatum dicitur.”

<sup>19</sup> *In Physic.* 1, l. 11, n. 11: “Omne quod non est principium, oportet esse ex principiiis.”

<sup>20</sup> *De potentia*, q. 7 a. 8 co.: “Oportet autem intelligi aliquam relationem inter principium et ea quae a principio sunt, non solum quidem relationem originis, secundum quod principiatum oriuntur a principio, sed

Because the *ratio* of *principle* conveys *some order to other things (ordinem quemdam ad alia)*, a principle is necessarily found in all those things in which there is an order (► 8.4).<sup>21</sup> Whereby, the name *principle* is said in multiple modes (i.e., analogically; ► 20.12, ¶3).<sup>22</sup>

For example, order is found in quantities; and, according to this, there is a principle in numbers (i.e., the unit), and (another principle) in longitudes (i.e., the point).<sup>23</sup> Likewise, order is found in time; and, according to this, there is a principle in time and in duration. Also, a twofold order is found in the disciplines: according to nature, and with respect to us; hence, there is a principle according to each. Order is also found in the production of a thing according to: (1) the thing generated, i.e., the first part itself of the thing generated or produced, as the foundation is said to be the principle of a house; and (2) the agent that produces it, in which the principle is threefold: (2a) the principle of intention (*intentionis*), which is the end that moves the agent; (2b) the principle of *ratio* (*rationis*), which is the form itself (of the thing to be generated or produced, as found) in the mind of the artificer; and (2c) the principle of execution (*executionis*), which is the operating potency (*potentia operans*, i.e., the operating power).

When used indefinitely, in absolute, and hence *according only to some order*, the name *principle* is more common than *cause*, as *cause* is more common than *element*; for no differences are included in its *ratio*: differences such as diversity of substance (essence), dependence of one upon another, or distance according to some perfection or virtue.<sup>24</sup>

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etiam relationem diversitatis: quia oportet effectum a causa distingui, cum nihil sit causa sui ipsius." *In Metaph.* 1, l. 16, §253: "unum et idem non est sui ipsius principium: nisi forte dicatur quod unum multipliciter dicitur, ut distincto uno ponantur omnia esse unum genere, et non specie vel numero." *ScG* 2, 10 n. 1: "nihil est sui ipsius principium." *STh* I, q. 41 a. 4 ad 3: "Principium autem distinctionem importat ab eo cuius est principium."

<sup>21</sup> *In Metaph.* 5, l. 1, §751: "hoc nomen principium ordinem quemdam importat." *Super Io.* 1, l. 1: "Cum enim principium importet ordinem quemdam ad alia, necesse est invenire principium in omnibus, in quibus est ordo."

<sup>22</sup> *Super Io.* 1, l. 1: "principium, secundum Origenem, multis modis dicitur." This observation is probably drawn from ORIGEN's *De principiis*. We were unable to find an explicit quote in Paul KOETSCHAU (ed.), *Origenes Werke*, vol. 5 (Leipzig: J.C. Hinrich'sche Buchhandlung, 1913).

<sup>23</sup> *Super Io.* 1, l. 1: "Invenitur autem ordo in quantitibus; et secundum hoc dicitur principium in numeris et longitudine, puta lineae. Invenitur etiam ordo in tempore; et secundum hoc dicitur principium temporis, vel durationis. Invenitur ordo in disciplinis, et hic est duplex: secundum naturam, et quoad nos; et utroque modo dicitur principium. [...] Invenitur etiam ordo in productione rei; et secundum hoc principium dicitur ex parte generati, scilicet ipsa prima pars generati seu facti: sicut fundamentum dicitur principium domus. Vel ex parte facientis: et sic est triplex principium, scilicet intentionis, quod est finis, quod movet agentem; rationis, quod est ipsa forma in mente artificis; et executionis, quod est potentia operans."

<sup>24</sup> *In Metaph.* 5, l. 1, §750: "hoc nomen principium communius est quam causa: aliquid enim est principium, quod non est causa; sicut principium motus dicitur terminus a quo. Et iterum causa est in plus quam elementum. Sola enim causa intrinseca potest dici elementum." *Contra err. Gr.* 1, c. 1, 63–64: "Sicut autem causa est communius quam elementum, ita et principium quam causa." *De potentia*, q. 10 a. 1 ad 9: "causa communior est quam elementum, quod significat aliquid primum et simplex in genere causae materialis, ita etiam principium est communius quam causa." *STh* I, q. 33 a. 1 ad 1: "principium communius est quam causa, sicut causa communius quam elementum [...]. Unde hoc nomen causa videtur importare diversitatem substantiae, et dependentiam alicuius ab altero; quam non importat



Hence, some principles are consubstantial with—i.e., not outside the essence of—that which is from them: for example, a point is consubstantial with the line that flows from it (that is, if we imagine, as geometers do, that a moved point produces a line);<sup>25</sup> and the foundation is of a house's essence.<sup>26</sup>

Also, a principle need not have an influence towards the being of the thing that is from it (*aliquam influentiam ad esse principiati*): for example, morning is said to be a principle of night (and yet—to be—night does not depend on morning).<sup>27</sup> Likewise, the point is said to be the principle of the line, but not its cause.<sup>28</sup> Moreover, the *terminus a quo* (whence motion begins: e.g., the first terminus of a length; or a privation or a contrary, such as non-white or black) is said to be a principle of motion.<sup>29</sup> And not only the first terminus of a thing is said to be its principle, but so is its first part, insofar only as there is some order: for example, the point (i.e., the first terminus of a line, which *is not* itself a line) is said to be the principle of the line; and the first part of the line (which *is* itself a line) is also said to be its principle.<sup>30</sup>

A principle can be considered in two ways: (1) (in regard to) *that which is a principle (id quod est principium; ►8.3)*; and (2) *according to the relation of principle (secundum relationem principii; ►8.7)*.<sup>31</sup> Considered in the latter mode, the *ratio* of *principle*, which is in the genus of *relation*, befits (*convenit*) any principle, and some relation befalls (*accidit*) every principle; but considered in the former mode, not everything that is a principle is in

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nomen principii. In omnibus enim causae generibus, semper invenitur distantia inter causam et id cuius est causa, secundum aliquam perfectionem aut virtutem. Sed nomine principii utimur etiam in his quae nullam huiusmodi differentiam habent, sed solum secundum quendam ordinem.”

<sup>25</sup> See, for example, *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b15–28): “Imaginemur igitur secundum geometras, quod punctus motus faciat lineam”; *In De caelo* 1, l. 15, n. 8 (cf. ARISTOTLE, *De caelo* A.1, 268a30–b3): “Et utitur modo loquendi quo utuntur geometrae, imaginantes quod punctus motus facit lineam, linea vero mota facit superficiem, superficies autem corpus.”

<sup>26</sup> St. Thomas often adds to these the ancient example of the heart—or brain—of an animal. *In Sent.* 1, d. 12 q. 1 a. 2 ad 1: “principium aliquod a quo aliquid fluit, est consubstantiale rei cuius est principium; sicut dicimus, quod punctum est principium lineae, et cor principium animalis, et fundamentum domus.” *In Sent.* 1, d. 29 q. 1 a. 1 co.: “Invenitur enim aliquod principium quod non est extra essentiam principiati, sicut punctus a quo fluit linea.”

<sup>27</sup> *In Sent.* 1, d. 29 q. 1 a. 1 co.: “Invenitur enim aliquod principium [...] quod non habet aliquam influentiam ad esse principiati, [...] sicut mane dicitur principium diei.”

<sup>28</sup> *Contra err. Gr.* 1, c. 1, 64–65: “dicitur enim punctum principium lineae sed non causa.”

<sup>29</sup> *De potentia*, q. 10 a. 1 ad 9: “prima pars motus vel lineae dicitur principium sed non causa. In quo patet quod principium potest dici aliquid quod non est secundum essentiam distinctum, ut punctum lineae; non autem causa, maxime si loquamur de causa originante, quae est causa efficiens.” *In Sent.* 1, d. 29 q. 1 a. 1 co.: “Invenitur enim aliquod principium [...] quod non habet aliquam influentiam ad esse principiati, sicut terminus a quo dicitur principium motus.”

<sup>30</sup> *STh* I, q. 33 a. 1 ad 1: “primus enim terminus, vel etiam prima pars rei dicitur principium [...] solum secundum quendam ordinem, sicut cum dicimus punctum esse principium lineae, vel etiam cum dicimus primam partem lineae esse principium lineae.”

<sup>31</sup> *In Sent.* 1, d. 9 q. 2 a. 1 ad 3: “principium potest dupliciter considerari: vel id quod est principium [...]; vel secundum relationem principii [...].” Cf. *De potentia*, q. 1 a. 1 ad 3.

the genus of *relation*: for example, potency (*potentia*, i.e., power) and science (*scientia*) are principles in the genus of *quality*,<sup>32</sup> while matter (i.e., the matter that corresponds to a substantial form) is a principle in the genus of *substance*.<sup>33</sup> In this way, the name *principle* signifies—through the mode of a noun—a *property*.<sup>34</sup>

The **end** or **terminus** (*finis vel terminus*; ► 8.8) is the opposite or contrary of a *principle*.<sup>35</sup> Thus, *principle* and *end* have opposite *ratios*: if a principle and an end were the same in respect of the same, opposites would be in the same (subject) according to the same (which is impossible; e.g., the same number cannot be both even and odd).

### 8.3. First

The *ratio* of **first** is *that before which there is nothing* (*primum est ante quod nihil*).<sup>36</sup> Thus, it consists in a removal—i.e., *not to be from a principle* belongs to the *ratio* of *first*—which is best established by negation, as happens with *blindness* (i.e., the privation of sight).

Since *that which is a principle* is naturally prior to *that of which it is a principle* (*id quod est principium est prius naturaliter eo cuius est principium*),<sup>37</sup> *first* and *principle* seem to be

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<sup>32</sup> *De potentia*, q. 2 a. 2 co.: “potentia secundum suam rationem est principium quoddam [...]. Sed [...] licet potentiae conveniat ratio principii, quod in genere relationis est, tamen id quod est principium actionis vel passionis, non est relatio, sed aliqua forma absoluta; et id est essentia potentiae; et inde est quod Philosophus ponit potentiam non in genere relationis, sed qualitatis, sicut et scientiam, quamvis utrique aliqua relatio accidat.”

<sup>33</sup> *In Sent.* 1, d. 3 q. 4 a. 2 ad 4: “si per potentiam passivam intelligatur relatio vel ordo materiae ad formam, tunc materia non est sua potentia, quia essentia materiae non est relatio. Si autem intelligatur potentia, secundum quod est principium in genere substantiae, secundum quod potentia et actus sunt principia in quolibet genere, ut dicitur, in 12 *Metaph.*, sic dico, quod materia est ipsa sua potentia.”

<sup>34</sup> *STh* I, q. 36 a. 4 co.: “licet hoc nomen principium significet proprietatem, tamen significat eam per modum substantivi, sicut hoc nomen pater vel filius etiam in rebus creatis.”

<sup>35</sup> *In Physic.* 4, l. 21, n. 6 (cf. ARISTOTLE, *Physica* Δ.13, 222b5–7): “Principium enim et finis habent oppositas rationes: si ergo idem esset principium et finis respectu eiusdem, opposita inessent eidem secundum idem.” Cf. *In Metaph.* 5, l. 1, §751: “Ex parte vero opposita sive contraria, est diversum vel alterum, idest finis vel terminus,” where St. Thomas is commenting the phrase “ex opposito autem alterum,” corresponding to the last four words in ARISTOTLE, *Metaphysica* Δ.1, 1012b34–1013a1: “Ἀρχὴ λέγεται ἢ μὲν ὅθεν ἂν τις τοῦ πράγματος κινηθεῖ πρῶτον, οἷον τοῦ μήκους καὶ ὁδοῦ ἐντεῦθεν μὲν αὕτη ἀρχή, ἐξ ἐναντίας δ' ἑτέρα.” The ROSS edition translates this text as “‘Beginning’ means (1) that part of a thing from which one would start first, e.g., a line or a road has a beginning in either of the contrary directions.” Thus, ARISTOTLE seems not to be referring to the terminus *ad quem* but to another principle. However, a careful reading of the commentary will show that St. Thomas is correlating this text with ARISTOTLE, *Metaphysica* Δ.17, 1022a10–13: “ὥστε φανερόν ὅτι ὁσαυτῶς τε ἡ ἀρχὴ λέγεται, τοσαυτῶς καὶ τὸ πέρασ, καὶ ἐπι πλεοναχῶς: ἢ μὲν γὰρ ἀρχὴ πέρασ τι, τὸ δὲ πέρασ οὐ πᾶν ἀρχή,” which the ROSS edition renders thus: “Evidently, therefore, ‘limit’ has as many senses as ‘beginning’, and yet more; for the beginning is a limit, but not every limit is a beginning.” Therefore, St. Thomas is clearly not misrepresenting ARISTOTLE: the contrary principle is not only a principle, as the Stagirite points out, but also a terminus, which is what St. Thomas is highlighting here.

<sup>36</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 1: “illud cuius ratio consistit in remotione, optime per negationem certificatur, sicut caecitas et hujusmodi: et hujusmodi est ratio primi, vel ejus quod est non de principio esse, quia primum est ante quod nihil.”

<sup>37</sup> *In Sent.* 1, d. 9 q. 2 a. 1 ad 3: “principium potest [...] considerari [...] id quod est principium, et hoc est prius naturaliter eo cuius est principium.” *Ibid.*, d. 12 q. 1 a. 1 ad 1: “principium, secundum relationem principii non est eo prius cuius est principium aliquo modo; sed id quod est principium, naturaliter est prius.” Cf. *In Metaph.* 12, l. 4 §2459 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b2–3, referring to στοιχείον).

the same (*idem enim videtur esse primum et principium* < ταὐτὸ γὰρ λέγω πρῶτον καὶ ἀρχήν); for *the first and maximum* (in virtue) *in each genus* (►27) *is the cause* (►9) *of those things that are posterior*, as ARISTOTLE says.<sup>38</sup>

Whence, ARISTOTLE reduces to something common the diverse modes in which *principle* is said; for, in each of them, **principle** is *the first whence* (*primum unde* = τὸ πρῶτον ὅθεν) something proceeds: whether in respect of the being of the thing (*in esse rei* < ἔστιν), as the first part of a thing is said to be its principle; or in respect of the coming-to-be of the thing (*in fieri rei* < γίγνεται), as the first mover is said to be its principle; or in respect of the cognition of the thing (*in rei cognitione* < γινώσκειται).<sup>39</sup>

#### 8.4. Intrinsic and Extrinsic Principles

Although principles (generically) agree in that any of them is *that which is first*, they differ in that some are **intrinsic** (*inexistens, idest intrinsecum* = ἐνυπάρχοντος), that is, *existing within*, while others are **extrinsic** (*non inexistens, idest extrinsecum* = μὴ ἐνυπάρχοντος; i.e., *extra rem*, not existing within the thing of which they are principles).<sup>40</sup>

For example, nature and element are *intrinsic* principles (►12).<sup>41</sup> Nature is a principle as that from which motion begins; element, as the first part in the generation of a thing.

<sup>38</sup> *In Post. an.* 1, l. 4, 319–322: “*idem enim videtur esse primum et principium: nam primum in unoquoque genere et maximum, est causa eorum que sunt post, ut dicitur in II Methaphisice.*” Cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a5–7: “ἐκ πρώτων δ’ ἐστὶ τὸ ἐξ ἀρχῶν οἰκείων: ταὐτὸ γὰρ λέγω πρῶτον καὶ ἀρχήν.” The reference is to ARISTOTLE, *Metaphysica* α.1, 993b23–31: “οὐκ ἴσμεν δὲ τὸ ἀληθές ἄνευ τῆς αἰτίας. ἕκαστον δὲ μάλιστα αὐτὸ τῶν ἄλλων καθ’ ὃ καὶ τοῖς ἄλλοις ὑπάρχει τὸ συνώνυμον, οἷον τὸ πῦρ θερμότατον: καὶ γὰρ τοῖς ἄλλοις τὸ αἴτιον τοῦτο τῆς θερμότητος: ὥστε καὶ ἀληθέστατον τὸ τοῖς ὑστέροις αἴτιον τοῦ ἀληθέσιν εἶναι. διὸ τὰς τῶν αἰδὸντων ἀρχὰς ἀναγκαῖον αἰε εἶναι ἀληθεστάτας: οὐ γὰρ ποτε ἀληθεῖς, οὐδ’ ἐκείναις αἰτιότις ἐστὶ τοῦ εἶναι, ἀλλ’ ἐκείναις τοῖς ἄλλοις, ὡσθ’ ἕκαστον ὡς ἔχει τοῦ εἶναι, οὕτω καὶ τῆς ἀληθείας.” The Ross edition renders this passage thus: “we do not know a truth without its cause; and <a> [each] thing has <a quality> in a higher degree than other things if in virtue of it the <similar quality> [univocal] belongs to the other things as well (e.g. fire is the hottest of things; for it is the cause of the heat of all other things); so that that which causes <derivative> [posterior] <truths> to be true is most true. Hence the principles of eternal things must be always most true (for they are not merely sometimes true, nor is there any cause of their being, but they themselves <are the cause of the being> of other things), so that as each thing is in respect of being, so is it in respect of truth.”

<sup>39</sup> *In Metaph.* 5, l. 1, §761 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a17–20): “reducit [Philosophus] omnes praedictos modos ad aliquid commune; et dicit quod commune in omnibus dictis modis est, ut dicatur principium illud, quod est primum, aut in esse rei, sicut prima pars rei dicitur principium, aut in fieri rei, sicut primum movens dicitur principium, aut in rei cognitione.”

<sup>40</sup> *In Metaph.* 5, l. 1, §§761–2 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a17–19): “reducit [Philosophus] omnes praedictos modos ad aliquid commune; et dicit quod commune in omnibus dictis modis est, ut dicatur principium illud, quod est primum [...]. Sed quamvis omnia principia in hoc, ut dictum est, convenient, differunt tamen, quia quaedam sunt intrinseca, quaedam extrinseca.” Ibid., §754 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a4; 7): “Quod quidem principium [sc., *in generatione vel fieri rerum*] dupliciter se habet. Aut enim est *inexistens*, idest intrinsecum; vel *non est inexistens*, idest extrinsecum.” Ibid., §763: “*inexistens*, idest intus existens.”

<sup>41</sup> *In Metaph.* 5, l. 1, §762 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a19–24): “natura potest esse principium et elementum, quae sunt intrinseca. Natura quidem, sicut illud a quo incipit motus: elementum autem sicut pars prima in generatione rei. [...] Et iterum quasi intrinsecum dicitur principium substantia rei, idest forma quae est principium in essendo, cum secundum eam res sit in esse.”

Likewise, the substantial form (*substantia* = οὐσία; ► 15.12) that is a principle in being (*in essendo*) is said to be a principle as intrinsic; for the thing has being (*esse*) through it. Also, the foundation is a principle of a house according to (the mode of) matter (► 9.3); and *animal* (is a principle) of *man* (i.e., human being) according to form (► 9.5).<sup>42</sup>

On the other hand, the mind or intellect (*mens* = διάνοια), and the purpose (*praevoluntas* = προαίρεσις), are said to be principles as *extrinsic*.<sup>43</sup> Hence, the end (► 9.8) for the sake of which something comes to be, is also said to be a principle; for the good, which has the *ratio* of *end* in pursuing, and the bad in avoiding, are principles of cognition and of motion in many things; and such are all those that are done for the sake of an end.

### 8.5. Order

The *ratio* of **order** (*ordo* = τάξις) includes three (*ratios*):<sup>44</sup> (1) the *ratio* of **prior and posterior** (► 8.6); (2) (the *ratio* of) **distinction** (► 40.7); for there is no order except among distinct things, although the name *order* presupposes distinction rather than signifying it; and (3) the *ratio* of the order whence the species of order is derived (i.e., the *ratio* of a specific difference in the genus of order according to prior and posterior):<sup>45</sup> thus, there is an order *according to place*; another, *according to dignity*; another, *according to origin*, etc.

If multiple things are to have an order, it is necessary for each of them to be: (1) a being (*ens*); (2) distinct (*distinctum*), for there is no order of the same to itself; and (3) susceptible of being ordered to the other (*ordinabile ad aliud*).<sup>46</sup> Hence, together with distinction, *order*

<sup>42</sup> *In Metaph.* 12, l. 4, §2469: “Sunt enim quaedam principia intrinseca [...]. Sicut fundamentum est principium domus secundum materiam, et animal hominis secundum formam.”

<sup>43</sup> *Ibid.*: “mens, idest intellectus, et praevoluntas, idest propositum, dicuntur principia quasi extrinseca. [...] Et secundum etiam praedicta, finis cuius causa fit aliquid, dicitur etiam esse principium. Bonum enim, quod habet rationem finis in prosequendo, et malum in vitando, in multis sunt principia cognitionis et motus, sicut in omnibus quae aguntur propter finem. In naturalibus enim, et moralibus et artificialibus, praecipue demonstrationes ex fine sumuntur.”

<sup>44</sup> *In Sent.* 1, d. 20 q. 1 a. 3 qc. 1 co.: “ordo in ratione sua includit tria, scilicet rationem prioris et posterioris; [...] Includit etiam distinctionem, quia non est ordo aliquorum nisi distinctorum. Sed hoc magis praesupponit nomen ordinis quam significet. Includit etiam tertio rationem ordinis, ex qua etiam ordo in speciem trahitur. Unde unus est ordo secundum locum, alius secundum dignitatem, alius secundum originem, et sic de aliis.”

<sup>45</sup> This becomes clearer if we consider what St. Thomas immediately adds about divine order (in the same passage of *In Sent.* 1, d. 20 q. 1 a. 3 qc. 1 co.), explaining that the species of order *of origin* is the one that befits the order *of nature* found therein, but only with respect to the ratio of the specific difference (i.e., *according to origin*) and not with respect to the ratio of the genus (i.e., [order of] *priority and posteriority*). Cf. *ibid.*, ad 3: “Ad tertium [sc., *ubicumque est ordo, est aliquis gradus*] dicendum, quod illa ratio procedit de ordine quantum ad rationem generis, prout ponit prius et posterius, quod nullo modo divinis competit.”

<sup>46</sup> *De potentia*, q. 7 a. 11 co.: “Ad hoc autem quod aliqua habeant ordinem, oportet quod utrumque sit ens, et utrumque distinctum (quia eiusdem ad seipsum non est ordo) et utrumque ordinabile ad aliud.” *In De div. nom.*, c. 4, l. 1: “Dico autem distinctionem cum convenientia, quia ubi non est distinctio, ordo locum non habet; si autem quae distinguuntur in nullo convenient, unius ordinis non essent.” *Ibid.*, c. 5

includes **agreement** (*convenientia*), which is also called **harmony** (*harmonia*); for if those things that are distinct were to agree in nothing, there would be no order.

Because *order* includes some mode of *prior and posterior*, there necessarily is an order wherever there is a principle.<sup>47</sup> Whence, there are as many modes in which there can be said to be an order among things as there are modes in which one thing can be said to be prior to another: according to place, by comparison to the principle of place; in the disciplines, by comparison to the principle of a discipline; likewise, in time, etc.<sup>48</sup>

Since the name *order* is always said by comparison to some principle, just as *principle* is said in multiple modes, so *order* is said in multiple modes: for example, *according to site* (*secundum situm*), as the point is the principle of the line; *according to what is understood* (*secundum intellectum*), as an axiom is a principle of demonstration; or according to each of the individual causes (i.e., formal, material, efficient, and final).<sup>49</sup>

## 8.6. Prior and Posterior

**Prior** (*prius* = πρότερον) and **posterior** (*posterius* = ὕστερον) are names that signify an order.<sup>50</sup> They are—in whatever order—said by comparison to (*per comparisonem ad*), according to a relation to (*secundum relationem ad*) the principle of that order.<sup>51</sup> Whence, *prior* and *posterior* are said in multiple modes.<sup>52</sup> **Prior** is *that which is nearer some determinate principle* (*quod est propinquius alicui determinato principio*; and **posterior**, *what is farther from it*).<sup>53</sup> The signification of *prior* depends on the signification of *principle* because *the principle in every genus is that which is first in the genus* (► 27).

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I. 1: “ponit [Dionysius] ea quae pertinent ad sapientiam; et dicit quod ex Deo est *omnis sapientia*. Et quia sapientis est ordinare, subiungit: et *omnis ordo* et *omnis harmonia*, quae est convenientia ordinis.”

<sup>47</sup> *STh* II-II, q. 26 a. 1 co.: “Ordo autem includit in se aliquem modum prioris et posterioris. Unde oportet quod ubicumque est aliquod principium, sit etiam aliquis ordo.” *Quodlibet* 5, q. 10 a. 1 co.: “prius et posterius dicuntur in quolibet ordine per comparisonem ad principium illius ordinis; sicut in loco per comparisonem ad principium loci, in disciplinis per comparisonem ad principium disciplinae.” *STh* II-II, q. 26 a. 6 co.: “in omnibus in quibus invenitur aliquod principium, ordo attenditur secundum comparisonem ad illud principium.”

<sup>48</sup> *In Sent.* 1, d. 20 q. 1 a. 3 qc. 1 co.: “unde secundum omnes illos modos potest dici esse ordo aliquorum, secundum quos aliquis altero prius dicitur et secundum locum et secundum tempus et secundum omnia huiusmodi.”

<sup>49</sup> *STh* I, q. 42 a. 3 co.: “ordo semper dicitur per comparisonem ad aliquod principium. Unde sicut dicitur principium multipliciter, scilicet secundum situm, ut punctus, secundum intellectum, ut principium demonstrationis, et secundum causas singulas; ita etiam dicitur ordo.”

<sup>50</sup> *In Metaph.* 5, l. 13, §936: “hic [sc., *Metaphysica* Δ.11, 1018b9–1019a14] distinguit [Philosophus] nomina significantia ordinem, scilicet prius et posterius.”

<sup>51</sup> *STh* II-II, q. 26 a. 1 co.: “sicut Philosophus dicit, in V *Metaphys.* prius et posterius dicitur secundum relationem ad aliquod principium.” *Quodlibet* 5, q. 10 a. 1 co.: “secundum Philosophum in V *Met.* prius et posterius dicuntur in quolibet ordine per comparisonem ad principium illius ordinis.”

<sup>52</sup> *In Sent.* 4, d. 2 q. 1 a. 3 co.: “prius et posterius multipliciter dicitur.”

<sup>53</sup> *In Metaph.* 5, l. 13, §936: “significatio prioris dependet a significatione principii. Nam principium in unoquoque genere est id, quod est primum in genere. Prius autem dicitur, quod est propinquius alicui

Something is said (to be) *prior* either according to the *ratio* of some principle (*secundum rationem alicuius principii*) or because it is nearer a principle (*principio propinquius est*).<sup>54</sup> The mode of order of a principle and of that which is near a principle can be considered in multiple ways: either (1) something is a principle and a first (*principium et primum*) simply and according to nature (*simpliciter et secundum naturam*), as the father is the principle of the son; or (2) it is a principle in relation to something (*principium ad aliquid*): that is, because of an order (*per ordinem*) to something *extrinsic*.<sup>55</sup> In the latter mode, something that is according to itself (*secundum se*) posterior, is said to be prior in respect to something (*quantum ad aliquid*): whether in respect of cognition, perfection, dignity, or something of this sort; whether it is said to be a principle and prior in respect of where (*quantum ad ubi*), or in some other way. On the other hand, something can be taken as prior to something (else) in one comparison, and as posterior in respect to another thing in another comparison.<sup>56</sup> And thus, something diversely taken is prior and posterior in some comparison.

(The *ratios* of) *prior* and *posterior* follow upon the *ratio* of *one* (► 38.1), because *one* conveys (*importat*) some order; for to be one is to be a principle (► 27).<sup>57</sup>

### 8.7. Simultaneous

(In some order, those are **simultaneous** [*simul* = ἅμα] of which one is neither prior nor posterior to the other. Whence, *simultaneous* is said in as many modes as *prior* and *posterior*: e.g., simultaneous in time, in nature, in *ratio*, in being, in predication, etc.)<sup>58</sup>

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determinato principio.” Cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b9–12: “πρότερα καὶ ὕστερα λέγεται ἕνια μὲν, ὡς ὄντος τινὸς πρώτου καὶ ἀρχῆς ἐν ἐκάστῳ γένει, τῷ ἐγγύτερον <εἶναι> ἀρχῆς τινὸς ὠρισμένης ἢ ἀπλῶς καὶ τῇ φύσει ἢ πρὸς τι ἢ τοῦ ἢ ὑπὸ τινῶν.”

<sup>54</sup> *De virtutibus*, q. 4 a. 3 co.: “prius dicitur aliquid, vel secundum rationem alicuius principii, vel quia principio propinquius est.”

<sup>55</sup> *In Metaph.* 5, l. 13, §936: “Huiusmodi autem ordo principii [sc., prioris et posterioris], et eius, quod est principio propinquum, potest attendi multipliciter. Aut enim aliquid est principium et primum simpliciter et secundum naturam, sicut pater est principium filii. Aut est principium ad aliquid, idest per ordinem ad aliquid extrinsecum; sicut dicitur id, quod est secundum se posterius, esse prius quantum ad aliquid; vel quantum ad cognitionem, vel perfectionem, vel dignitatem, vel aliquo tali modo. Vel etiam dicitur aliquid esse principium et prius quantum ad ubi. Aut etiam aliquibus aliis modis.”

<sup>56</sup> *In Sent.* 2, d. 16 q. 1 a. 4 ad 4: “in una comparatione potest aliquid accipi ut prius aliquo, quod in alia accipitur ut posterius respectu alterius: secundum quem modum possunt comparari potentiae intellectivae naturae ad habitus, quibus inveniuntur priores, vel una ad alteram, et sic est una prior altera. [...] aliquid est prius et posterius in aliqua comparatione diversimode acceptum.”

<sup>57</sup> *In Metaph.* 5, l. 11, §906: “In secunda [pars], [Philosophus distinguit] nomina, quae significant, aliquod consequens ad rationem unius, scilicet prius et posterius. Nam unum esse, est principium esse [...]” *Ibid.*, l. 13, §936: “Unum enim quemdam ordinem importat, eo quod uni esse est principium esse, ut supra [l. 11, §906] dictum est.”

<sup>58</sup> We were unable to find an explicit *ratio* of *simul* in St. Thomas, but it can be inferred from multiple places in his work. And we find the requirements in ARISTOTLE, *Categoriae* 13, 14b24–27: “Ἄμα δὲ λέγεται ἀπλῶς μὲν καὶ κυριώτατα ὧν ἡ γένεσις ἐν τῷ αὐτῷ χρόνῳ· οὐδέτερον γὰρ πρότερον οὐδὲ ὕστερόν ἐστιν· ἅμα δὲ κατὰ τὸν χρόνον ταῦτα λέγεται.” Evidently, what is required is (1) an agreement in some order (in this case, in time, κατὰ τὸν χρόνον); (2) a distinction that is *not* based on priority and posteriority (in this case, the things that are generated, ὧν... ταῦτα); (3) the negation of priority and posteriority (οὐδέτερον...)

Considered *according to the relation of principle*, every principle is simultaneous with the thing that is from it: not only *in nature*, but also *in understanding*, insofar as one is in the *ratio* of the other.<sup>59</sup>

Those things are relative (►37.1) *in nature* which are mutually referred to for the same reason, or *ratio (pari ratione)*: for example, father to son, master to servant, double to half.<sup>60</sup> But it is not necessary for the subjects of such relative things—which are **simultaneous in nature**—to be naturally simultaneous (►47.1): rather, only the relations (need to be simultaneous). On the other hand, those relative things in which the *ratio* of referring is not the same on one part and on the other (*non est eadem ratio referendi ex utraque parte*) are **not simultaneous in nature**: rather, one of them is naturally prior, as, for example, ARISTOTLE says of sense and sensible (*de sensu et sensibili*), and (of) science and the scientifically knowable (*scientia et scibili*).

If a relation is an accident (►37.20), it presupposes a distinction of suppositum (i.e., the relation would then be from one individual subject to another).<sup>61</sup> On the other hand, if the

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πρότερον οὐδὲ ὕστερόν ἐστιν); likewise, in the order of nature, simultaneous are any correlatives of which one is not the cause of the other, as *double* and *half* (ibid., 27–32). In St. Thomas, *In De gen.* 1, l. 5 n. 5: “si enim esset simul quaelibet pars eius, iam non esset secundum prius et posterius.” *In Physic.* 4, l. 15, n. 7: “Illa dicuntur esse simul secundum tempus, et nec prius nec posterius, quae sunt in eodem nunc.” Cf. ARISTOTLE, *Physica* Δ.10, 218a25–27: “εἰ τὸ ἅμα εἶναι κατὰ χρόνον καὶ μήτε πρότερον μήτε ὕστερον τὸ ἐν τῷ αὐτῷ εἶναι καὶ ἐν τῷ νῦν ἐστιν.” *In Sent.* 1, d. 9 q. 2 a. 1 co.: “simul sunt omnibus modis praedictis. Unde patet quod [...] nullo modo potest esse prior [...]” *In Sent.* 2, d. 2 q. 1 a. 1 co.: “ubicumque est prius et posterius, oportet intelligere partem priorem et posteriorem, et in nulla duratione partes priores et posteriores sunt simul; unde oportet quod quando est prius non sit posterius; et ideo oportet posterius de novo advenire, cum prius non fuerit.” *Comp. th.* 1, c. 150, 2–17: “Sicut enim ex motu causatur tempus in quo prius et posterius inuenitur, ita oportet quod remoto motu cesset prius et posterius: et sic ratio eternitatis relinquatur, que est tota simul.” *STh I*, q. 13 a. 5 co.: “aevum est totum simul, non tamen est eternitas, quia compatitur secum prius et posterius.” That *simultaneous* is said in multiple modes can be inferred from what has been said so far; and it is corroborated by many places in which things are said to be simultaneous in some order but not in another. For example, *In Sent.* 1, d. 3 q. 4 a. 3 ad 1: “quamvis sint simul tempore, nihilominus tamen una naturaliter prior est altera.” *In Sent.* 4, d. 16 q. 1 a. 1 q. 3 co.: “quandoque plures eorum, quorum unus est altero prior per naturam, sunt simul tempore.” *STh I*, q. 77 a. 4 ad 1: “alicuius generis species se habent secundum prius et posterius, sicut numeri et figurae, quantum ad esse; licet simul esse dicantur in quantum suscipiunt communis generis praedicationem.” *In Sent.* 3, d. 23 q. 2 a. 5 co.: “aliquid potest dici prius altero et tempore et natura. Tempore quidem omnes virtutes sunt simul, quia simul divinitus infunduntur; sed secundum naturam ordo virtutum pensandus est ex actibus, sicut et ordo potentiarum, quae simul in anima concreantur.”

<sup>59</sup> *STh I*, q. 42 a. 3 ad 2: “si considerentur ipsae relationes causae et causati, et principii et principiatii, manifestum est quod relativa sunt simul natura et intellectu, in quantum unum est in definitione alterius.” For example, *according to the relation of principle*, father and son are simultaneous in the order of understanding because when we understand *son*, we co-understand the principle *father*; and they are simultaneous in the order of nature because the relation of father and son can only exist if the two terms of the relation exist.

<sup>60</sup> *De potentia*, q. 7 a. 8 ad 1: “illa relativa sunt simul natura quae pari ratione mutuo referuntur, sicut pater ad filium, dominus ad servum, duplum ad dimidium. Illa vero relativa in quibus non est eadem ratio referendi ex utraque parte, non sunt simul natura, sed alterum est prius naturaliter, sicut etiam Philosophus dicit, de sensu et sensibili, scientia et scibili. [...] Nihilominus autem non est necesse in illis etiam relativis quae sunt simul natura, quod subiecta sint naturaliter simul sed relationes solae.”

<sup>61</sup> *STh I*, q. 40 a. 2 ad 4: “relatio praesupponit distinctionem suppositorum, quando est accidens, sed si relatio sit subsistens, non praesupponit, sed secum fert distinctionem. Cum enim dicitur quod relativity esse est ad aliud se habere, per ly aliud intelligitur correlativum, quod non est prius, sed simul natura.”

relation should be subsistent, then, rather than presupposing a distinction, it would bear (*ferē*) in itself the distinction; for, when it is said that to be relatives is to be (related) to another (*relativi esse est ad aliud se habere*), the correlative is understood by *another* (*aliud*), which is not prior but simultaneous in nature.<sup>62</sup>

Hence, it is not impossible for some principle to altogether be naturally simultaneous with the thing that is from it.<sup>63</sup> And even if the name *principle* would not befit such a (priority-less) principle in respect of the mode of signifying, the *ratio* of *principle* would most properly befit it in respect of the thing signified, for the name *principle* is imposed to signify *origin* rather than *priority* (► 8.2).<sup>64</sup>

### 8.8. Terminus

The *ratio* of **terminus** (*terminus* = πέρας, *end, limit, boundary*; ὀρισμός, *limitation, marking out by boundaries; definition of a thing*)<sup>65</sup> is *that which is last of anything* (*quod est ultimum cuiuslibet <rei> = τὸ ἔσχατον ἐκάστου*) *in such a way that nothing that belongs to what is first terminated is outside the terminus itself* (*ita quod nihil de primo terminato est extra ipsum terminum < et cuius extra nihil est accipere primi = καὶ οὐ ἔξω μηδὲν ἔστι λαβεῖν πρώτου*) *and everything that belongs to it, is contained in it* (*et omnia quae sunt eius, continentur intra ipsum < et cuius infra omnia primi = καὶ οὐ ἔσω πάντα πρώτου*).<sup>66</sup> (The expression) *of a first* (*primi* = πρώτου) is added because it may happen that that which is last of a first is the principle of a second: for example, the *now* that is the last of the past, is the principle of the future.

<sup>62</sup> Cf. *In Sent.* 1, d. 9 q. 2 a. 1 ad 3: “principium potest dupliciter considerari: vel id quod est principium, et hoc est prius naturaliter eo cuius est principium; vel secundum relationem principii, et sic est simul naturaliter cum principiato.”

<sup>63</sup> *In Sent.* 1, d. 9 q. 2 a. 1 ad 3: “Si igitur esset aliquis ab eodem habens quod sit aliquis et quod sit ad aliquid; omnino simul esset naturaliter cum eo ad quod diceretur.” Cf. *ibid.*, d. 12 q. 1 a. 1 ad 1.

<sup>64</sup> *De potentia*, q. 10 a. 1 ad 10: “licet principium secundum rationem nominis a prioritatem sumatur, non tamen imponitur ad significandum prioritatem sed originem; sicut etiam hoc nomen lapis non imponitur ad significandum laesionem pedis, licet ab hoc nomen sumi videatur.” As St Thomas explains (*In Sent.* 1, d. 29 q. 1 a. 1 ad 1), although the name *principle* expresses an order of origin indefinitely and in absolute, it is imposed from some priority because of the way it is found in creatures, in which every principle is prior—in some mode—to that which is from it. (Note that, in beings composed of act and potency, act is naturally prior: only within something that is pure act can there be no prior or posterior.)

<sup>65</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entries for πέρας and ὀρισμός. St. Thomas often uses other words akin to *terminus*, such as *finis*, *extremitas* (e.g., *In Metaph.* 5, l. 1, §778: “ex terminis praemissarum componitur conclusio, scilicet ex maiori et ex minori extremitate”; *ibid.* 11, l. 2, §2185: “Punctum enim quod est in extremitate lineae, est terminus lineae”), *ultimum* (*In Sent.* 2, d. 1 q. 1 a. 5 ad 6: “aliquid est primum et aliquid ultimum, secundum terminum a quo et in quem”; *STh I-II*, q. 12 a. 2 co.: “In motu autem potest accipi terminus dupliciter, uno modo, ipse terminus ultimus, in quo quiescitur, qui est terminus totius motus; alio modo, aliquid medium, quod est principium unius partis motus, et finis vel terminus alterius”). Whence the alternative renderings such as *term*, *extremity*, *end*, *last*, etc.

<sup>66</sup> *In Metaph.* 5, l. 19, §1044 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a4–5): “ponit [Philosophus] rationem termini; dicens, quod terminus dicitur quod est ultimum cuiuslibet rei, ita quod nihil de primo terminato est extra ipsum terminum; et omnia quae sunt eius, continentur intra ipsum. Dicit autem primi quia contingit id, quod est ultimum primi, esse principium secundi; sicut nunc quod est ultimum praeteriti, est principium futuri.”



A terminus is only (a terminus) of that of which it is the terminus (*terminus non est nisi eius cuius est terminus*).<sup>67</sup> Thus, an extremity and that of which it is an extremity are of one genus (*extremum et id cuius est extremum sunt unius generis*).<sup>68</sup> But those (principles or termini) that are intrinsic to a thing are proportionate to its extrinsic principle and end.<sup>69</sup> Everything that is from a principle tends towards some end (*ad finem aliquem tendit*).<sup>70</sup>

*Terminus* is one of the names that signify a condition of the perfect (►23.2; 23.3); for **perfect** is said (to be) *that which is terminated* (*terminatum*, i.e., complete), *absolute, not dependent on something else, and not deprived* (*non privatum*): rather, *having those things that befit it* (*sibi competunt*) *according to its genus*.<sup>71</sup> Thus, the end of a thing responds to its principle: a thing is perfect when it attains its proper principle, whether by likeness or in whatever mode.<sup>72</sup>

As ARISTOTLE says, *end* or *terminus* is said in multiple modes, of which he posits four:<sup>73</sup>

**1. The end of a magnitude—or of that which has magnitude**—is said to be its terminus in whatever species (εἶδος) of magnitude.<sup>74</sup> For example, a point is said to be the terminus of a line; and a surface (is said to be the terminus or end) of a body—or of a stone, which has continuous quantity.

**2. The extremity (extremum) of a motion or of an action:** namely, *that towards which* (*ad quod* = ἐφ’ ὃ) there is motion, and not *that from which* (*a quo* = ἀφ’ οὗ), though

<sup>67</sup> *In Physic.* 4, l. 18, n. 11 (cf. ARISTOTLE, *Physica* Δ.11, 220a18–24): “terminus non est nisi eius cuius est terminus.”

<sup>68</sup> *In De sensu* 1, c. 5, 291–292: “extremum et id cuius est extremum sunt unius generis.”

<sup>69</sup> *STh* I, q. 77 a. 3 ad 1: “actus, licet sit posterior potentia in esse, est tamen prior in intentione et secundum rationem, sicut finis agente. Obiectum autem, licet sit extrinsecum, est tamen principium vel finis actionis. Principio autem et fini proportionantur ea quae sunt intrinseca rei.” I.e., although act is posterior to potency in being (*in esse*), it is, however, prior in intention and according to ratio, as the end is posterior in being to the agent but prior in intention and according to ratio. Thus, although the object is extrinsic to its intrinsic action, it is, however, the extrinsic principle or end of the action; and therefore, the object is proportionate to the extrinsic principle or end.

<sup>70</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “omne quod a principio est, ad finem aliquem tendit.”

<sup>71</sup> *In Metaph.* 5, l. 19, §1044: “Hic [sc., ARISTOTLE, *Metaphysica* Δ.17, 1022a4] prosequitur [Philosophus] de nominibus, quae significant conditiones perfecti. Perfectum autem, ut ex praemissis patet, est terminatum et absolutum, non dependens ab alio, et non privatum, sed habens ea, quae sibi secundum suum genus competunt. Et ideo primo ponit hoc nomen terminus.”

<sup>72</sup> *ScG* 2, 87 n. 6: “Finis rei respondet principio eius: tunc enim res perfecta est cum ad proprium principium pertingit, vel per similitudinem vel quocumque modo.”

<sup>73</sup> *In Metaph.* 5, l. 19, §1045 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a5–10): “ponit [Philosophus] quatuor modos, quibus dicitur terminus.” *In Sent.* 1, d. 43 q. 1 a. 1 co.: “secundum Philosophum, finis vel terminus multipliciter dicitur.”

<sup>74</sup> *In Metaph.* 5, l. 19, §1045 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a5–6): “quorum primus est secundum quod in qualibet specie magnitudinis, finis magnitudinis, vel habentis magnitudinem, dicitur terminus; sicut punctus dicitur terminus lineae, et superficies corporis, vel etiam lapidis habentis quantitatem.” *In Sent.* 1, d. 43 q. 1 a. 1 co.: “Uno modo [finis vel terminus dicitur] terminus quantitatis, sicut punctus lineae.”

sometimes either extreme of motion—namely, from which (*a quo*) and into which (*in quod*)—is said to be its terminus insofar as we say that every motion is between two terms.<sup>75</sup> For example, the terminus of generation is *being* (*esse*), and not *non-being* (*non esse*). This mode is like the first (i.e., because motion follows upon quantity).

**3. The cause for the sake of which** something comes to be (*cuius causa fit aliquid* < τὸ οὐ ἔνεκα; ►9.8) is said to be its terminus.<sup>76</sup> This is that which is last of an intention (*ultimum intentionis*), just as, according to the second mode, the terminus is that which is last of a motion or of an operation (*ultimum motus vel operationis*).

**4. The substance** (*substantia* = οὐσία) **of a thing**, which is **the essence** and **the definition** signifying *that which* the thing is (*quod quid est* = τὸ τί ἦν εἶναι).<sup>77</sup> This is the terminus **of cognition** (*terminus cognitionis* = γνώσεως πέρας) of a thing, for the cognition of a thing begins from some external signs from which the definition of a thing is reached; and when it is attained, a perfect cognition of the thing is had from it (►49).

The **definition** can also be said (to be) a *terminus* because prior things through which a thing is known are contained under it (►16.6).<sup>78</sup> Thus, definitions are like numbers (►16.7): if any unit or difference is added to—or subtracted from—a number, a different species is constituted; likewise, if a difference were to be mutated, added, or subtracted, it would no longer be the same definition. In this mode, the last constitutive difference is said (to be) a *terminus* in respect of the essence of the thing; for it is that at which the essence of the species is ended (►16.6). Whence, that which signifies the essence of the thing is called *definition* or *terminus* (►1.3, 4.3).

And, if (the essence or definition) is the terminus of cognition, it necessarily is also the terminus **of the thing itself** (< εἰ δὲ τῆς γνώσεως [πέρας], καὶ τοῦ πράγματος); for

<sup>75</sup> *In Metaph.* 5, l. 19, §1046 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a7–8): “Secundus modus est similis primo, secundum quod unum extremum motus vel actionis dicitur terminus, hoc scilicet ad quod est motus, et non a quo: sicut terminus generationis est esse, non autem non esse; quamvis quandoque ambo extrema motus dicantur terminus largo modo, scilicet a quo, et in quod; prout dicimus, quod omnis motus est inter duos terminos.”

<sup>76</sup> *In Metaph.* 5, l. 19, §1047 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a8): “Tertius modus dicitur terminus, cuius causa fit aliquid; hoc enim est ultimum intentionis, sicut terminus secundo modo dictus est ultimum motus vel operationis.”

<sup>77</sup> *In Metaph.* 5, l. 19, §1048 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a8–10): “Quartus modus est secundum quod substantia rei, quae est essentia et definitio significans quod quid est res, dicitur terminus. Est enim terminus cognitionis. Incipit enim cognitio rei ab aliquibus signis exterioribus quibus pervenitur ad cognoscendum rei definitionem; quo cum perventum fuerit, habetur perfecta cognitio de re.”

<sup>78</sup> *In Sent.* 1, d. 43 q. 1 a. 1 co.: “Dicitur alio modo finis quantum ad essentiam rei, sicut ultima differentia constitutiva est ad quam finitur essentia speciei. Unde illud quod significat essentiam rei, vocatur definitio vel terminus.” *In Metaph.* 5, l. 19, §1048 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a8–10): “Vel dicitur terminus cognitionis definitio, quia infra ipsam continentur ea, per quae scitur res. Si autem mutetur una differentia, vel addatur, vel subtrahatur, iam non erit eadem definitio.”

cognition is produced (*fit*) through the assimilation of the knower to the thing known.<sup>79</sup> Thus, each thing is said to be ended by that which determines or limits (*determinat vel contrahit*) its essence.<sup>80</sup> For example, the nature of a genus, which is, of itself (*de se*), indifferent to many (species), is ended by one difference; and first matter, which is of itself indifferent to all (substantial) forms—whence, it is said to be infinite—is ended by a form; likewise, form, which considered in itself (*quantum in se est*) can perfect diverse parts of matter, is ended by the matter in which it is received (► 10.7).

◀ *Terminus* is said in as many modes as *principle*—and then some; for every principle is a terminus, but not every terminus is a principle.<sup>81</sup> For example, that towards which there is motion, is a terminus (i.e., a *terminus ad quem*), but not a principle in any mode; and that from which there is motion, is a principle and a terminus (i.e., a *terminus a quo*).

### 8.9. Mean

The *ratio* of **mean** (*medium*, i.e., *middle*; *intermedium*, i.e., *intermediary*) is *to be between (two) extremes (inter extrema)*.<sup>82</sup> There can be multiple means between two extremes.<sup>83</sup> Therefore, the principle, the mean, and the end can be diversely assigned insofar as, of

<sup>79</sup> *In Metaph.* 5, l. 19, §1048 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a10): “Si autem est terminus cognitionis, oportet quod sit rei terminus, quia cognitio fit per assimilationem cognoscentis ad rem cognitam.”

<sup>80</sup> *In Sent.* 1, d. 43 q. 1 a. 1 co.: “et sic dicitur unumquodque finiri per illud quod determinat vel contrahit essentiam suam; sicut natura generis, quae de se est indifferens ad multa, finitur per unam differentiam; et materia prima, quae de se est indifferens ad omnes formas (unde et infinita dicitur) finitur per formam; et similiter forma, quae, quantum in se est, potest perficere diversas partes materiae, finitur per materiam in qua recipitur.”

<sup>81</sup> *In Metaph.* 5, l. 19, §1049 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a10–13): “concludit [Philosophus] comparisonem termini ad principium; dicens, quod quoties dicitur principium, toties dicitur terminus, et adhuc amplius; quia omne principium est terminus, sed non terminus omnis est principium. Id enim ad quod motus est, terminus est, et nullo modo principium est: illud vero a quo est motus, est principium et terminus, ut ex praedictis patet.”

<sup>82</sup> *In Sent.* 3, d. 19 q. 1 a. 5 qc. 2 co.: “in medio est [...] considerare [...] rationem quare dicatur medium [...]. Dicitur autem aliquid medium ex hoc quod est inter extrema.”

<sup>83</sup> *In Sent.* 1, d. 3 q. 2 a. 2 co.: “Contingit autem inter duo extrema esse plura media; et ideo contingit quod principium et medium et finis diversimode possunt assignari, secundum quod ex his omnibus, scilicet principio, medio et fine, et multis mediis, quaedam possunt accipi ut principium et quaedam ut medium et quaedam ut finis, diversimode combinando.” St. Thomas applies this distinction to *Wisdom* 11:21, “but thou hast ordered all things in measure, and number, and weight” (*sed omnia mensura et numero et pondere disposuisti*), harmonizing the seemingly incompatible interpretations of St. AUGUSTINE and pseudo-DIONYSIUS. He shows that principle, end, and multiple means can be diversely assigned to diverse parts (i.e., measure, number, and weight) of the divine trace (*vestigium*) that is found in created things. Thus, the first that pertains to the perfection of the thing are the principles of that thing; and the last is the perfection of the thing according to its operation towards other things, not only insofar as it is perfect in itself; but between these, there are multiple middles, for there is a disposition of the principles, or an inclination toward being of that which is from the principles, and a limitation of the principles under the form of that which is from the principles. Therefore, a trace can be assigned insofar as one can take as a principle not only that which is first: namely, the substance itself of the principles; and as a middle, that which immediately follows: namely, the disposition of the principles, or inclination towards being; and as an end, the whole that is obtained. Hence, number pertains to the plurality of principles; weight corresponds to the inclination of the principles in the being of that which originates in them; and measure terminates at the termination of the principles under the being of the creature, such that *termination* is taken in being, in operating, and in all other (orders).

all of them—i.e., the principle, the end, and the multiple means—, some can be taken as a principle, some as a mean, and some as an end, combining them diversely.

In any mean, both its *ratio* and its act (*actus*) must be considered.<sup>84</sup> The act of the mean is *to unite the extremes* (*extrema conjungere*), which can only be exerted if the nature of *mean*—namely, being between extremes—is found in it. But being between extremes belongs to something in two respects: **(1)** insofar as the mean *participates* (in) both extremes; and **(2)** according to an *order*, insofar as the mean is under (or inferior to) the first (*sub primo*) and above (or superior to) the last (*supra ultimum*). This is required for the *ratio* of *mean* properly said, because *mean* is said in respect of a first (to which it is posterior) and of a last (to which it is prior), which (i.e., first and last) convey (*dicunt*) an order (i.e., of prior and posterior). For example, the tepid (which participates in the nature of both the hot and the cold) is cold in respect of the hot but is cold in respect of the hot.

### 8.10. Knowing and Naming Principles

We receive knowledge of things through sense; composite, confounded things fall prior in sense (► 49).<sup>85</sup> Hence, those things that are prior according to nature and (in themselves) more knowable (*magis nota*) are posterior and less knowable to us (*quo ad nos*). Whence, composite things fall prior in our cognition, while simpler things, which are prior and more knowable according to nature, fall in our cognition through the posterior (*per posterius*).

Consequently, we define the first principles of things only by negation of posterior things; for we (intellectually) apprehend simple things through composite things.<sup>86</sup> For example, we define the **point** (i.e., the first principle in the genus of magnitude) as *that which has no part* (i.e., by negation of composition in continuous quantity, even if every magnitude

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<sup>84</sup> *In Sent.* 3, d. 19 q. 1 a. 5 qc. 2 co.: “in medio est duo considerare, scilicet rationem quare dicatur medium, et actum medii. [...] Actus autem medii est extrema conjungere. [...] Non potest autem actus medii exercere nisi aliquo modo natura medii in ipso inveniatur, ut scilicet sit inter extrema. Esse autem inter extrema convenit quantum ad duo; scilicet quantum ad hoc quod medium participat utrumque extremorum; et secundum ordinem, in quantum est sub primo, et supra ultimum: et hoc exigitur ad rationem medii proprie dicti: quia medium dicitur secundum respectum ad primum et ultimum, quae ordinem dicunt.” *In Sent.* 4, d. 46 q. 2 a. 2 qc. 2 co.: “Omne autem medium participat quodammodo cum utroque extremorum.” *STh* I, q. 108 a. 5 ad 4: “Medium autem comparatum uni extremo, videtur alterum, in quantum participat naturam utriusque, sicut tepidum respectu calidi est frigidum, respectu vero frigidi est calidum.” Cf. *De mix. elem.*, 137–140: “Sicut igitur extrema inveniuntur in medio quod participat naturam utriusque, sic qualitates simplicium corporum inveniuntur in propria qualitate corporis mixti.” *In Ethic.* 2, l. 10, 36–37: “considerandum est quod, cum medium participet aliquo modo utrumque extremum [...]” Cf. *In Physic.* 6, l. 5, nn. 17–18; *In De caelo* 2, l. 15, n. 8.

<sup>85</sup> *In Metaph.* 10, l. 4, §1990: “ea quae sunt priora secundum naturam et magis nota, sunt posteriora et minus nota quo ad nos, eo quod rerum notitiam per sensum accipimus. Composita autem et confusa prius cadunt in sensu, ut dicitur in primo Physicorum. Et inde est, quod composita prius cadunt in nostram cognitionem. Simpliciora autem quae sunt priora et notiora secundum naturam, cadunt in cognitionem nostram per posterius.”

<sup>86</sup> *STh* I, q. 11 a. 2 ad 4: “Apprehendimus enim simplicia per composita, unde definimus punctum, cuius pars non est, vel principium lineae.” *In Metaph.* 10, l. 4, §1990: “Inde est quod prima rerum principia non definimus nisi per negationes posteriorum; sicut dicimus quod punctum est, cuius pars non est.”

is naturally posterior to the point; ►4); or as *the principle of the line* (i.e., by reference to the first species of magnitude that originates immediately from the point).

Since names are signs of intelligible conceptions, we first impose names on those things that we understand first, even if they happen to be posterior according to the order of nature.<sup>87</sup> Thus, we sometimes understand prior things from posterior things, and assign a name that befits a thing as (naturally) posterior, but which is prior in respect of us.

Therefore, although a name can be said in multiple modes, all modes can be reduced to a first one in two ways:<sup>88</sup> **(1)** according to the order that is considered in the imposition of names (►8.11); or **(2)** according to the order of things (►8.12).

### 8.11. The Order of Knowing Principles

An order of prior and posterior is found in diverse things.<sup>89</sup> But there are three orders of things that (naturally) follow one upon the other (►48.26): **(1)** magnitude; **(2)** (local) motion; and **(3)** time. Thus, following upon what is prior and posterior in magnitude, there is a prior and a posterior in local motion; and following upon what is prior and posterior in local motion, there is a prior and a posterior in time.

According to what is firstly known by us, order is (first) discovered in local motion because such a motion is more manifest to sense (►48.18), and things are named following the knowledge we have of them (►8.10).<sup>90</sup> Whence, *principle* is said in respect of some order; and the order that is considered according to prior and posterior in magnitude is known to—and named by—us firstly.

1. According to its proper inquiry (*secundum propriam sui inquisitionem*), therefore, the name **principle** properly signifies *that which is first in a magnitude over which motion*

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<sup>87</sup> *In Metaph.* 5, l. 5, §824: “Nomina enim imponuntur a nobis secundum quod nos intelligimus, quia nomina sunt intellectuum signa. Intelligimus autem quandoque priora ex posterioribus. Unde aliquid per prius apud nos sortitur nomen, cui res nominis per posterius convenit.” *In Metaph.* 9, l. 3, §1805: “Cum enim nomina sint signa intelligibilium conceptionum, illis primo imponimus nomina, quae primo intelligimus, licet sint posteriora secundum ordinem naturae.”

<sup>88</sup> *In Metaph.* 5, l. 5, §824: “Sciendum est autem, quod reductio aliorum modorum ad unum primum, fieri potest dupliciter. Uno modo secundum ordinem rerum. Alio modo secundum ordinem, qui attenditur quantum ad nominis impositionem.”

<sup>89</sup> *In Metaph.* 5, l. 1, §751: “Ordo autem prioris et posterioris invenitur in diversis [...]. Sunt autem trium rerum ordines sese consequentes; scilicet magnitudinis, motus, et temporis. Nam secundum prius et posterius in magnitudine est prius et posterius in motu; et secundum prius et posterius in motu est prius et posterius in tempore, ut habetur quarto Physicorum.” *In Physic.* 4, l. 18, n. 4: “motus quantum ad continuitatem et prius et posterius, sequitur magnitudinem, et tempus motum.” Cf. ARISTOTLE, *Physica* Δ.11, 219b15–16: “ἀκολουθεῖ [...] τῷ μὲν μεγέθει ἢ κίνησις, ταύτη δ' ὁ χρόνος.”

<sup>90</sup> *In Metaph.* 5, l. 1, §751: “sed secundum id, quod primo est nobis notum, est ordo inventus in motu locali, eo quod ille motus est sensui manifestior. [...] igitur principium dicitur quod in aliquo ordine, et ordo qui attenditur secundum prius et posterius in magnitudine, est prius nobis notus, secundum autem quod res sunt nobis notae secundum hoc a nobis nominantur [...].”

passes. This is the first mode posited by ARISTOTLE, according to which **principle** is said (to be) *that <part> of a thing whence something may first be set in motion*: that is, some part of a magnitude from which **local motion** begins: for example, of a length (*in longitudine* < τοῦ μήκους) and of a journey (*et in via* < καὶ ὁδοῦ), the principle is that part from which local motion begins.<sup>91</sup>

2. However, (local) motion does not always begin from the principle of a magnitude, but rather from that part whence each thing is more readily set in motion. Hence, ARISTOTLE posits a second mode, saying that—in another way—the **principle** of motion is said to be *that whence each optimally comes about*, that is, *whence each begins optimally to be moved* (*unde unusquisque incipit optime moveri* < ἢ ὅθεν ἂν κάλλιστα γένοιτο ἕκαστον).<sup>92</sup>

The first mode differs from the second mode in that, in the former, a principle of motion is designated from the principle of a magnitude; conversely, in the latter, a principle is designated in a magnitude from the principle of motion.<sup>93</sup> Thus, even in those motions that are over circular magnitudes, which have no principle, something is taken as a principle from which the mobile optimally or opportunely is set in motion according to its nature.

3. From the order considered in local motion (§1), order is made known to us in other motions.<sup>94</sup> Thus, the significations of *principle* that are taken according to the **generation** or **coming-to-be** of things (*in generatione vel fieri rerum*) follow the one taken from local

<sup>91</sup> *In Metaph.* 5, l. 1, §751: “ideo hoc nomen principium secundum propriam sui inquisitionem significat id quod est primum in magnitudine, super quam transit motus. Et ideo dicit [Philosophus], quod principium dicitur illud unde aliquis rem primo moveat, idest aliqua pars magnitudinis, a qua incipit motus localis. Vel secundum aliam literam, unde aliquid rei primo movebitur, idest ex qua parte rei aliquid incipit primo moveri. Sicut in longitudine et in via quacumque, ex illa parte est principium, unde incipit motus.” Cf. ARISTOTLE, *Metaphysica* Δ.1, 1012b34–35: “ἀρχὴ λέγεται ἢ μὲν ὅθεν ἂν τις τοῦ πράγματος κινηθεῖ πρῶτον.” St. Thomas consigns in his *Commentary* two alternative renderings of this passage, the first of which is not as accurate: “unde aliquis rem primo moveat” (whence someone first sets a thing in motion). Note also that the name *part* is neither in the Greek nor in the *ratio* offered by St. Thomas, “id quod est primum in magnitudine, super quam transit motus.” As to the example provided, both the Greek ὁδός and the Latin *via* can be understood either as “way” (i.e., a length that can be traversed) or as “journey” (i.e., motion along a way), but the context requires *motion along a length* (i.e., the latter), since the length itself has already been distinctly mentioned.

<sup>92</sup> *In Metaph.* 5, l. 1, §752 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a1–2): “Quia vero motus non semper incipit a principio magnitudinis, sed ab ea parte unde est unicuique in promptu magis ut moveatur, ideo ponit [Philosophus] secundum modum, dicens, quod alio modo dicitur principium motus unde unumquodque fiet maxime optime, idest unusquisque incipit optime moveri.”

<sup>93</sup> *In Metaph.* 5, l. 1, §753: “Differt autem hic modus a primo. Nam in primo modo ex principio magnitudinis designatur principium motus. Hic autem ex principio motus designatur principium in magnitudine. Et ideo etiam in illis motibus, qui sunt super magnitudines circulares non habentes principium, accipitur aliquod principium a quo optime vel opportunely movetur mobile secundum suam naturam. Sicut in motu primi mobilis principium est ab oriente. In motibus etiam nostris non semper incipit homo moveri a principio viae, sed quandoque a medio, vel a quocumque termino, unde est ei opportunum primo moveri.”

<sup>94</sup> *In Metaph.* 5, l. 1, §754: “Ex ordine autem, qui consideratur in motu locali, fit nobis etiam notus ordo in aliis motibus; et ideo sequuntur significationes principii, quae sumuntur secundum principium in generatione vel fieri rerum. Quod quidem principium dupliciter se habet. Aut enim est *inexistens*, idest intrinsecum; vel *non est inexistens*, idest extrinsecum.”

motion. This happens both according to the *intrinsic mode* and according to the *extrinsic mode* (► 8.4):

**(a)** According to the *intrinsic mode*, **principle** is said (to be) *that part of a thing that is first generated and from which the generation of the thing begins*.<sup>95</sup> For example, what is made firstly in a ship is its seat or keel, which is—as it were—the foundation of the ship, on which all the timber of the ship is joined together; likewise, what is firstly made in a house is the foundation; (and whatever is firstly generated in an animal, is its principle).<sup>96</sup>

**(b)** According to the *extrinsic mode*, **principle** is said (to be) *that whence the generation of a thing begins, which is, however, outside the thing (extra rem)*.<sup>97</sup> Thus, in natural things that come to be through motion, the principle of generation is said to be that whence motion naturally begins, as in those things that come to be through alteration (i.e., continuous change in quality) or through some other motion of this kind: for example, a man is said to become great (i.e., according to continuous change in quantity) or white (i.e., according to continuous change in quality); or in those things that come to be not through motion but through mutation alone, as is evident in the generation of substances: for example, a child is generated from its father and mother, who are its principles; and war comes to be from reviling, which incites the animus of men to war.

In things subject to **ethics** (*in rebus agibilibus*), moral or political, **principle** is said (to be) *that from whose will or purpose others are moved or mutated*.<sup>98</sup> Thus, those who hold civil,

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<sup>95</sup> *In Metaph.* 5, l. 1, §755 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a4–5): “Dicitur ergo primo modo principium illa pars rei, quae primo generatur, et ex qua generatio rei incipit; sicut in navi fit primo sedile vel carina, quae est quasi navis fundamentum, super quod omnia ligna navis compaginantur. Similiter quod primo in domo fit, est fundamentum.”

<sup>96</sup> Following an ancient controversy, the heart and the brain are alternatively posited dialectically as principles. *In Metaph.* 5, l. 1, §755 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a5–7): “In animali vero primo fit cor secundum quosdam, et secundum alios cerebrum, aut aliud tale membrum. Animal enim distinguitur a non animali, sensu et motu. Principium autem motus apparet esse in corde. Operationes autem sensus maxime manifestantur in cerebro. Et ideo qui consideraverunt animal ex parte motus, posuerunt cor principium esse in generatione animalis. Qui autem consideraverunt animal solum ex parte sensus, posuerunt cerebrum esse principium; quamvis etiam ipsius sensus primum principium sit in corde, etsi operationes sensus perficiantur in cerebro. Qui autem consideraverunt animal in quantum agit vel secundum aliquas eius operationes, posuerunt membrum adaptatum illi operationi, ut hepar vel aliud huiusmodi, esse primam partem generatam in animali. Secundum autem Philosophi sententiam, prima pars est cor, quia a corde omnes virtutes animae per corpus diffunduntur.”

<sup>97</sup> *In Metaph.* 5, l. 1, §756 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a7–10): “Alio autem modo dicitur principium, unde incipit rei generatio, quod tamen est extra rem; et hoc quidem manifestatur in tribus. Primo quidem in rebus naturalibus, in quibus principium generationis dicitur, unde primum natus est motus incipere in his quae fiunt per motum, sicut in his quae acquiruntur per alterationem, vel per aliquem alium motum huiusmodi. Sicut dicitur homo fieri magnus vel albus. Vel unde incipit permutatio, sicut in his quae non per motum, sed per solam fiunt mutationem; ut patet in factione substantiarum, sicut puer est ex patre et matre qui sunt eius principium, et bellum ex convitio, quod concitat animos hominum ad bellum.”

<sup>98</sup> *In Metaph.* 5, l. 1, §757 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a10–13): “Secundo etiam manifestat [Philosophus] in rebus agibilibus sive moralibus aut politicis, in quibus dicitur principium id, ex cuius voluntate vel proposito moventur et mutantur alia; et sic dicuntur principatus in civitatibus illi qui obtinent

imperial, or even tyrannical power in states, are said to have the primacy (*principatus, first place, preeminence*) in the state, for everything in it is set in motion through their will.

In things subject to **art** (*in artificialibus*), the arts are said to be principles of artifacts because motion towards the construction of an artifact begins from an art.<sup>99</sup> And among these arts, the architectonical (ἀρχιτεκτονικάί, *master-arts*),<sup>100</sup> which take their name from *principle* (ἀρχή), are maximally said (to be) *principles* (► 50.11, ¶1). Those arts are said (to be) *architectonical* which order or command (*imperant*) other, subservient arts, as the art of the navigator orders over that of shipbuilding; the military art, over the equestrian.

4. Finally, in the likeness of the order that is considered in external motion, some order is considered also in the **cognition** of things (*in rerum cognitione*; ► 49):<sup>101</sup> **(a)** above all, an order of cognition is considered insofar as our intellect has some likeness to motion (► 52.5), proceeding (*discurrens*) from principles to conclusions; **(b)** in another mode, **principle** is said (to be) *that whence a thing first comes to be known*. For example, we say that the principles of demonstrations are *suppositions* (*suppositiones* = ὑποθέσεις; ► 54.7, ¶1; 54.8, ¶1)<sup>102</sup> or axioms (*dignitates*; ► 54.6, ¶2; e.g., *contradictories cannot be simultaneously true*),<sup>103</sup> and assumptions (*petitiones*; ► 54.8, ¶2).<sup>104</sup>

## 8.12. The Order of Things

In things, order is twofold: **(1)** the order among themselves **of the parts** of some whole or of some multitude; and **(2)** the order of things **into an end** (*ordo rerum in finem*). The latter is more principal (*principalior*) than the former; for, as ARISTOTLE says, the order of the

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potestates et imperia, vel etiam tyrannides in ipsis. Nam ex eorum voluntate fiunt et moventur omnia in civitatibus. Dicuntur autem potestates habere homines, qui in particularibus officiis in civitatibus praeponuntur, sicut iudices et huiusmodi. Imperia autem illi, qui universaliter quibuscumque imperant, ut reges. Tyrannides autem obtinent, qui per violentiam et praeter iuris ordinem ad suam utilitatem civitates et regnum detinent.”

<sup>99</sup> *In Metaph.* 5, l. 1, §758 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a13–14): “Tertium exemplum ponit [Philosophus] in artificialibus, quia artes etiam simili modo principia esse dicuntur artificiatorum, quia ab arte incipit motus ad artificii constructionem. Et inter has maxime dicuntur principia architectonicae, quae a principio nomen habent, idest principales artes dictae. Dicuntur enim artes architectonicae quae aliis artibus subservientibus imperant, sicut gubernator navis imperat navifactivae, et militaris equestri.”

<sup>100</sup> See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἀρχιτεκτονικός.

<sup>101</sup> *In Metaph.* 5, l. 1, §759 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a14–16): “Ad similitudinem autem ordinis, qui in motibus exterioribus consideratur, attenditur etiam quidam ordo in rerum cognitione; et praecipue secundum quod intellectus noster quamdam similitudinem motus habet, discurrens de principiis in conclusiones. Et ideo alio modo dicitur principium, unde res primo innotescit; sicut dicimus principia demonstrationum esse suppositiones, idest dignitates et petitiones.”

<sup>102</sup> See *In Physic.* 2, l. 5 n. 8: “*suppositiones*, idest propositiones syllogismi.”

<sup>103</sup> See *In Sent.* 1, d. 8 q. 1 a. 3 co.: “primum quod cadit in credulitate intellectus, sunt dignitates, et praecipue ista, contradictoria non esse simul vera: unde omnia alia includuntur quodammodo in ente unite et indistincte, sicut in principio.”

<sup>104</sup> See *In Post. an.* 1, l. 19, 64–70 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b27–31) “Differunt autem [suppositiones et petitiones] ad invicem, quia, *si quidem* talis propositio sit probabilis addiscenti cui fit demonstratio, dicitur suppositio, et sic suppositio dicitur *non simpliciter, set ad aliquem; si vero* ille *neque* sit eiusdem *opinionis* neque *contrarie*, oportet quod demonstrator hoc ab eo petat, et tunc dicitur petitio.”



parts of the army among themselves according to diverse offices is for the sake of (*propter*) the order of the whole army to the good (i.e., end) of the leader, which is victory.<sup>105</sup>

Since something is said to be prior or posterior in an order to some principle (*in ordinem ad principium aliquod*); and since a principle is that which is first in being (*in esse*), in coming-to-be (*in fieri*), or in cognition (*in cognitione*); therefore, the determination of the various orders of prior and posterior (in respect of things) can be divided into three parts:<sup>106</sup> **(1)** the natural order in **being** (►47); **(2)** the order of **coming-to-be** (►48); and **(3)** the order of **cognition** (►49).

That which is prior in cognition is also prior simply (*simpliciter*), i.e., not according to something (*secundum quid*), because a thing is known by its principles.<sup>107</sup> But cognition is twofold: cognition of sense (*sensus*), and cognition of intellect or reason (*intellectus vel rationis*). Thus, we say that something is prior according to sense (*secundum sensum* = κατὰ τὴν αἴσθησιν) in one way; and that something is prior according to reason (*secundum*

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<sup>105</sup> *In Ethic.* 1, l. 1, 7–14: “Invenitur autem duplex ordo in rebus. Unus quidem partium alicuius totius seu alicuius multitudinis adinvicem, sicut partes domus ad invicem ordinantur; alius autem est ordo rerum in finem. Et hic ordo est principalior, quam primus. Nam, ut Philosophus dicit in XI Metaphysicae, ordo partium exercitus adinvicem, est propter ordinem totius exercitus ad ducem.” Cf. *In Sent.* 1, d. 44 q. 1 a. 2 co., where St. Thomas writes about the order of the whole universe: “secundum Philosophum in 11 Metaph., bonum universi consistit in duplici ordine; scilicet in ordine partium universi ad invicem, et in ordine totius universi ad finem [...]; sicut etiam est in exercitu ordo partium exercitus ad invicem, secundum diversa officia, et est ordo ad bonum ducis, quod est victoria; et hic ordo est praecipuus, propter quem est primus ordo.” Cf. *Comp. th.* 1, c. 103, 23–29. References to ARISTOTLE’s *Metaphysics* are to book Λ rather than K, which St. Thomas comments, *In Metaph.* 12, l. 12 §§2629–31: “Et, quia omnia, quorum unum est finis, oportet quod in ordine ad finem conveniant, necesse est, quod in partibus universi ordo aliquis inveniatur; et sic universum habet et bonum separatum, et bonum ordinis. Sicut videmus in exercitu: nam bonum exercitus est et in ipso ordine exercitus, et in duce, qui exercitui praesidet: sed magis est bonum exercitus in duce, quam in ordine: quia finis potior est in bonitate his quae sunt ad finem: ordo autem exercitus est propter bonum ducis adimplendum, scilicet ducis voluntatem in victoriae consecutionem; non autem e converso, bonum ducis est propter bonum ordinis. Et, quia ratio eorum quae sunt ad finem, sumitur ex fine, ideo necesse est quod non solum ordo exercitus sit propter ducem, sed etiam quod a duce sit ordo exercitus, cum ordo exercitus sit propter ducem.” See ARISTOTLE, *Metaphysica* Λ.10, 1075a14–15: “καὶ γὰρ ἐν τῇ τάξει τὸ εὖ καὶ ὁ στρατηγός, καὶ μᾶλλον οὗτος οὐ γὰρ οὗτος διὰ τὴν τάξιν ἀλλ’ ἐκείνη διὰ τοῦτόν ἐστιν.” Literally, “For the good <of an army consists> both in its order and in its commander, but mainly in the latter; for he does not exist for the sake of the order, but the order exists for him.”

<sup>106</sup> *In Metaph.* 5, l. 13, §937: “quia prius et posterius dicuntur in ordinem ad principium aliquod, principium autem est [...], quod est primum in esse, aut in fieri, aut in cognitione: ideo pars ista dividitur in partes tres. In prima dicit quomodo dicitur aliquid esse prius secundum motum et quantitatem; nam ordo in motu, sequitur ordinem in quantitate. Per prius enim et posterius in magnitudine, est prius et posterius in motu [...]. Secundo ostendit, quomodo aliquid dicitur prius altero in cognitione [...]. Tertio, quomodo dicitur aliquid altero prius in essendo, idest secundum naturam [...].” ARISTOTLE treats first of the order of becoming; then, of cognition; and lastly, of being (*Metaphysica* Δ.11, 1018b12–1019a14). His plan seems to follow the way in which we come scientifically to know. In the ensuing chapters, we instead follow the natural order of dependence outlined by St. Thomas.

<sup>107</sup> *In Metaph.* 5, l. 13, §946 (Cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b29–34): “Ostendit [Philosophus] quomodo aliquid dicitur prius altero in cognitione. Illud autem prius est cognitione, quod etiam prius est simpliciter, non secundum quid [...]: nam res per sua principia cognoscitur. Sed, cum cognitio sit duplex, scilicet intellectus vel rationis, et sensus, aliter dicimus aliqua priora secundum rationem, et aliter secundum sensum.”

*rationem* = κατὰ τὸν λόγον) in another way. Sensory powers (*vires sensitivae*) know some things in absolute (*absolute*).<sup>108</sup> But it befits the intellect or reason alone to know the order of one thing to another (►8.13). And the foremost perfection of reason is wisdom—to which it is proper to know order (►50.14; 51.24; 59). Whence, ARISTOTLE says that it behooves the wise man to order.<sup>109</sup>

### 8.13. The Order of Reason

In every operation of reason, some order is found according to which there is a process from one thing to another (►52.5).<sup>110</sup> But order is compared to reason in a fourfold way:<sup>111</sup>

1. There is an order that reason does not produce, but only **considers**, as is the order of natural things.<sup>112</sup>

Since the consideration of reason is perfected by the habit of science, there are diverse sciences according to the diverse orders that reason properly considers. Thus, it pertains to **natural philosophy** (►58) to consider the order of things that human reason considers but does not produce—that is, if we comprehend under *natural philosophy* (not only physics, but) also mathematics and metaphysics.

2. There is an order that reason, in considering, **produces** (*facit*) in its proper act: for example, when it orders its concepts among themselves; and (when it orders) the signs of the concepts, which are voices that signify (*voces significativae*).<sup>113</sup>

The order that, in considering, reason produces in its proper act, pertains to **rational philosophy** (►52), to which it belongs to consider the order among the parts of the sentence, and the order of principles (of demonstration) into conclusions.

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<sup>108</sup> *In Ethic.* 1, l. 1, 1–7: “Sicut Philosophus dicit in principio Metaphysicae, sapientis est ordinare. Cuius ratio est, quia sapientia est potissima perfectio rationis, cuius proprium est cognoscere ordinem. Nam etsi vires sensitivae cognoscant res aliquas absolute, ordinem tamen unius rei ad aliam cognoscere est solius intellectus aut rationis.”

<sup>109</sup> ARISTOTLE, *Metaphysica* A.2, 982a17–19: “οὐ γὰρ δεῖν ἐπιτάττεσθαι τὸν σοφὸν ἀλλ’ ἐπιτάττειν, καὶ οὐ τοῦτον ἐτέρῳ πείθεσθαι, ἀλλὰ τούτῳ τὸν ἥττον σοφόν.” Literally, “the wise <man> must not be ordered but <must> order, and he <must> not obey another, but the less wise <must> obey him.”

<sup>110</sup> *In De caelo*, pr. 1: “in omni opere rationis ordo aliquis invenitur, secundum quem proceditur ab uno in aliud.”

<sup>111</sup> *In Ethic.* 1, l. 1, 14–15: “Ordo autem quadrupliciter ad rationem comparatur.”

<sup>112</sup> *In Ethic.* 1, l. 1, 15–17: “Est enim quidam ordo quem ratio non facit, sed solum considerat, sicut est ordo rerum naturalium.” *Ibid.*, 25–31: “Et quia consideratio rationis per habitum scientiae perficitur, secundum hos diversos ordines quos proprie ratio considerat, sunt diversae scientiae. Nam ad philosophiam naturalem pertinet considerare ordinem rerum quem ratio humana considerat sed non facit; ita quod sub naturali philosophia comprehendamus et mathematicam et metaphysicam.”

<sup>113</sup> *In Ethic.* 1, l. 1, 17–20: “alius autem est ordo, quem ratio considerando facit in proprio actu, puta cum ordinat conceptus suos adinvicem, et signa conceptuum, quae sunt voces significativae.” *Ibid.*, 32–35: “Ordo autem quem ratio considerando facit in proprio actu, pertinet ad rationalem philosophiam, cuius est considerare ordinem partium orationis adinvicem, et ordinem principiorum in conclusiones.”

3. There is an order that, in considering, reason **produces in the operations of the will**.<sup>114</sup> The order of voluntary actions pertains to the consideration of **moral philosophy** (not discussed in this work).

4. There is an order that, in considering, reason **produces in exterior things**, of which reason itself is a cause: for example, (reason produces order) in a chest and in a house.<sup>115</sup> The order that, in considering, reason makes in exterior things constituted by human reason, pertains to the **mechanical arts** (not discussed in this work).

◀ Therefore, those things that are from our work and those that are from the work of nature, considered according to their proper *ratios*, do not fall into the same doctrine.<sup>116</sup> In the **disciplines** (*in disciplinis* < μαθήσεως), however, one does not always begin to learn from that which is a principle simply and according to nature (*simpliciter et secundum naturam*), but from that whence one is more easily or opportunely disposed to learn: that is, from those things that are more knowable with respect to us, even if they sometimes are posterior according to nature (▶ 66).<sup>117</sup>

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<sup>114</sup> *In Ethic.* 1, l. 1, 21–22: “tertius autem est ordo quem ratio considerando facit in operationibus voluntatis.” Ibid., 35–37: “ordo autem actionum voluntariarum pertinet ad considerationem moralis philosophiae.”

<sup>115</sup> *In Ethic.* 1, l. 1, 22–24: “quartus autem est ordo quem ratio considerando facit in exterioribus rebus, quarum ipsa est causa, sicut in arca et domo.” Ibid., 37–39: “Ordo autem quem ratio considerando facit in rebus exterioribus constitutis per rationem humanam, pertinet ad artes mechanicas.”

<sup>116</sup> *In Sent.* 1, q. 1 a. 2 ad 3: “ea quae sunt ab opere nostro et ea quae sunt ab opere naturae, considerata secundum proprias rationes, non cadunt in eandem doctrinam.”

<sup>117</sup> *In Metaph.* 5, l. 1, §752 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a2–4): “in disciplinis [...] non semper incipit aliquis addiscere ab eo quod est principium simpliciter et secundum naturam, sed ab eo unde aliquid facilius sive opportunius valet addiscere, idest ab illis, quae sunt magis nota quo ad nos, quae quandoque posteriora sunt secundum naturam.”



## 9. Cause

*In this chapter, we examine the most important kind of principle—the cause. St. Thomas, following ARISTOTLE, divides it into four species: material, formal, efficient, and final.*

*Since necessity belongs to the ratio of cause, it is also discussed here.*

### 9.1. Cause

Properly, that is the **cause** (*causa* = αἰτίον) of something *without which it cannot be* (*sine quo esse non potest*); for every effect depends on its cause.<sup>1</sup> Hence, **cause** is *that upon which something depends according to its being or to its coming-to-be* (*ex quibus aliquid dependet secundum suum esse vel fieri*), *that upon which follows the being of another* (*ad quam sequitur esse alterius*).<sup>2</sup> We can also say that **cause** is *that on which another follows of necessity* (*ad quam de necessitate sequitur aliud*), if we properly understand by this the sufficient, unimpeded cause (►9.9).<sup>3</sup>

ARISTOTLE posits *principles* in the place of *intrinsic causes* in his *Physics*, but, as stated in his *Metaphysics*, *principle* is properly said of extrinsic causes, while *element* (►12.9; is said) of causes that are parts of the thing—that is, of intrinsic causes—and *cause* is said of both (i.e., intrinsic and extrinsic).<sup>4</sup> That is properly said (to be a) *principle* which is outside as a mover, since the principle of motion is from it (*ab eo*). Nevertheless, sometimes one is posited for the other; for every cause can be said (to be a) *principle*, and every principle (can be said to be a) *cause*. Thus, *cause* is said in as many modes as

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<sup>1</sup> *STh* III, q. 86 a. 6 s. c.: “illud est proprie causa alicuius sine quo esse non potest, omnis enim effectus dependet a sua causa.” There is a response to this contrary objection, but it does not deny the premise concerning the essence of a cause.

<sup>2</sup> *In Physic.* 1, l. 1, n. 5: “causae autem dicuntur ex quibus aliqua dependent secundum suum esse vel fieri.” *In Physic.* 2, l. 10, n. 15: “cum causa sit ad quam sequitur esse alterius [...]” Cf. *ibid.*, l. 12, n. 1: “necesse est fieri vel esse ea quae ex eis causantur.”

<sup>3</sup> *In Metaph.* 5, l. 1, §749: “causa est ad quam de necessitate sequitur aliud.” *De malo*, q. 3 a. 3 ad 3: “proprie causa dicitur ad quam ex necessitate sequitur aliquid.” *STh* I-II, q. 75 a. 1 arg. 2: “causa est ad quam de necessitate sequitur aliud.” Cf. the reply to this objection, *ibid.*, arg. 2: “si illa definitio causae universaliter debeat verificari, oportet ut intelligatur de causa sufficienti et non impedita. Contingit enim aliquid esse causam sufficientem alterius, et tamen non ex necessitate sequitur effectus, propter aliquod impedimentum superveniens, alioquin sequeretur quod omnia ex necessitate contingerent, ut patet in VI *Metaphys.*”

<sup>4</sup> *De prin. nat.* §3, 59–66: “Sed licet principia ponat Aristoteles pro causis intrinsecis in I *Physicorum*, tamen, ut dicitur in XI *Metaphysice*, principium dicitur proprie de causis extrinsecis, elementum de causis que sunt partes rei, id est de causis intrinsecis, causa dicitur de utrisque; tamen aliquando unum ponitur pro altero: omnis enim causa potest dici principium et omne principium causa.” *In Metaph.* 12, l. 4 §2468: “principium proprie dicitur quod est extra sicut movens. Nam ab eo est principium motus.” Cf. ARISTOTLE, *Physica* A.7, 191a20: “αἱ ἀρχαὶ τρεῖς,” meaning three *intrinsic* principles: matter, form, and privation, where the latter is a principle but not a cause; *Metaphysica* Λ.4, 1070b22–25: “ἔπει δὲ οὐ μόνον τὰ ἐνυπάρχοντα αἴτια, ἀλλὰ καὶ τῶν ἐκτὸς οἷον τὸ κινεῖν, δῆλον ὅτι ἕτερον ἀρχὴ καὶ στοιχεῖον, αἴτια δ’ ἄμφω· καὶ εἰς ταῦτα διαιρεῖται ἡ ἀρχή, τὸ δ’ ὡς κινεῖν ἢ ἰστᾶν ἀρχὴ τις καὶ οὐσία.” Cf. AVERROES, *In Metaph.* XI (=XII), comm. 23: “causa dicitur de omnibus, principium autem de extrinsecis, elementum uero de intrinsecis” (taken from the apparatus of *De prin. nat.*).

*principle*; for all causes are principles, and the motion towards a thing's being (*ad esse rei*) begins from a cause, although *cause* and *principle* are not said according to the same *ratio*.<sup>5</sup>

*Cause* seems to add (some *ratio*) over *principle* said in common (*communiter dictum*); for *that which is first* can be said (to be a) *principle* whether (there) follows a posterior (thing) being (*esse*) or not.<sup>6</sup> For example, a smith (*faber*) is said (to be a) *principle* of a knife as *that from whose operation* the knife's being (*esse cultelli*) is; but when something moves (i.e., changes continuously) from blackness to whiteness (i.e., from one of two contraries to the other), it is said that black is the principle of motion—and universally, everything from which motion begins to be (*incipit esse*) is said (to be a) *principle*—even though blackness is not that from which (there) follows a whiteness being (*esse*).

*Cause*, on the other hand, is said only of that first (principle) from which follows the being of a posterior [thing] (*ex quo consequitur esse posterioris*).<sup>7</sup> Whence, it is said that **cause** is *that from whose being follows another* (*ex cuius esse sequitur aliud*). And thus, that first (principle) from which motion begins to be cannot be said (to be a) *cause* by itself (*per se*), even if it is said (to be a) *principle*. This is why privation (►42.7; e.g., a colored subject that is not white) is posited among the principles but not (among) the causes, because privation is that from which generation begins. But (privation) can also be said (to be an) *accidental cause* insofar as it coincides with matter (which is a cause by itself).

Therefore, even though *principle* and *cause* are the same in subject (*idem subiecto*; e.g., the subject of a contrary, such as black, and the subject of a privation, such as a colored subject that is not white, are the same matter), they differ in *ratio* because the name *principle* conveys (only) some order (►8.2), while the name **cause** (additionally) conveys (*importat*) *some influence towards the being of the thing caused* (*influxum quemdam ad esse causati*), *a respect of origin towards the being of the thing that proceeds from the cause* (*respectum originis per comparationem ad esse rei quod a causa procedit*); for

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<sup>5</sup> *In Metaph.* 5, l. 1, §760 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a16–17): “His etiam modis et causae dicuntur quaedam principia. Nam omnes causae sunt quaedam principia. Ex causa enim incipit motus ad esse rei, licet non eadem ratione causa dicatur et principium.” Cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a16–17: “ἴσα ἄρα καὶ τὰ αἴτια λέγεται πάντα γὰρ τὰ αἴτια ἀρχαί.”

<sup>6</sup> *De prin. nat.* §3, 66–76: “Sed tamen causa uidetur addere supra principium communiter dictum, quia id quod est primum, siue consequatur esse posterius siue non, potest dici principium, sicut faber dicitur principium cultelli ut ex eius operatione est esse cultelli; sed quando aliquid mouetur de nigredine ad albedinem, dicitur quod nigrum est principium illius motus, et uniuersaliter omne id a quo incipit esse motus dicitur principium: tamen nigredo non est id ex quo consequatur esse albedo.”

<sup>7</sup> *De prin. nat.* §3, 76–85: “Sed causa solum dicitur de illo primo ex quo consequitur esse posterioris: unde dicitur quod causa est ex cuius esse sequitur aliud; et ideo illud primum a quo incipit esse motus non potest dici causa per se, etsi dicatur principium. Et propter hoc priuatio ponitur inter principia et non inter causas, quia priuatio est id a quo incipit generatio; sed potest etiam dici causa per accidens, quantum concidit materie, ut supra expositum est.”

every cause has an order of principle (in relation) to the (act of) being (*esse*) of that which it causes, which (act of being) is constituted by it (i.e., by the cause).<sup>8</sup>

Whence, the name *cause* always posits, conveys a diversity of substance, essence, and a dependence of the thing caused upon its cause, which the name *principle* does not convey; for, in all genera of causes, there is always found a distance—according to some perfection or virtue—between the cause and the thing of which it is a cause.<sup>9</sup>

And thus, the name *principle* is more common (i.e., is said of more things) than *cause*; for there is some principle that is not a cause.<sup>10</sup> For example, the *terminus from which* (*terminus a quo*, e.g., a contrary, such as black; a privation, such as a colored subject that is not white; or the first part of a magnitude whence motion begins, such as a point in a line) is said to be a principle of motion (but not its cause).

## 9.2. Division of Cause

Causes are distinguished by species (*per species* = τῷ εἶδει) and by modes (*per modos* = τρόποι; note that ARISTOTLE and St. Thomas sometimes speak of the species or genera of causes also as being modes, since they are divided analogically; ► 20.12, ¶3):<sup>11</sup>

1. The distinction by species is in virtue of diverse *ratios* of *causing*.<sup>12</sup> Thus, it is like a division by essential differences that constitute (multiple) species (in the genus of *cause*). Every cause is either a part of the essence (i.e., intrinsic), as **matter** (► 9.3) and **form** (► 9.4), or is outside the essence of the thing (i.e., extrinsic), as the **efficient cause** (► 9.7)

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<sup>8</sup> *In Metaph.* 5, l. 1, §751: “principium et causa licet sint idem subiecto, differunt tamen ratione. Nam hoc nomen principium ordinem quemdam importat; hoc vero nomen causa, importat influxum quemdam ad esse causati.” *In Sent.* 3, d. 11 q. 1 a. 1 ad 5: “nomen principii importat relationem originis absolute; nomen autem causae importat respectum originis per comparisonem ad esse rei quod a causa procedit.” *In Sent.* 1, d. 29 q. 1 a. 1 co.: “omnis causa habet ordinem principii ad esse sui causati quod per ipsam constituitur.”

<sup>9</sup> *STh* I, q. 33 a. 1 ad 1: “hoc nomen causa videtur importare diversitatem substantiae, et dependentiam alicuius ab altero; quam non importat nomen principii. In omnibus enim causae generibus, semper invenitur distantia inter causam et id cuius est causa, secundum aliquam perfectionem aut virtutem.” *In Sent.* 1, d. 12 q. 1 a. 2 ad 1: “causa enim semper ponit diversitatem essentiae, sicut patet in omnibus. [...] causatum habet dependentiam ad causam.”

<sup>10</sup> *In Metaph.* 5, l. 1, §750: “hoc nomen principium communius est quam causa: aliquid enim est principium, quod non est causa; sicut principium motus dicitur terminus a quo.” *In Sent.* 3, d. 11 q. 1 a. 1 ad 5: “unde terminus a quo, dicitur principium motus, non tamen causa.”

<sup>11</sup> *In Metaph.* 5, l. 3, §783: “Est autem distinctio causae per species et per modos.”

<sup>12</sup> *In Metaph.* 5, l. 3, §783: “distinctio per species est penes diversas rationes causandi; et ideo est quasi divisio per differentias essentiales species constituentes.” *In Sent.* 1, d. 29 q. 1 a. 1 co.: “omnis causa vel est extra essentiam rei, sicut efficiens et finis; vel pars essentiae, sicut materia et forma.” *In Metaph.* 12, l. 4 §2468: “computando tam causas intrinsecas quam extrinsecas, sunt quatuor proportionaliter omnium.” Cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b25–30: “στοιχεῖα μὲν κατ’ ἀναλογίαν τρία, αἰτίαι δὲ καὶ ἀρχαὶ τέτταρες: ἄλλο δ’ ἐν ἄλλῳ, καὶ τὸ πρῶτον αἴτιον ὡς κινοῦν ἄλλο ἄλλῳ. ὑγίεια, νόσος, σῶμα: τὸ κινοῦν ἰατρική. εἶδος, ἀταξία τοιαδί, πλίνθοι: τὸ κινοῦν οἰκοδομική. καὶ εἰς ταῦτα διαίρεται ἡ ἀρχή.” *In Metaph.* 5, l. 2, §763: “Primo enumerat [Philosophus] diversas species causarum. Secundo reducit eas ad quatuor.” *Ibid.*, §772 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b16–17): “Concludit ergo quod causae toties dicuntur, idest quatuor modis.”

and the **end** (►9.8). Thus, counting both the intrinsic and the extrinsic, analogically (*proportionaliter* < κατ' ἀναλογίαν), there are four (species of) causes of all things.

2. The division by modes (►11) is in virtue of the diverse *relations of cause to thing caused*.<sup>13</sup> Hence, it is (found) in those (causes) that have the same *ratio* of *causing*. For example, (in causes that have the same *ratio* of *causing*, we find a cause that is related) *by itself* (*per se*) [to the thing caused] and (a cause that is related) *accidentally* (*per accidens*) [to the thing caused]; (likewise, we find a cause that is) *remote* (in relation to the thing caused) and (a cause that is) *proximate*. Whence, (this distinction by modes) is as (a division) by accidental differences that do not diversify the species (of the cause).

◀ Therefore, the name *cause* is said in multiple modes (►20.12, ¶3): not only in respect of the diverse species of cause (¶1), but also in respect of the co-special causes (¶2; i.e., in respect of the various accidental modes of being a cause of the same species).<sup>14</sup>

### 9.3. Material Cause

The *ratio of material cause* is *that from which something comes to be* (*id ex quo fit aliquid* = τὸ ἐξ οὗ γίνεταί τι), *which exists in it* (*est ei inexistens, idest intus existens; cum insit* = ἐνυπάρχοντος, i.e., is intrinsic).<sup>15</sup> It (moreover) belongs to the *ratio of matter* to be *that which of itself* (*de se*) *lacks any form* (►9.4).<sup>16</sup>

(The expression *which exists in it*) is said to differentiate (this mode of being a cause) from *privation* (►42.7) and *contrary* (►43); for something is said to come to be from a contrary (*ex contrario*) or from a privation (*ex privatione*) as from something that does not exist within (*ex non inexistente*, i.e., from something extrinsic).<sup>17</sup> Thus, white comes to be from black (*ex nigro*, i.e., from the contrary of white) or from non-white (*ex non albo*, i.e., from the privation of white); and a statue comes to be from an un-figured (*ex infigurato*, i.e.,

<sup>13</sup> *In Metaph.* 5, l. 3, §783: “Divisio autem per modos est penes diversas habitudines causae ad causatum. Et ideo est in his quae habent eandem rationem causandi, sicut per se et per accidens, remotum et propinquum. Unde est quasi per differentias accidentales non diversificantes speciem.”

<sup>14</sup> *In Metaph.* 5, l. 3, §784: “Causae enim multis modis dicuntur, non solum quantum ad diversas species causae, sed etiam quantum ad causas conspicias.” Cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b30–31): “λέγονται γὰρ αἴτια πολλαχῶς.”

<sup>15</sup> *In Metaph.* 5, l. 2, §763 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a24–25): “uno modo dicitur causa id ex quo fit aliquid, et est ei inexistens, idest intus existens.” Ibid. 5, l. 3, §777 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b17–21): “in omnibus istis [sc., *literae syllabarum, materia artificialium, et cetera*] est una ratio causae, secundum quod dicitur causa illud ex quo fit aliquid, quod est ratio causae materialis.” *In Physic.* 2, l. 5, n. 3 (cf. ARISTOTLE, *Physica* B.3, 194b23–24): “uno modo dicitur causa ex quo fit aliquid cum insit.”

<sup>16</sup> *Q. d. de anima*, a. 7 co.: “Cum autem de ratione materiae sit quod de se careat omni forma [...]”

<sup>17</sup> *In Metaph.* 5, l. 2, §763 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a24–25): “Quod quidem [sc., *et est ei inexistens, idest intus existens*] dicitur ad differentiam privationis, et etiam contrarii. Nam ex contrario vel privatione dicitur aliquid fieri sicut ex non inexistente, ut album ex nigro vel album ex non albo.” *In Physic.* 2, l. 5, n. 3 (cf. ARISTOTLE, *Physica* B.3, 194b24): “Apposuit autem cum insit, ad differentiam privationis et contrarii: nam statua [...] fit etiam ex infigurato, quod quidem non inest statuae iam factae.”



something deprived of figure; ►42.9), which is not in the statue that has already come into being. On the other hand, a statue is made from bronze—and a saucer from silver—as from something that exists within; for, when the statue is made, the *ratio* of *bronze* is not removed—nor is the *ratio* of *silver* removed when a saucer is made.<sup>18</sup> Hence, bronze is a cause of the statue—and silver, of the saucer—according to the mode of matter (*per modum materiae*); but not the non-figured, which is a principle by accident (*per accidens*).

In this mode, letters or phonemes (*elementa, idest literae* < τὰ [φωνῆς] στοιχεῖα)<sup>19</sup> are said to be elements and causes of syllables.<sup>20</sup>

Likewise, the matter of artifacts is said to be a (material) cause of those things that are made through art; and all simple bodies (►12.9) are said to be causes of compound bodies (*corporum mixtorum*);<sup>21</sup> and parts are said to be a cause of the whole (►13.1); and the propositions of a syllogism's premises are said to be a cause of the conclusion: (that is), insofar as a conclusion is constituted from the termini of the propositions, and not insofar as they stand under the order of the propositions (►53.6, ¶13), just as flour is said to be the matter of bread, but not insofar as it is under the form of flour.<sup>22</sup>

<sup>18</sup> *In Metaph.* 5, l. 2, §763 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a25–26): “Statua autem fit ex aere, et phiala ex argento, sicut ex inexistente. Nam cum statua fit, non tollitur ratio aeris, nec si fit phiala, tollitur ratio argenti. Et ideo aes statuae, et argentum phialae sunt causa per modum materiae.” *In Physic.* 2, l. 5, n. 3 (cf. ARISTOTLE, *Physica* B.3, 194b24–25): “sicut aes dicitur causa statuae et argentum causa phialae.” *In Physic.* 2, l. 5, n. 3: “statua quidem fit ex aere, quod inest statuae iam factae [...]. Unde aes est causa statuae, non autem infiguratum, cum sit principium per accidens tantum, ut in primo dictum est.”

<sup>19</sup> Cf. *In Peri.* 1, l. 2, 147–151: “etiam littere dicuntur in prolatione et scriptura, quamvis magis proprie secundum quod sunt in scriptura dicantur littere, secundum autem quod sunt in prolatione, dicantur elementa uocum.” Cf. ARISTOTLE, *De interpretatione* 1, 16a3–4: “Ἔστι μὲν οὖν τὰ ἐν τῇ φωνῇ τῶν ἐν τῇ ψυχῇ παθημάτων σύμβολα, καὶ τὰ γραφόμενα τῶν ἐν τῇ φωνῇ.” Cf. *Merriam-Webster Dictionary*, entry for *phoneme*: “the smallest unit of speech that can be used to make one word different from another word.” This definition, of course, accounts also for quantity, which goes against the ratio of *element*.

<sup>20</sup> *In Metaph.* 5, l. 3, §777 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b17–21): “Dicuntur enim elementa, idest literae, causae syllabarum, et materia artificialium dicitur esse causa factorum per artem, et ignis et terra et huiusmodi omnia simplicia corpora, dicuntur esse causae corporum mixtorum. Et partes dicuntur esse causa totius. Et suppositiones, idest propositiones praemissae, ex quibus propositis syllogizatur, dicuntur esse causa conclusionis.”

<sup>21</sup> St. Thomas, following ARISTOTLE, explicitly mentions fire and earth among the elements (*et ignis et terra et huiusmodi* = καὶ τὸ πῦρ καὶ ἡ γῆ καὶ τὰ τοιαῦτα πάντα) as causes of composite bodies, according to ancient science. But the same can be said in modern chemistry, for example, of sodium (Na) and chloride (Cl), which are causes of common salt; or, in modern physics, the same can be said of so-called elementary particles, which are taken to be the ultimate material causes of all composite bodies. Thus, the ratio of *element* and of *material cause* remain the same regardless of the development of science.

<sup>22</sup> *In Physic.* 2, l. 5, n. 9: “potest esse dubium de hoc quod dicit [Philosophus], quod propositiones sunt materia conclusionis. Materia enim inest ei cuius est materia: unde supra notificans causam materialem, dixit quod est ex quo fit aliquid cum insit; propositiones autem sunt seorsum a conclusione. Sed dicendum quod ex terminis propositionum constituitur conclusio: unde secundum hoc propositiones dicuntur materia conclusionis, in quantum termini, qui sunt materia propositionum, sunt etiam materia conclusionis, licet non secundum quod stant sub ordine propositionum; sicut et farina dicitur materia panis, licet non secundum quod stat sub forma farinae. Ideo tamen potius dicuntur propositiones materia conclusionis quam e converso, quia termini qui coniunguntur in conclusione, separatim ponuntur in praemissis. Sic igitur habemus duos modos causae.”

#### 9.4. Formal Cause

The **formal cause** is compared to a thing in two modes:<sup>23</sup> **(1)** as the **intrinsic** form (►9.5) of the thing, which is the **species** (*species* = τὸ εἶδος) mentioned by those natural (philosophers) who posited forms in matter (as ARISTOTLE does); **(2)** as **extrinsic** to the thing (►9.6), but in the likeness of which the thing is said to come to be (*ad cuius similitudinem res fieri dicitur*), which is the **exemplar** or **paradigm** (*exemplum, id est exemplar; exemplum vel paradigma* = τὸ παράδειγμα), according to which PLATO posited ideas to be abstract forms.

In every form, we find a respect towards that which is formed according to it: for example, (scientific) knowledge is related to (scientific) knower (*scientia respicit scientem*; i.e., knowledge *in-forms* the knower).<sup>24</sup> This respect is what the name *form* conveys. Hence, *form* always denotes a relation of cause (*notat habitudinem causae*); for a form is in some mode a cause of that which is formed according to it, whether such formation comes to be by the mode of **inherence** (*per modum inhaerentiae*), as in intrinsic forms, or by the mode of **imitation** (*per modum imitationis*), as in exemplar forms. Some forms have, moreover, a respect towards that which is outside, as (scientific) knowledge is related to the (scientifically) knowable (*scientia respicit scibile*); but the relation of cause does not belong to such forms according to this likeness and *ratio* (►37.1, ¶3; 37.10; 37.11, ¶3).

#### 9.5. Species-Form

That is something's (intrinsic) **formal cause** (*causa alicuius ut substantia, id est ut forma* < ὡς οὐσία) which is the *cause of being* (*causa essendi* = τὸ αἴτιον τοῦ εἶναι); for each thing is in act by its form.<sup>25</sup> The (intrinsic) **formal cause** (*causa formalis*) is (moreover) *the ratio of the essence or quiddity of a thing* (*ratio ipsius quod quid erat esse* = ὁ λόγος τοῦ

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<sup>23</sup> *In Metaph.* 5, l. 2, §764 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a26–27): “Alio autem modo dicitur causa, species et exemplum, id est exemplar; et haec est causa formalis, quae comparatur dupliciter ad rem. Uno modo sicut forma intrinseca rei; et haec dicitur species. Alio modo sicut extrinseca a re, ad cuius tamen similitudinem res fieri dicitur; et secundum hoc, exemplar rei dicitur forma. Per quem modum ponebat Plato ideas esse formas.” *In Physic.* 2, l. 5, n. 4 (cf. ARISTOTLE, *Physica* B.3, 194b26): “Secundo modo dicitur causa *species et exemplum*. Considerandum est etiam quod duo posuit [Philosophus] pertinentia ad quidditatem rei, scilicet speciem et exemplum, propter diversas opiniones de essentiis rerum. Nam Plato posuit naturas specierum esse quasdam formas abstractas, quas dicebat exemplaria et ideas; et propter hoc posuit *exemplum vel paradigma*. Naturales autem philosophi qui aliquid de forma tetigerunt, posuerunt formas in materia; et propter hoc nominavit *speciem*.”

<sup>24</sup> *De veritate*, q. 3 a. 3 co.: “Invenimus autem in quibusdam formis duplicem respectum: unum ad id quod secundum eas formatur, sicut scientia respicit scientem; alium ad id quod est extra, sicut scientia respicit scibile; hic tamen respectus non est omni formae communis, sicut primus. Hoc igitur nomen forma importat solum primum respectum; et inde est quod forma semper notat habitudinem causae. Est enim forma quodammodo causa eius quod secundum ipsam formatur; sive talis formatio fiat per modum inhaerentiae, ut in formis intrinsecis, sive per modum imitationis, ut in formis exemplaribus. Sed similitudo et ratio respectum etiam secundum habent, ex quo non competit eis habitudo causae.”

<sup>25</sup> *In De anima* 2, c. 7, 176–179 (cf. ARISTOTLE, *De anima* B.4, 415b12–13): “illud est causa alicuius ut substantia, id est ut forma, quod est causa essendi, nam per formam unumquodque est actu.”

τί ἦν εἶναι, *ratio quidditativa rei* = ὁ λόγος ὁ τοῦ τί ἦν εἶναι = ἡ μορφή καὶ τὸ εἶδος): that is, the definition by which we know *what* a thing is.<sup>26</sup> Whence, a formal difference varies the species (►16.7); for it is the form that gives the (act of) being (*esse*) to a thing.<sup>27</sup>

Considered abstractly, every form has infinity (►24.8) in its proper *ratio*.<sup>28</sup> For example, in (the form of) whiteness abstractly considered, the *ratio* of *whiteness* is not finite according to something. It is, however, contracted (*contrahitur*) into a determinate species; for the *ratio* of *color* (*ratio coloris*) and the *ratio* of *being* (*ratio essendi*) are determined in it (i.e., whiteness is limited, determined *to be some species of color*).

Since every form (of a composite being) informs matter through its essence, a form is the origin and principle of the properties that naturally follow upon a composite thing (e.g., having a specific figure or shape follows upon the substantial form of a specific natural body, as the shape of a dog follows upon its substantial form).<sup>29</sup> Thus, from any one form follows some inclination; and from the inclination, an operation. The same form that gives (to) matter the (act of) being (*esse*) is also a principle of operation because each thing

<sup>26</sup> *In Metaph.* 5, l. 2, §764 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a27): “forma est ratio ipsius quod quid erat esse, idest definitio per quam scitur quid est res.” *In Physic.* 2, l. 5, n. 4 (cf. ARISTOTLE, *Physica* B.3, 194b26–27): “et hoc [sc., *forma*] dicitur causa in quantum est ratio quidditativa rei; hoc enim est per quod scimus de unoquoque quid est.” See also ARISTOTLE, *Metaphysica* Δ.8, 1017b10–26.

<sup>27</sup> *Q. d. de anima*, a. 7 co.: “Formalis autem differentia speciem variat. Nam forma est quae dat esse rei.” *In Sent.* 1, d. 8 q. 5 a. 2 co.: “forma [...] dat esse materiae.” *De virtutibus*, q. 4 a. 4 co.: “Sicut autem forma in rebus naturalibus dat speciem, ita et in moralibus obiectum dat speciem actui, et per consequens habitui.” *In Sent.* 2, d. 9 q. 1 a. 4 co.: “omnis denominatio est a forma, quae dat esse et est principium operationis.” *In Sent.* 2, d. 12 q. 1 a. 4 co.: “omnis forma substantialis dat esse completum in genere substantiae.” *In Sent.* 2, d. 18 q. 1 a. 2 co.: “cum omnis forma det aliquod esse, et impossibile sit unam rem habere duplex esse substantiale, oportet, si prima forma substantialis adveniens materiae det sibi esse substantiale, quod secunda superveniens det esse accidentale.” *In Sent.* 2, d. 26 q. 1 a. 6 ad 2: “una enim forma est quae dat esse, et quae est principium operis.” *STh* I, q. 76 a. 4 co.: “forma substantialis in hoc a forma accidentali differt quia forma accidentalis non dat esse simpliciter, sed esse tale, sicut calor facit suum subiectum non simpliciter esse, sed esse calidum.” *STh* I-II, q. 18 a. 3 co.: “in rebus naturalibus non invenitur tota plenitudo perfectionis quae debetur rei, ex forma substantiali, quae dat speciem; sed multum superadditur ex supervenientibus accidentibus, sicut in homine ex figura, ex colore, et huiusmodi; quorum si aliquod desit ad decentem habitudinem, consequitur malum.” *STh* III, q. 6 a. 4 ad 2: “forma actu dat speciem, materia autem, quantum est de se, est in potentia ad speciem. Et ideo contra rationem formae esset quod praeexisteret naturae speciei, quae perficitur per unionem eius ad materiam, non autem est contra naturam materiae quod praeexistat naturae speciei.” *STh* III, q. 72 a. 4 co.: “forma rei naturalis dat ei speciem.” *De veritate*, q. 29 a. 8 ad 8: “in eodem instanti forma dat esse, ordinat et distinguit.”

<sup>28</sup> *In Sent.* 1, d. 43 q. 1 a. 1 co.: “Omnis enim forma in propria ratione si abstracte consideretur, infinitatem habet; sicut in albedine abstracte intellecta, ratio albedinis non est finita ad aliquid; sed tamen ratio coloris et ratio essendi determinatur in ea, et contrahitur ad determinatam speciem.”

<sup>29</sup> *In Sent.* 4, d. 44 q. 3 a. 3 qc. 1 co.: “forma est principium proprietatum compositi. [...] forma quaelibet ex hoc ipso quod per essentiam suam materiam informat, est origo proprietatum quae compositum naturaliter consequuntur.” *In De anima* 2, c. 5, 107–109: “ex unaquaque autem forma sequitur aliqua inclinatio et ex inclinatione operatio.” *Q. d. de anima*, a. 9 co.: “quia eadem forma quae dat esse materiae est etiam operationis principium, eo quod unumquodque agit secundum quod est actu; necesse est quod anima, sicut et quaelibet alia forma, sit etiam operationis principium.” *Comp. th.* 1, c. 87, 20–22: “omnis actio que est propria alicui speciei, est a principiis consequentibus formam que dat speciem.” *Q. d. de anima*, a. 10 ad 2: “cum materia sit propter formam, hoc modo forma dat esse et speciem materiae, secundum quod congruit suae operationi.”

acts insofar as it is in act. Thus, every action that is proper to some species, is from the principles that follow upon the form that gives the species.

## 9.6. Exemplar-Form

*The likeness (similitudo) of one thing that exists in another has either:<sup>30</sup> (1) the ratio of exemplar, if it is related (to the thing in which the likeness exists) as a principle; or (2) the ratio of image, if it is related to that of which it is a likeness as to a principle.*

As (not only PROCLUS, but) also (pseudo-)DIONYSIUS says, it is manifest that the effect must preexist in the cause in an exemplary way (*exemplariter*); for causes produce effects according to their likeness; and conversely too, caused (things) have the image of their causes.<sup>31</sup>

An example of both is ascertained in our intellect. Indeed, (1) the likeness of the artifact that exists in the mind of the artificer, (which) is the principle of the operation by which the artifact is constituted, is compared to the artifact as the exemplar (is compared) to that which is exemplified. And (2) the likeness of a natural thing conceived in our intellect is compared to the thing whose likeness it is as to its principle; for our understanding begins from the senses, which are affected (*immutantur*) by natural things (► 49.3, ¶1).<sup>32</sup>

An **exemplar** is necessary for the production of anything in order for the effect to attain a determinate form.<sup>33</sup> Thus, the artificer produces a determinate form in matter because of the exemplar considered, whether it is (something) external or it is conceived internally in the mind. Likewise, it is manifest that those things that come to be naturally, attain determinate forms, and that the determination of these forms must be reduced into a first principle and first exemplar of all things. But other things are said to be exemplars, too,

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<sup>30</sup> ScG 4, 11 n. 14: "Similitudo autem alicuius in altero existens vel habet rationem exemplaris, si se habeat ut principium: vel habet potius rationem imaginis, si se habeat ad id cuius est similitudo sicut ad principium."

<sup>31</sup> *In De causis*, l. 14: "Manifestum est autem quod oportet effectus praeexistere in causis exemplariter, quia causae producunt effectus secundum suam similitudinem; et e converso causata habent imaginem suarum causarum, ut etiam Dionysius dicit II capitulo De Divinis Nominibus."

<sup>32</sup> ScG 4, 11 n. 14: "Utriusque autem [sc., exemplaris atque imaginis] exemplum in nostro intellectu perspicitur. Quia enim similitudo artificiatum existens in mente artificis est principium operationis per quam artificiatum constituitur, comparatur ad artificiatum ut exemplar ad exemplatum: sed similitudo rei naturalis in nostro intellectu concepta comparatur ad rem cuius similitudo existit ut ad suum principium, quia nostrum intelligere a sensibus principium accipit, qui per res naturales immutantur."

<sup>33</sup> *STh* I, q. 44 a. 3 co.: "ad productionem alicuius rei ideo necessarium est exemplar, ut effectus determinatam formam consequatur, artifex enim producit determinatam formam in materia, propter exemplar ad quod inspicit, sive illud sit exemplar ad quod extra intuetur, sive sit exemplar interius mente conceptum. Manifestum est autem quod ea quae naturaliter fiunt, determinatas formas consequuntur. Haec autem formarum determinatio oportet quod reducat[ur] [...] in primum principium [...] primum exemplar omnium. Possunt etiam in rebus creatis quaedam aliorum exemplaria dici, secundum quod quaedam sunt ad similitudinem aliorum, vel secundum eandem speciem, vel secundum analogiam alicuius imitationis."

insofar as some are (produced) in (*ad*) the likeness of others, whether according to the same species (e.g., human begets human) or according to the analogy of some imitation.

The preposition *in* (*ad*) can designate an exemplar cause, as when we say, “This book is made in [the likeness of] that [book].”<sup>34</sup>

### 9.7. Efficient Cause

The **efficient** or **moving cause** (*causa movens, vel efficiens*) is *whence the first principle of change and of rest is (unde primum est principium permutationis et quietis < ἡ ἀρχὴ τῆς μεταβολῆς ἢ πρώτη ἢ τῆς ἡρεμῆσεως)*.<sup>35</sup> ARISTOTLE says not only *of motion* (*motus* = τῆς μεταβολῆς) but also *of rest* (*quietis* = τῆς ἡρεμῆσεως) because natural motion and natural rest are reduced to the same cause (► 12.4). Likewise, violent motion and violent rest (are reduced to the same cause); for that cause by which something moves into a place is the same cause by which the thing rests in that place (whether naturally or violently).

An agent-cause produces an effect in the likeness (*in similitudine*) of its form.<sup>36</sup> Whence, not only is it an efficient cause, but also an exemplar (► 9.6) of the effect. This happens in two modes: **(a)** sometimes, the form itself by which the likeness of the agent to the effect is considered, is directly the principle of the action by which the effect is produced, as heat in a heating fire; but **(b)** sometimes it is not the principle first and by itself (*primo et per se*) of the active generation of the action by which the effect is produced; rather, the principles of that form (are the generative principles): for example, when a white man generates a white man, the whiteness itself of the begetter is not the principle of active generation; and, nonetheless, the whiteness of the begetter is said to be a cause of the whiteness of the begotten because the principles of whiteness in the begetter are the generative principles producing whiteness in the begotten.

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<sup>34</sup> *STh* I, q. 93 a. 5 ad 4: “haec praepositio ad potest designare causam exemplarem; sicut cum dicitur, iste liber est factus ad illum.” Cf. *In Sent.* 1, d. 8 q. 1 a. 2 ad 2: “esse creatum non est per aliquid aliud, si ly per dicat causam formalem intrinsecam; immo ipso formaliter est creatura; si autem dicat causam formalem extra rem, vel causam effectivam, sic est per divinum esse et non per se.”

<sup>35</sup> *In Metaph.* 5, l. 2, §765 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a29–30): “Tertio modo dicitur causa unde primum est principium permutationis et quietis; et haec est causa movens, vel efficiens. Dicit autem, motus, aut etiam quietis, quia motus naturalis et quies naturalis in eadem causam reducuntur, et similiter quies violenta et motus violentus. Ex eadem enim causa ex qua movetur aliquid ad locum, quiescit in loco.” *In Physic.* 2, l. 5, n. 5 (cf. ARISTOTLE, *Physica* B.3, 194b29–30): “Ulterius autem dicit quod alio modo dicitur causa a quo est principium motus vel quietis.”

<sup>36</sup> *In Sent.* 4, d. 43 q. 1 a. 2 qc. 1 co.: “Causa autem univoca agens producit effectum in similitudine suae formae; unde non solum est causa efficiens, sed exemplaris, istius effectus. Hoc autem contingit dupliciter. Quandoque enim ipsa forma, per quam attenditur similitudo agentis ad effectum, est directe principium actionis qua producitur ille effectus, sicut calor in igne calefaciente. Quandoque autem illius actionis qua effectus producitur, non est principium primo et per se ipsa forma secundum quam attenditur similitudo, sed principia illius formae; sicut si homo albus generaret hominem album, ipsa albedo generantis non est principium generationis activae; et tamen albedo generantis dicitur causa albedinis generati, quia principia albedinis in generante sunt principia generativa facientia albedinem in generato.”

To this genus of cause is reduced whatever produces (*facit*) something in whatever mode of being (*quocumque modo esse*): not only according to substantial being (*secundum esse substantiale*), but also accidental (*accidentale*), which is possible in every motion.<sup>37</sup> Whence, ARISTOTLE not only adds that—universally (*universaliter* = ὅλως)—every producer (*faciens* = τὸ ποιῶν) is a cause of the thing produced (*facti* = τοῦ ποιουμένου); but also every changer (*mutans; permutans; commutans* = τὸ μεταβλητικόν), of the thing changed (*mutati; permutati; commutati* = τοῦ μεταβάλλοντος).

For example, an advisor (*consiliator* = βουλευσας) is a cause because it is from the advisor that motion begins insofar as someone acts following advice for the sake of preserving something.<sup>38</sup> Likewise, the father is a cause of the son. In these two examples, ARISTOTLE points to two principles of motion from which everything is produced: namely, purpose (*propositum*) in the counsellor, and nature (► 12) in the father. Also, although propositions are as matter in respect of their termini (► 9.3), they are reduced to the genus of efficient cause in respect of their inferring virtue (*quantum ad vim illativam*), because the principle of the discourse of reason comes from the propositions into its conclusion (► 55).<sup>39</sup>

### 9.8. Final Cause

The **end** (*finis* = τὸ τέλος) is the *cause for the sake of which* (*cuius causa* < τὸ οὗ ἕνεκα) something comes to be (*aliquid fit*), as health is a cause of walking.<sup>40</sup>

The end or **final cause** is a principle only insofar as it is in the intention of the mover; whence, it is not altogether something extrinsic to the act; for it is compared to the act as a *terminus* or as a *principle* (► 33.5):<sup>41</sup>

<sup>37</sup> *In Metaph.* 5, l. 2, §770 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a32): “Ad hoc autem genus causae reducitur quicquid facit aliquid quocumque modo esse, non solum secundum esse substantiale, sed secundum accidentale; quod contingit in omni motu. Et ideo non solum dicit quod faciens sit causa facti, sed etiam mutans mutati.” *Ibid.*, §765: “Et universaliter omne faciens est causa facti per hunc modum, et permutans permutati.” *In Physic.* 2, l. 5, n. 5 (cf. ARISTOTLE, *Physica* B.3, 194b31–32): “et omne commutans commutati.”

<sup>38</sup> *In Metaph.* 5, l. 2, §765 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a30–32): “Sicut consiliator est causa. Nam ex consiliatore incipit motus in eo, qui secundum consilium agit ad rei conservationem. Et similiter pater est causa filii. In quibus duobus exemplis duo principia motus tetigit ex quibus omnia fiunt, scilicet propositum in consiliatore, et naturam in patre.” *In Physic.* 2, l. 5, n. 5 (cf. ARISTOTLE, *Physica* B.3, 194b30–31): “sicut consilians dicitur causa, et pater filii.”

<sup>39</sup> *In Physic.* 2, l. 5, n. 10: “propositiones quidem quantum ad terminos sunt materia conclusionis, ut dictum est; quantum autem ad vim illativam ipsarum reducuntur ad hoc genus causae; nam principium discursus rationis in conclusione est ex propositionibus.”

<sup>40</sup> *In Metaph.* 5, l. 2, §771 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a32–34): “Quarto modo dicitur causa finis; hoc autem est cuius causa aliquid fit, sicut sanitas est causa ambulandi.” *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 194b32–33): “Quartum autem modum causae ponit, quod aliquid dicitur causa ut finis; et hoc est *cuius causa* aliquid fit, sicut sanitas dicitur ambulationis.”

<sup>41</sup> *In Metaph.* 12, l. 4, §2470: “finis non est principium nisi secundum quod est in intentione moventis.” *STh* I-II, q. 1 a. 3 ad 1: “finis non est omnino aliquid extrinsecum ab actu, quia comparatur ad actum ut principium vel terminus.”

1. It belongs to the *ratio* of *act* to be *towards something* (*ad aliquid*) in respect of the affection (*quantum ad passionem*, i.e., as the terminus of the act; ► 33.5, ¶1).<sup>42</sup>
2. (It belongs to the *ratio* of *act*) to be *from something* (*ab aliquo*) in respect of the action (*quantum ad actionem*, i.e., as the principle of the act; ► 33.5, ¶2).<sup>43</sup>

Two (things) must be considered in any action: the agent (*agens*) and the *ratio* of *acting* (*ratio agendi*).<sup>44</sup> For example, in (the action of) heating, fire is the agent, and heat is the *ratio* of *acting*. In moving, the end is said to move as the *ratio* of *moving*; but the efficient (cause is said to move) as the agent (produces) motion: that is, educating (*educens*, i.e., by drawing out) the mobile from potency into act. Thus, both the end and the efficient (cause) are said to move, but diversely. The *ratio* of *acting* is the form of the agent by which it acts; whence, it must be in the agent for it to act. However, it is not in (the agent) according to the perfect (act of) being of nature (*secundum esse naturae perfectum*); for motion would cease as soon as this is had; rather, it is in the agent by the mode of *intention*; for the end is prior in intention but posterior in being (► 11.5).

As is evident from the name itself, **intention** (*intentio*) signifies *to tend into something* (*in aliquid tendere*).<sup>45</sup> Both the action of a mover and the motion (i.e., the affection) of a mobile tend into something, but the motion of a mobile tends into something because it proceeds from the action of a mover. Whence, *intention* pertains first and principally to that which moves. Thus, architects, and all those who give precepts to anyone, are said to move others into that which they intend; and the will moves all the other powers of the soul into an end.

Properly, therefore, the intention of the mover is the act of an appetitive power; for the name *intention* designates, first and by itself (*primo et per se*), the act of the will (i.e. of an intellectual appetitive power, rather than a sensitive or natural one).<sup>46</sup> But there is also a

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<sup>42</sup> *STh* I-II, q. 1 a. 3 ad 1: “et hoc ipsum est de ratione actus, [...] ut sit ad aliquid, quantum ad passionem.”

<sup>43</sup> *STh* I-II, q. 1 a. 3 ad 1: “et hoc ipsum est de ratione actus, ut scilicet sit ab aliquo.”

<sup>44</sup> *De veritate*, q. 22 a. 12 co.: “tam finis quam efficiens movere dicuntur, sed diversimode; cum in qualibet actione duo considerentur: scilicet agens, et ratio agendi; ut in calefactione ignis est agens, et ratio agendi calor. In movendo dicitur finis movere sicut ratio movendi: sed efficiens sicut agens motum, hoc est educens mobile de potentia in actum. Ratio autem agendi est forma agentis per quam agit; unde oportet quod insit agenti ad hoc quod agat. Non autem inest secundum esse naturae perfectum, quia hoc habito quiescit motus; sed inest agenti per modum intentionis; nam finis est prior in intentione, sed posterior in esse.”

<sup>45</sup> *STh* I-II, q. 12 a. 1 co.: “intentio, sicut ipsum nomen sonat, significat in aliquid tendere. In aliquid autem tendit et actio moventis, et motus mobilis. Sed hoc quod motus mobilis in aliquid tendit, ab actione moventis procedit. Unde intentio primo et principaliter pertinet ad id quod movet ad finem, unde dicimus architectorem, et omnem praecipientem, movere suo imperio alios ad id quod ipse intendit. Voluntas autem movet omnes alias vires animae ad finem.”

<sup>46</sup> *STh* I-II, q. 12 a. 1 co.: “Unde manifestum est quod intentio proprie est actus voluntatis.” *De malo*, q. 16 a. 11 ad 3: “intentio est virtutis appetitivae actus: quae quidem est duplex. Una sensitiva, quae quidem

natural appetitive power whereby things tend towards something even if they do not possess any sense or intellectual cognition: that is, they have a natural tendency or inclination—an *intention*.<sup>47</sup> Thus, the intention of the mover is not the act of a cognitive power (unlike intellectual intentions; ►8.1), even though the name *intention* (*intentio*) is taken from the act of the mind, which is *to intend*.<sup>48</sup>

Since the end is prior in intention and posterior (*posterior*) or last (*ultimum*) in being (*in esse*), in execution (*in executione*), in generation (*in generatione*), it would seem less to be a cause; and so, it had been neglected by the earliest philosophers.<sup>49</sup> This is why ARISTOTLE proves especially that the end is a cause, in this way: to ask “why?” (*quare*) or “for the sake of what?” (*propter quid* = δὲ τὶ) is to inquire for a cause (►55.4, ¶2); when we are asked why or for the sake of what someone walks, befittingly (*convenienter*) replying we say, “(in order) to be healthy” (*ut sanetur* = ἵνα ὑγιαίνῃ); and thus answering, we believe that we have rendered the cause. Hence, it is evident that the end is a cause.

## 9.9. Necessary

*Necessary* is among the proper differences of being (*ens*).<sup>50</sup> *Necessary* is a name that signifies something that pertains to the discourse of *cause*: *necessary* follows upon *cause*;

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est virtus organi corporei [...]. Alia autem est vis appetitiva intellectiva, scilicet voluntas [...].” *In Sent.* 2, d. 38 q. 1 a. 3 co.: “intentio primo et per se actum voluntatis nominat secundum quod in ea est vis intellectus ordinantis.”

<sup>47</sup> *In Sent.* 2, d. 38 q. 1 a. 3 ad 2: “naturalia quamvis non habeant voluntatem, tamen intendunt aliquid per appetitum naturalem.” Cf. *In Ethic.* 1, l. 1, 165–183.

<sup>48</sup> *De veritate*, q. 21 a. 3 ad 5: “finis dicitur esse prior in intentione his quae sunt ad finem, non autem aliis causis, nisi secundum quod ipsae sunt ad finem [...]. Et tamen sciendum, quod cum dicitur quod finis est prior in intentione, intentio sumitur pro actu mentis, qui est intendere.” *In Sent.* 2, d. 38 q. 1 a. 3 co.: “Intellectus autem speculativus neque fugit aut prosequitur, neque etiam aliquid de fugiendo et prosequendo dicit; et ideo intentio non est actus cognoscitivae, sed appetitivae.”

<sup>49</sup> *In Sent.* 3, d. 23 q. 2 a. 5 ad 4: “finis est prior in intentione, et posterior in esse.” *De malo*, q. 2 a. 3 co.: “Finis autem est posterior in esse, sed prior in intentione.” *Contra retr.*, c. 7, 334–335: “Finis autem prior est in intentione, posterior autem in executione.” *In Metaph.* 5, l. 2, §771 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a34–35): “Et quia de fine videbatur minus quod esset causa, propter hoc quod est ultimum in esse, unde etiam ab aliis prioribus philosophis haec causa est praetermissa, ut in primo libro prae habitum est, ideo specialiter probat de fine quod sit causa. Nam haec quaestio quare, vel propter quid, quaerit de causa: cum enim quaeritur quare, vel propter quid quis ambulat, convenienter respondentes dicimus, ut sanetur. Et sic respondentes opinamur reddere causam. Unde patet quod finis est causa.” *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 194b33–35): “Et hoc patet quia respondetur ad quaestionem factam *propter quid*: cum enim quaerimus *propter quid ambulat*? Dicimus *ut sanetur*; et hoc dicentes opinamur nos assignare causam. Ideo autem potius probat de fine quod sit causa quam de aliis, quia hoc minus videbatur propterea quia finis est ultimum in generatione.”

<sup>50</sup> *De sub. sep.*, c. 16, 133–134: “Necessarium autem et possibile sunt propriae differentiae entis.” *In Metaph.* 5, l. 1, §749: “Primo distinguit [Philosophus] nomina significantia causas. Secundo quoddam nomen significans quoddam quod consequitur ad causam, scilicet necessarium.” *In Metaph.* 5, l. 6, §827: “Postquam Philosophus distinxit nomina, quae significant causas, hic distinguit nomen quod significat aliquid pertinens ad orationem causae; scilicet necessarium. Causa enim est ad quam de necessitate sequitur aliud.” *STh* I, q. 82 a. 1 co.: “necessitas dicitur multipliciter.” *In Metaph.* 5, l. 6, §827 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015a20–36): “distinguit [Philosophus] modos necessarii. [...] Ponit autem [...] quatuor modos necessarii.” *Ibid.*, §832 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015a33–35): “Quartum modum [...] necessarium etiam dicimus sic se habere, quod non contingit aliter se habere: et hoc est necessarium absolute. Prima autem necessaria sunt secundum quid.” *Ibid.*, §836 (cf. ARISTOTLE,



for cause is *that from which another follows of necessity*. Necessity (*necessitas*) is said in multiple modes.

ARISTOTLE posits four modes of the necessary (the first three are: ► 9.10, ¶1, ¶2; ► 9.11, ¶3); but all of them are reduced to the fourth one (discussed here, under ¶1): **necessary** (*necessarium* = ἀναγκαῖον) is *that which cannot be otherwise* (*quod non contingit aliter se habere* = τὸ οὐκ ἐνδέχεται ἄλλως ἔχειν). This is the absolutely necessary (*absolute*), while the other modes are necessary according to something (*secundum quid*; under ¶2).

1. The **absolutely necessary** (*absolute*) differs from the other (modes of being necessary) because absolute and natural necessity pertains to a thing according to that which is intrinsic, intimate and proximate to it.<sup>51</sup> This can be **(a) the form, (b) the matter, or (c) the essence** (i.e., form and matter together) of the thing. Thus, **(a)** that which has necessity from (its) formal cause is absolutely necessary: for example, (we say) that man is rational, or that it is necessary for an animal to be sensible, because it follows upon its form; or that a triangle has three angles equal to two right angles, which (necessity) is reduced to the definition of *triangle*.<sup>52</sup> Likewise, in **(b)**, the necessary that depends on matter: for example, it is absolutely necessary that an animal be corruptible because this (necessity) follows from its being composed from contraries (*ex contrariis*).<sup>53</sup> Also, we say **(c)** that an animal necessarily is a sensible animated-substance, because it is its essence (i.e., *sensible* is taken from its form, while *animated-substance* is taken from its matter).<sup>54</sup>

2. The **necessary according to something** (*secundum quid*)—and not absolutely (*non absolute*)—is that whose necessity depends upon an extrinsic cause; and the extrinsic

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*Metaphysica* Δ.5, 1015a35–b2): “reducit [Philosophus] omnes modos ad unum [...] ostendit quod omnes modi necessitatis, qui in rebus inveniuntur ad hunc ultimum modum pertinent.” The same definition is found in *In Post. an.* 1, l. 44, 31–32 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b31–32). Cf. the adverbial use in *STh* I, q. 82 a. 1 co.: “Necesse est enim quod non potest non esse.”

<sup>51</sup> *In Metaph.* 5, l. 6, §833: “Differt autem necessarium absolute ab aliis necessariis: quia necessitas absoluta competit rei secundum id quod est intimum et proximum ei; sive sit forma, sive materia, sive ipsa rei essentia.” *STh* I, q. 82 a. 1 co.: “Quod quidem [*sc.*, *quod non potest non esse*] convenit alicui, uno modo ex principio intrinseco, sive materiali [...]; sive formali [...]. Et haec est necessitas naturalis et absoluta.”

<sup>52</sup> *In Physic.* 2, l. 15, n. 2: “Similiter etiam quod habet necessitatem ex causa formali, est necessarium absolute; sicut hominem esse rationalem, aut triangulum habere tres angulos aequales duobus rectis, quod reducitur in definitionem trianguli.” *In Metaph.* 5, l. 6, §833: “Dicimus etiam animal necessario esse sensibile, quia consequitur eius formam.” *STh* I, q. 82 a. 1 co.: “ex principio intrinseco [...] formali, sicut cum dicimus quod necesse est triangulum habere tres angulos aequales duobus rectis.” *In Sent.* 4, d. 7 q. 1 a. 1 qc. 2 co.: “Una est necessitas absoluta, sicut [...] triangulum habere tres angulos.”

<sup>53</sup> *In Physic.* 2, l. 15, n. 2: “necessitas quae dependet ex causis prioribus, est necessitas absoluta, ut patet ex necessario quod dependet ex materia. Animal enim esse corruptibile, est necessarium absolute: consequitur enim ad hoc quod est animal, esse compositum ex contrariis.” *In Metaph.* 5, l. 6, §833: “dicimus animal necesse esse corruptibile, quia hoc consequitur eius materiam in quantum ex contrariis componitur.” *STh* I, q. 82 a. 1 co.: “ex principio intrinseco [...] materiali, sicut cum dicimus quod omne compositum ex contrariis necesse est corrumpi.”

<sup>54</sup> *In Metaph.* 5, l. 6, §833: “Dicimus [...] animal necessario esse substantiam animatam sensibilem, quia est eius essentia.”

cause is twofold: the end (►9.10); and the efficient (►9.11).<sup>55</sup> Both modes of necessity *according to something* pertain (i.e., are reduced) to the simply necessary.<sup>56</sup> Thus, that cause is said to be *necessary in respect of an end* without which it is impossible (for something) to live or to be; or to have (some) good; or to be deprived of (some) bad; so that (its) first *ratio* of *necessary* is *that it is impossible to be otherwise*. On the other hand, that which suffers a force is said to necessarily act or to necessarily be acted upon because it is not possible for it to act according to its proper impetus due to the violence of an agent, which is some necessity on account of which *it cannot be otherwise*.

### 9.10. Necessary According to an End

The necessity of anything that is ordered to an end is taken from its end.<sup>57</sup> That which has necessity from something posterior in being (*posterius in esse*; i.e., where the end is prior in intention but posterior in being) is necessary **from a condition or supposition** (*ex conditione, vel suppositione*).<sup>58</sup>

For example, when it is necessary for *this* (thing) to be if *this* (other thing) must come to be, the necessity is from the end (*ex fine*); or from the form (*ex forma*) insofar as it is the end of generation.<sup>59</sup> In natural things, as in artificial things, the necessary is by supposition: but not in such a way that the necessary is as an end; for that which is necessary is posited from the part of matter, while the *ratio* of *necessity* is posited from the part of the end.<sup>60</sup> Thus, we do not say that such an end is necessary because the

<sup>55</sup> *In Metaph.* 5, l. 6, §834: “Necessarium autem secundum quid et non absolute est, cuius necessitas dependet ex causa extrinseca. Causa autem extrinseca est duplex; scilicet finis et efficiens.” *STh* I, q. 82 a. 1 co.: “Alio modo convenit [necessitas] alicui quod non possit non esse, ex aliquo extrinseco, vel fine vel agente.”

<sup>56</sup> *In Metaph.* 5, l. 6, §836 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015a35–b2): “Dicit ergo [Philosophus] primo, quod secundum istum ultimum modum necessarii, omnes alii modi aliquid dicuntur. Quod primo ostendit in tertio modo. Illud enim quod vim patitur, de necessitate dicitur aliquid facere vel pati, propter hoc quod non contingit secundum proprium impetum aliquid agere propter violentiam agentis, quae est quaedam necessitas propter quam non contingit aliter se habere.” *Ibid.*, §837 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015b2–5): “ostendit [Philosophus] hoc in primo et secundo modo, in quibus necessitas sumitur ex causis vivendi vel essendi simpliciter, quantum ad primum modum: vel ex causis boni, quantum ad secundum modum. Sic enim in aliis modis necessarium dicebatur, sine quo non poterat esse ex una parte bonum, et ex alia parte vivere et esse. Et sic illa causa, sine qua non contingit vivere vel esse, vel bonum habere, vel malo carere, necessitas dicitur; quasi ex hoc sit prima ratio necessarii, quia impossibile est aliter se habere.”

<sup>57</sup> *In Post. an.* 1, l. 1, 133–134: “Necessitas autem cuiuslibet rei ordinate ad finem ex suo fine sumitur.”

<sup>58</sup> *In Physic.* 2, l. 15, n. 2: “Quod autem habet necessitatem ab eo quod est posterius in esse, est necessarium ex conditione, vel suppositione.”

<sup>59</sup> *In Physic.* 2, l. 15, n. 2: “ut puta si dicatur, necesse est hoc esse si hoc debeat fieri: et huiusmodi necessitas est ex fine, et ex forma in quantum est finis generationis.”

<sup>60</sup> *In Physic.* 2, l. 15, n. 5 (cf. ARISTOTLE, *Physica* B.9, 200a15–19): “Sic igitur patet quod in rebus naturalibus est necessarium ex suppositione, sicut et in rebus artificialibus: sed non ita quod id quod est necessarium, sit sicut finis; quia id quod necessarium est, ponitur ex parte materiae; sed ex parte finis ponitur ratio necessitatis. Non enim dicimus quod necessarium sit esse talem finem, quia materia talis est; sed potius e converso, quia finis et forma talis futura est, necesse est materiam talem esse. Et sic necessitas ponitur ad materiam, sed ratio necessitatis ad finem.”

matter is such, but conversely: i.e., because the end and the form is to be such, it is necessary for matter to be such. And thus, necessity is posited for matter—but the *ratio of necessity*, for the end.

Necessity from the supposition of an end (*ex suppositione finis*) is twofold; for *necessary* is said (to be):<sup>61</sup>

1. *That without which something cannot be preserved in being.*<sup>62</sup> For example, nutriment (is said to be necessary) for an animal to live. Here, the end is *the absolute (act of) being itself (ipsum esse absolutum)*, and the necessity taken from this end pertains to the first mode posited by ARISTOTLE, according to which it is said to be necessary insofar as something cannot live or be without it, which, even if it is not the principal cause of the thing, is some co-cause (*concausa* = συναίτιον).<sup>63</sup> For example, to breathe is necessary to the breathing animal because it cannot live without breathing. Thus, even if respiration itself is not the cause of life, it is, however, a co-cause of life insofar as it cooperates to its preservation; and the same can be said of food, without which an animal cannot live, insofar as (food) cooperates to restoring what is lost. Thus, in this mode are said to be necessary *those (things) without which it is impossible (for something) to be.*

2. *That without which something that pertains to being well cannot be had.*<sup>64</sup> For example, a horse is said (to be) *necessary* for someone who wants to travel; or medicine (is said to be necessary) for a man to live healthily. This is called **necessity of an end** (*necessitas finis*) or, sometimes, **utility** (*utilitas*). Here, the end is *to be well (bene esse)* or *to have something good (aliquid bonum habere)*; and the necessity of the second mode posited by ARISTOTLE is taken from this end: namely, that is said to be necessary *without*

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<sup>61</sup> *In Sent.* 4, d. 7 q. 1 a. 1 qc. 2 co.: “Tertia est necessitas ex suppositione finis; et est duplex.”

<sup>62</sup> *In Sent.* 4, d. 7 q. 1 a. 1 qc. 2 co.: “uno modo dicitur necessarium sine quo aliquis non potest conservari in esse, sicut nutrimentum animali.” *STh* I, q. 82 a. 1 co.: “[convenit necessitas alicui quod non possit non esse ex] fine quidem, sicut cum aliquis non potest sine hoc consequi [...] finem aliquem, ut cibus dicitur necessarius ad vitam.”

<sup>63</sup> *In Metaph.* 5, l. 6, §834: “Finis autem est [...] ipsum esse absolutum, et ab hoc fine necessitas sumpta pertinet ad primum modum.” *Ibid.*, §827 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015a20–23): “Primus [modus] est, secundum quod dicitur aliquid necessarium, sine quo non potest aliquid vivere aut esse; quod licet non sit principalis causa rei, est tamen quaedam concausa. Sicut respirare est necessarium animali respiranti, quia sine respiratione vivere non potest. Ipsa enim respiratio, etsi non sit causa vitae, est tamen concausa, inquantum cooperatur ad contemperamentum caloris, sine quo non est vita. Et similiter est de cibo, sine quo animal vivere non potest, inquantum cooperatur ad restaurationem deperditi, et impedit totalem consumptionem humidi radicalis, quod est causa vitae. Igitur huiusmodi dicuntur necessaria, quia sine eis impossibile est esse.” In accordance with ancient science, St. Thomas points to respiration as keeping the proper balance of heat, *without which there is no life*, and to nutrition as preventing the total consumption of moisture, *which is a cause of life*.

<sup>64</sup> *In Sent.* 4, d. 7 q. 1 a. 1 qc. 2 co.: “Alio modo [dicitur necessarium] sine quo non potest haberi quod pertinet ad bene esse, sicut equus dicitur necessarius ambulare volenti, et medicina ad hoc quod homo sane vivat.” *STh* I, q. 82 a. 1 co.: “[convenit necessitas alicui quod non possit non esse ex] fine quidem, sicut cum aliquis non potest sine hoc [...] bene consequi finem aliquem, ut [...] dicitur necessarius [...] equus ad iter. Et haec vocatur necessitas finis; quae interdum etiam utilitas dicitur.”

which something good cannot be or come to be, or something bad (cannot be) avoided or expelled.<sup>65</sup> For example, we say that taking a drug is necessary not because the animal cannot live without it but (because it is necessary) to expel or to avoid illness. Likewise, navigating to some place is necessary not because man cannot be without it, but because without it, he cannot acquire something good, e.g., wealth; and such navigation is said to be necessary for the acquisition of wealth.

### 9.11. Necessary According to an Efficient Cause

3. That which exerts violence, and violence itself, receives the name *necessary* because violence is said (to be) *necessary*; and one who is forced is said to do *of necessity* that which he is compelled to do.<sup>66</sup> Thus, in natural things there is an **impetus** (*impetus* = ὀπή) or **inclination** toward some end, which responds to the will in a rational nature; and so, natural inclination itself is called *appetite* (►9.8). Either of them, the impetus of natural inclination or the purpose of will, can be impeded and prevented: impeded in the prosecution of a motion that has already started; prevented, so that motion does not start. Hence, that is said violent which is against the inclination of a natural thing and impedes the prosecution of a voluntary motion already started or prevents one from starting.

The necessity that is (had) from an external mover pertains to this third mode posited by ARISTOTLE; for there is violence when something is moved by an external agent toward something to which it is not naturally inclined.<sup>67</sup> Hence, if it were ordered according to its

<sup>65</sup> *In Metaph.* 5, l. 6, §834: “Finis autem est [...] bene esse, sive aliquod bonum habere, et ab hoc fine sumitur necessitas secundi modi.” *Ibid.*, §828 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015a23–26): “secundo modo dicuntur necessaria, sine quibus non potest esse vel fieri bonum aliquod, vel vitari aliquod malum, vel expelli; sicut bibere pharmacum, idest medicinam laxativam, dicimus esse necessarium, non quia sine hoc vivere animal non possit; sed ad expellendum, scilicet hoc malum quod est infirmitas, vel etiam vitandum. Est enim hoc necessarium ut non laboret, idest ut non infirmetur aliquis. Similiter navigare ad Aeginam, scilicet ad illum locum, est necessarium, non quia sine hoc non possit homo esse; sed quia sine hoc non potest acquirere aliquod bonum, idest pecuniam. Unde dicitur, quod necessaria est talis navigatio, ut aliquis pecuniam recipiat.”

<sup>66</sup> *In Metaph.* 5, l. 6, §829 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015a26–28): “Tertium modum [...] id quod infert violentiam, et etiam ipsa violentia necessarii nomen accepit; nam violentia necessaria dicitur, et qui vim patitur dicitur de necessitate id facere ad quod cogitur. Quid autem sit faciens vim, manifestat in naturalibus, et in voluntariis. In naturalibus quidem est impetus, sive inclinatio ad aliquem finem, cui respondet voluntas in natura rationali; unde et ipsa naturalis inclinatio appetitus dicitur. Utrumque autem, scilicet et impetum naturalis inclinationis, et propositum voluntatis, contingit impediri et prohiberi. Impediri quidem, in prosecutione motus iam incepti. Prohiberi autem, ne etiam motus incipiat. Illud ergo dicitur esse violentum, quod est praeter impetum, idest praeter inclinationem rei naturalis, et est impediens praevoluntatem, idest propositum in prosecutione motus voluntarii iam incepti, et prohibens etiam ne incipiat. Alia litera habet et hoc est secundum ormin, idest secundum impetum. Violentia enim est cum aliquid agit secundum impetum exterioris agentis, contra voluntatem vim passi. Violentum autem est secundum impetum vim faciens.”

<sup>67</sup> *In Metaph.* 5, l. 6, §835: “Necessitas autem quae est a movente exteriori, pertinet ad tertium modum. Nam violentia est quando aliquid movetur ab exteriori agente ad aliud ad quod ex propria natura aptitudinem non habet. Si enim secundum suam naturam ordinetur ad hoc quod recipiat motum ab exteriori agente, tunc motus non erit violentus, sed naturalis. Sicut patet de motu caelestium orbium a substantiis separatis, et de motu inferiorum corporum a superioribus.”

own nature to receive motion from an external agent, then the motion will not be violent, but natural.

For example, a necessity from an efficient cause happens when someone is forced by some agent in such a way that it cannot act contrarily.<sup>68</sup> This is called **necessity of coaction** (*necessitas coactionis*), and is altogether opposed to will; for we call **violent that which is against the inclination of a thing**, since the motion of will is some inclination into something (*inclinatio quaedam in aliquid*). Hence, just as that is said to be natural which is according to the inclination of (a thing's) nature, so is something said to be voluntary which is according to the inclination of the (power of) will. Therefore, just as it is impossible for something to be at once violent and natural, so is it impossible for someone to be simply (*simpliciter*) forced (*coactum sive violentum*) and (to act out of) voluntary (will).

The necessity of an end is not opposed to the will when the end can only be attained in one mode.<sup>69</sup> For example, from the will to traverse the sea, there comes to be in the will a necessity to want a vessel. Likewise, nor is natural necessity opposed to the will. Indeed, it is necessary that, just as the intellect begins, of necessity (*ex necessitate*), from first principles, so the will, of necessity, begins from the last end, which is happiness; for, in things subject to operations, the end is related as the principle (is related) in things subject to theorizing. Thus, that which befits (*convenit*) something naturally and without motion must be the foundation and principle of all other things, because the nature of a thing is the first in each thing, and every motion proceeds from something immobile.

### 9.12. Multiple Causes of the Same Thing

Since *cause* is said in multiple modes, one thing may have multiple causes not only accidentally (*secundum accidens* = κατὰ συμβεβηκός) but also by itself (*secundum se*).<sup>70</sup>

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<sup>68</sup> *In Sent.* 4, d. 7 q. 1 a. 1 qc. 2 co.: "Alia est necessitas ex causa efficiente, quae dicitur necessitas coactionis." *STh* I, q. 82 a. 1 co.: "Ex agente autem hoc alicui convenit, sicut cum aliquis cogitur ab aliquo agente, ita quod non possit contrarium agere. Et haec vocatur necessitas coactionis. Haec igitur coactionis necessitas omnino repugnat voluntati. Nam hoc dicimus esse violentum, quod est contra inclinationem rei. Ipse autem motus voluntatis est inclinatio quaedam in aliquid. Et ideo sicut dicitur aliquid naturale quia est secundum inclinationem naturae, ita dicitur aliquid voluntarium quia est secundum inclinationem voluntatis. Sicut ergo impossibile est quod aliquid simul sit violentum et naturale; ita impossibile est quod aliquid simpliciter sit coactum sive violentum, et voluntarium."

<sup>69</sup> *STh* I, q. 82 a. 1 co.: "Necessitas autem finis non repugnat voluntati, quando ad finem non potest perveniri nisi uno modo, sicut ex voluntate transeundi mare, fit necessitas in voluntate ut velit navem. Similiter etiam nec necessitas naturalis repugnat voluntati. Quinimmo necesse est quod, sicut intellectus ex necessitate inhaeret primis principiis, ita voluntas ex necessitate inhaereat ultimo fini, qui est beatitudo, finis enim se habet in operativis sicut principium in speculativis, ut dicitur in II Physic. Oportet enim quod illud quod naturaliter alicui convenit et immobiliter, sit fundamentum et principium omnium aliorum, quia natura rei est primum in unoquoque, et omnis motus procedit ab aliquo immobili."

<sup>70</sup> *In Metaph.* 5, l. 2, §773 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b3–6): "quia causa multis modis dicitur, contingit multas causas esse unius rei non secundum accidens, sed secundum se." *De prin. nat.* §4, 1–5: "Viso igitur quod quatuor sunt causarum genera, sciendum est quod non est impossibile quod idem habeat plures causas."

That one thing may accidentally have multiple causes does not seem difficult; for many things can happen to the thing that by itself is a cause of some effect, and all of them can also be said to be causes by accident (► 11.7).<sup>71</sup>

That one thing has multiple causes by themselves (*per se*) is made manifest by this: that *cause* is said in multiple modes.<sup>72</sup> Thus, the maker of the statue is by itself a cause of the statue, and so is the bronze—but not in the same mode; for it is impossible for the same thing, according to the same genus, to have multiple causes by themselves in the same order. Rather, each is a cause of the statue in diverse modes: bronze, as matter; but the artificer—or the art of the sculptor—as an efficient (cause).

Whence, sometimes multiple definitions are assigned to one thing according to diverse causes; but the perfect definition embraces all the causes (► 54.13).<sup>73</sup>

On the other hand, there can be multiple causes by themselves according to the same genus if one is proximate and the other remote (► 11.3).<sup>74</sup> Likewise, there can be multiple causes by themselves such that none of them is a sufficient cause, and yet all of them constitute a sufficient cause in conjunction, as happens when many persons run a ship (► 11.10).

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<sup>71</sup> *In Metaph.* 5, l. 2, §773: “Quod enim secundum accidens multae sint causae unius rei, hoc difficile non videbatur; quia rei, quae est causa per se alicuius effectus, multa possunt accidere, qua omnia illius effectus possunt etiam causa per accidens dici.”

<sup>72</sup> *In Metaph.* 5, l. 2, §773 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b6–9): “sed, quod causae per se sint multae unius, hoc fit manifestum ex hoc, quod causae multipliciter dicuntur. Statuae enim causa per se et non per accidens est factor statuae, et aes; sed non eodem modo. Hoc enim est impossibile quod eiusdem secundum idem genus, sint multae causae per se eodem ordine [...]. Sed in proposito diversis modis ista duo sunt causa statuae: aes quidem ut materia, artifex vero ut efficiens.” *In Physic.* 2, l. 5, n. 7 (cf. ARISTOTLE, *Physica* B.3, 195a5–8): “sicut causa statuae est ars statuifica ut efficiens, et aes ut materia.” *De prin. nat.* §4, 3–5: “ut ydolum cuius causa est cuprum et artifex, sed artifex ut efficiens, cuprum ut materia.”

<sup>73</sup> *In Physic.* 2, l. 5, n. 7: “Et inde est quod aliquando unius rei assignantur plures definitiones secundum diversas causas; sed perfecta definitio omnes causas complectitur.”

<sup>74</sup> *In Metaph.* 5, l. 2, §773: “licet possint esse plures causae hoc modo, quod una sit proxima, alia remota: vel ita, quod neutrum sit causa sufficiens, sed utrumque coniunctim; sicut patet in multis, qui trahunt navem.”

## 10. Order among Causes

Hitherto, we have determined that: (1) a principle is that from which something originates; (2) causes are principles upon which something depends according to its being or to its coming-to-be; (3) according to the four diverse ratios of causing, there are four genera or species of causes: material, formal, efficient and final. Here, we aim to determine the order among these kinds of causes.

### 10.1. Order of Ratio

The name *cause* conveys (*importat*) some order; and an order is found in causes, one to another.<sup>1</sup> Causes have an order to one another (*ad invicem ordinem habent*) because the *ratio* of one is taken from (the *ratio* of) another:<sup>2</sup>

1. The *ratio* of **efficient** cause is taken from (the *ratio* of) **end**; for every agent acts for the sake of an end (*omne agens agit propter finem*).<sup>3</sup>

2. The *ratio* of **form** is (taken from the *ratio* of the) **efficient** (*cause*).<sup>4</sup> Since *the agent produces its like* (*agens agit sibi simile*), the mode of the form that is attained from the action (*modus formae quae ex actione consequitur*) must also be according to the mode of the agent (*secundum modum agentis*).

3. The *ratio* of **matter** is taken from (the *ratio* of) **form**; for such must be the matter as the form requires (*talem oportet esse materiam, qualem forma requirit*).<sup>5</sup>

Whenever things are related to each other in such a way that one is the cause of the other, the one that has the *ratio* of *cause* can have (the act of) being (*esse*) without the other, but not conversely.<sup>6</sup>

### 10.2. Coincidence of Causes

Three causes can coincide (*incidere*) in one (thing): the form, the end, and the efficient (*cause*).<sup>7</sup> For example, in the generation of fire, fire generates fire, so fire is an efficient

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<sup>1</sup> *In De causis*, pr.: “nomen causae ordinem quemdam importat et in causis ordo ad invicem invenitur.”

<sup>2</sup> *In Post. an.* 1, l. 16, 63–65: “Cause autem ad invicem ordinem habent, nam ex una sumitur ratio alterius.”

<sup>3</sup> *In Post. an.* 1, l. 16, 70–72: “ex fine autem sumitur ratio efficientis, nam omne agens agit propter finem.”

<sup>4</sup> *In Post. an.* 1, l. 16, 67–70: “efficiens autem est ratio forme, quia enim agens agit sibi simile, oportet quod secundum modum agentis sit etiam modus forme que ex actione consequitur.”

<sup>5</sup> *In Post. an.* 1, l. 16, 65–67: “ex forma enim sumitur ratio materie, talem enim oportet esse materiam, qualem forma requirit.”

<sup>6</sup> *De ente*, c. 4, 42–45: “Quecumque enim ita se habent ad invicem quod unum est causa esse alterius, illud quod habet rationem cause potest habere esse sine altero, sed non conuertitur.”

<sup>7</sup> *De prin. nat.* §4, 95–103: “tres cause possunt incidere in unum, scilicet forma, finis et efficiens, sicut patet in generatione ignis: ignis enim generat ignem, ergo ignis est causa efficiens in quantum generat;

cause insofar as it generates; and again, fire is a form insofar as it makes to be in act what was prior in potency; and again, it is an end insofar as it is intended by the agent, and insofar as the operations of the agent itself terminate in it.

### 10.3. Order of Causes of the Same Thing

According to the order of causes of the same thing, it is evident that, in things having four (non-coincident) causes, one cause is—in some mode—the cause of another:<sup>8</sup>

1. Matter is for the sake of form (*propter formam*), and not conversely, since the definition that is taken from the formal cause is the cause of the definition that is taken from the material cause of the same thing (► 10.1, ¶3).<sup>9</sup>

2. Since that which is generated attains a form through the action of that which generates, it follows that the agent is—in some mode—a cause of the form (► 10.1, ¶2); and (the act of) defining (is a cause) of the definition.<sup>10</sup>

3. Ultimately, every agent acts (*agit*) for the sake of an end (*propter finem*); whence, also the definition that is taken from the end is—in some mode—a cause of the definition that is taken from the agent cause (► 10.1, ¶1).<sup>11</sup>

Beyond this, it is impossible to proceed in the genera of causes; whence, the end is said (to be the) *cause of causes* (► 10.9).<sup>12</sup> However, (it is possible to proceed) in each of the genera of causes from posterior to prior (► 11.3); but definitions must be given through proximate causes (► 54.13).

### 10.4. Cause and Caused in Respect of the Same Thing

In whatever genus of cause, the cause is naturally prior to the (thing) caused.<sup>13</sup> Whence, it is impossible for something to be cause and caused according to the same genus of

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et iterum ignis est forma in quantum facit esse actu quod prius erat potentia; et iterum est finis in quantum est intentum ab agente et in quantum terminantur ad ipsum operationes ipsius agentis.”

<sup>8</sup> *In Post. an. 2*, l. 8, 27–30: “Alio modo potest intelligi [sc., quod *quorundam est quedam altera causa, quorundam autem non*] secundum ordinem causarum eiusdem rei. Manifestum est enim in rebus habentibus quatuor causas, quod una causa est quodam modo causa alterius.”

<sup>9</sup> *In Post. an. 2*, l. 8, 30–34: “quia enim materia est propter formam et non e converso, ut probatur in II Phisicorum, diffinitio que sumitur ex causa formali, est causa diffinitionis, que sumitur ex causa materiali eiusdem rei.”

<sup>10</sup> *In Post. an. 2*, l. 8, 34–37: “et quia generatum consequitur formam per actionem generantis, consequens est quod agens sit quodam modo causa forme et diffinitio diffinitionis.”

<sup>11</sup> *In Post. an. 2*, l. 8, 37–40: “ulterius autem omne agens agit propter finem, unde et diffinitio que a fine sumitur, est quodam modo causa diffinitionis que sumitur a causa agente.”

<sup>12</sup> *In Post. an. 2*, l. 8, 41–45: “ulterius autem non est procedere in generibus causarum, unde dicitur quod finis est causa causarum. Potest tamen in singulis causarum generibus a posterioribus ad priora <procedi>; set diffinitiones debent dari per causas proximas.”

<sup>13</sup> *De veritate*, q. 28 a. 7 co.: “in quolibet genere causae, causa naturaliter est prior causato. Contingit autem secundum diversa genera causarum idem respectu eiusdem esse causam et causatum.” *In Sent.*



cause. However, it is possible for the same thing to be both a cause and (the thing) caused in respect of the same (thing) according to diverse genera of causes or in diverse modes; for nothing prevents something from being prior and posterior to another according to diverse *ratios*.

### 10.5. Correspondence between Intrinsic and Extrinsic Causes

A thing is said to be caused because it has a cause of its (act of) being (*esse*).<sup>14</sup> This cause of being (*causa essendi*) is either: **(1)** the same as the essence of the thing, as form and matter are parts of the essence (► 10.6); or **(2)** other (than the essence of the thing), as the efficient cause and the end (► 10.8), which are—in some mode—causes of form and of matter; for the agent operates for the sake of an end, and unites form to matter.

Thus, of the four (genera of) causes, two correspond to each other (i.e., the extrinsic); and likewise, the other two (i.e., the intrinsic): matter and form (i.e., the intrinsic causes correspond to each other) because form gives (the act of) being (*forma dat esse*), while matter receives it (*materia recipit*); likewise, the efficient (cause) and the end (i.e., the extrinsic causes) correspond to each other because the efficient is the principle of motion, while the end is the terminus (of motion).<sup>15</sup>

### 10.6. Matter and Form

The relation between matter and form is such that: **(1)** according to the genus of material cause, matter is a cause of form as sustaining it; **(2)** according to the genus of the formal cause, form is a cause of matter as making it be in act.<sup>16</sup> Form is prior to matter according to the *ratio* of fulfilling (*secundum rationem complementi*), while matter is prior to form in generation and in time in anything that is moved from potency into act (► 46.29).<sup>17</sup>

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4, d. 17 q. 1 a. 4 qc. 1 co.: “In causis autem contingit quod idem est causa et causatum, secundum diversum genus causae, ut patet in 2 Physic. et in 5 Metaph.” *In Metaph.* 5, l. 2, §774: “Secundum enim idem genus causae aliquid esse causam et causatum est impossibile.” *De veritate*, q. 28 a. 7 co.: “nihil prohibet aliquid altero esse prius et posterius secundum diversum genus causae.” *In Physic.* 2, l. 5, n. 7: “Nihil enim prohibet aliquid esse prius et posterius altero secundum diversas rationes.” *De prin. nat.* §4, 9–11: “possibile est ut aliquid idem sit causa et causatum respectu eiusdem, sed diuersimode.”

<sup>14</sup> *In Post. an.* 2, l. 7, 33–41: “oportet quod eius quod est rem esse, sit aliqua causa (per hoc enim dicitur aliquid causatum, quod habet causam sui esse); hec autem causa essendi aut est eadem, scilicet cum essentia ipsius rei, aut alia (eadem quidem, sicut forma et materia, que sunt partes essencie; alia uero, sicut efficiens et finis, que quidem due cause sunt quodam modo cause forme et materie, nam agens operatur propter finem et unit formam materie).”

<sup>15</sup> *In Metaph.* 5, l. 2, §775: “Sciendum est autem, quod cum sint quatuor causae superius positae, earum duae sibiinvicem correspondent, et aliae duae similiter. Nam efficiens et finis sibi correspondent invicem, quia efficiens est principium motus, finis autem terminus. Et similiter materia et forma: nam forma dat esse, materia autem recipit.”

<sup>16</sup> *In Sent.* 4, d. 17 q. 1 a. 4 qc. 1 co.: “de habitudine quae est inter materiam et formam: [...] secundum genus causae materialis materia est causa formae quasi sustentans ipsam, et forma est causa materiae quasi faciens eam esse actu secundum genus causae formalis.”

<sup>17</sup> *In Physic.* 2, l. 5, n. 7: “Et similiter forma est prior quam materia secundum rationem complementi, materia autem est prius quam forma generatione et tempore in omni eo quod movetur de potentia in actum.”

It is necessary for form to be something of that to which it gives (the act of) being (*esse*); for form and matter are intrinsic principles that constitute the essence of the thing.<sup>18</sup> Matter is said to be a cause of form insofar as form is only in matter.<sup>19</sup> Likewise, form is a cause of matter insofar as matter has being in act only by form; for matter and form are said (to be) relative to one another (► 37.1, ¶2); they are said (to be related) to the composite as *parts to the whole* (► 13.1); and as *the simple to the composite*.

### 10.7. Termination of Matter and of Form

In some mode, both, matter is ended (*finitur*) by form and form (is ended) by matter:<sup>20</sup>

**1. Matter is ended by form** insofar as matter, before it receives form, is in potency to many forms; but when it receives one, it is terminated by it.

**2. Form is ended by matter** insofar as form, considered in itself, is common to many; but by being received in matter, it comes to be the determined form of *this* thing.

### 10.8. Agent and End

The efficient is a cause of the end; and the end is a cause of the efficient.<sup>21</sup> The end is prior according to *ratio* (*secundum rationem*) and posterior in being (*in esse*); the agent, conversely.<sup>22</sup> Thus,

**1.** The efficient is a cause of the end in respect of the (act of) being; for the efficient cause, by moving, brings the end into being, since the end is in act only by the operation of the agent.<sup>23</sup> The efficient is a cause of that which is an end—e.g., health—but does not make the end be an end.<sup>24</sup> Hence, it is not the cause of the causality of the end—that is,

<sup>18</sup> *Q. d. de anima*, a. 10 co.: “oportet quod forma sit aliquid eius cui dat esse; nam forma et materia sunt principia intrinsecus constituentia essentiam rei.”

<sup>19</sup> *De prin. nat.* §4, 37–43: “Materia enim dicitur causa forme in quantum forma non est nisi in materia; et similiter forma est causa materie in quantum materia non habet esse in actu nisi per formam: materia enim et forma dicuntur relative ad inuicem, ut dicitur in II Phisicorum; dicuntur enim ad compositum sicut partes ad totum et simplex ad compositum.”

<sup>20</sup> *STh* I, q. 7 a. 1 co.: “Finitur autem quodammodo et materia per formam, et forma per materiam. Materia quidem per formam, in quantum materia, antequam recipiat formam, est in potentia ad multas formas, sed cum recipit unam, terminatur per illam. Forma vero finitur per materiam, in quantum forma, in se considerata, communis est ad multa, sed per hoc quod recipitur in materia, fit forma determinate huius rei.” Cf. *Quodlibet* 3, q. 2 a. 1 co.; *De spirit. creat.*, a. 1 ad 2; *In Sent.* 4, d. 49 q. 2 a. 1 ad 12; *ScG* 2, 95 n. 3.

<sup>21</sup> *In Metaph.* 5, l. 2, §775: “Est igitur efficiens causa finis, finis autem causa efficientis.”

<sup>22</sup> *In Physic.* 2, l. 5, n. 7: “finis enim est prius secundum rationem, sed posterius in esse; agens autem e converso.”

<sup>23</sup> *In Metaph.* 5, l. 2, §775: “Efficiens est causa finis quantum ad esse quidem, quia movendo perducit efficiens ad hoc, quod sit finis.” *De prin. nat.* §4, 16–17: “Efficiens enim dicitur causa respectu finis, cum finis non sit in actu nisi per operationem agentis.”

<sup>24</sup> *De prin. nat.* §4, 19–24: “Vnde efficiens est causa illius quod est finis—ut sit sanitas—, non tamen facit finem esse finem; et ita non est causa causalitatis finis, id est non facit finem esse finalem: sicut medicus facit sanitatem esse in actu, non tamen facit quod sanitas sit finis.”

it does not make the end be an end. For example, the physician makes health be in act; but does not make health be an end.

2. The end is a cause of the efficient not in respect of the (act of) being, but in respect of the *ratio* of *causality*, for the efficient is a cause insofar as it acts, but it acts only for the sake of an intended end.<sup>25</sup> Whence, the efficient has its causality from the end. The end is not a cause of that which is efficient: rather, it is the cause of the efficient being efficient.<sup>26</sup> For example, health—i.e., that which the physician causes—does not make the physician be a physician: rather, it makes the physician be an efficient (cause). Thus, the end is the cause of the causality of the efficient because it makes the efficient be efficient.

### 10.9. Causes of Each Other

(From what has just been said), it is possible for some to be causes of each other according to a diverse species of cause; for, then, the causes are said in multiple modes.<sup>27</sup>

For example, (in extrinsic causes) purgation is a cause of health in the genus of efficient cause; but health is a cause of purgation according to the genus of final cause.<sup>28</sup> Likewise, exercise is an efficient cause of wellbeing; and wellbeing is a final cause of exercise.

In turn, (in intrinsic causes) form and matter are causes of one another in respect of (the act of) being (*quantum ad esse*):<sup>29</sup> form is a cause of matter insofar as it gives (to) matter

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<sup>25</sup> *In Metaph.* 5, l. 2, §775: “Finis autem est causa efficientis non quantum ad esse, sed quantum ad rationem causalitatis. Nam efficiens est causa in quantum agit: non autem agit nisi causa finis. Unde ex fine habet suam causalitatem efficiens.” *De prin. nat.* §4, 18–19: “finis dicitur causa efficientis, cum non operetur nisi per intentionem finis.”

<sup>26</sup> *De prin. nat.* §4, 25–31: “Finis autem non est causa illius quod est efficiens, sed est causa ut efficiens sit efficiens; sanitas enim non facit medicum esse medicum—et dico sanitatem que fit operante medico—, sed facit ut medicus sit efficiens. Unde finis est causa causalitatis efficientis, quia facit efficiens esse efficiens.”

<sup>27</sup> *In Physic.* 2, l. 5, n. 7: “quaedam sibi invicem sunt causae secundum diversam speciem causae.” *In Metaph.* 5, l. 2, §774: “contingit, quod aliqua duo adinvicem sibi sunt causae: quod impossibile est in eodem genere causae. Manifestum vero fit multipliciter dictis causis.” Cf. ARISTOTLE, *Physica* B.3, 195a8–11 (= *Metaphysica* Δ.2, 1013b9–11): “ἔστι δέ τινα καὶ ἀλλήλων αἴτια [...] ἀλλ’ οὐ τὸν αὐτὸν τρόπον, ἀλλὰ τὸ μὲν ὡς τέλος τὸ δ’ ὡς ἀρχὴ κινήσεως.”

<sup>28</sup> *De veritate*, q. 28 a. 7 co.: “purgatio est causa sanitatis in genere causae efficientis, sanitas vero est causa purgationis secundum genus causae finalis.” *In Physic.* 2, l. 5, n. 7 (cf. ARISTOTLE, *Physica* B.3, 195a9–10): “laborare est causa efficiens bonae habitudinis, bona autem habitudo est causa finalis laboris.” Cf. *In Metaph.* 5, l. 2, §774 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b9–10): “«laborare causa est euexiae», idest bonae dispositionis, quae causatur ex labore moderato, qui ad digestionem confert et superfluos humores consumit.” St. Thomas offers another reading, according to which pain resulting from the incision of a wound is a cause of health as an efficient cause or principle of motion; and health is a cause of that pain as an end, *ibid.*: “Sicut dolor ex incisione vulneris est causa sanitatis, ut efficiens sive principium motus: sanitas autem est causa illius doloris, ut finis.” This reading follows the *translatio anonyma*, which, as St. Thomas says (in *ibid.*), is inferior: “Alia litera habet melius.” Cf. *In Sent.* 4, d. 17 q. 1 a. 4 qc. 1 co.: “ambulatio est causa efficiens sanationis, et sanatio est causa finalis ambulationis.” *De prin. nat.* §4, 11–14: “deambulatio est causa sanitatis ut efficiens, sed sanitas est causa deambulationis ut finis, deambulatio enim est aliquando propter sanitatem.”

<sup>29</sup> *In Metaph.* 5, l. 2, §775: “Forma autem et materia sibi invicem sunt causa quantum ad esse. Forma quidem materiae in quantum dat ei esse actu; materia vero formae in quantum sustentat ipsam.” *De*

being in act (*inquantum dat ei* [sc., *materiae*] *esse actu*), while matter (is a cause of form) insofar as (matter) sustains it (*inquantum sustentat ipsam* [sc., *formam*]). For example, the body is the matter of the soul, while the soul is the form of the body.<sup>30</sup>

### 10.10. Primacy of the Final Cause

Although in some things the end is last in being (*ultimus in esse*), it is always prior in causality (*in causalitate*).<sup>31</sup> Hence, the principal (*potissima*) species of cause among all is the final cause, which is said (to be) *the cause of the causes* (*causa causarum*); for it is the cause of the causality (*causa causalitatis*) in all causes.

The end is the cause of the causality of the efficient cause because the agent acts for the sake of an end.<sup>32</sup> The efficient cause, in turn, is the cause of the causality of both matter and form; for, through its motion, it makes matter susceptible of form; and (makes) form be in matter. The end makes matter be matter, and form be form, because matter receives (< *suscipiat*) form only for (the sake of) an end; and form completes (< *perficiat*) matter only for (the sake of) the end. Consequently, the end is the cause of the causality of both matter and form, too.

For example, in artifacts, form is ordered to use as to an end; and matters (are ordered) to forms as to an end.

In all those (things) that are for the sake of an end (*propter finem*), the definition by final cause is the *ratio* of the definition by the material cause.<sup>33</sup> For example, a house must be built from stone and timber (i.e., its material causes) because it is a cover (*operimentum*) that protects us from the cold and heat. Whence, in those things in which something is done (*agitur*) for the sake of an end (*propter finem*), as in natural, moral, and artificial

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*veritate*, q. 28 a. 7 co.: “*materia causa est formae aliquo modo in quantum sustinet formam, et forma est aliquo modo causa materiae in quantum dat materiae esse actu.*”

<sup>30</sup> *De prin. nat.* §4, 14–15: “*corpus est materia anime, anima uero est forma corporis.*”

<sup>31</sup> *In Metaph.* 5, l. 3, §782: “*licet finis sit ultimus in esse in quibusdam, in causalitate tamen est prior semper. Unde dicitur causa causarum, quia est causa causalitatis in omnibus causis.*” *In Physic.* 2, l. 5, n. 11 (cf. ARISTOTLE, *Physica* B.3, 195a23–27): “*In aliis vero causis invenitur alia ratio causae, secundum scilicet quod finis vel bonum habet rationem causae. Et haec species causae potissima est inter alias causas: est enim causa finalis aliarum causarum causa [...]: et pro tanto dicitur finis causa causarum.*” *De prin. nat.* §4, 34–36: “*dicitur quod finis est causa causarum, quia est causa causalitatis in omnibus causis.*” Note that *causa causarum* is a Semitism, akin to שִׁיר הַשִּׁירִים.

<sup>32</sup> *In Metaph.* 5, l. 3, §782: “*Est enim [finis] causa causalitatis efficientis [...]. Efficiens autem est causa causalitatis et materiae et formae. Nam facit per suum motum materiam esse susceptivam formae, et formam inesse materiae. Et per consequens etiam finis est causa causalitatis et materiae et formae.*” *In Physic.* 2, l. 5, n. 11: “*Manifestum est enim quod agens agit propter finem; et similiter [...] in artificialibus, [...] formae ordinantur ad usum sicut ad finem, et materiae in formas sicut in finem.*” *De prin. nat.* §4, 31–36: “*similiter facit materiam esse materiam et formam esse formam, cum materia non suscipiat formam nisi per finem, et forma non perficiat materiam nisi per finem.*”

<sup>33</sup> *In Post. an.* 1, l. 4, 41–47: “*in omnibus que sunt propter finem, diffinitio que <est> per causam finalem est ratio diffinitionis que est per causam materialem et medium probans ipsam: propter hoc enim oportet ut domus fiat ex lapidibus et lignis, quia est operimentum prohibens nos a frigore et estu.*”

things, the most forceful demonstrations are taken from the end (►54.13; note that even the definition of *demonstration* is taken from the end: *to scientifically know*; ►53.2).<sup>34</sup>

### 10.11. Contrary Causes of the Same Thing

Contraries (►43) can also be causes of the same.<sup>35</sup> This would seem difficult or even impossible if they were to be referred to one another in a like mode (*similiter*); but one is a cause of the other in an unlike mode (*dissimiliter*). Thus, that which is the cause of *this* by its presence, is accounted as a cause of the contrary when it is absent; for an opposite is a cause of (its) opposite in the same mode as the latter is a cause of the former.

For example, the pilot is a cause of the ship's safety by his presence; but we say that his absence is the cause of the ship's loss.<sup>36</sup> And one and the other (of these two contraries) is reduced to the same genus of cause: the mover (i.e., efficient) cause.<sup>37</sup>

### 10.12. Order of Nature

Speaking simply (*simpliciter*), that is prior in the order of nature (►47.1) which is prior according to the genus of the cause that is prior in the *ratio* of *causality*.<sup>38</sup> Thus, the end is called *the cause of the causes* because all other causes receive their being causes from the final cause; for the efficient acts only for the sake of an end; from the action of the efficient, the form is reduced towards the material cause; and matter sustains the form.

In the *ratio of material cause*, whenever one form is expelled from matter and another (form) is induced (►48.6), the expulsion of the preceding form is naturally prior; for every disposition towards a form is reduced to the material cause; and the denudation of matter

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<sup>34</sup> *In Metaph.* 5, l. 3, §782: "et ideo potissimae demonstrationes sumuntur a fine, in illis in quibus agitur aliquid propter finem, sicut in naturalibus, in moralibus et artificialibus."

<sup>35</sup> *In Metaph.* 5, l. 2, §776 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b11–13): "dicit [Philosophus], quod idem contrariorum contingit esse causam. Quod etiam difficile videbatur vel impossibile, si similiter ad utrumque referatur; sed dissimiliter est causa utriusque. Illud enim, quod per sui praesentiam est causa huius, quando est absens «causamur» id est accusamus ipsum «de contrario,» id est dicimus ipsum esse causam contrarii. [...] Eodem enim modo oppositum est causa oppositi, quo haec est causa huius." *In Physic.* 2, l. 5, n. 7 (cf. ARISTOTLE, *Physica* B.3, 195a11–13): "idem est causa contrariorum quandoque." *De prin. nat.* §4, 5–6: "Non autem est impossibile ut idem sit causa contrariorum."

<sup>36</sup> *In Metaph.* 5, l. 2, §776 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b13–15): "Sicut patet, quod gubernator per sui praesentiam est causa salutis navis, dicimus eius absentiam esse causam perditionis. Ne autem putetur quod hoc sit referendum ad diversa genera causarum sicut et priora duo, ideo subiungit quod utrumque istorum reducitur ad idem genus causae, scilicet ad causam moventem." *In Physic.* 2, l. 5, n. 7 (cf. ARISTOTLE, *Physica* B.3, 195a14–15): "sicut per suam praesentiam gubernator est causa salutis navis, per absentiam autem suam causa est submersionis eius." *De prin. nat.* §4, 6–8: "sicut gubernator est causa salutis navis et submersionis, sed huius per absentiam, illius quidem per praesentiam."

<sup>37</sup> *In Metaph.* 5, l. 2, §776 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b15–16): "Ne autem putetur quod hoc sit referendum ad diversa genera causarum sicut et priora duo, ideo subiungit [Philosophus] quod utrumque istorum reducitur ad idem genus causae, scilicet ad causam moventem."

<sup>38</sup> *De veritate*, q. 28 a. 7 co.: "Sed tamen illud est prius simpliciter dicendum ordine naturae, quod est prius secundum genus illius causae quae est prior in ratione causalitatis; sicut finis, qui dicitur causa causarum, quia a causa finali omnes aliae causae recipiunt quod sint causae: quia efficiens non agit nisi propter finem, et ex actione efficientis forma perficit materiam, et materia sustinet formam."

from a contrary form is some disposition towards the undertaking of a form (►46.29, ¶1).<sup>39</sup> Also, the subject—that is, matter—is numerable; and it is numbered according to *ratio* insofar as privation—which is had from the part of matter and of subject—is found in it, besides the substance of the subject.

On the other hand, in the *ratio* of *formal cause*, the introduction of the form—which formally perfects the subject and expels the contrary—is naturally prior (►46.29, ¶2).<sup>40</sup> The form and the end coincide (*incidunt*) in the same (thing) in number, while the form and the efficient (cause coincide) in the same (thing) in species insofar as the form is a likeness (*similitudo*) of the agent. Hence, the introduction of the form is prior naturally according to the order of the efficient and final causes. From what has been said, it is evident that (form) is simply prior in the order of nature (►46.29, ¶2; 12.4).

### 10.13. Order in Causing vs. in the Thing Caused

That which is first in causing is last in (the thing) caused (*id quod est primum in causando, ultimum est in causato*).<sup>41</sup> For example, fire heats first, before it induces the form of fire (i.e., according to the order in the thing caused), although in fire heat follows upon the substantial form (i.e., according to the order in causing).

1. Thus, in **causing** (*in causando*):<sup>42</sup>

(a) The *good* and the *end* is found first, which moves the efficient (cause).

(b) Secondly, the *action* of the efficient (cause), which moves towards the form.

(c) Thirdly, comes the *form*.

2. Whence, it must be conversely in **(the thing) caused** (*in causato*):<sup>43</sup>

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<sup>39</sup> *De veritate*, q. 28 a. 7 co.: “quandocumque a materia una forma expellitur et alia inducitur, expulsio formae praecedentis est prior naturaliter in ratione causae materialis: omnis enim dispositio ad formam reducitur ad causam materialem: denudatio autem materiae a forma contraria, est quaedam dispositio ad formae susceptionem. Subiectum etiam, id est materia, ut dicitur in libro I Physic. numerabilis est: numeratur enim secundum rationem, in quantum in eo praeter subiecti substantiam invenitur privatio, quae se tenet ex parte materiae et subiecti.”

<sup>40</sup> *De veritate*, q. 28 a. 7 co.: “Sed in ratione causae formalis est prior naturaliter introductio formae; quae formaliter perficit subiectum, et expellit contrarium. Et quia forma et finis in idem numero incidunt, forma vero et efficiens in idem specie, in quantum forma est similitudo agentis; ideo formae introductio est prior naturaliter secundum ordinem causae efficientis et finalis: et ex hoc patet, secundum praedicta, quod ordine naturae sit simpliciter prior.”

<sup>41</sup> *STh* I, q. 5 a. 4 co.: “Videmus enim quod id quod est primum in causando, ultimum est in causato, ignis enim primo calefacit quam formam ignis inducat, cum tamen calor in igne consequatur formam substantialem.”

<sup>42</sup> *STh* I, q. 5 a. 4 co.: “In causando autem, primum invenitur bonum et finis, qui movet efficientem; secundo, actio efficientis, movens ad formam; tertio advenit forma.”

<sup>43</sup> *STh* I, q. 5 a. 4 co.: “Unde e converso esse oportet in causato, quod primum sit ipsa forma, per quam est ens; secundo consideratur in ea virtus effectiva, secundum quod est perfectum in esse (quia

**(a)** First is the *form*, by which the being is.

**(b)** The *effective virtue* (*virtus effectiva*, i.e., the active power; ►22.2), according to which (a thing) is perfect in being, is considered in (the form) secondly; for each thing is perfect when it can produce its like (*unumquodque tunc perfectum est, quando potest sibi simile facere*).

**(c)** Thirdly, follows the *ratio* of *good*, through which perfection (►23) is founded in the being.

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unumquodque tunc perfectum est, quando potest sibi simile facere, ut dicit Philosophus in IV Meteor.); tertio consequitur ratio boni, per quam in ente perfectio fundatur.”





## 11. Modes of a Cause

*In this chapter, we determine the division of a genus or species of cause according to its diverse—or, as it were, accidental—modes (► 9.2, ¶2).*

### 11.1. Division in Modes

Any of the four causes—i.e., efficient, material, formal, and final—is divided in multiple modes that are distinguished also according to the same species of cause.<sup>1</sup>

ARISTOTLE distinguishes them according to four divisions or combinations of modes:<sup>2</sup>

**(1) prior vs. posterior (► 11.3); (2) by itself vs. by accident (► 11.7); (3) in potency vs. in act (► 11.9); and (4) simple vs. composite (► 11.10).**

When these multiple modes are thus recapitulated, they are fewer; and the combinations of modes are fewer than the (combined) modes (► 11.11).<sup>3</sup> Thus, *by itself* and *by accident* are two modes; yet, they are reduced to one heading insofar as the consideration of both is the same.<sup>4</sup> And it is likewise (the case) concerning the other opposite modes; for causes are said in multiple modes not only in respect of diverse species of causes (► 9.2, ¶1), but also in respect of co-special causes, which are reduced to one species of cause.

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<sup>1</sup> *In Metaph.* 5, l. 3, §784 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b29–30): “Dicit ergo [Philosophus], quod multi sunt modi causarum.” *In Physic.* 2, l. 6, n. 1 (cf. ARISTOTLE, *Physica* B.3, 195a27–28): “Postquam Philosophus distinxit species causarum, hic distinguit diversos modos causarum, etiam secundum eandem speciem causae. [...] Circa primum distinguit modos causarum secundum quatuor divisiones.” *De prin. nat.* §5, 1–4: “Viso igitur quod sint quatuor cause, scilicet efficiens, materialis, formalis et finalis, sciendum est quod quelibet istarum causarum diuiditur multis modis.”

<sup>2</sup> **(1)** *In Physic.* 2, l. 6, n. 2 (cf. ARISTOTLE, *Physica* B.3, 195a29–32): “Prima ergo divisio vel combinatio modorum est, quod in eadem specie causae dicitur una causa prior altera.” *In Metaph.* 5, l. 3, §785 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b31–34): “Dicitur enim [causa] una prior, et altera posterior.” *De prin. nat.* §5, 4–5: “Dicitur enim aliquid causa per prius et aliquid per posterius.” **(2)** *In Physic.* 2, l. 6, n. 4 (cf. ARISTOTLE, *Physica* B.3, 195a32–b3): “Secundam divisionem [...]. Est enim praeter causas *per se*, accipere causas *per accidens*.” *In Metaph.* 5, l. 3, §787 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b34–1014a6): “Alia divisio est causarum, secundum quod aliquid dicitur esse causa per se et per accidens.” *De prin. nat.* §5, 29: “Item causarum alia est per se, alia per accidens.” **(3)** *In Physic.* 2, l. 6, n. 5 (cf. ARISTOTLE, *Physica* B.3, 195b3–9): “Tertiam divisionem [...], quaedam dicuntur causae in potentia [...]; quaedam vero [...] in actu.” *In Metaph.* 5, l. 3, §790 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a7–13): “Tertia distinctio est, [...] quaedam sunt causae in potentia, quaedam [...] in actu.” *De prin. nat.* §5, 56–57: “Item causarum quedam est actu, quedam potentia.” **(4)** *In Physic.* 2, l. 6, n. 7 (cf. ARISTOTLE, *Physica* B.3, 195b10–12): “Quartam divisionem [...] quandoque complexe accipiuntur causae.” *In Metaph.* 5, l. 3, §792 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a13–15): “Uterius ponit [Philosophus] quartam distinctionem causae, quae est in simplex et in compositum.” *De prin. nat.* §5, 38–39: “Item causarum quedam est simplex et quedam composita.”

<sup>3</sup> *In Metaph.* 5, l. 3, §784 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b30): “sed pauciores [sc., modi causarum] inveniuntur quando «capitulatim,» idest quodam compendio comprehenduntur.” *In Physic.* 2, l. 6, n. 1 (cf. ARISTOTLE, *Physica* B.3, 195a27–29): “Dicit ergo [Philosophus] primo quod multi numero sunt modi causarum: sed si reducuntur capitulatim, sive in quadam summa, ad aliqua communia, inveniuntur pauciores. Vel *capitales* [sive *capitularie* < κεφαλαιούμενοι] accipiuntur secundum combinationem: manifestum est enim quod pauciores sunt combinationes modorum quam modi.”

<sup>4</sup> *In Metaph.* 5, l. 3, §784: “Per se enim et per accidens sunt duo modi; tamen reducuntur ad unum capitulum, secundum quod est eadem consideratio de utroque. Et similiter est de aliis modis oppositis. Causae enim multis modis dicuntur, non solum quantum ad diversas species causae, sed etiam quantum ad causas conspicales, quae scilicet reducuntur ad unam speciem causae.”

## 11.2. Coincidence in One Mode

Cause and effect do not coincide (*non incidunt*) in the same (thing) according to the same mode of cause, even if it is possible for the same (thing) to be cause and caused according to diverse genera of causes (► 10.4): for example, the end is a cause of the efficient (► 10.8, ¶2); and the efficient is a cause of the end (► 10.8, ¶1).<sup>5</sup>

However, in respect of diverse (things), it is possible for something to be a cause of one and (to be) caused by another even according to the same genus (and the same mode) of cause.<sup>6</sup>

## 11.3. Prior vs. Posterior

According to the first division or combination of modes, one cause is said (to be) **prior** and another **posterior** (► 8.6) in respect of the same species of cause.<sup>7</sup> (It is the same to say) **remote** cause and *prior* cause, and it is the same to say **proximate** cause and *posterior* cause. Hence, these two divisions, one by *prior* and *posterior* causes, and the other by *remote* and *proximate* causes, signify the same.

The *prior* cause is understood to be **more universal**, while the *posterior* cause (is understood to be more) **proper** (or more *special*).<sup>8</sup> Hence, that which is *more universal* is always said (to be a) *remote* cause; that which is **more special** (is said to be a more) *proximate* (cause). A **common** cause is *prior* and **superior** to *proper* causes: the more a cause is *superior*, the more it is *universal*, the greater is its virtue (*virtus*, i.e., power), and (the more) it extends to many.

*The higher a cause is, the more its causality extends to many.*<sup>9</sup> The higher cause has its proper higher caused, which is more common and is found in more (things). However, the

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<sup>5</sup> *In Sent.* 2, d. 36 q. 1 a. 3 ad 2: “Ad secundum dicendum, quod causa et effectus respectu ejusdem non incidunt in idem, secundum eundem modum causae (quia secundum diversa genera causarum etiam hoc non est inconveniens ut idem sit ejusdem causa et causatum, sicut finis est causa efficientis, et efficiens est causa finis).”

<sup>6</sup> *In Sent.* 2, d. 36 q. 1 a. 3 ad 2: “sed respectu diversorum non est inconveniens ut etiam secundum idem genus causae aliquid sit causa unius, et causatum ab altero.”

<sup>7</sup> *In Metaph.* 5, l. 3, §785 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b31–32): “Dicitur enim [causa] una prior, et altera posterior.” *In Physic.* 2, l. 6, n. 2 (cf. ARISTOTLE, *Physica* B.3, 195a30): “Prima ergo divisio vel combinatio modorum est, quod in eadem specie causae dicitur una causa prior altera.” *De prin. nat.* §5, 14–21: “Sciendum est quod idem est dictu causa propinqua quod causa posterior, et causa remota quod causa prior; unde iste due diuisiones causarum, alia per prius alia per posterius, et causarum alia remota alia propinqua, idem significant. Hoc autem obseruandum est quod semper illud quod uniuersalius est causa remota dicitur, quod autem specialius causa propinqua.”

<sup>8</sup> *In Physic.* 2, l. 6, n. 2: “ut intelligamus causam priorem universaliolem.” *Ibid.*, n. 3: “causa universalis et propria, vel prior et posterior.” *De sub. sep.*, c. 10, 104–125: “quanto aliqua causa est superior, tanto est universalior et virtus eius ad plura se extendit.” *Ibid.*, c. 17, 87–90: “Causa autem communis prior est et superior propriis causis, quanto enim est aliqua causa superior, tanto virtus eius maior et ad plura se extendens.”

<sup>9</sup> *In Metaph.* 6, l. 3, §1205: “quanto aliqua causa est altior, tanto eius causalitas ad plura se extendit. Habet enim causa altior proprium causatum altius quod est communius et in pluribus inventum. Sicut in

ordering that is in the effects (that originate) from some cause extends only as much as the causality of that cause. For example, in artificial things, it is evident that the political art, which is above the military, extends to the whole status of the community; but the military (art extends) only to those who are *contained* in the military order.

Indeed, since every cause has the *ratio* of *principle* (►8.2), an order (►8.5) is derived from any which cause towards its effects.<sup>10</sup> Hence, following upon the multiplication of causes, orders too are multiplied, of which one is **contained** under another, just as *one cause is contained under another*. Whence, a *superior* cause is not contained under the order of an *inferior* cause: rather, conversely.

An example of this is evident in human affairs; for on the paterfamilias depends the order of a household, which is contained under the order of the city, which proceeds from the ruler of the city, while the latter is contained under the order of the king, by whom the whole kingdom is ordered.<sup>11</sup>

*That which belongs to a prior cause is participated by the posterior* (►26).<sup>12</sup> Hence, that in which some things participate is a cause of the participants, as whiteness is a cause of white (things).<sup>13</sup> The more some receptive (thing) is proximate to an influent cause, the more it participates in its influence.<sup>14</sup> And the more something is proximate to a cause, the more it participates in its effect.<sup>15</sup>

Both PLATO and ARISTOTLE agree in that every participant receives that (in) which it participates from that which participates (it); and, insofar as this (is the case), that which participates is its cause.<sup>16</sup> For example, air (i.e., the participant) has light participated from the sun (i.e., that which participates light), which is the cause of its illumination.

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artificialibus patet quod ars politica, quae est supra militarem, ad totum statum communitatis se extendit. Militaris autem solum ad eos, qui in ordine militari continentur. Ordinatio, autem quae est in effectibus ex aliqua causa tantum se extendit quantum extendit se illius causae causalitas.”

<sup>10</sup> *STh* I, q. 105 a. 6 co.: “a qualibet causa derivatur aliquis ordo in suos effectus, cum quaelibet causa habeat rationem principii. Et ideo secundum multiplicationem causarum, multiplicantur et ordines, quorum unus continetur sub altero, sicut et causa continetur sub causa. Unde causa superior non continetur sub ordine causae inferioris, sed e converso.”

<sup>11</sup> *STh* I, q. 105 a. 6 co.: “Cuius exemplum apparet in rebus humanis, nam ex paterfamilias dependet ordo domus, qui continetur sub ordine civitatis, qui procedit a civitatis rectore, cum et hic contineatur sub ordine regis, a quo totum regnum ordinatur.”

<sup>12</sup> *STh* I-II, q. 10 a. 1 ad 1: “quod est prioris causae, participatur a posteriori.”

<sup>13</sup> *In De div. nom.*, c. 13, l. 2: “id quo aliqua participant est causa participantium, sicut albedo est causa alborum.”

<sup>14</sup> *STh* III, q. 7 a. 1 co.: “Quanto enim aliquod receptivum propinquius est causae influenti, tanto magis participat de influenza ipsius.”

<sup>15</sup> *ScG* 2, 28 n. 14: “Quanto aliquid propinquius est causae, tanto plus participat de effectu ipsius.”

<sup>16</sup> *De sub. sep.*, c. 3, 11–21 (cf. ARISTOTLE, *Metaphysica* α.1, 993b23–31): “omne autem participans aliquid accipit id quod participat ab eo a quo participat, et quantum ad hoc id a quo participat est causa

An effect is said to participate in its cause insofar as it receives particularly what pertains universally to its cause (► 26.3).<sup>17</sup> (This is said) above all, when (the effect) does not attain (*non adequat*) the virtue of its cause (by equaling it). Thus, we say that air participates (in) the light of the sun because it does not receive it in the brightness that is in the sun.

An effect is reduced to its cause as a participant (is reduced) to that which is participated (► 26.2, ¶4).<sup>18</sup> Effects participate (in) the likeness of their causes as much as they can.<sup>19</sup> Every effect participates (in) something of the virtue of its cause.<sup>20</sup> Just as a cause is—in some mode—in (its) effect by its participated likeness, so, too, every effect is in its cause in a more excellent mode according to its virtue.<sup>21</sup>

A cause is prior to that of which it is a cause.<sup>22</sup> Prior (causes) are causes of posterior (causes).<sup>23</sup> The posterior is not a cause of the prior.<sup>24</sup> And posterior (causes) have their necessity (► 9.9) from prior (causes) according to the mode of the prior.<sup>25</sup>

However, it should be noted that, in causes, *prior* and *posterior* is found in **two modes**:<sup>26</sup>

1. According to **community of predication** (► 11.4; 45.8, ¶1).<sup>27</sup> (This occurs) in one and the same cause in number *according to the order of ratio* that there is between universal and particular (*ratios*), for the universal is prior, (while) the particular (is) posterior.

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ipsius: sicut aer habet lumen participatum a sole, quae est causa illuminationis ipsius. Sic igitur secundum Platonem summus deus causa est omnibus immaterialibus substantiis quod unaquaeque earum et unum sit et bonum. Et hoc etiam Aristoteles posuit, quia, ut ipse dicit, necesse est ut id quod est maxime ens et maxime verum sit causa essendi et veritatis omnibus aliis.”

<sup>17</sup> *In De ebd.*, l. 2, 70–85: “quando aliquid particulariter recipit id quod ad alterum pertinet uniuersaliter, dicitur participare illud, sicut [...] effectus dicitur participare suam causam, et precipue quando non adequat uirtutem sue cause, puta si dicamus quod aer participat lucem solis quia non recipit eam in claritate qua est in sole.” See LEWIS and SHORT, *A Latin Dictionary*, entry for *ādaequo*, “To make equal to, to equalize, to level with; to attain to, or reach, by equaling.”

<sup>18</sup> *In Sent.* 3, d. 26 q. 1 a. 4 ad 5: “sicut effectus [reducitur] ad causam, et participans ad participatum.”

<sup>19</sup> *In Sent.* 2, d. 35 q. 1 a. 4 ad 5: “effectus participant similitudinem suarum causarum quantum possunt.”

<sup>20</sup> *In De causis*, l. 3: “Effectus autem omnis participat aliquid de virtute suae causae.”

<sup>21</sup> *De sub. sep.*, c. 14, 74–77: “sicut causa est quodam modo in effectu per sui similitudinem participatam, ita omnis effectus est in sua causa excellentiori modo secundum virtutem ipsius.”

<sup>22</sup> *In Post. an.* 2, l. 18, n. 6: “causa est prior eo cuius est causa.”

<sup>23</sup> *In De causis*, l. 14: “priora sunt causa posteriorum.”

<sup>24</sup> *In De caelo* 2, l. 10, n. 10: “posterius non est causa prioris.”

<sup>25</sup> *STh* I, q. 19 a. 8 ad 3: “posteriora habent necessitatem a prioribus, secundum modum priorum.” Cf. *ScG* 2, 28 n. 14.

<sup>26</sup> *In Metaph.* 5, l. 3, §785: “Prius autem et posterius in causis invenitur dupliciter.” *In Physic.* 2, l. 6, n. 3: “Advertendum est autem quod causa universalis et propria, vel prior et posterior, potest accipi aut secundum communitatem praedicationis [...]; vel secundum communitatem causalitatis.” ARISTOTLE omits the first mode in both his *Physics* and his *Metaphysics*. In his *Commentary* on the latter, St. Thomas inverts these two modes and notes ARISTOTLE’s omission, *In Metaph.* 5, l. 3, §786: “Praetermittit autem primum modum, et accipit secundum.” Cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b31–34.

<sup>27</sup> *In Metaph.* 5, l. 3, §785: “Alio modo in una et eadem causa numero secundum ordinem rationis qui est inter universale et particulare. Nam universale naturaliter est prius, particulare posterius.”

2. According to **community of causality** (► 11.5; 45.8, ¶2).<sup>28</sup> (This happens) in causes (that are) diverse in number (and) ordered to each other such that one is first and remote, and the other (is) second and proximate.

Nonetheless, *these two modes correspond to each other*, for it is manifest that any virtue (*virtus*, i.e., power; ► 22.2) extends to some things insofar as it communicates in one *ratio* of *object* (► 14.9): the more it extends to many, the more common that *ratio* must be; and since the virtue is proportioned to the object according to its *ratio*, it follows that the superior cause acts according to a more universal and less contracted form.<sup>29</sup> In the same way must it be considered in the order of things; for the more some things are superior in beings, the more they have forms (that are) less contracted and more dominant over matter, which contracts the virtue of a form.

Whence, that which is prior in causing is also found to be prior—in some mode—according to a *ratio* of more universal predication.<sup>30</sup>

#### 11.4. Prior vs. Posterior in *Ratio*

According to community of predication, that is always said to be a **prior cause** *which contains singulars* (*ea quae continent singularia*), i.e., *that which contains any one cause in the community of its ambit* (*ea quae continet unamquamque causam communitate sui ambitus*): that is, the **universal**.<sup>31</sup>

In this mode, unlike that of community of causality (► 11.5), the effect exists immediately from both causes—that is, from the prior and the posterior (i.e., there is no effect that is a *mean*; ► 8.9).<sup>32</sup>

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<sup>28</sup> *In Metaph.* 5, l. 3, §785: “Uno modo in causis diversis numero adinvicem ordinatis, quarum una est prima et remota, et alia secunda et propinqua.”

<sup>29</sup> *In Physic.* 2, l. 6, n. 3: “Advertendum est autem quod causa universalis et propria, vel prior et posterior, potest accipi aut secundum communitatem praedicationis [...]; vel secundum communitatem causalitatis [...]; et haec duo sibi invicem correspondent. Manifestum est enim quod quaelibet virtus extenditur ad aliqua secundum quod communicant in una ratione obiecti; et quanto ad plura extenditur, tanto oportet illam rationem esse communiorem: et cum virtus proportionetur obiecto secundum eius rationem, sequitur quod causa superior agat secundum formam magis universalem et minus contractam. Et sic est considerare in ordine rerum: quia quanto aliqua sunt superiora in entibus, tanto habent formas minus contractas, et magis dominantes supra materiam, quae coarctat virtutem formae. Unde et id quod est prius in causando, invenitur esse prius quodammodo secundum rationem universalioris praedicationis.”

<sup>30</sup> *In Physic.* 2, l. 6, n. 3: “id quod est prius in causando, invenitur esse prius quodammodo secundum rationem universalioris praedicationis; ut puta, si ignis est primum calefaciens, caelum non tantum est primum calefaciens, sed primum alterans.” The example provided is, of course, obsolete.

<sup>31</sup> *In Metaph.* 5, l. 3, §786: “In secundo enim modo [...] semper ea quae continent singularia, scilicet universalialia, dicuntur causae priores.” *In Physic.* 2, l. 6, n. 2: “Et similiter ea quae continet unamquamque causam communitate sui ambitus, dicitur causa prior.” Cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b33–34: “τὰ περιέχοντα ὁτιοῦν τῶν καθ’ ἕκαστα”; *Physica* B.3, 195a32: “τὰ περιέχοντα πρὸς τὰ καθ’ ἕκαστον.”

<sup>32</sup> *In Metaph.* 5, l. 3, §786: “In secundo enim modo immediate effectus ab utraque causa existit, scilicet priori et posteriori, quod in primo non convenit.”

For example, in the order of efficient cause, a cause of health is the physician and the artificer: the artificer as *universal* or *more common*, and *prior*; the physician, on the other hand, as *particular* or *special*, and *posterior*.<sup>33</sup> Likewise, (in the genus of material cause) the proximate matter of a statue is bronze; a remote (matter) is *metal*; and an even more remote, *body*.<sup>34</sup>

In *formal causes*, all superior (forms) are forms of the inferiors (*omnia superiora sunt formae inferiorum*); so, the cause is twofold (i.e., prior-universal-common-superior, and posterior-particular-special-inferior).<sup>35</sup>

For example, a formal cause of the octave (*diapason* = τοῦ διὰ πασῶν; ► 6.4) is the double (*duplum* = τὸ διπλάσιον), double ratio (*proportio dupla*), or twoness (*dualitas*), as *special* or *proper*, and *posterior*; and (a formal cause of the octave) as *universal* or *more common*, and *prior*, is numerical proportion—i.e., the ratio of a number to a number or to the unit (*proportio numeri ad numerum vel ad unum*)—or (as still more universal and prior) number (*numerum* = ἀριθμός).<sup>36</sup>

Also, we say that the form of man is (a cause) proximate to its definition: that is, *rational mortal animal*; but *animal* is more remote; and, again, *substance* is even more remote.<sup>37</sup>

*In a multitude of forms or ratios, the prior is always more*.<sup>38</sup> This is not to be understood as if it were more complete; for only specific forms are complete. Rather, it is said to be

<sup>33</sup> *In Metaph.* 5, l. 3, §786 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b32–33): “Unde dicit [Philosophus], quod sanitatis causa est medicus et artifex in genere causae efficientis. Artifex quidem ut universale, et prius; medicus vero ut particulare, sive speciale, et posterius.” *In Physic.* 2, l. 6, n. 2 (cf. ARISTOTLE, *Physica* B.3, 195a30–31): “ut sanitatis causa est medicus ut causa propria et posterior, artifex autem ut communior et prior; et hoc in specie causae efficientis.” *In Physic.* 2, l. 6, n. 3: “Advertendum est autem quod causa universalis et propria, vel prior et posterior, potest accipi [...] secundum communitatem praedicationis, secundum exempla hic posita de medico et artifice.”

<sup>34</sup> *De prin. nat.* §5, 26–28: “Et similiter materia ydoli propinqua est cuprum, sed remota est metallum, et iterum remotius corpus.”

<sup>35</sup> *De prin. nat.* §5, 25–26: “Omnia enim superiora sunt forme inferiorum.” *In Metaph.* 5, l. 3, §786: “Similiter etiam in causis formalibus dupliciter est causa formalis.” *In Physic.* 2, l. 6, n. 2: “Et simile est in specie causae formalis.”

<sup>36</sup> *In Metaph.* 5, l. 3, §786 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b33–34): “ut diapason duplum, vel proportio dupla, vel dualitas est causa formalis, ut speciale et posterius; numerum autem, vel proportio numeri ad numerum vel ad unum, ut universale et prius.” *In Physic.* 2, l. 6, n. 2 (cf. ARISTOTLE, *Physica* B.3, 195a31–32): “causa formalis diapason propria et posterior est proportio dupla; causa autem prior et communior est proportio numeralis, quae dicitur multiplicitas.”

<sup>37</sup> *De prin. nat.* §5, 21–25: “sicut dicimus quod forma hominis propinqua est sua diffinitio, scilicet animal rationale mortale, sed animal est magis remota, et iterum substantia remotior est.”

<sup>38</sup> *In Metaph.* 2, l. 4, §322 (cf. ARISTOTLE, *Metaphysica* α.2, 994b18–20): “Deinde cum dicit *semper enim* probat propositum quatuor rationibus. Quarum prima talis est. In multitudine formarum vel rationum semper illa quae est prius est magis. Quod non est intelligendum quasi sit completior; quia formae specificae sunt completae. Sed dicitur esse magis, quia est in plus quam illa quae est posterior, quae non est ubicumque est prior. Non enim ubicumque est ratio animalis, est ratio hominis. Ex quo argumentatur, quod si primum non est, nec habitum idest consequens est. Sed si in infinitum procedatur in rationibus et formis, non erit prima ratio vel forma definitiva; ergo excludentur omnes consequentes.”

more because the prior form is in more (things) than the form that is posterior, which is not wherever the prior is. Thus, the *ratio* of *man* is not wherever the *ratio* of *animal* is.

### 11.5. Prior vs. Posterior in Causing

According to *community of causality* (► 11.3), the effect does not exist immediately from both the prior and the posterior causes (i.e., there exists a *mean* effect; ► 8.9).<sup>39</sup>

For example, in efficient causes, a man generates a man as a *proximate* and *posterior* cause, while the sun (generates a man) as a *remote* and *prior* cause.<sup>40</sup> Likewise, the sun can be said to be a universal cause of heating, while fire is a proper cause. And we say that art (i.e., the art of medicine) and the physician are causes of health, but art is a prior cause, and the physician a posterior (cause). Thus, inferior causes move through their proper virtues insofar as they participate (in) the virtue of superior causes (► 26).<sup>41</sup>

And the same can be said of the formal cause, and of the other species of causes.<sup>42</sup> Whence, nothing prevents one form from being formed by the participation of another form.<sup>43</sup> And the more proximate something is to an end, the more prior it is in purpose (*in proposito*), even if it should be posterior in being, in time, or in nature.<sup>44</sup>

### 11.6. Reduction to a First Cause

It should be noted that one ought always to reduce a question (► 55.4) to a first cause (► 46).<sup>45</sup> Thus, in natural, as in other—e.g., artificial—things, it is always necessary to inquire (i.e., to seek) the highest cause (< δεῖ δ' αἰετὸ ἀίτιον ἐκάστου τὸ ἀκρότατον ζητεῖν, ὡσπερ καὶ ἐπὶ τῶν ἄλλων).

For example, if it is asked, “Why is this healthy?”, one must say, “Because the physician healed.” And, again, “Why did the physician heal?”, “Because of the art of healing that he

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<sup>39</sup> *In Metaph.* 5, l. 3, §786: “In secundo enim modo immediate effectus ab utraque causa existit, scilicet priori et posteriori, quod in primo non convenit.”

<sup>40</sup> *In Metaph.* 5, l. 3, §785: “sicut in causis efficientibus homo generat hominem ut causa propinqua et posterior, sol autem ut causa prior et remota.” *In Physic.* 2, l. 6, n. 3: “ut si dicamus solem esse causam universalem calefactionis, ignem vero causam propriam.” *De prin. nat.* §5, 5–8: “sicut dicimus quod ars et medicus sunt causa sanitatis, sed ars est causa per prius et medicus per posterius.”

<sup>41</sup> *De veritate*, q. 5 a. 9 ad 7: “inferiores causae [movent] per virtutes proprias, secundum quod participant virtutem superiorum causarum.”

<sup>42</sup> *In Metaph.* 5, l. 3, §785: “et similiter potest considerari in aliis speciebus causarum.” *De prin. nat.* §5, 5–8: “et similiter in causa formali et in aliis causis.”

<sup>43</sup> *De potentia*, q. 6 a. 6 ad 5: “secundum Philosophum, etiam in causis formalibus prius et posterius invenitur; unde nihil prohibet unam formam per alterius formae participationem formari.”

<sup>44</sup> *In Sent.* 3, d. 23 q. 2 a. 5 ad 4: “sicut finis est prior in intentione, et posterior in esse; ita quanto aliquid est propinquius fini, est prius in proposito, quamvis sit posterius in esse vel tempore vel natura.”

<sup>45</sup> *De prin. nat.* §5, 9–10: “Et nota quod semper debemus reducere questionem ad primam causam.” *In Physic.* 2, l. 6, n. 10 (cf. ARISTOTLE, *Physica* B.3, 195b21–23): “in naturalibus oportet semper supremam causam uniuscuiusque requirere, sicut contingit in artificialibus.”

possesses.”<sup>46</sup> Likewise, if we should inquire why a man builds, one would answer, “because he is a builder.” And if we should ask why he is a builder, one would answer, “because he has the art of building [*quia habet artem aedificativam*].” And here one rests; for this is the first cause in this order.

Hence, in natural things (as in all others, ὥσπερ καὶ οὕτως ἐπὶ πάντων), one must proceed up to the highest cause.<sup>47</sup> And this is so because the effect is only (scientifically) known if the cause is known (►53.4). Whence, if the cause of some effect were also an effect of another cause, it could not be (scientifically) known unless its cause is known; and so on, until the first cause is reached (►46).

### 11.7. By Itself vs. by Accident

There is another division of causes (in modes) insofar as something is said to be a cause *by itself* or *by accident*.<sup>48</sup> That is said (to be a) cause **by itself** (*secundum se sive per se* = καθ’ αὐτό), or *cause properly said* (*proprie dicta* = οἰκείως λεγόμενον), which is a *cause of something as such* (*causa alicuius rei in quantum huiusmodi*), as a builder is the (efficient) cause of a house, and wood is the matter of a bench. A cause **by accident** (*secundum accidens sive per accidens* = κατὰ συμβεβηκός) is *whatever is conjoined to the cause by itself that does not belong to its ratio* (*omne illud quod coniungitur causae per se, quod non est de ratione eius*): i.e., *those (accidents) that happen to the cause by itself* (*illa quae accidit causae per se*), as when we say that the grammarian builds; for the grammarian is said (to be a) *cause of the building* by accident—indeed, (the grammarian builds) not insofar as (he is) a grammarian, but insofar as (to be a grammarian) befalls the builder. And the same can be said of the other (genera of) causes.

This cause by accident is, therefore, said **from the part of the cause**, as when the white or the musical or musician is said (to be a) cause of the house because it (i.e., the white

<sup>46</sup> *De prin. nat.* §5, 10–13: “ut si queratur ‘Quare est iste sanus?’, dicendum est ‘Quia medicus sanauit’; et iterum ‘Quare medicus sanauit?’, ‘Propter artem sanandi quam habet.’” *In Physic.* 2, l. 6, n. 10 (cf. ARISTOTLE, *Physica* B.3, 195b23–25): “Ut si quaeramus quare homo aedificat, respondetur, quia est aedificator; et similiter si quaeramus quare est aedificator, respondetur, quia habet artem aedificativam; et hic statur, quia haec est prima causa in hoc ordine.”

<sup>47</sup> *In Physic.* 2, l. 6, n. 10 (cf. ARISTOTLE, *Physica* B.3, 195b25): “Et ideo oportet in rebus naturalibus procedere usque ad causam supremam. Et hoc ideo est, quia effectus nescitur nisi sciatur causa; unde si alicuius effectus causa sit etiam alterius causae effectus, sciri non poterit nisi causa eius sciatur; et sic quousque perveniatur ad primam causam.”

<sup>48</sup> *In Metaph.* 5, l. 3, §787: “Alia divisio est causarum, secundum quod aliquid dicitur esse causa per se et per accidens.” *In Physic.* 2, l. 6, n. 4: “causa per accidens dicitur omne illud quod coniungitur causae per se, quod non est de ratione eius.” *In Physic.* 2, l. 6, n. 5 (cf. ARISTOTLE, *Physica* B.3, 195b3–4 = *Metaphysica* Δ.2, 1014a7): “causas proprie dictas, idest per se.” *De prin. nat.* §5, 29–37: “Item causarum alia est per se, alia per accidens. Causa per se dicitur causa alicuius rei in quantum huiusmodi, sicut edificator est causa domus et lignum materia scamni. Causa per accidens est illa que accidit cause per se, sicut cum dicimus ‘Grammaticus edificat’; grammaticus enim dicitur causa edificationis per accidens, non enim in quantum grammaticus sed in quantum accidit edificatori. Et similiter est in aliis causis.”



or the musical) is conjoined to the builder (i.e., is conjoined to the cause by itself of the building).<sup>49</sup> This must be distinguished from the cause by accident that is said **from the part of the effect** (► 11.8), which occurs when something is accidentally conjoined to that which is the effect by itself: for example, when the builder is a cause of strife (i.e., because strife is not by itself an effect of the builder, but befalls the effect).

The cause *by itself* differs from the cause *by accident* in that the cause by itself is finite and determinate (*finita et determinata* < ὥρισμένον), while the cause by accident is infinite and indeterminate (*infinita et indeterminata* < ἀόριστον), since many (accidents) can happen to one (subject).<sup>50</sup>

Just as the *cause by itself* is divided into *universal* and *particular*, or into *prior* and *posterior*, so, too, (is divided) the *cause by accident*.<sup>51</sup> Whence, not only causes by accident themselves are said (to be) *causes by accident*, but also their genera (► 11.3).

For example, the sculptor (*statae factor* = ἀνδριαντοποιός) is the cause by itself of the statue (i.e., it belongs to the *ratio* of *sculptor* to produce a statue).<sup>52</sup> Polycleitus,<sup>53</sup> on the other hand, is a cause by accident insofar as he happens (*accidit ei*) to be the sculptor (i.e., because it does not belong to the *ratio* of *this sculptor* to produce a statue). And just as Polycleitus is a cause by accident of the statue, so are said (to be) *causes by accident*

<sup>49</sup> *In Physic.* 2, l. 8, n. 8 (cf. ARISTOTLE, *Physica* B.5, 196b23–27): “considerandum est quod causa per accidens dicitur dupliciter: uno modo ex parte causae; alio modo ex parte effectus. Ex parte quidem causae, quando illud quod dicitur causa per accidens, coniungitur causae per se; sicut si album vel musicum dicatur causa domus, quia accidentaliter coniungitur aedificatori. Ex parte autem effectus, quando accipitur aliquid quod accidentaliter coniungitur effectui; ut si dicamus quod aedificator est causa discordiae, quia ex domo facta accidit discordia.” *In Metaph.* 5, l. 3, §789: “Sciendum autem est, quod aliquid potest dici causa per accidens alterius dupliciter. Uno modo ex parte causae; quia scilicet illud quod accidit causae, dicitur causa per accidens, sicut si album dicatur causa domus. Alio modo ex parte effectus; ut scilicet aliquid dicatur causa per accidens alicuius, quod accidit ei quod est effectus per se.”

<sup>50</sup> *In Physic.* 2, l. 8, n. 8: “Ponit autem [Philosophus] differentiam inter causam per se et causam per accidens: quia causa per se est finita et determinata; causa autem per accidens est infinita et indeterminata, eo quod infinita uni possunt accidere.” Cf. ARISTOTLE, *Physica* B.5, 196b27–29: “τὸ μὲν οὖν καθ’ αὐτὸ αἴτιον ὥρισμένον, τὸ δὲ κατὰ συμβεβηκὸς ἀόριστον· ἄπειρα γὰρ ἂν τῷ ἐνὶ συμβαίῃ.” *In Sent.* 4, d. 30 q. 1 a. 3 co.: “causae per accidens sunt infinitae.”

<sup>51</sup> *In Metaph.* 5, l. 3, §787 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b34–35): “Sicut enim causa per se dividitur in universale et particulare, sive in prius et posterius, ita etiam causa per accidens. Unde non solum ipsae causae accidentales dicuntur causae per accidens, sed etiam ipsarum genera.” *In Physic.* 2, l. 6, n. 4 (cf. ARISTOTLE, *Physica* B.3, 195a32–33): “dicit [Philosophus] quod sicut causae per se dividuntur per causas priores et posteriores, vel communes et proprias, ita etiam et causae per accidens. Est enim praeter causas *per se*, accipere causas *per accidens*, et genera horum.”

<sup>52</sup> *In Metaph.* 5, l. 3, §787 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b35–1014a3): “Ut statae factor, statae causa est per se; Polycleitus autem per accidens est causa, in quantum accidit ei factorem statae esse. Et sicut Polycleitus est causa statae per accidens, ita omnia universalia continentia accidens, id est causam per accidens, dicuntur per accidens causae; sicut homo et animal, quae sub se continent Polycleitum, qui est homo et animal.” *In Physic.* 2, l. 6, n. 4 (cf. ARISTOTLE, *Physica* B.3, 195a33–b1): “sicut causa statae per accidens quidem est Polycleitus, per se autem causa statae est faciens statuam: Polycleitus enim est causa statae in quantum accidit ei esse statuam facientem. Et etiam ea quae sua communitate continent Polycleitum, sunt causa statae per accidens, sicut et homo et animal.”

<sup>53</sup> A fifth-century BC Greek sculptor and architect.

all the universals that, in their community, contain the accident (*continentia accidens* = τὰ περιέχοντα τὸ συμβεβηκός): that is, the causes by accident; for example, *man* and *animal*, which contain under themselves Polycleitus, who is a man and an animal.

Moreover, just as some causes by themselves are proximate and others remote, so too (are) causes by accident; for in causes by accident, some are more proximate to causes by themselves, and some are more remote (from them).<sup>54</sup> Again, anything is said (to be a) *cause by accident* which is conjoined to the cause by itself that does not belong to its *ratio*; but this may be either more proximate to the *ratio* of the cause or more remote from it; and according to this, causes by accident will be either more proximate or more remote.

For example, if the sculptor happens to be white (*album* = ὁ λευκός) and to be musical or musician (*musicum* = ὁ μουσικός), then the musical is more proximate because it is in the same subject and according to the same—that is, according to the soul (i.e., mind), in which music exists, and also the art of producing—while the white is in (the subject) according to the body.<sup>55</sup> In turn, the subject is related even more proximately than other accidents, as Polycleitus (is more proximately related to the sculptor) than the white or the musical, for these are conjoined to the sculptor only on account of the subject (i.e., Polycleitus).

Thus, Polycleitus is a more proximate cause of the statue than the white or the musical or musician, for the accidental mode of predication (►17) is more remote when an accident is predicated of an accident than when an accident is predicated of a subject.<sup>56</sup> An accident is predicated of an accident only because both accidents are predicated of the subject; whence, it is more remote to attribute to an accident what belongs to another (accident). For example, (it is more remote to attribute) to the musical or musician what

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<sup>54</sup> *In Metaph.* 5, I. 3, §788 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a4–5): “Et sicut causarum per se quaedam sunt propinquae, quaedam remotae, ut dictum est, ita et inter causas per accidens.” *In Physic.* 2, I. 6, n. 4 (cf. ARISTOTLE, *Physica* B.3, 195b1–2): “Et iterum considerandum est quod in causis per accidens quaedam sunt propinquiores causis per se, et quaedam magis remotae. Nam causa per accidens dicitur omne illud quod coniungitur causae per se, quod non est de ratione eius; hoc autem contingit esse vel propinquius rationi causae, vel remotius ab ea; et secundum hoc causae per accidens erunt vel propinquiores vel remotiores.”

<sup>55</sup> *In Physic.* 2, I. 6, n. 4 (cf. ARISTOTLE, *Physica* B.3, 195b2–4): “sicut, si statuam facienti accidat esse album et musicum, musicum propinquius est, quia est in eodem subiecto et secundum idem, scilicet secundum animam, in qua est musica et ars statuae factiva; album autem inest secundum corpus. Sed subiectum propinquius se habet adhuc quam alia accidentia, sicut Polycleitus quam album vel musicum: non enim coniunguntur haec statuam facienti nisi propter subiectum.”

<sup>56</sup> *In Metaph.* 5, I. 3, §788 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a5–6): “Nam Polycleitus est causa statuae magis propinqua quam album et musicum. Magis enim remotus modus praedicationis per accidens est, cum accidens praedicatur de accidente, quam cum accidens praedicatur de subiecto. Accidens enim non praedicatur de accidente, nisi quia ambo praedicantur de subiecto. Unde magis remotum est ut attribuatur uni accidenti quod est alterius, sicut musico quod est aedificatoris, quam quod attribuatur subiecto quod est accidentis, sicut Polycleto quod est aedificatoris.”

belongs to the builder than it is to attribute to the subject what belongs to the accident, as (to attribute) to Polycleitus what belongs to the builder.

Every cause by itself (*causa per se*) has determinate effects, which it produces according to some order.<sup>57</sup> Therefore, it is manifest that effects (that are) related to some inferior cause seem to have no order: rather, they (seem to) accidentally coincide with each other; which (causes), if they were to be referred to a superior, common cause, would be found to be ordered, and not (to be) by accident, but simultaneously produced by one cause by itself.

### 11.8. By Accident from the Part of the Effect

As just noted, that is said (to be an) *accidental cause* of another **from the part of the effect** *insofar as something befalls that which is the effect by itself (quod accidit ei quod est effectus per se)*.<sup>58</sup>

This can happen in one of three modes:

1. Because the cause that is said to be accidental from the part of the effect has a *necessary order to the effect*, as the removal of an impediment has a necessary order to the effect.<sup>59</sup> Hence, anything that removes that which prohibits (*prohibens*, i.e., that which prevents the cause by itself from causing its effect) is said to be an accidental mover (*movens per accidens*), whether the accident is a contrary or not.
2. When an accident has an *order to the effect that is neither necessary nor as in the more, but as in the fewer (cases)*.<sup>60</sup> For example, the discovery of a treasure is an accident that has an order that is not necessary to the digging of the soil. And it is in this mode that fortune and chance (*fortuna et casus*) are said to be accidental causes.

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<sup>57</sup> *In Metaph.* 6, l. 3, §1205: "Omnis enim causa per se habet determinatos effectus, quos secundum aliquem ordinem producit. Manifestum igitur est, quod effectus relati ad aliquam inferiorem causam nullum ordinem habere videntur, sed per accidens sibiipsis coincidunt; qui si referantur ad superiorem causam communem, ordinati inveniuntur, et non per accidens coniuncti, sed ab una per se causa simul producti sunt."

<sup>58</sup> *In Metaph.* 5, l. 3, §789: "aliquid potest dici causa per accidens alterius [...] ex parte effectus; ut scilicet aliquid dicatur causa per accidens alicuius, quod accidit ei quod est effectus per se. Quod quidem potest esse tripliciter."

<sup>59</sup> *In Metaph.* 5, l. 3, §789: "Uno modo, quia habet ordinem necessarium ad effectum, sicut remotio impedimenti habet ordinem necessarium ad effectum. Unde removens prohibens dicitur movens per accidens; sive illud accidens sit contrarium [...] sive etiam si non sit contrarium [...]" As an example of contraries, St. Thomas resorts to ancient medicine, in which some medication is said to accidentally cause coolness: namely, not insofar as it cools, but insofar as it removes an impediment to cooling. As an example of non-contraries, he proposes a pillar that holds a stone, for that which removes the pillar is said to be an accidental mover of the stone.

<sup>60</sup> *In Metaph.* 5, l. 3, §789: "Alio modo, quando accidens habet ordinem ad effectum, non tamen necessarium, nec ut in pluribus, sed ut in paucioribus, sicut inventio thesauri ad fossionem in terra. Et hoc modo fortuna et casus dicuntur causae per accidens." *In Physic.* 2, l. 8, n. 8 (cf. ARISTOTLE, *Physica* B.5, 196b23–27): "Et hoc modo dicitur fortuna esse causa per accidens, ex eo quod effectui aliquid coniungitur per accidens; utpote si fossurae sepulcri adiungatur per accidens inventio thesauri."

Just as the effect by itself of a natural cause is what is attained (*consequitur*) according to the requirement of its form, so the effect of an agent cause (that acts) on purpose is that which happens from the intention of the agent.<sup>61</sup> Whence, whatever is brought forth in the effect apart from the intention, is by accident—as long as it is attained as in the fewer, for that which is always or frequently conjoined to the effect falls under the same intention: it is foolish to say that someone intends something but does not want that which is adjoined (to it) frequently or always.

3. When the accidental cause and the effect have *no order*, except perhaps according to supposition (*secundum existimationem*).<sup>62</sup> For example, if someone were to say that he is the cause of an earthquake because an earthquake happens as he enters a house.

### 11.9. In Potency vs. in Act

The third distinction of causes by modes, before or beyond all the above (*prae omnibus his vel praeter omnia haec < παρὰ πάντα*) that are said to be causes by themselves or by accident, is insofar as some are causes *in act* and some *in potency*.<sup>63</sup> A cause **in act** (*in actu = ὡς ἐνεργοῦντα*) is *that which causes in act a thing (quae actu causat rem)*, as the builder when he is building, or copper when the statue is (made) from it (*ex eo*). A cause **in potency** (*in potentia = ὡς δυνάμενα*) is *that which can cause, although it does not cause the thing in act*, as the builder while he does not build (but can build).

Thus, the builder is a cause *in potency* of that which is (being) built (*aedificationis = τοῦ οἰκοδομεῖσθαι*) insofar as the name *builder* (*aedificator = οἰκοδόμος*) refers to (*sonat*) the habit or office (*habitus vel officium*), rather than to the builder *in act* (i.e., the builder actually producing that which is being built).<sup>64</sup>

<sup>61</sup> *In Physic.* 2, l. 8, n. 8: “Sicut enim effectus per se causae naturalis est quod consequitur secundum exigentiam suae formae, ita effectus causae agentis a proposito est illud quod accidit ex intentione agentis: unde quicquid provenit in effectu praeter intentionem, est per accidens. Et hoc dico si id quod est praeter intentionem ut in paucioribus consequatur: quod enim vel semper vel ut frequenter coniungitur effectui, cadit sub eadem intentione. Stultum est enim dicere quod aliquis intendat aliquid, et non velit illud quod ut frequenter vel semper adiungitur.”

<sup>62</sup> *In Metaph.* 5, l. 3, §789: “Tertio, quando nullum ordinem habent, nisi forte secundum existimationem; sicut si aliquis dicat se esse causam terraemotus, quia eo intrante domum accidit terraemotus.”

<sup>63</sup> *In Metaph.* 5, l. 3, §790 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a7–9): “Tertia distinctio est, secundum quod prae omnibus his vel praeter omnia haec, quae dicuntur esse secundum se sive per se, et secundum accidens, quaedam sunt causae in potentia, quaedam ut agentia, idest in actu.” *De prin. nat.* §5, 56–61: “Item causarum quaedam est actu, quaedam potentia. Causa in actu est quae actu causat rem, sicut edificator cum edificat, uel cuprum cum ex eo est ydolum; causa autem in potentia est quae, licet non causet rem in actu, tamen potest causare, ut edificator dum non edificat.” *In Physic.* 2, l. 6, n. 5 (cf. ARISTOTLE, *Physica* B.3, 195b3–5): “dicit [Philosophus] quod praeter causas proprie dictas, idest per se, et per accidens, quaedam dicuntur causae in potentia.”

<sup>64</sup> *In Metaph.* 5, l. 3, §790 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a9–10): “Sicut aedificationis causa est aedificator in potentia. Hoc enim sonat habitum vel officium. Vel aedificans actu.” *In Physic.* 2, l. 6, n. 5 (cf. ARISTOTLE, *Physica* B.3, 195b5–6): “sicut potentes operari; quaedam vero sicut operantes in actu; sicut causa aedificandi domum potest dici vel aedificans in habitu vel aedificans in actu.”

Everything acts insofar as it is in act: that is, (in act) of that which it acts; for fire heats not insofar as it is bright in act, but insofar as it is hot in act.<sup>65</sup> Thence it is that *every agent produces its like (omne agens agit sibi simile; ►9.7; 9.6)*.

### 11.10. Simple vs. Composite

Finally, ARISTOTLE posits a fourth division of causes, which is into *simple* and *composite*, such that causes by themselves would be complexly taken with causes by accident.<sup>66</sup> According to this, a cause is said (to be) **simple** (*simplex*) *when it alone is said (to be a) cause (quando solum dicitur causa illud; secundum quod accipitur causa... totum vel solum)*,<sup>67</sup> whether it is a cause by itself or by accident. A **composite** (*composita < complexa = συμπλεκόμενα*) cause occurs *when multiple (causes) need to come together in order for there to be a cause (quando oportet plura advenire ad hoc quod sit causa)*.

For example, *the sculptor* is said (to be a) *simple* cause by itself; *Polycleitus*, by accident; and neither *the sculptor* nor *Polycleitus*, but *Polycleitus (the) sculptor*, is said (to be a) *composite* cause.<sup>68</sup> Likewise, *the builder* is a (simple) cause (by itself) of the house, and *the physician* is a (simple) cause (by accident) of the house; but *the physician builder* is a (composite) cause of the house.

In another mode, according to AVICENNA, *that which is a cause without addition of another (illud quod sine adiunctione alterius est causa)* can also be said (to be) a **simple** cause.<sup>69</sup> A **composite** cause would then be *when many must be present in order for there to be a*

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<sup>65</sup> Q. d. de anima, a. 12 co.: “unumquodque agit secundum quod actu est, illud scilicet quod agit; ignis enim calefacit non in quantum actu est lucidum, sed in quantum est actu calidum: et exinde est quod omne agens agit sibi simile.”

<sup>66</sup> In Physic. 2, l. 6, n. 7 (cf. ARISTOTLE, Physica B.3, 195b10): “Quartam divisionem ponit [Philosophus] ibi: *Amplius autem complexae* etc. Et dicit quod quandoque complexe accipiuntur causae per se cum causis per accidens.” In Metaph. 5, l. 3, §792 (cf. ARISTOTLE, Metaphysica Δ.2, 1014a13–14): “Uterius ponit [Philosophus] quartam distinctionem causae, quae est in simplex et in compositum; ut simplex causa dicatur secundum quod accipitur causa [...] per se totum [...], sive per accidens tantum [...]. Composita autem secundum quod utrumque simul accipitur.” De prin. nat. §5, 38–45: “Item causarum quedam est simplex et quedam composita. Simplex causa dicitur quando solum dicitur causa illud quod per se est causa, uel etiam solum illud quod est per accidens. [...] Composita autem dicitur quando utrumque dicitur causa, ut si dicarupus ‘edificator medicus est causa domus’.”

<sup>67</sup> Editions of St. Thomas’s *Commentary* vary. At the time of writing, we are still waiting for the Leonine critical edition to be published.

<sup>68</sup> In Physic. 2, l. 6, n. 7 (cf. ARISTOTLE, Physica B.3, 195b11–12): “ut si non dicamus causam statuæ Polycletum, qui est causa per accidens, neque facientem statuam, qui est causa per se, sed Polycletum statuam facientem.” In Metaph. 5, l. 3, §792 (cf. ARISTOTLE, Metaphysica Δ.2, 1014a14–15): “ut simplex causa dicatur [...] statuæ factor, [...] per accidens tantum, [...] Polycletus. Composita autem [...] Polycletus statuæ factor.” De prin. nat. §5, 41–43: “sicut si dicamus edificatorem esse causam domus, et similiter si dicamus medicum esse causam domus.” Ibid., 45–46: “ut si dicarupus ‘edificator medicus est causa domus’.”

<sup>69</sup> De prin. nat. §5, 46–53: “Potest etiam dici causa simplex, secundum quod exponit Avicenna, illud quod sine adiunctione alterius est causa [...]. Composita autem causa est quando oportet plura aduenire ad hoc quod sit causa.” In Metaph. 5, l. 3, §793: “Est autem alius modus quo causae possunt dici compositae, secundum quod plures causae concurrunt ad unius rei constitutionem.”

cause (*quando oportet plura advenire ad hoc quod sit causa*), insofar as multiple causes concur in the constitution of one thing (*secundum quod plures causae concurrunt ad unius rei constitutionem*).

For example, bronze (is said to be a *simple* cause) of the statue when the statue is made from bronze without the addition of other matters.<sup>70</sup> Likewise, when it is said that the physician produces health, or that fire heats. On the other hand, multiple men (are said to be a *composite* cause of the motion of a ship because they) concur as an efficient cause in running the ship (*ad trahendum navem*); for one man is not the cause of the motion of the ship, but many.<sup>71</sup> Likewise, multiple stones concur as the matter of a house, for one stone is not the matter of a house, but many.

However, ARISTOTLE omits this (mode of being a *composite* cause) because none of these is a cause, but **part of a cause** (*pars causae*).<sup>72</sup>

### 11.11. Modal Combinations

All these modes of causes amount to six, having a twofold variation (*variantur dupliciter < λεγόμενα διχῶς*), making a total of twelve.<sup>73</sup> The six modes are:<sup>74</sup> as **(1) singular** (*singulare < ὡς τὸ καθ' ἕκαστον*) or **(2) genus** (*genus < ὡς τὸ γένος*), which are called *prior* and *posterior* above (► 11.3); as **(3) by itself** (*secundum se*) or **(4) by accident** (*per accidens < ὡς τὸ συμβεβηκός*), to which is reduced the genus of the accident (*genus accidentis < ὡς τὸ γένος τοῦ συμβεβηκότος*); for the genus of the accident is an accidental cause (► 11.6); and as **(5) complex** (*per complexum < ὡς συμπλεκόμενα*) or **(6) simple** (*simplex < ὡς ἀπλῶς*; ► 11.10).

These six modes are further divided by *potency* and by *act* (*per potentiam et per actum*; ► 11.9); for *that which is in potency is not simply* (*quod est in potentia, non simpliciter est*),

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<sup>70</sup> *De prin. nat.* §5, 48–51: “sicut cuprum ydoli, sine adiunctione enim alterius materie ex cupro fit ydolum; et sicut dicitur quod medicus facit sanitatem, uel quod ignis calefacit.”

<sup>71</sup> *In Metaph.* 5, l. 3, §793: “sicut plures homines ad trahendum navem, vel plures lapides, ut sint materia domus.” *De prin. nat.* §5, 53–55: “sicut unus homo non est causa motus nauis, sed multi; et sicut unus lapis non est materia domus, sed multi.”

<sup>72</sup> *In Metaph.* 5, l. 3, §793: “Sed hoc praetermisit [Philosophus], quia nullum illorum est causa, sed pars causae.”

<sup>73</sup> *In Metaph.* 5, l. 3, §794 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a15–17): “His autem modis positus, colligit [Philosophus] istorum modorum numerum, dicens, quod isti modi causarum sunt sex et variantur dupliciter, et ita efficiuntur duodecim.” *In Physic.* 2, l. 6, n. 8 (cf. ARISTOTLE, *Physica* B.3, 195b12–13): “reducit [Philosophus] praedictos modos ad certum numerum. Et dicit quod praedicti modi certo numero sunt sex; sed quilibet eorum dupliciter dicitur.”

<sup>74</sup> *In Metaph.* 5, l. 3, §794 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a17–19): “Hi enim modi sex sunt aut singulare, aut genus, quod superius dixit prius et posterius. Et secundum se et per accidens, ad quod etiam reducitur genus accidentis, nam genus accidentis est causa per accidens. Et iterum per complexum et simplex.” *In Physic.* 2, l. 6, n. 8 (cf. ARISTOTLE, *Physica* B.3, 195b13–16): “Sex autem modi sunt isti: singulare et genus, quod supra dixit prius et posterius; accidens et genus accidentis; simplex et complexum.”

thus bringing the total to twelve.<sup>75</sup> These must be divided by potency and act because potency and act diversify the relation of cause to effect: (when) operating in act, singular causes—i.e., particular, proper causes of singular acts—*simultaneously* (► 8.7) *are or are not* with those things of which they are causes in act—i.e., (such causes) are removed together with their effects.

For example, *this physician* simultaneously is or is not with *this patient who is becoming healthy*; and *this builder* with *this building*; for something can be built in act only if there is a builder in act.<sup>76</sup> Taking *the builder of this building* and *this building insofar as it is being built*, if one is posited or removed, the other is necessarily posited or removed too. But this would not be true if proper causes were not taken, even if (causes) were taken in act. Thus, (it is) not (true that) *a builder* simultaneously is or is not with *this (building) that is being built*; for it can (happen) that there is a builder in act, yet this building is not being built, but another.

On the other hand, causes according to potency (*secundum potentiam*) are not always removed with their effects.<sup>77</sup> For example, the house and the builder who built it do not simultaneously cease to be (*corrumpuntur*).

In some (things), it happens that the substance of the effect is removed when the action of the efficient (cause) is removed, as in those (things) whose (act of) being (*esse*) is coming to be (*in fieri*); or in those whose cause is not only a cause of coming-to-be (*causa*

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<sup>75</sup> *In Metaph.* 5, l. 3, §794 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a19–20): “Hi autem sex modi ulterius dividuntur per potentiam et per actum, et sunt duodecim. Ideo autem oportet omnes istos modos per potentiam et actum dividi, quia potentia et actus diversificant habitudinem causae ad effectum. Nam causae in actu particulares sunt simul et tolluntur cum suis effectibus. [...] Dicit autem [Philosophus] causas singulares, quia actus singularium sunt.” *In Physic.* 2, l. 6, n. 8 (cf. ARISTOTLE, *Physica* B.3, 195b16): “Distinguit autem [Philosophus] omnes modos per potentiam et actum, quia quod est in potentia, non simpliciter est.” *Ibid.*, n. 9: “inter causas in actu et causas in potentia est ista differentia, quod causae operantes in actu simul sunt et non sunt cum eis quorum causae sunt in actu; ita tamen quod accipiantur causae singulares, idest propriae.” *De prin. nat.* §5, 61–64: “Et sciendum quod loquendo de causis in actu, necessarium est causam et causatum simul esse, ita quod si unum sit, et alterum.”

<sup>76</sup> *In Metaph.* 5, l. 3, §794 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a20–23): “sicut hic medicans cum hoc convalescente, et hic aedificans cum hoc aedificato: non enim potest aliquid actu aedificari, nisi sit actu aedificans.” *In Physic.* 2, l. 6, n. 9 (cf. ARISTOTLE, *Physica* B.3, 195b16–20): “sicut hic medicans simul est et non est cum hoc qui fit sanus, et hic aedificans cum hoc quod aedificatur. Si vero non acciperentur causae propriae, licet acciperentur in actu, non esset verum quod dicitur. Non enim aedificans est et non est simul cum hoc quod aedificatur: potest enim esse quod est aedificans in actu, sed tamen hoc aedificium non aedificatur, sed aliud. Sed si accipiamus aedificantem hoc aedificium, et hoc aedificium secundum quod est in aedificari, necesse est quod posito uno ponatur et alterum, et remoto uno removeatur et alterum.” *De prin. nat.* §5, 64–66: “si enim est edificator in actu, oportet quod edificet, et si sit edificatio in actu, oportet quod sit edificator in actu.”

<sup>77</sup> *In Metaph.* 5, l. 3, §794 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a23–25): “Sed causae secundum potentiam non semper removeantur cum effectibus; sicut domus et aedificator non simul corrumpuntur.” *In Physic.* 2, l. 6, n. 9 (cf. ARISTOTLE, *Physica* B.3, 195b20–21): “Hoc autem non accidit semper in causis quae sunt in potentia: non enim simul corrumpitur domus et homo qui aedificavit ipsam.” *De prin. nat.* §5, 66–68: “Sed hoc non est necessarium in causis quae sunt solum in potentia.”

*fiendi*) of the effect, but a cause of its being (*essendi*).<sup>78</sup> For example, light is taken away when the illumination of the sun is removed from the air.

### 11.12. Modal Division of Effects

In the same modes in which causes are divided, so too can be divided the things caused in which or of which (*in quibus vel quorum*) the causes are causes.<sup>79</sup> Thus, the thing caused can be divided into *prior and posterior* or *universal and particular*.<sup>80</sup> For example, the sculptor is a cause of *this statue*, which is posterior; or of *the statue*, which is more universal and prior; or of *the image* (*imago* = εἰκών), which is even more universal. Likewise, something is the formal or the motive cause of *this bronze*; or of *bronze*, which is more universal; or of *matter*, which is even more universal.<sup>81</sup>

And the same can be said of effects by accident—both that something is more common and (that) something (is) less common.<sup>82</sup> For example, the sculptor, who is a cause of the statue (by itself), is also a cause of the heavy, or of the white or red (i.e., all of them effects by accident), which befall (*accidunt*) from the part of matter (*ex parte materiae*) and are not caused by *this agent*.

That is said (to be an) **effect by accident** *which is conjoined to the effect by itself and is outside its ratio* (*quod coniungitur effectui per se et est praeter rationem eius*).<sup>83</sup> For

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<sup>78</sup> *In Metaph.* 5, l. 3, §794: “In quibusdam tamen contingit, quod remota actione efficientis tollitur substantia effectus, sicut in his quorum esse est in fieri, vel quorum causa non solum est effectui causa fiendi sed essendi. Unde remota illuminatione solis ab aere, tollitur lumen.” *In Physic.* 2, l. 6, n. 9: “Unde habetur quod sicut agentia inferiora, quae sunt causa rerum quantum ad suum fieri, oportet simul esse cum iis quae fiunt quandiu fiunt; ita agens divinum, quod est causa existendi in actu, simul est cum esse rei in actu. Unde subtracta divina actione a rebus, res in nihilum deciderent, sicut remota praesentia solis lumen in aere deficeret.”

<sup>79</sup> *In Metaph.* 5, l. 3, §791 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a10–11): “Et eisdem modis, quibus dividuntur causae, possunt dividi causata in quibus vel quorum causae sunt causae.” *In Physic.* 2, l. 6, n. 6 (cf. ARISTOTLE, *Physica* B.3, 195b6–7): “Et sicut distinguuntur causae modis praedictis, similiter distinguuntur ea quorum sunt causae.”

<sup>80</sup> *In Metaph.* 5, l. 3, §791 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a11–12): “Potest enim dividi causatum per prius et posterius sive particulare et universale; sicut si dicamus, quod statuae factor est causa huius statuae, quod est posterius, aut statuae, quod est universalis et prius, aut imaginis, quod est adhuc universalis.” *In Physic.* 2, l. 6, n. 6 (cf. ARISTOTLE, *Physica* B.3, 195b7–8): “Est enim aliquid causatum posterius et magis proprium, et aliquid quod est prius et magis commune: sicut si dicatur quod aliquid est causa huius statuae vel statuae in communi; et adhuc communius si dicatur causa imaginis.”

<sup>81</sup> *In Metaph.* 5, l. 3, §791 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a12): “Et similiter aliquid est causa formalis huius aeris, aut aeris, quod est universalis, aut materiae, quod est adhuc universalis.” *In Physic.* 2, l. 6, n. 6 (cf. ARISTOTLE, *Physica* B.3, 195b8–9): “Et similiter si dicatur aliquid causa motiva huius aeris, vel aeris in universali, vel materiae.”

<sup>82</sup> *In Metaph.* 5, l. 3, §791 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1014a12–13): “Et similiter potest dici in accidentalibus, scilicet in effectibus per accidens. Nam statuae factor qui est causa statuae, est etiam causa gravis vel albi vel rubei quae accidunt ex parte materiae, et non sunt ab hoc agente causata.” *In Physic.* 2, l. 6, n. 6 (cf. ARISTOTLE, *Physica* B.3, 195b9–10): “Et ita etiam potest dici in effectibus per accidens, et quod aliquid sit communius, et aliquid minus commune.”

<sup>83</sup> *In Physic.* 2, l. 6, n. 6: “Et dicitur effectus per accidens, quod coniungitur effectui per se et est praeter rationem eius: sicut per se effectus coqui est cibus delectabilis, per accidens autem cibus sanativus; medici autem e converso.”



example, the effect by itself of the cook is delectable food, while an effect by accident is healing food. On the other hand, (the effect by itself) of the physician (is) conversely.

### 11.13. Proportion of Effect to Cause

From what has been said, it follows that effects must proportionately respond to causes.<sup>84</sup> Thus, from general causes are rendered general effects, while singular (effects are rendered) by singular (causes). And a universal cause is compared to a universal caused, while a singular (cause) is compared to a singular caused. Likewise, effects in potency respond to causes in potency; and effects in act, to causes in act. And only a cause by itself—not a cause by accident—is proportioned to an effect.

For example, the cause of *the statue* is *the sculptor*, but (the cause) of *this statue* (is) *this sculptor*.<sup>85</sup> Likewise, we say that *the builder* is a cause of *the house*, and that *this builder* is a cause of *this house*.<sup>86</sup>

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<sup>84</sup> *De prin. nat.* §5, 69–71: “Sciendum est autem quod causa uniuersalis comparatur causato uniuersali, causa uero singularis comparatur causato singulari.” *In Physic.* 2, l. 6, n. 9: “determinat [Philosophus] tria consequentia ad praedictam distinctionem modorum.” The first consequence is the difference between causes in potency and act; the second one, the requirement of seeking the highest cause; these have already been noted. This is the third consequence, *ibid.*, n. 11 (cf. ARISTOTLE, *Physica* B.3, 195b25–27): “Tertium [...] est, quod causis debent proportionaliter respondere effectus, ita quod generalibus causis generales effectus reddantur, et singularibus singulares.” *Ibid.* (cf. ARISTOTLE, *Physica* B.3, 195b27–28): “Et similiter causis in potentia respondent effectus in potentia, et causis in actu effectus in actu.” *In Sent.* 2, d. 21 q. 1 a. 3 co.: “Cum ergo causa per accidens non sit proportionata ad effectum, sed solum causa per se [...]”

<sup>85</sup> *De prin. nat.* §5, 71–73: “Sciendum est autem quod causa uniuersalis comparatur causato uniuersali, causa uero singularis comparatur causato singulari: sicut dicimus quod edificator est causa domus, et hic edificator huius domus.”

<sup>86</sup> The requirement of proportion between cause and effect according to their diverse modes and combinations is applied by St. Thomas through his work to all genera of causes and in all orders. For example, *STh* I-II, q. 96 a. 1 co.: “unumquodque quod est propter finem, necesse est quod sit fini proportionatum.” *ScG* 2, 15 n. 4: “Secundum ordinem effectuum oportet esse ordinem causarum: eo quod effectus causis suis proportionati sunt. Unde oportet quod, sicut effectus proprii reducuntur in causas proprias, ita id quod commune est in effectibus propriis, reducat in aliquam causam communem: sicut supra particulares causas generationis huius vel illius est sol uniuersalis causa generationis; et rex est uniuersalis causa regiminis in regno, supra praepositos regni et etiam urbium singularium. Omnibus autem commune est esse. [...]” *Ibid.*, 16 n. 3: “Unaquaeque materia per formam superinductam contrahitur ad aliquam speciem. Operari ergo ex materia praeiacente superinducendo formam quocumque modo, est agentis ad aliquam determinatam speciem. Tale autem agens est agens particulare: causae enim causatis proportionales sunt. Agens igitur quod requirit ex necessitate materiam praeiacentem ex qua operetur, est agens particulare.” *Ibid.*, 21 n. 4: “Effectus suis causis proportionaliter respondent: ut scilicet effectus in actu causis actualibus attribuamus, et effectus in potentia causis quae sunt in potentia; et similiter effectus particulares causis particularibus, uniuersalibus uero uniuersales; ut docet Philosophus, in II Physicorum.” *Ibid.*, n. 10: “effectus proportionaliter reducuntur in causas.” *Ibid.* 3, 10 n. 4: “Quicquid est proprie et per se alicuius causa, tendit in proprium effectum.” *In Post. an.* 1, l. 4, 179–182 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b22–23): “si propositiones demonstrationis sunt causae conclusionis, necesse est quod sint *propria principia eius*: oportet enim causas esse proportionatas effectibus.” *In Sent.* 1, d. 3 q. 4 a. 2 co.: “effectus proprius et immediatus oportet quod proportionetur suae causae.” *De potentia*, q. 3 a. 16 co.: “multa non posse procedere ab uno principio immediate et proprie, videtur esse ex determinatione causae ad effectum, ex qua videtur debitum et necessarium ut si est talis causa, talis effectus proveniat.” *In Sent.* 2, d. 27 q. 1 a. 1 co.: “cum effectus proportionetur suae causae, oportet actum potentiae rationalis ipsi potentiae proportionatum esse.” *Ibid.* 3, d. 23 q. 1 a. 2 co.: “Si autem effectus non fuerint proportionati causae, non facient causam cognoscere quid est, sed quia est tantum, sicut patet de Deo.” *Ibid.* 4, d. 24 q. 1 a. 3 qc. 3 co.: “causa debet esse

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proportionata suo effectui." *De veritate*, q. 26 a. 3 ad 8: "Effectus enim proportionantur secundum proportionem causarum." *De sub. sep.*, c. 10, 79–82: "Oportet autem effectus proportionaliter causis respondere: ut scilicet effectus particularis causae particulari respondeat, effectus autem universalis universali causae." *In De div. nom.*, c. 5, l. 1: "Quae enim est proportio particularis causae ad suos effectus, eadem est proportio universalis causae ad omnia." *Ibid.*, l. 2: "Eadem autem est proportio causae particularis ad suos particulares effectus et causae universalis ad suos; quinimmo plus influit causa universalis ad suos effectus, quam causa particularis."

## 12. Nature and Element

As mentioned above (►8.4), nature and element signify intrinsic principles. We consider here how they are related to the genera of causes and their modes.

### 12.1. Nature

The name **nature** (*natura* = φύσις) signifies some cause especially (*in speciali*).<sup>1</sup> Whence, it always has the *ratio* of principle.<sup>2</sup>

*Nature* is said in multiple modes, of which the five principal are, according to ARISTOTLE: **(1)** generation or begetting (►12.2); **(2)** the intrinsic principle from which the begotten is generated (►12.3); **(3)** the principle of motion and of rest (►12.4); **(4)** matter (►12.5); and **(5)** form (►12.6).<sup>3</sup> He posits two more modes, adjunct to the latter two, according to which *first matter* (►12.7) and *essence* (►12.8) are said (to be) *nature*.<sup>4</sup>

According to this order, which follows the imposition of names (►8.10), generation or begetting receives the name *nature* first—while form receives it last—because the forms and the virtues (*virtutes*) of things are known through (their) acts.<sup>5</sup> Thus, the name *nature* (*natura*) is said or taken from *about to be begotten* (*nascendo*).<sup>6</sup> And it was first imposed to signify *the generation of living things* (►12.2), which is called *begetting* (*nativitas*) or *sprouting* (*pullulatio*), as though *that which is to be begotten* (*nascitura*) were called *nature* (*natura*). Thence, the name *nature* was transferred to signify *the principle of generation in living things* (►12.3).<sup>7</sup> And since the principle of such generation is intrinsic, the name

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<sup>1</sup> *In Metaph.* 5, l. 1, §749: “Primo distinguit [Philosophus] nomina significantia causas. [...] Primo distinguit nomina significantia causas generaliter. Secundo distinguit quoddam nomen, quod significat quamdam causam in speciali, scilicet hoc nomen natura.”

<sup>2</sup> *In Sent.* 1, d. 34 q. 2 a. 1 ad 3: “natura semper habet rationem principii: est enim principium motus et quietis in eo in quo est, per se, et non secundum accidens, ut in 2 Physic. dicitur.” Although the last remark refers especially to the third mode in which *nature* is said according to ARISTOTLE, it is evident, from what has been said, that *nature* has the *ratio* of principle also according to all the other modes.

<sup>3</sup> *STh* I-II, q. 10 a. 1 co.: “sicut Boetius dicit in libro *de Duabus Naturis*, et Philosophus in V *Metaphys.*, natura dicitur multipliciter.” *In Metaph.* 5, l. 5, §808 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b16–37): “Primo distinguit [Philosophus] diversos modos, quibus natura dicitur. [...] ponit quinque modos principales.”

<sup>4</sup> *In Metaph.* 5, l. 5, §821 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a7–13): “ponit [Philosophus] duos modos adiunctos duobus ultimis praecedentibus.”

<sup>5</sup> *In Metaph.* 5, l. 5, §824: “reductio aliorum modorum ad unum primum, fieri potest [...] secundum ordinem, qui attenditur quantum ad nominis impositionem. [...] et sic est in proposito. Quia enim formae et virtutes rerum ex actibus cognoscuntur, per prius ipsa generatio vel nativitas, naturae nomen accepit, et ultimo forma.”

<sup>6</sup> *STh* III, q. 2 a. 1 co.: “nomen naturae a nascendo est dictum vel sumptum. Unde primo est impositum hoc nomen ad significandum generationem viventium, quae nativitas vel pullulatio dicitur, ut dicatur natura quasi nascitura.” *STh* I, q. 29 a. 1 ad 4: “secundum Philosophum, in V *Metaphys.*, nomen naturae primo impositum est ad significandam generationem viventium, quae dicitur nativitas.” *ScG* 3, c. 35, n. 5: “Nomen naturae primo impositum est ad significandum ipsam generationem nascentium.”

<sup>7</sup> *ScG* 3, c. 35, n. 5: “Et exinde translatum est [nomen naturae] ad significandum principium generationis huiusmodi [sc., nascentium].” *STh* III, q. 2 a. 1 co.: “Deinde translatum est nomen naturae ad significandum principium huius [sc., nascentium] generationis.”

*nature* was further derived to signify *any which intrinsic principle of motion* (► 12.4), according to what ARISTOTLE says, that *nature is the principle of motion in that in which it is by itself and not by accident* (*natura est principium motus in eo in quo est per se et non secundum accidens*).<sup>8</sup> Now, the intrinsic principle of motion of the mobile thing is either matter or form.<sup>9</sup> Whence, sometimes matter (► 12.5) is said (to be) *nature*, and sometimes form (► 12.6).

According to the order of things, on the other hand, the *ratio* of *nature* befits (*competit*) form priorly (*prius*), because nothing is said to have a nature unless it has a form.<sup>10</sup> First and properly, therefore, *nature* is said of the substance (*substantia* = ἡ οὐσία)—i.e., the **(substantial) form**—of things having in themselves the principle of motion as such.<sup>11</sup> Form itself is the principle of motion of things that exist according to nature, whether in act or in potency; for form does not always produce (*facit*) motion in act, but sometimes only in potency: for example, when natural motion is impeded by some exterior thing that prohibits it, or when natural action is impeded due to a defect of matter.<sup>12</sup>

Those (things) that have a nature are those that have in themselves the principle of their motion.<sup>13</sup> And natural subjects are all such; for (nature) **is in a subject** insofar as **form** is said (to be) *nature*; and nature **is a subject** insofar as **matter** is said (to be) *nature*. **Matter** (*materia* = ἡ ὕλη) is said to be nature insofar as it is susceptible (*susceptibilis* = δεκτική)

<sup>8</sup> *STh* III, q. 2 a. 1 co.: “Et quia principium generationis in rebus viventibus est intrinsecum, ulterius derivatum est nomen naturae ad significandum quodlibet principium intrinsecum motus, secundum quod Philosophus dicit, in II *Physic.* quod *natura est principium motus in eo in quo est per se et non secundum accidens.*” *STh* I, q. 29 a. 1 ad 4: “Et quia huiusmodi generatio est a principio intrinseco, extensum est hoc nomen ad significandum principium intrinsecum cuiuscumque motus. Et sic definitur natura in II *Physic.*” *STh* I-II, q. 10 a. 1 co.: “Quandoque enim [natura] dicitur principium intrinsecum in rebus mobilibus.”

<sup>9</sup> *STh* I-II, q. 10 a. 1 co.: “Et talis natura [sc., principium intrinsecum in rebus mobilibus] est vel materia, vel forma materialis, ut patet ex II *Physic.*” *STh* III, q. 2 a. 1 co.: “Hoc autem principium vel forma est, vel materia. Unde quandoque natura dicitur forma, quandoque vero materia.” *STh* I, q. 29 a. 1 ad 4: “Et quia huiusmodi principium est formale vel materiale, communiter tam materia quam forma dicitur natura.” *ScG* 3, c. 35, n. 5: “Et inde [translatum est nomen naturae] ad significandum principium motus intrinsecum mobili.” *ScG* 3, c. 35, n. 5: “Et quia huiusmodi principium [sc., principium motus intrinsecum mobili] est materia vel forma, ulterius natura dicitur forma vel materia rei naturalis habentis in se principium motus.”

<sup>10</sup> *In Metaph.* 5, l. 5, §824: “reductio aliorum modorum ad unum primum, fieri potest [...] secundum ordinem rerum.” *Ibid.*, §825: “Sed secundum rerum ordinem, formae prius competit ratio naturae, quia, ut dictum est, nihil dicitur habere naturam, nisi secundum quod habet formam.”

<sup>11</sup> *In Metaph.* 5, l. 5, §826 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a13–16): “Unde patet ex dictis, quod primo et proprie natura dicitur substantia, idest forma rerum habentium in se principium motus in quantum huiusmodi. Materia enim dicitur esse natura, quia est formae susceptibilis.”

<sup>12</sup> *In Metaph.* 5, l. 5, §826 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a17–19): “Et idipsum, scilicet forma est principium motus rerum existentium secundum naturam, aut in actu, aut in potentia. Forma enim non semper facit motum in actu, sed quandoque in potentia tantum: sicut quando impeditur motus naturalis ab aliquo exteriori prohibente, vel etiam quando impeditur actio naturalis ex materiae defectu.”

<sup>13</sup> *In Physic.* 2, l. 1, n. 6 (cf. ARISTOTLE, *Physica* B.1, 192b32–34): “habentia naturam sunt illa quae habent in seipsis principium sui motus. Et talia sunt omnia subiecta naturae: quia natura est subiectum, secundum quod natura dicitur materia; et est in subiecto, secundum quod natura dicitur forma.”

of form. However, form is more nature than matter; for something is said (to be) *more* insofar as it is in act rather than insofar as it is in potency.<sup>14</sup> Thus, form, according to which something natural is in act, is more nature than matter, according to which something natural is in potency. **Generations (and begetting)** also have the name *nature* because they are motions proceeding from a form—and towards forms.<sup>15</sup>

## 12.2. Generation and Begetting

According to the first mode posited by ARISTOTLE, **nature** is said (to be) *the generation (generatio = γένεσις) of those (things) that are begotten (nascentium = τῶν φουομένων)*.<sup>16</sup> This is said only of living beings such as plants and animals, or their parts; for, properly speaking, the generation of non-living things cannot be called *nature* according to the common use of the vocable. The Greek φύσις that signifies the generation of living beings is with a long ū; φύσις with a short ũ, as commonly used, signifies *principle*.<sup>17</sup>

When said as generation—e.g., as begetting—nature is (signified as) a way towards nature (*via in naturam*): that towards which generation tends is a form; and form, therefore, is a nature.<sup>18</sup> That which is begotten goes (1) *from* something, and (2) *towards* something insofar as it is begotten; but that which is begotten is denominated from that *into which (in*

<sup>14</sup> *In Physic.* 2, l. 2, n. 5 (cf. ARISTOTLE, *Physica* B.1, 193b6–8): “procedit [Philosophus] ad ostendendum quod forma sit magis natura quam materia; quia unumquodque magis dicitur secundum quod est in actu, quam secundum quod est in potentia. Unde forma, secundum quam aliquid est naturale in actu, est magis natura quam materia, secundum quam est aliquid naturale in potentia.”

<sup>15</sup> *In Metaph.* 5, l. 5, §826 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a16–17): “Et generationes habent nomen naturae, quia sunt motus procedentes a forma, et iterum ad formas.” St. Thomas omits *et nasci* (< καὶ τὸ φύεσθαι) from his commentary, but it is in the text he is reading.

<sup>16</sup> St. Thomas consigns first the reading of the *translatio anonyma*, “of those [things] that are generated” (*generatorum*), which he shows to be inferior, since it does not apply specifically to living things. *In Metaph.* 5, l. 5, §808 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b16–17): “Dicit ergo [Philosophus] primo, quod natura dicitur uno modo generatio generatorum, vel ut alia litera habet melius, nascentium. Non enim omnia generata nascentia dici possunt; sed solum in viventibus, sicut in plantis, sive in animalibus, et in partibus eorum. Non autem generatio rerum non viventium potest dici natura proprie loquendo secundum communem usum vocabuli, sed solum generatio viventium; ut dicatur natura ipsa nativitas vel ipsa nascentia, quod ipsum nomen sonare videtur.”

<sup>17</sup> St. Thomas rejects the *translatio anonyma* as corrupted, although he proposes another interpretation for it. *In Metaph.* 5, l. 5, §808: “«Ut si quis porrigens dicat naturam.» Litera ista corrupta est. Quod ex alia translatione patet, quae sic habet «ut si quis producens dicat ypsilon.» Physis enim, quod apud Graecos naturam significat, si pro generatione viventium accipiatur, habet primum ypsilon productum; si vero pro principio, sicut communiter utitur, habet primum ypsilon breve. Posset tamen per hanc literam intelligi quod hoc nomen natura de generatione viventium dicatur secundum quamdam porrectionem idest extensionem.” Cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b17: “οἷον εἴ τις ἐπεκτείννας λέγοι τὸ υ.”

<sup>18</sup> *In Physic.* 2, l. 2, n. 7 (cf. ARISTOTLE, *Physica* B.1, 193b12–18): “Natura potest significari ut generatio, puta si natura dicatur nativitas. Sic igitur natura dicta ut generatio, idest nativitas, est via in naturam. Haec enim est differentia inter actiones et passiones, quod actiones denominantur a principiis, passiones vero a terminis. Unumquodque enim denominatur ab actu, qui est principium actionis et terminus passionis. Non enim ita est in passionibus sicut in actionibus: medicatio enim non dicitur via in medicinam, sed in sanitatem; necesse est enim quod medicatio sit a medicina, non in medicinam. Sed natura dicta ut generatio, idest nativitas, non sic se habet ad naturam sicut medicatio ad medicinam: sed se habet ad naturam sicut ad terminum, cum sit passio. Id enim quod nascitur, a quodam in quoddam venit in quantum nascitur: unde id quod nascitur, denominatur ab eo in quod, non ab eo ex quo. Id autem in quod tendit nativitas, est forma: forma igitur est natura.”

*quod*; ►48.21), and not from that *from which* (*ex quo*). This (too) is the difference between actions and affections (►33.5): actions are denominated from principles, while affections (are denominated) from termini; for each (thing) is denominated from (its) *act*, which is *the principle of the action and the terminus of the affection*. Thus, (generation) is not the same in affections as in actions: (e.g.), medication is not said (to be a) way towards (the art of) medicine, but towards health; for it is necessary that medication be from (the art of) medicine, and not toward (the art of) medicine. But *nature* said as *generation*—e.g., begetting—is not related to nature as medication (is related) to (the art of) medicine; rather, it is related to nature (i.e., form) as to (its) terminus, since it is an affection.

### 12.3. The Intrinsic Principle of the Begotten

In the second mode posited by ARISTOTLE, which follows from the first, **nature** is said (to be) *that from which the begotten is first generated* (*ex quo illud, quod nascitur generatur primo* < ἐξ οὗ φύεται πρώτου τὸ φυόμενον) *as from an intrinsic principle* (*sicut ex intrinseco principio* < ἐνυπάρχοντος).<sup>19</sup>

### 12.4. The Principle of Motion and of Rest

According to the third mode posited by ARISTOTLE (in his *Metaphysics*), in the likeness of begetting (*nativitatis*) to other motions, **nature**, in whatever beings, is said (to be) *whence the principle of motion is in any of the beings according to nature* (*unde est principium motus in quolibet entium secundum naturam* < ὅθεν ἡ κίνησις ἢ πρώτη ἐν ἐκάστω τῶν φύσει ὄντων), provided the principle of motion is *in it as such* (*in eo in quantum huiusmodi* < ἐν αὐτῷ ἢ αὐτὸ ὑπάρχει), and not accidentally (*et non per accidens*).<sup>20</sup>

This third mode is the same definition posited by ARISTOTLE in his *Physics*: *the principle (and cause) of motion and of rest in that in which it is first and by itself, and not accidentally* (*principium [et causa] motus et quietis in eo in quo est primo et per se et non secundum accidens* < ἀρχῆς τινὸς καὶ αἰτίας τοῦ κινεῖσθαι καὶ ἡρεμεῖν ἐν ᾧ ὑπάρχει πρώτως καθ' αὐτὸ καὶ μὴ κατὰ συμβεβηκός).<sup>21</sup>

<sup>19</sup> *In Metaph.* 5, l. 5, §809 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b17–18): “Ex hoc autem quod ipsa nativitas primo natura dicta est, secutus est modus secundus, ut scilicet generationis principium, ex quo aliquid generatur, sive ex quo illud, quod nascitur generatur primo, sicut ex intrinseco principio, dicatur natura.”

<sup>20</sup> *In Metaph.* 5, l. 5, §810 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b18–20): “Et per similitudinem nativitatis ad alios motus, ulterius processit huius nominis significatio, ut natura tertio modo dicatur id, unde est principium motus in quolibet entium secundum naturam, dummodo sit in eo in quantum huiusmodi, et non per accidens.”

<sup>21</sup> *In Physic.* 2, l. 1, n. 5 (cf. ARISTOTLE, *Physica* B.1, 192b20–23): “concludit [Philosophus] ex praemissis definitionem naturae hoc modo. Naturalia differunt a non naturalibus in quantum habent naturam; sed non differunt a non naturalibus nisi in quantum habent principium motus in seipsis; ergo natura nihil aliud est quam *principium motus et quietis in eo in quo est primo et per se et non secundum accidens*.” *In Metaph.* 5, l. 5, §810: “Et haec est definitio naturae posita in secundo Physicorum.”

1. In this definition, *principle* is posited as a genus, and not (as) something absolute, because the name *nature* conveys the *relation* of a principle (►8.2).<sup>22</sup> The principle of generation or motion is denominated *nature* because those are said to be begotten which are generated after having been joined to a generator, as is evident in plants and animals. Whence, those are to be derided who, wanting to correct ARISTOTLE's definition, have tried to define *nature* by something absolute, saying that nature is *an innate power in things (vis insita rebus)*, or something of this sort.
2. (The expression) *principle and cause* is said to designate that nature is not a principle in the same mode for all motions in that which is moved, but diversely.<sup>23</sup> In natural things, the principle of motion is in the mode in which motion pertains (*convenit*) to them: in those (things) to which it pertains *to move*, there is an active principle of motion, while in those (things) to which it pertains *to be moved*, there is a passive principle, which is matter. This principle, insofar as it has a natural potency (*potentia*, i.e., power) towards such a form and motion, makes the motion to be natural. This is why the productions of artificial things are not natural; for, although the material principle is in that which comes to be, however, it does not have a natural potency towards that form.
3. (The expression) *of moving and of resting* is said because those that are moved naturally towards a place, rest in the place likewise or more naturally.<sup>24</sup> However, one should not understand (by this) that, in whatever (thing) that is moved naturally, nature would be a principle of resting: rather, that (nature) is a principle not only of motion, but also of rest.
4. (The expression) *in which it is*, is said to differentiate (natural beings) from artifacts, in which there is motion only accidentally.<sup>25</sup>

<sup>22</sup> *In Physic. 2, l. 1, n. 5*: "Ponitur autem in definitione naturae *principium*, quasi genus, et non aliquid absolutum, quia nomen naturae importat habitudinem principii. Quia enim nasci dicuntur ea quae generantur coniuncta generanti, ut patet in plantis et animalibus, ideo principium generationis vel motus natura nominatur. Unde deridendi sunt qui volentes definitionem Aristotelis corrigere, naturam per aliquid absolutum definire conati sunt, dicentes quod natura est *vis insita rebus*, vel aliquid huiusmodi."

<sup>23</sup> *In Physic. 2, l. 1, n. 5*: "Dicitur autem *principium et causa*, ad designandum quod non omnium motuum natura est eodem modo principium in eo quod movetur, sed diversimode, ut dictum est." *In Physic. 2, l. 1, n. 4*: "in rebus naturalibus eo modo est principium motus, quo eis motus convenit. Quibus ergo convenit movere, est in eis principium activum motus; quibus autem competit moveri, est in eis principium passivum, quod est materia. Quod quidem principium, in quantum habet potentiam naturalem ad talem formam et motum, facit esse motum naturalem. Et propter hoc factiones rerum artificialium non sunt naturales: quia licet principium materiale sit in eo quod fit, non tamen habet potentiam naturalem ad talem formam."

<sup>24</sup> *In Physic. 2, l. 1, n. 5*: "Dicit autem [Philosophus] *movendi et quiescendi*, quia ea quae naturaliter moventur ad locum, similiter vel magis naturaliter in loco quiescunt [...]. Non tamen intelligendum est quod in quolibet quod movetur naturaliter, natura sit etiam principium quiescendi [...]: sed hoc pro tanto dicitur, quia non solum motus, sed etiam quietis principium est."

<sup>25</sup> *In Physic. 2, l. 1, n. 5*: "Dicit autem [Philosophus] *in quo est*, ad differentiam artificialium, in quibus non est motus nisi per accidens."

5. (The term) *first* is added because, although nature is a principle of motion of composite (things), it is not, however, the first.<sup>26</sup> Thus, an animal is moved downwards not because of the nature of animal insofar as it is an animal, but because of the nature of the dominant element (i.e., due the natural heaviness of the prevailing elements that constitute it).

6. (The expression) *by itself and not accidentally* is said because, sometimes, it may happen that (something is not *per se* the principle of motion; for example), some physician is to itself a cause of health.<sup>27</sup> And in this way, the principle of his healing is in him, but accidentally (*per accidens* = *secundum accidens* = κατὰ συμβεβηκός). Thus, nature is not a principle of healing in him; for he does not possess the art of medicine insofar as he is healed, but insofar as he is a physician; and in this way, the principle of motion is not in him insofar as he is moved. Being a physician and being healed happens (*accidit*) to the same (subject); but he is healed insofar as he is sick. Wherefrom, since they are conjoined accidentally, sometimes they are divided accidentally.<sup>28</sup> Thus, it may happen that the physician who heals is other than the sick (subject) who is healed. But the principle of natural motion is in the natural body that is moved insofar as it is moved.

All artificial things are also like the physician who heals; for not one of them has in itself the principle of its production.<sup>29</sup> Rather, some of them come to be from an extrinsic (principle), as a house and other things that are manufactured, while others come to be from an intrinsic principle, but accidentally.

### 12.5. Matter

The fourth mode posited by ARISTOTLE follows upon the third: since *nature* is said (to be) the principle of motion of natural things, and matter seemed—to some (philosophers)—to

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<sup>26</sup> *In Physic.* 2, l. 1, n. 5: “Addit autem *primum*, quia natura, etsi sit principium motus compositorum, non tamen primo. Unde quod animal movetur deorsum, non est ex natura animalis in quantum est animal, sed ex natura dominantis elementi.”

<sup>27</sup> *In Physic.* 2, l. 1, n. 5 (cf. ARISTOTLE, *Physica* B.1, 192b23–26): “Quare autem dicat [Philosophus] *per se et non secundum accidens*, exponit consequenter cum dicit, *Dico autem non secundum accidens*. Contingit enim aliquando quod aliquis medicus est sibi ipsi causa sanitatis; et sic principium suae sanationis est in eo, sed per accidens: unde principium sanationis in eo non est natura. Non enim secundum quod sanatur habet medicinam, sed secundum quod est medicus; accidit autem eundem esse medicum et sanari; sanatur enim secundum quod est infirmus.”

<sup>28</sup> *In Metaph.* 5, l. 5, §810: “Sicut in medico, qui infirmatur, inest principium sanationis, scilicet ars medicinae, non tamen in quantum est infirmus, sed in quantum medicus. Sanatur autem non in quantum est medicus, sed in quantum infirmus: et sic principium motus non est in eo in quantum movetur.” *In Physic.* 2, l. 1, n. 5 (cf. ARISTOTLE, *Physica* B.1, 192b26–27): “Et ideo, quia per accidens coniunguntur, aliquando per accidens dividuntur: contingit enim alium esse medicum sanantem et alium infirmum qui sanatur. Sed principium motus naturalis est in corpore naturali quod movetur, in quantum movetur: [...]. Nec dividuntur ad invicem [...], sed semper [sunt] unum et idem.”

<sup>29</sup> *In Physic.* 2, l. 1, n. 5 (cf. ARISTOTLE, *Physica* B.1, 192b27–32): “Et sicuti est de medico sanante, ita est de omnibus artificialibus. Nullum enim eorum habet in seipso suae factionis principium: sed quaedam eorum fiunt ab extrinseco, ut domus et alia quae manu inciduntur; quaedam autem fiunt a principio intrinseco, sed per accidens, ut dictum est.”



be the principle of motion in natural things, consequently, matter came to be called *nature*.<sup>30</sup> In this mode, matter is said (to be the) *nature* that underlies any natural thing which has in itself the principle of motion or of any mutation; for motion is a species of mutation (►48.2, ¶3).<sup>31</sup> However, matter is a principle of a thing both (in respect) of being (*quantum ad esse*) and (in respect) of coming-to-be (*quantum ad fieri*).<sup>32</sup>

Whence, ARISTOTLE says that **nature** is (*that*) *from which some being first is or comes to be* (*ex quo aliquod entium primo est aut fit < ex quo primo aut est aut fit aliquid entium natura = ἐξ οὗ πρώτου ἢ ἔστιν ἢ γίγνεται τι τῶν φύσει ὄντων*).<sup>33</sup>

1. (*That*) *from which*: an *existent without order* (*existente inordinato = ἀρρυθμίστου ὄντος*), that is, without form; whence, another version says: *for it is formless* (*cum informe sit*).<sup>34</sup> For in some (things), order itself (*ipse ordo*) is had instead of form (*pro forma*), as in an army or in a state.

2. (*That*) *from which* (is) *immutable by its power* (*immutabili ex [sive a] sua [propria] potestate = ἀμεταβλήτου ἐκ τῆς δυνάμεως τῆς αὐτοῦ*).<sup>35</sup> That is, it cannot be moved by its power, but (only) according to the power of an agent higher than it; for matter—considered without form—does not move itself towards form, but is moved by another: i.e., from a higher exterior agent. Thus, we could say that bronze is the matter of a statue and of brazen vessels, and timber of wooden things, if such vessels were natural bodies. And in all other things that are or come to be from matter, it is likewise; for any one of them comes to be from its matter having been preserved; but the dispositions of form are not preserved in generation; for one form is introduced (when) the other is expelled (►48.6).<sup>36</sup>

<sup>30</sup> *In Metaph.* 5, l. 5, §816: “Ex hac autem tertia ratione naturae sequitur quarta. Si enim principium motus rerum naturalium natura dicitur, principium autem motus rerum naturalium quibusdam videbatur esse materia, consequens fuit ut materia natura diceretur.”

<sup>31</sup> *In Physic.* 2, l. 2, n. 2 (cf. ARISTOTLE, *Physica* B.1, 193a9–30): “natura uno modo dicitur materia quae subiicitur unicuique rei naturali habenti in se principium motus vel cuiuscumque mutationis: nam motus est species mutationis.”

<sup>32</sup> *In Metaph.* 5, l. 5, §816: “quae quidem [materia] est principium rei, et quantum ad esse et quantum ad fieri.” *In Metaph.* 5, l. 5, §817: “Quod ideo dicit, quia materia essendi et fiendi est principium.”

<sup>33</sup> *In Metaph.* 5, l. 5, §816 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b26–27): “Et ideo dicit [Philosophus] quod natura dicitur ex quo aliquod entium primo est aut fit.”

<sup>34</sup> *In Metaph.* 5, l. 5, §817 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b27–28): “Ex quo, dico, «existente inordinato» idest absque forma. Unde alia litera habet «Cum informe sit.» In quibusdam enim ipse ordo habetur pro forma, sicut in exercitu et civitate.”

<sup>35</sup> *In Metaph.* 5, l. 5, §817 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b28–30): “Ex quo, dico, «immutabili ex sua potestate», idest, quod moveri non potest per suam potestatem, sed secundum potestatem sui superioris agentis. Nam materia non movet seipsam ad formam, sed movetur a superiori exteriori agente.” *In Metaph.* 5, l. 5, §816: “Ipsa etiam [materia] absque omni forma consideratur, nec a seipsa movetur, sed ab alio.”

<sup>36</sup> *In Metaph.* 5, l. 5, §817 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b30–32): “Sicut si diceremus aes materiam statucae et vasorum aereorum, et ligna ligneorum, si huiusmodi vasa, naturalia corpora essent. Similiter est in omnibus aliis quae ex materia sunt vel fiunt. Unumquodque enim eorum fit ex sua materia,

## 12.6. Form

According to the fifth mode posited by ARISTOTLE, form is said (to be) *nature* because the motion of natural things is caused more from their (intrinsic) form than from their matter.<sup>37</sup> Whence, some (philosophers) said that the nature of things is the composition itself of the compounds; for those (substances) are said to have a diverse nature which have diverse composition.

(Such philosophers) brought forward the following reason to posit that nature is a form: whatever things that naturally are and come to be—provided that the matter from which they are naturally apt to come to be exists—are said to have a nature only if they have the proper species and form, by which they may attain the species.<sup>38</sup> However, the name *species* (*species* = εἶδος) seems to be posited instead of *substantial form* (*pro forma substantiali*), and *form* (*forma* = μορφή) instead of *figure* (*figura*, i.e., σχῆμα, *shape*), which follows upon the species and is a sign of the species. Therefore, if form is nature, something can only be said to have a nature if it has a form, since that which is composed from form and matter is according to nature (*secundum naturam* = φύσει): for example, animals and their parts, such as flesh, bones, and such.

Thus, **nature** is said (to be), firstly and properly (*primo et proprie natura dicitur < prima natura et proprie dicta* = ἡ πρώτη φύσις καὶ κυρίως λεγομένη), *the substance*—i.e., *the form*—of things having in themselves the principle of motion as such (*substantia, idest forma rerum habentium in se principium motus in quantum huiusmodi < substantia quae principium motus habentium in se in quantum ipsa* = ἡ οὐσία ἢ τῶν ἐχόντων ἀρχὴν κινήσεως ἐν αὐτοῖς ἢ αὐτά).<sup>39</sup>

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ea salvata. Dispositiones autem formae non salvantur in generatione; una enim forma introducitur altera abiecta.” Because of this, as ARISTOTLE says and St. Thomas explains, to some philosophers, forms seemed to be accidents, and only matter seemed to be substance and nature. Ibid. (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b32–35): “Et propter hoc formae videbantur esse quibusdam accidentia, et sola materia substantia et natura, ut dicitur secundo Physicorum.” See *ibid.*, §§818–20 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b35–1015a7).

<sup>37</sup> *In Metaph.* 5, l. 5, §819 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b35–1015a7): “Quia vero motus rerum naturalium magis causatur ex forma quam ex materia, ideo supervenit quintus modus quo ipsa forma dicitur natura. [...] sicut naturam rerum dixerunt esse ipsam compositionem mixtorum; [...]. Dicuntur enim quae sunt permixtionis diversae, naturam diversam habere.”

<sup>38</sup> *In Metaph.* 5, l. 5, §820 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a3–7): “Ad ponendum autem formam esse naturam, hac ratione inducebantur, quia quaecumque sunt et fiunt naturaliter non dicuntur habere naturam, existente materia ex qua nata sunt fieri vel esse, nisi habeant speciem propriam et formam, per quam speciem consequantur. Videtur autem nomen speciei poni pro forma substantiali, et forma pro figura quae consequitur speciem, et est signum speciei. Si igitur forma est natura, nec aliquid potest dici habere naturam nisi quando habet formam, illud ergo quod compositum est ex materia et forma «dicitur esse natura,» idest secundum naturam, ut animalia et partes eorum, sicut caro et os et huiusmodi.”

<sup>39</sup> *In Metaph.* 5, l. 5, §826 (ARISTOTLE, *Metaphysica* Δ.4, 1015a13–15): “Unde patet ex dictis, quod primo et proprie natura dicitur substantia, idest forma rerum habentium in se principium motus in quantum huiusmodi.” Ibid., §819 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1014b35–36): “Et sic alio modo natura dicitur ipsa substantia, idest forma rerum existentium secundum naturam.”

## 12.7. First Matter

The first adjunct mode posited by ARISTOTLE is added to the fourth mode, in which matter is said (to be) *nature* (► 12.5).<sup>40</sup> According to this mode, only the **first matter** (*materia prima* = πρώτη ὕλη, i.e., prime matter) is said (to be a) *nature*. This can be understood in two modes: **(1)** in respect of that which is a genus; or **(2)** wholly and simply first. For example, of artifacts that are made from bronze, first matter according to genus is bronze; but *simply first* is the physical element from which bronze comes to be (► 46.7).<sup>41</sup>

## 12.8. Essence

The second adjunct mode posited by ARISTOTLE borders upon the aforesaid fifth mode, in which form was said (to be) *nature* (► 12.6).<sup>42</sup> According to this mode, not only the form of the part (*forma partis*) is said (to be) *nature*, but the species itself is the form of the whole (*forma totius*): for example, if we were to say that the nature of man is not merely the soul, but the humanity and **substance** (i.e., essence) that the definition signifies (► 16). According to this mode, then, **nature** is said (to be) *the form and the species that is according to ratio* (*forma et species quae est secundum rationem* = ἡ μορφή καὶ τὸ εἶδος τὸ κατὰ τὸν λόγον), i.e., from which the *ratio* of the thing is constituted.<sup>43</sup>

Since matter and form constitute the essence of a natural thing, the name *nature* was extended to signify the essence of anything existing in nature, such that the **essence** of a thing—which (its) definition signifies—would be said (to be its) *nature*.<sup>44</sup> And since the essence of any one thing is completed by a form, the **essence in common** (*communiter*

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<sup>40</sup> *In Metaph.* 5, l. 5, §821 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a7–10): “Deinde cum dicit *natura autem* ponit duos modos adiunctos duobus ultimis praecedentibus, quorum primus additur quarto modo quo materia dicebatur natura. Et dicit, quod materia dicitur natura non quaecumque, sed prima. Quod potest intelligi dupliciter aut quantum ad id quod est genus; aut ex toto vel simpliciter prima. Sicut operum artificialium quae fiunt ex aere, prima materia secundum genus illud est aes. Prima vero simpliciter est aqua. Nam omnia quae liquescunt calido et indurantur frigido sunt aquea magis, ut dicitur quarto Meteororum.”

<sup>41</sup> Replacing “water” with “the physical element from which bronze comes to be.” Some ancient authors thought that all composite substances that can be liquefied are made from of water. But ARISTOTLE allows water to be the first matter of such substances only hypothetically: “ὄλως δ’ ἴσως ὕδωρ, εἰ πάντα τὰ τηκτὰ ὕδωρ.” Today, we would refer, e.g., to the subatomic particles of modern physics.

<sup>42</sup> *In Metaph.* 5, l. 5, §822: “Secundus modus adiacet quinto modo praedicto quo forma dicebatur natura. Et secundum hunc modum non solum forma partis dicitur natura, sed species ipsa est forma totius. Ut si dicamus quod hominis natura non solum est anima, sed humanitas et substantia quam significat definitio.”

<sup>43</sup> *In Physic.* 2, l. 2, n. 3 (cf. ARISTOTLE, *Physica* B.1, 193a30–31): “ostendit [Philosophus] quod natura dicitur de forma. Et [...] primo ostendit propositum, scilicet quod forma sit natura; [...]. Dicit ergo primo quod alio modo dicitur natura forma et species, quae est secundum rationem, idest ex qua ratio rei constituitur.”

<sup>44</sup> ScG 3, c. 35, n. 5: “Et quia forma et materia constituunt essentiam rei naturalis, extensum est nomen naturae ad significandum essentiam cuiuscumque rei in natura existentis: ut sic natura alicuius rei dicatur essentia, quam significat definitio.” *STh* III, q. 2 a. 1 co.: “Et quia finis generationis naturalis est, in eo quod generatur, *essentia speciei, quam significat definitio*, inde est quod huiusmodi essentia speciei vocatur etiam natura.” *STh* I, q. 29 a. 1 ad 4: “Et quia per formam completur essentia uniuscuiusque rei, communiter essentia uniuscuiusque rei, quam significat eius definitio, vocatur natura.”

*essentia*) of any one thing, which its definition signifies, is called *nature*; for the end of natural generation is, in that which is generated, *the essence of the species, which the definition signifies* (*essentia speciei, quam significat definitio*; ► 16).

Thus, just as that is (said to be) *art* (*ars* < τέχνη λέγεται) which befits something insofar as it is according to art and artificial (*secundum artem et artificiosum* = τὸ κατὰ τέχνην καὶ τὸ τεχνικόν), so too that is (said to be) *nature* (*natura* = φύσις) which befits something insofar as it is according to nature and natural (*secundum naturam et naturale* = τὸ κατὰ φύσιν καὶ τὸ φυσικόν).<sup>45</sup> But we do not say that that which is only in potency of being artificial has something of art; for it does not yet have the species (for example) of bed. Therefore, in natural things, that which is flesh and bone in potency does not have the nature of flesh and bone before it receives the form according to which the definitive *ratio* of the thing is taken (*ratio definitiva rei* < τὸ εἶδος τὸ κατὰ τὸν λόγον; ► 8.1): that is, (the *ratio*) by which we know what flesh or bone is; nor is there a nature in it before it has a form.

Therefore, the **nature** of natural things having in themselves the principle of motion is, in another mode, also a *form* (*forma* < ἡ μορφή καὶ τὸ εἶδος) *that differs from matter in ratio* (*ratione* < κατὰ τὸν λόγον), even though it cannot be separated from matter according to the thing (*non separetur <a materia> secundum rem* < οὐ χωριστὸν ὄν).<sup>46</sup> Thus, just as bronze and figureless are one in subject but differ in *ratio*, so matter and form (are one in subject but differ in *ratio*). ARISTOTLE says this because the mode in which matter is said (to be) *nature* can only be other than the mode in which form is said (to be) *nature* if form is other than matter according to *ratio* (*secundum rationem*).

Hence, just as form or matter is said (to be) *nature* because it is the principle of generation, which (generation) is said (to be) *nature* according the first imposition of the name, so too **the species and substance** (*species et substantia* = τὸ εἶδος καὶ ἡ οὐσία) is said (to be) *nature* because it is the end of generation (*finis generationis* = τὸ τέλος τῆς γενέσεως).<sup>47</sup>

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<sup>45</sup> *In Physic.* 2, l. 2, n. 3 (cf. ARISTOTLE, *Physica* B.1, 193a31–b3): “et hoc probat tali ratione. Sicuti enim illud est ars, quod competit alicui in quantum est secundum artem et artificiosum; ita illud est natura, quod competit alicui in quantum est secundum naturam et naturale. Sed illud quod est in potentia tantum ad hoc quod sit artificiosum, non dicimus habere aliquid artis, quia nondum habet speciem lecti: ergo in rebus naturalibus id quod est potentia caro et os, non habet naturam carnis et ossis antequam accipiat formam, secundum quam sumitur ratio definitiva rei (per quam scilicet scimus quid est caro vel os); nec adhuc est natura in ipso antequam habeat formam.”

<sup>46</sup> *In Physic.* 2, l. 2, n. 3 (cf. ARISTOTLE, *Physica* B.1, 193b3–5): “Ergo natura rerum naturalium habentium in se principium motus, alio modo etiam forma est: quae licet non separetur a materia secundum rem, tamen differt ab ea ratione. Sicut enim aes et infiguratum, quamvis sint unum subiecto, tamen ratione differunt, ita materia et forma. Et hoc pro tanto dicit [Philosophus], quia nisi forma esset aliud secundum rationem a materia, non esset alius et alius modus quo materia dicitur natura, et quo forma dicitur natura.”

<sup>47</sup> *In Metaph.* 5, l. 5, §822 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a10–11): “Sicut autem forma vel materia dicebatur natura, quia est principium generationis, quae secundum primam nominis impositionem natura dicitur; ita species et substantia dicitur natura, quia est finis generationis. Nam generatio terminatur ad speciem generati, quae resultat ex unione formae et materiae.”

For generation is terminated at the species of the thing generated, which results from the union of form and matter (► 15.14).

Therefore, according to some metaphor (*secundum quamdam metaphoram* < μεταφορᾶ) and extension of the name, *nature* is said of every **substance**; for the nature that we said is the terminus of generation is some substance.<sup>48</sup> And thus, every substance has a likeness with that which is said (to be) *nature*. It is on account of this mode that the name *nature* is distinguished from the other common names; for in this way it is as common as *substance*.

In this mode, not only any substance, but even any **being** (*quodlibet ens*)—is said (to be a) *nature*.<sup>49</sup> According to this, that is said to be natural to a thing (*naturale rei*) which befits it (*convenit ei*) according to its substance. And this (i.e., whatever befits a thing according to its substance) is what is by itself in the thing (*quod per se inest rei*). In all things, those that are not by themselves in (the thing) are reduced to something that is by itself as to a principle. Hence, taking *nature* in this mode, it is necessary, in those that befit (*conveniunt*) a thing, that the principle always be natural. This is evident in (the habit of) understanding (► 51.21); for the principles of intellectual cognition are known naturally.

According to this mode too, BOETHIUS defines **nature** as *the specific difference that informs any one thing* (*unumquodque informans specifica differentia*), since the specific difference is that which completes the substance (i.e., essence) of a thing and gives it a species, for the specific difference completes the definition and is taken from the proper form of the thing (► 13.16; 16.7).<sup>50</sup>

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<sup>48</sup> *In Metaph.* 5, l. 5, §823 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1015a7–13): “Et ex hoc secundum quamdam metaphoram et nominis extensionem omnis substantia dicitur natura; quia natura quam diximus quae est generationis terminus, substantia quaedam est. Et ita cum eo quod natura dicitur, omnis substantia similitudinem habet. [...] Ratione autem istius modi distinguitur hoc nomen natura inter nomina communia. Sic enim commune est sicut et substantia.” *In Metaph.* 5, l. 5, §808: “Hic distinguit hoc nomen natura: cuius quidem consideratio, licet non videatur ad primum philosophum, sed magis ad naturalem pertinere, ideo tamen hic hoc nomen natura distinguitur, quia natura secundum sui quamdam acceptionem de omni substantia dicitur, ut patebit. Et per consequens cadit in consideratione philosophi primi, sicut et substantia universalis.”

<sup>49</sup> *STh* I-II, q. 10 a. 1 co.: “Alio modo dicitur natura quaelibet substantia, vel etiam quodlibet ens. Et secundum hoc, illud dicitur esse naturale rei, quod convenit ei secundum suam substantiam. Et hoc est quod per se inest rei. In omnibus autem, ea quae non per se insunt, reducuntur in aliquid quod per se inest, sicut in principium. Et ideo necesse est quod, hoc modo accipiendo naturam, semper principium in his quae conveniunt rei, sit naturale. Et hoc manifeste apparet in intellectu, nam principia intellectualis cognitionis sunt naturaliter nota.”

<sup>50</sup> *In Metaph.* 5, l. 5, §823: “Et hunc modum etiam ponit Boetius.” *In Metaph.* 5, l. 5, §822: “Secundum hoc enim Boetius dicit, quod natura est unumquodque informans specifica differentia. Nam specifica differentia est, quae complet substantiam rei et dat ei speciem.” *STh* III, q. 2 a. 1 co.: “Et hoc modo Boetius naturam definit, in libro *de Duabus Naturis*, dicens: *Natura est unamquamque rem informans specifica differentia*, quae scilicet complet definitionem speciei.” *STh* I, q. 29 a. 1 ad 4: “Unde Boetius in eodem libro dicit quod *natura est unumquodque informans specifica differentia*, specifica enim differentia est quae complet definitionem, et sumitur a propria forma rei.”

## 12.9. Element

Properly (as opposed to metaphorically: ► 12.12), **element** (*elementum* = στοιχεῖον) is *that intrinsic (principle) from which something is first composed, specifically indivisible into another species (ex quo aliquid componitur primo inexistente, indivisibili specie in aliam speciem = ἐξ οὗ σύγκειται πρώτου ἐνυπάρχοντος, ἀδιαίρετου τῷ εἶδει εἰς ἕτερον εἶδος)*.<sup>51</sup> (Or, according to another wording of the same Aristotelian definition), *that from which a thing is composed first, is in it, and is not divided (or divisible) according to form (id ex quo componitur res primo, et est in ea, et non diuiditur secundum formam)*. Whence, it can be gathered that four (*ratios*) belong to the *ratio* of *element*.<sup>52</sup>

1. That (an element) should be a cause *from which* (*ex quo* = ἐξ οὗ).<sup>53</sup> Whence, *element* is posited in the genus of *material cause* (► 9.3); for it is properly said only of those causes from which (*ex quibus*) the composition of the thing is, which are properly material.

2. That (an element) should be a principle from which something comes to be *first* (*primo* < πρώτου); for *element* is not said of whatever material cause, but (only) of that (material cause) from which composition first comes to be (► 11.6).<sup>54</sup>

For example, limbs (*membra*) are not the elements of man; for limbs, too, are composed from (*ex*) other (material causes).<sup>55</sup> Likewise, copper is (a material cause) from which (*ex quo*) a statue is made, but is not an element; for it has another matter from which it is made.<sup>56</sup>

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<sup>51</sup> *In Metaph.* 5, l. 4, §795 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014a26–27): “ostendit [Philosophus] quomodo elementum proprie dicatur.” *Ibid.*, §807 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014b14–15): “dicit, quod omnibus praedictis modis elementi hoc est commune, esse primum in unoquoque, sicut dictum est.” This Latin definition has been taken directly from the version that St. Thomas is using. *De prin. nat.* §3, 95–98: “Vnde Aristoteles in V Methaphisice dicit quod «elementum est id ex quo componitur res primo, et est in ea, et non diuiditur secundum formam».”

<sup>52</sup> *In Metaph.* 5, l. 4, §795: “Ponit [Philosophus] ergo primo, quamdam elementi descriptionem; ex qua colligi potest, quod quatuor sunt de ratione elementi.” *Ibid.*, §798: “Propter hoc dicit, quod elementum est ex quo aliquid componitur, quantum ad primum. Primo, quantum ad secundum. Inexistente, quantum ad tertium. Indivisibili specie in aliam speciem, quantum ad quartum.”

<sup>53</sup> *In Metaph.* 5, l. 4, §795: “primum est, ut sit causa sicut ex quo: per quod patet, quod elementum ponitur in genere causae materialis.” *De prin. nat.* §3, 86–88: “Elementum uero non dicitur proprie nisi de causis ex quibus est compositio rei, que proprie sunt materiales.”

<sup>54</sup> *In Metaph.* 5, l. 4, §796: “Secundum est, quod sit principium ex quo aliquid fiat primo.” *De prin. nat.* §3, 88–91: “et iterum non de qualibet causa materiali [dicitur proprie elementum], sed de illa ex qua est prima compositio.” Cf. *ibid.*, 99–100: “Expositio prime particule, ‘ex quo componitur res primo’, patet per ea que diximus.”

<sup>55</sup> *De prin. nat.* §3, 88–91: “sicut nec membra elementa sunt hominis, quia membra etiam sunt composita ex aliis.”

<sup>56</sup> *In Metaph.* 5, l. 4, §796: “Cuprum enim est ex quo fit statua; non tamen est elementum, quia habet aliquam aliam materiam ex qua fit.” St. Thomas is referring here to the composition of copper from the elements of ancient physics (earth, water, air, fire); cf. *De prin. nat.* §3, 91–95: “sed dicimus quod terra et aqua sunt elementa, quia hec non componuntur ex aliis corporibus, sed ex ipsis est prima compositio corporum naturalium.” Chemically speaking, of course, copper *is* an element, and in this sense, a statue could be said to be made from an element—a chemical one. However, the argument that St. Thomas

What is first in composition is last in resolution.<sup>57</sup> Hence, an element is that from which a thing is first composed, and into which it is last divided. However, we find a double mode of composition and division: **(a)** according to *ratio*, in which species are resolved into genera, as PLATO posited genera to be principles and elements;<sup>58</sup> **(b)** according to nature, insofar as natural bodies are composed from natural elements and are resolved into them,<sup>59</sup> as the natural philosophers posited elements to be the first principles.

3. That (an element) should be *intrinsic (inexistens sive intrinsecum, est in ea = ἐνυπάρχοντος)*.<sup>60</sup> This is posited to differentiate (elements) from that matter that is totally (*ex toto*) corrupted by generation.<sup>61</sup> Whence, an element differs from anything transient (*transeunte*) from which something comes to be, whether it is a privation, a contrary, or matter subjected to contrariety or privation, which is transient matter (► 43).<sup>62</sup>

For example, bread is the matter of blood; but blood is generated only if bread is corrupted; and, since bread does not remain in blood, bread cannot be said to be an element of blood; for elements must somehow remain, since they are not corrupted.<sup>63</sup> Likewise, we say that a musical man comes to be from a non-musical man (i.e., from a man-matter subjected to privation), or that a musical (comes to be) from a non-musical (i.e., from a privation); but elements must remain in those things of which they are elements.<sup>64</sup>

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makes here can be readily applied to our modern understanding of nature insofar as any chemical element is known to be composed of other, more *elementary* physical particles—whatever they may be. Thus understood, a copper statue is *not* made from a natural element—which is precisely the point that St. Thomas is making here.

<sup>57</sup> *In Metaph.* 3, l. 3, §355 (cf. ARISTOTLE, *Metaphysica* B.1, 995b27–29): “elementum est ex quo primo componitur res, et in quod ultimo dividitur. Invenimus autem duplicem modum compositionis et divisionis: unum scilicet secundum rationem, prout species resolvuntur in genera. Et secundum hoc videntur genera esse principia et elementa, ut Plato posuit. Alio modo secundum naturam sicut corpora naturalia componuntur ex igne et aere et aqua et terra, et in haec resolvuntur. Et propter hoc naturales posuerunt esse prima principia elementa.”

<sup>58</sup> As St. Thomas explains, supposing genera were the principles of things, the question would arise of whether the most specific species or the most generic genera are the principles of things: for example, whether *animal* or *man* is more of a principle. He explains that this question comes from two divisions: (1) according as we divide genera into species; and (2) according as we resolve species into genera.

<sup>59</sup> Replacing “fire, air, water, and earth” with “natural elements.”

<sup>60</sup> *In Metaph.* 5, l. 4, §797: “Tertium est, quod sit inexistens sive intrinsecum.”

<sup>61</sup> *De prin. nat.* §3, 100–109: “Secunda particula, scilicet ‘et est in ea’, ponitur ad differentiam illius materie que ex toto corrumpitur per generationem.”

<sup>62</sup> *In Metaph.* 5, l. 4, §797: “Tertium est, quod sit inexistens sive intrinsecum: per quod differt elementum ab omni eo ex quo fit aliquid sicut ex transeunte, sive sit privatio, aut contrarium, sive materia contrarietati et privationi subiecta, quae est materia transiens. Ut cum dicimus, quod homo musicus fit ex homine non musico, vel musicum ex non musico. Elementa enim oportet manere in his quorum sunt elementa.”

<sup>63</sup> *De prin. nat.* §3, 100–109: “sicut panis est materia sanguinis, sed non generatur sanguis nisi corrumpatur panis, unde panis non remanet in sanguine: unde non potest dici panis elementum sanguinis; sed elementa oportet aliquo modo manere cum non corrumpantur, ut dicitur in libro De generatione.” Cf. ARISTOTLE, *De generatione* A.10, 327b29–31.

<sup>64</sup> *In Metaph.* 5, l. 4, §797: “Ut cum dicimus, quod homo musicus fit ex homine non musico, vel musicum ex non musico. Elementa enim oportet manere in his quorum sunt elementa.”

4. That (an element) should be of some *species that is not divisible into another species* (*indivisibili specie in aliam speciem* < ἀδιαίρετου τῷ εἶδει εἰς ἕτερον εἶδος).<sup>65</sup> This (*ratio*) is posited to differentiate (an element) from those (things) that have parts diverse in form: i.e., in species, as a hand, whose parts are flesh and bones, which differ according to species.<sup>66</sup> Hence, *element* differs from *first matter*—which does not have any species—and from all other matters that can be resolved into other species, such as blood.<sup>67</sup>

An element is not divided into parts that are diverse according to species, as water, of which whatever part is water.<sup>68</sup> On the other hand, it is not necessary for an element not to be divided according to quantity: it suffices for it not to be divided according to species; and if it is not divisible (according to species), it is said to be an element, as letters or phonemes are said to be the elements of diction.<sup>69</sup> Thus, when it is posited in this definition that an element is not divisible into things that are diverse according to species (*non dividitur in diversa secundum speciem*), this must not be understood of the parts into which something is divided according to the division of quantity (*divisione quantitatis*; ► 13.9).<sup>70</sup> Otherwise, wood would be an element; for every part of wood is wood. Instead, it should be understood of the division that is done according to alteration, as compounds (*mixta*) are resolved into simpler bodies.

#### 12.10. Properties of Elements

All (things) that are composite are not constituted from elements that are related in just any mode whatsoever (*quocumque modo* = ὅπωςοῦν), but always according to a certain *ratio* and composition (*quadam ratione et compositione* = λόγῳ τινὶ καὶ συνθέσει).<sup>71</sup>

<sup>65</sup> *In Metaph.* 5, l. 4, §798: “Quartum est, quod habeat aliquam speciem, quae non dividatur in diversas species.”

<sup>66</sup> *De prin. nat.* §3, 109–120: “Tertia particula, scilicet ‘et non dividitur secundum formam’, ponitur ad differentiam eorum scilicet que habent partes diuersas in forma, id est in specie, sicut manus cuius partes sunt caro et ossa que differunt secundum speciem.”

<sup>67</sup> *In Metaph.* 5, l. 4, §798: “per quod differt elementum a materia prima, qua nullam speciem habet, et etiam ab omnibus materiis, quae in diversas species resolvi possunt, sicut sanguis et huiusmodi.”

<sup>68</sup> *De prin. nat.* §3, 109–120: “elementum non dividitur in partes diuersas secundum speciem, sicut aqua cuius quelibet pars est aqua. Non enim oportet ad esse elementi ut non diuidatur secundum quantitatem, sed sufficit si non diuidatur secundum speciem; et si etiam non diuiditur, dicitur elementum, sicut littere dicuntur elementa dictionum.”

<sup>69</sup> Thus, phonemes of the same species may be short or long according to quantity.

<sup>70</sup> *In Metaph.* 5, l. 4, §800: “Sciendum est, quod cum in definitione elementi ponatur, quod non dividitur in diversa secundum speciem, non est intelligendum de partibus in quas aliquid dividitur divisione quantitatis: sic enim lignum esset elementum, quia quaelibet pars ligni est lignum: sed de divisione, quae fit secundum alterationem, sicut corpora mixta resolvuntur in simplicia.” Thus, according to quantitative division, any part of salt is salt; but, as chemistry shows, sodium chloride (a *mixtum*) is resolved into sodium and chlorine, which are its chemical elements.

<sup>71</sup> *In De anima* 1, c. 12, 41–45 (cf. ARISTOTLE, *De anima* A.1, 410a1–2): “omnia que sunt composita non consistunt quocumque modo se habeant elementa, set quadam ratione et compositione, ut scilicet sint proportionata ad inuicem.”



Elements are not in a compound (*in mixto*) *actually* (*actu*), but *virtually* (*virtute*).<sup>72</sup>

No element is the same as that which is composed from the elements; for nothing is a cause or an element of itself.<sup>73</sup> For example, an element of the syllable BA is the letter B or A (and neither B nor A is the same as BA).

### 12.11. Principle vs. Element

From what has been said thus far, it is evident that *principle* is somehow had in more (things) that *cause*; and *cause*, in more (things) than *element*.<sup>74</sup>

Not only are causes those that are intrinsic to the thing, but also those that are outside the thing: for example, the moving (cause; ►9.7).<sup>75</sup> Whence, it is evident that *principle* and *element* differ; for, properly, that is said (to be) an element which is an intrinsic cause from which (*ex qua*) a thing is constituted.

Thus, just as the name *principle* is more common than *cause* (i.e., for there are principles that are not causes), so is *cause* (found) in more (things) than *element*; for only an intrinsic cause can be said (to be an) *element*.<sup>76</sup>

### 12.12. Element Metaphorically Speaking

*Element* is also said metaphorically (*transumptive* < μεταφέρωντες),<sup>77</sup> such that, from the preceding *ratio* and signification of *element*, some (thinkers) have transferred the name to

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<sup>72</sup> *In De anima* 2, c. 8, 92–93: “cum elementa non sint actu in mixto, set uirtute [...]”

<sup>73</sup> *In Metaph.* 12, l. 4 §2461 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b4–7): “Nullum elementum est idem cum eo quod ex elementis est compositum: quia nihil est causa aut elementum suiipsius; sicut huius syllabae BA, elementum est haec litera B aut A.” This is applied directly in *ibid.*, §2462 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b7–8): “Et quia videbatur hoc habere instantiam in principiis a Platone positis, quae sunt unum et ens, eo quod unumquodque principiorum est unum et ens; ideo consequenter hoc excludit, dicens, quod neque etiam intellectualium elementorum, quae sunt unum et ens, possibile est aliquod esse idem cum his quae sunt ex elementis. Vocat autem ea intellectualia, quia universalia intellectu percipiuntur, et quia Plato ea ponebat separata a sensibilibus.” And *ibid.*, §2463 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b8–10): “Et quod huiusmodi elementa sint alia ab eis quorum sunt elementa, probat, quia huiusmodi elementa, idest unum et ens, insunt singulis compositorum ex eis, nullum autem compositorum ex eis inest aliis. Unde patet, quod et ista elementa differunt ab his quae sunt composita ex eis. Si igitur verum est quod elementa non sunt idem cum his quae sunt ex elementis, si eadem sunt elementa substantiarum et aliorum generum, consequitur, quod nihil eorum sit in genere substantiae, neque in aliis generibus. Sed hoc est impossibile; quia necesse est omne quod est, esse in aliquo genere: non igitur possibile est, quod sint eadem principia omnium.”

<sup>74</sup> *De prin. nat.* §3, 120–123: “Patet igitur quod principium quodammodo in plus habet se quam causa, et causa in plus quam elementum: et hoc est quod dicit Commentator in V Methaphisice.”

<sup>75</sup> *In Metaph.* 12, l. 4 §2468 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b22–23): “quia non solum sunt causae ea quae dicta sunt intrinseca rei, sed etiam ea quae sunt extra rem, sicut movens, manifestum est quod principium et elementum differunt. [...] Elementum autem proprie dicitur causa intrinseca ex qua constituitur res.”

<sup>76</sup> *In Metaph.* 5, l. 1, §750: “hoc nomen principium communius est quam causa: aliquid enim est principium, quod non est causa; [...]. Et iterum causa est in plus quam elementum. Sola enim causa intrinseca potest dici elementum.”

<sup>77</sup> *In Metaph.* 5, l. 4, §802 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014b3–6): “ostendit [Philosophus] quomodo elementum dicatur transumptive; dicens, quod ex hac praemissa ratione et significatione elementi

signify *that which is one, small, and useful for many* (*quod est unum, et parvum, et ad multa utile* = ὁ ἓν ἐν ὄν καὶ μικρὸν ἐπὶ πολλὰ ἢ χρήσιμον).

Since an element is indivisible into diverse species, this has been taken to be *one*; from its being first, to be *simple*; and because others are composed from elements, to be *useful for many*. And thus, this *ratio* of *element* was established so that everything that is small in quantity, simple—as if not composed from others—, and indivisible into diverse things, would be called *element*.<sup>78</sup> Once this *ratio* of *element* was established by transfer, it happened that two modes of *elements* were arrived at:<sup>79</sup>

1. Those would be called *elements* which are maximally universal (*ea quae sunt maxime universalia* = τὰ μάλιστα καθόλου).<sup>80</sup>

The universal is *one* according to *ratio* (*secundum rationem*; ►38); it is simple because its definition is not composed from diverse things; and is in many, and thus useful for many, whether it be in everything, as *one* and *being*, or in many, as the other genera.<sup>81</sup>

2. Through the same *ratio*, it happened that the point and the unit came to be called *principles* and *elements*; for each of them is one, simple, and useful for many.<sup>82</sup>

◀ However, these two modes fall short of the *ratio* of *element*.<sup>83</sup> Universals are not the matter from which particular things are composed; rather, they predicate their substance (i.e., they predicate, of particular things, their essence). Likewise, the point is not the matter of lines; for a line is not composed from points (►34.23; and, although numbers are composed from units, it is prime numbers that are properly the *elements* of other numbers, since they are the first species of numbers).

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transtulerunt quidam hoc nomen elementum ad significandum aliquid, quod est unum, et parvum, et ad multa utile.”

<sup>78</sup> *In Metaph.* 5, l. 4, §802: “Ex hoc enim quod elementum est indivisibile in diversas species, acceperunt quod sit unum. Ex eo vero quod est primum, quod sit simplex. Ex eo vero, quod ex elementis alia componuntur, acceperunt quod sit utile ad multa. Unde hanc rationem elementi constituerunt, ut elementum dicerent omne illud, quod est parvum in quantitate, et simplex, quasi ex aliis non compositum, et indivisibile in diversa.”

<sup>79</sup> *In Metaph.* 5, l. 4, §803: “Hac autem ratione elementi constituta, per transumptionem contingebat eis ut duos modos elementorum adinvenirent.”

<sup>80</sup> *In Metaph.* 5, l. 4, §803 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014b6–8): “quorum primus est, ut ea quae sunt maxime universalia, dicerent elementa.”

<sup>81</sup> *In Metaph.* 5, l. 4, §803: “Universale enim est unum secundum rationem, et est simplex, quia eius definitio non componitur ex diversis, et est in multis, et sic est ad multa utile, sive sit in omnibus, sicut unum et ens; sive in pluribus, sicut alia genera.”

<sup>82</sup> *In Metaph.* 5, l. 4, §803 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014b8–9): “Per eandem vero rationem contingebat eis secundo, quod punctum et unitatem dicerent esse principia vel elementa, quia utrumque eorum est unum simplex et ad multa utile.”

<sup>83</sup> *In Metaph.* 5, l. 4, §804: “Sed in hoc a vera ratione elementi defecerunt, quia universalia non sunt materia, ex quibus componuntur particularia, sed praedicant eorum substantiam. Similiter et punctus non est materia linearum; non enim linea ex punctis componitur.”

## 13. Whole and Part

*It has already been determined that parts are said to be the material cause of the whole (► 9.3). Here, we aim to resolve what whole and part are, how they are related, and what kinds of wholes and parts there are.*

### 13.1. Part as Matter, Whole as Form

All parts are compared to the whole according to the *ratio* of *matter* as the imperfect to the perfect, which is a comparison of *matter to form*.<sup>1</sup> Since every part is ordered to the whole as the imperfect to the perfect, every part naturally is on account of the whole (*omnis pars naturaliter est propter totum*). Any part in itself is imperfect; it has perfection—i.e., it is completed—in its whole; whence, whole is related to parts as *form to matter*.

### 13.2. Whole

The common *ratio* of **whole** (*totum* = ὅλον) consists in two (*ratios*); for it is both:<sup>2</sup>

1. *That which lacks no part of those (parts) from which it is said to be a whole by nature (et cuius nulla pars abest ex quibus dicitur totum natura = οὐ τε μηθὲν ἄπτεστι μέρος ἐξ ὧν λέγεται ὅλον φύσει)*, which signifies that the perfection of the whole is integrated from (*ex*) the parts; for **whole** is *that of which none of its parts is lacking*: i.e., (lacking) parts from which it is said to be a whole by nature—that is, (the parts from which) the whole is constituted according to its nature.<sup>3</sup> Hence, the opposite of whole is **truncated** (► 13.22).

Therefrom, any which **whole** is defined as *that from which nothing is wanting (cui nihil deest = οὐ μηδὲν ἄπτεστιν)*.<sup>4</sup> For example, a whole man and a whole box lack none (of the

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<sup>1</sup> *In Physic.* 2, l. 5, n. 9: “omnes partes comparantur ad totum ut imperfectum ad perfectum, quae quidem est comparatio materiae ad formam.” ARISTOTLE, *Physica* B.3, 195a18–19 = *Metaphysica* Δ.2, 1013b19–21: “τὰ μέρη τοῦ ὅλου καὶ [...] ὡς τὸ ἐξ οὗ αἰτιά ἐστιν.” *In Post. an.* 2, l. 9, 81–83: “partes enim se habent ad totum secundum rationem materie, ut habetur in II Phisicorum.” *STh* II-II, q. 64 a. 2 co.: “Omnis autem pars ordinatur ad totum ut imperfectum ad perfectum. Et ideo omnis pars naturaliter est propter totum.” *STh* II-II, q. 65 a. 1 co.: “pars totius [...] est propter totum, sicut imperfectum propter perfectum.” *STh* I-II, q. 90 a. 2 co.: “cum omnis pars ordinetur ad totum sicut imperfectum ad perfectum [...]” *In Sent.* 3, d. 21 q. 2 a. 1 co.: “omnis autem pars est imperfecta respectu totius, ut patet per Philosophum in 3 Physic.” *In Sent.* 3, d. 29 q. 1 a. 3 co.: “pars quaelibet imperfecta est in seipsa, perfectionem autem habet in suo toto.” *In Sent.* 4, d. 49 q. 1 a. 4 qc. 1 co.: “omnis pars imperfecta est, et completur in suo toto; unde et totum se habet ad partes sicut forma ad materiam.” *ScG* 2, 83 n. 11: “pars a suo toto separata est imperfecta.” *De rat. Fidei*, c. 6 co.: “omnis pars imperfecta est.”

<sup>2</sup> *In Metaph.* 5, l. 21, §1098: “Primo ponit [Philosophus] rationem communem totius, quae consistit in duobus.”

<sup>3</sup> *In Metaph.* 5, l. 21, §1098 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b26–27): “prosequitur de ipso nomine totius. Secundo de eius opposito, scilicet de colobon [...]. Primo in hoc [consistit totum] quod perfectio totius integratur ex partibus. Et significat hoc, cum dicit quod totum dicitur cui nulla suarum partium deest, ex quibus scilicet partibus dicitur totum natura, idest totum secundum suam naturam constituitur.”

<sup>4</sup> *In Physic.* 3, l. 11, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 207a8–12): “Definitur enim unumquodque totum esse cui nihil deest: sicut dicimus hominem totum aut arcam totam, quibus nihil deest eorum quae debent habere. Et sicut hoc dicimus in aliquo singulari toto, ut est hoc particulare vel illud, ita etiam haec ratio competit in eo quod est vere et proprie totum, scilicet in universo, extra quod simpliciter nihil est. Cum

parts) they ought to have. This is said not only of some singular whole: e.g., *this* or *that* whole; for this *ratio* also befits (*competit in*) that which is truly and properly a whole: that is, the universe, outside of which there is nothing simply (*simpliciter*). But when something is lacking due to the absence of something intrinsic, then there is no whole (► 13.22). Whence, it is manifest that the definition of **whole** is *that of which nothing is outside* (*totum est cuius nihil est extra* = τὸ ὅλον οὐ μὴδὲν ἐστὶν ἔξω).

2. *And that which so contains the (parts) contained, that they are something one* (*et continens contenta ut unum aliquid sunt illa* = καὶ τὸ περιέχον τὰ περιεχόμενα ὥστε ἓν τι εἶναι ἐκεῖνα): (which signifies) that the parts are united in the whole; for the whole contains the parts in such a way that the (parts) contained are something *one* in the whole.<sup>5</sup>

Thus, a whole is defined through its parts.<sup>6</sup> However, parts are compared to whole in two modes: **(a) according to composition**, insofar as a whole is composed from parts; **(b) according to resolution**, insofar as a whole is divided (or divisible) into parts.

Those that are posterior in composition are prior in resolution (and vice-versa).<sup>7</sup> However, division is naturally posterior to composition; for division is only of composite (and, consequently, divisible) things, just as corruption is only of things generated.

*Division*—like *separation*—is properly said of composite things insofar as a whole is divided (or divisible) into parts.<sup>8</sup> Therefore, a whole is not found in simple things, which do not have parts: in these, we use the name **perfect** (► 23.1).

### 13.3. Part

**Part** is *that into which a whole is divided* (or *divisible*), just like *whole* is *what is divided* (or *divisible*) into parts; for *division* constitutes the *ratio* of *whole* and of *part* (► 13.2, ¶2).<sup>9</sup>

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autem aliquid desit per absentiam alicuius intrinseci, tunc non est totum. Sic igitur manifestum est quod haec est definitio totius: totum est cuius nihil est extra.”

<sup>5</sup> *In Metaph.* 5, l. 21, §1098 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b27–28): “Secundum est quod partes uniuntur in toto. Et sic dicit quod totum continens est contenta, scilicet partes, ita quod illa contenta sunt aliquid unum in toto.”

<sup>6</sup> *In Physic.* 3, l. 1, n. 3: “totum, per partes suas definiri habet: partes autem dupliciter comparantur ad totum, scilicet secundum compositionem, prout ex partibus totum componitur; et secundum resolutionem, prout totum dividitur in partes.”

<sup>7</sup> *De virtutibus*, q. 4 a. 3 ad 11: “ea quae sunt posteriora in compositione, sunt priora in resolutione.” *In Peri.* 1, l. 8, 28–31: “diuisio autem naturaliter posterior est compositione, nam non est diuisio nisi compositorum, sicut non est corruptio nisi generatorum.”

<sup>8</sup> *STh* I, q. 31 a. 2 co.: “Ne autem tollatur simplicitas [...], vitandum est nomen separationis et divisionis, quae est totius in partes.” Cf. *De potentia*, q. 9 a. 8 ad 4; *In Sent.* 1, d. 24 q. 1 a. 2 ad 2. *In Physic.* 3, l. 11, n. 4: “totum non invenitur in simplicibus, quae non habent partes: in quibus tamen utimur nomine perfecti.”

<sup>9</sup> *In De div. nom.*, c. 4, l. 8: “divisio autem constituit rationem totius et partis, quia pars est in quam dividitur totum.” *STh* I, q. 76 a. 8 co.: “cum totum sit quod dividitur in partes [...].”

### 13.4. Genera of Wholes and Parts

Every whole is reduced to (one of) three genera: **universal** (► 13.5), **integral** (► 13.7), or **potential** (► 13.20); and since *whole* is *that which is divided into parts* (► 13.2, ¶2), there are three corresponding (genera of) parts: **(1) subjective** (► 13.6), as *ox* and *lion* are parts of *animal*; **(2) integral** (► 13.8), as walls, roof, and foundation are parts of a house; and **(3) potential** (► 13.21), as the nutritive and the sensitive are parts of the soul.<sup>10</sup>

### 13.5. Universal Whole

**Universal** (*universale* = καθόλου) is *that which is totally*—i.e., *commonly*—*predicated* (*quod totaliter idest quod communiter praedicatur* = τὸ ὅλως λεγόμενον) *as some whole being* (*ut totum aliquid ens* = ὡς ὅλον τι ὄν), because it is predicated of each (of its parts).<sup>11</sup> It is universal in that, as though containing many (*quasi multa continens* = ὡς πολλὰ περιέχον) as parts, it is predicated of any (or each) of them (*praedicatur de unoquoque* = τῷ κατηγορεῖσθαι καθ' ἐκάστου); and all of them are one (*et omnia illa sunt unum* < καὶ ἔν ἅπαντα εἶναι) in the universal whole in such a way that any (*ita quod unumquodque* = ὡς ἕκαστον) of them is that one whole.

Thus, the **universal whole** (*totum universale*; sc., *ut unumquodque unum* = ὡς ἕκαστον ἔν) <sup>12</sup> is predicated of any/each of its parts, such that any of the (parts) contained by the

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<sup>10</sup> *In Sent.* 3, d. 33 q. 3 a. 1 qc. 1 co.: “omne totum ad tria genera reducitur, scilicet universale, integrale et potentiale; et similiter pars triplex invenitur dictis tribus respondens.” *STh* I, q. 76 a. 8 co.: “cum totum sit quod dividitur in partes, secundum triplicem divisionem est triplex totalitas.” *De spirit. creat.*, a. 11 ad 2: “sciendum est triplex esse totum. Unum universale [...]. Aliud vero est totum integrale [...]. Tertium est totum potentiale [...].” *In Sent.* 3, d. 33 q. 3 a. 1 qc. 1 co.: “omne totum ad tria genera reducitur, scilicet universale, integrale et potentiale; et similiter pars triplex invenitur dictis tribus respondens.” *STh* II-II, q. 48 co.: “triplex est pars, scilicet integralis, ut paries, tectum et fundamentum sunt partes domus; subiectiva, sicut bos et leo sunt partes animalis; et potentialis, sicut nutritivum et sensitivum sunt partes animae.” As St. Thomas observes (*In Metaph.* 5, l. 21, §1099), ARISTOTLE posits only two modes of *whole* (*universal* and *integral*) in his *Metaphysics*: “ponit duos modos totius; dicens quod totum dicitur dupliciter.” To these, St. Thomas adds in other places the *potential* whole and its part, usually providing the example of the rational soul, which is said to be a whole because all the powers of the soul are joined in it, while the sensible soul in brutes, and the vegetable soul in plants, are said to be parts of the soul because they have something of the (active) potency of the soul, but not the whole, whence ARISTOTLE says in his book *On plants* that they do not have the soul, but *parts* of the soul. See *In Sent.* 3, d. 33 q. 3 a. 1 qc. 1 co.: “Rationalis enim anima tota anima dicitur, eo quod in ipsa omnes animae potentiae congregantur. Sensibilis vero in brutis, et in plantis vegetabilis, dicuntur partes animae, quia aliquid de potentia animae habent, sed non totum. Unde dicitur in Lib. *De plantis*, quod non habent animam, sed partes animae.” Hence, also the potential part—and its whole—is based on ARISTOTLE, *De plantis* A.1, 815b27–31: “οὐδὲ συνίσταται παρ’ ἡμῶν τοῦτο εἰ μὴ διότι τὸ θρεπτικὸν καὶ αὐξητικὸν νοῦμεν μέρη εἶναι τῆς ψυχῆς. ὁπότεν γοῦν τὸ τοιοῦτον φυτὸν εὐρίσκωμέν τι μέρος ψυχῆς τοιαύτης ἐν αὐτῷ ἔχον, ἐξ ἀνάγκης νοῦμεν καὶ ψυχὴν ἔχειν αὐτό.” Cf. *ibid.* A.2, 817b24: “τοῦτο δὲ [sc., τὸ φυτὸν] ἔχει μᾶλλον μέρος μέρους ψυχῆς.”

<sup>11</sup> *In Metaph.* 5, l. 21, §1100 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b29–31): “*universale et quod totaliter idest quod communiter praedicatur, dicitur quasi sit aliquod unum totum ex hoc quod praedicatur de unoquoque, sicut universale, quasi multa continens ut partes, in eo quod praedicatur de unoquoque. Et omnia illa sunt unum in toto universali, ita quod unumquodque illorum est illud unum totum.*”

<sup>12</sup> *In Metaph.* 5, l. 21, §1099 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b28): “aut ita quod unumquodque contentorum a toto continente, sit ipsum unum, scilicet ipsum totum continens, quod est in toto universali de qualibet suarum partium praedicato.” *Ibid.*, §1100 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b32): “Sicut animal continet *hominem* et *equum* [...], *quia omnia sunt animalia*, idest quia animal praedicatur de unoquoque.”

containing whole is *something one*: i.e., the containing whole itself. For example, *animal* contains *man* and *horse* because *animal* is predicated of one and of the other.

This is so because the universal whole is present in each of its subjective parts according to its whole essence and virtue both simultaneously (*simul*; ►8.7) and equally (provided the whole is predicated of the parts according to one *ratio*).<sup>13</sup> For example, when we say that *man is (an) animal*, the whole virtue of *animal*, insofar as it is *animal*, is preserved in whichever species of *animal* that at once and equally divide (the whole genus of) *animal*.

However, the universal whole, whether it is a genus (e.g., *animal*) or a species (e.g., *man*), is not predicated singularly (*in singulari*) of its plural parts taken simultaneously (*simul acceptis*).<sup>14</sup> Thus, *three men* are not (*an*) *animal*, but *animals*.

### 13.6. Subjective Parts

A **subjective part** is *that (part) of which the whole is predicated essentially, and it is in fewer (de qua essentialiter praedicatur totum, et est in minus; e.g., man, which is a part of animal, is found in fewer things than animal)*.<sup>15</sup> This can happen in two (modes):

1. Sometimes, something is predicated of many **according to one ratio**: for example, *animal* (is predicated) of *horse* and of *ox*.<sup>16</sup> (Thus, subjective) parts are (parts) *into which something is divided without quantity (in quae dividitur aliquid sine quantitate < εἰς ἃ τὸ εἶδος διαίρεθῆναι ἂν ἄνευ τοῦ ποσοῦ)*.<sup>17</sup> It is in this mode that species are said to be parts of a genus (►14); for a whole quantity is not in any of its parts (e.g., the whole of six is not in three), while a genus is in any of (its) species.

2. Sometimes, on the other hand, (something) is predicated (of many) **according to prior and posterior**: e.g., *being* (►30.14) is predicated of *substance* and of *accident*.<sup>18</sup>

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<sup>13</sup> *De spirit. creat.*, a. 11 ad 2: “totum [...] universale, quod adest cuilibet parti secundum totam suam essentiam et virtutem; unde proprie praedicatur de suis partibus, ut cum dicitur: homo est animal.” *STh* III, q. 90 a. 3 co.: “partibus subiectivis singulis adest tota virtus totius, et simul, et aequaliter, sicut tota virtus animalis, in quantum est animal, salvatur in qualibet specie animalis, quae simul et aequaliter dividunt animal.” *In Sent.* 3, d. 33 q. 3 a. 1 qc. 1 co.: “universalis vero [pars] totius pars suscipit totius praedicationem, sicut homo animalis.”

<sup>14</sup> *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: “totum universale non praedicatur in singulari de suis partibus pluralibus simul acceptis, sive sit genus, sive species: tres enim homines non sunt animal, sed animalia.”

<sup>15</sup> *STh* II-II, q. 120 a. 2 co.: “Pars autem subiectiva est de qua essentialiter praedicatur totum, et est in minus. Quod quidem contingit dupliciter.”

<sup>16</sup> *STh* II-II, q. 120 a. 2 co.: “quandoque enim aliquid praedicatur de pluribus secundum unam rationem, sicut animal de equo et bove.”

<sup>17</sup> *In Metaph.* 5, l. 21, §1094 (cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b17–19): “Secundo modo ea dicuntur partes, in quae dividitur aliquid sine quantitate: et per hunc modum species dicuntur esse partes generis. Dividitur enim in species, non sicut quantitas, in partes quantitatis. Nam tota quantitas non est in una suarum partium. Genus autem est in qualibet specierum.”

<sup>18</sup> *STh* II-II, q. 120 a. 2 co.: “quandoque autem praedicatur secundum prius et posterius, sicut ens praedicatur de substantia et accidente.”

### 13.7. Integral Whole

The *ratio* of **integral whole** (*totum integrale*; sc., *ut ex hiis unum* = ὅς ἐκ τούτων τὸ ἓν) is that (*whole*) which is predicated of none of its integral parts (*quod de nulla suarum partium integralium praedicatur*).<sup>19</sup> It is a *one* so constituted from parts, that no part whatsoever is *that one* (i.e., no part of an integral whole is essentially the same as the containing whole).

The integral whole is not present in any of its parts according to its whole essence or according to its whole virtue: rather, (it is) simultaneously (present) in all (of its parts).<sup>20</sup> Whence, it is in no mode predicated of a part, as if one were to say, “a wall is a house.” This is what is required for the *ratio* of *integral part*, which enters into the constitution of the whole, as a wall (enters into the constitution) of a house: the *ratio* of **integral whole** consists in *composition*, and the *ratio* of *integral part* has the associated (*annexam*) imperfection (i.e., the associated imperfection of being a part according to composition).

(The integral whole is twofold:)

1. **(Quantitative whole).** There is an (integral) whole that is divided into quantitative parts, as the whole line or the whole body.<sup>21</sup>
2. **(Essential or substantial whole).** There is an (integral) whole that is divided into parts of the essence and of the *ratio*, as the composite is resolved into matter and form, and as that which is defined (*definitum*) [is divided] into the parts of the definition.<sup>22</sup>

### 13.8. Integral Parts

(Corresponding to the twofold integral whole), integral parts are twofold:<sup>23</sup>

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<sup>19</sup> *In Metaph.* 5, l. 21, §1099 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b28–29): “totum dicitur dupliciter; aut ita quod [...]. Aut ex partibus constituatur unum, ita quod non quaelibet partium sit unum illud. Et haec est ratio totius integralis, quod de nulla suarum partium integralium praedicatur.”

<sup>20</sup> *De spirit. creat.*, a. 11 ad 2: “Aliud vero est totum integrale, quod non adest alicui suae parti neque secundum totam essentiam neque secundum totam suam virtutem; et ideo nullo modo praedicatur de parte, ut dicatur: paries est domus.” *STh* III, q. 90 a. 3 co.: “partes integrales [...], ad quarum rationem exigitur ut totum non adsit singulis partibus neque secundum totam virtutem eius, neque secundum totam essentiam, sed omnibus simul.” *In Sent.* 3, d. 33 q. 3 a. 1 qc. 1 co.: “Integralis enim pars intrat in constitutionem totius, sicut paries domus.” *In Sent.* 1, d. 19 q. 4 a. 1 co.: “ratio totius integralis consistit in compositione. Ratio autem partis integralis habet imperfectionem annexam.”

<sup>21</sup> *STh* I, q. 76 a. 8 co.: “Est enim quoddam totum [integrale] quod dividitur in partes quantitativas, sicut tota linea vel totum corpus.”

<sup>22</sup> *STh* I, q. 76 a. 8 co.: “Est etiam quoddam totum [integrale] quod dividitur in partes rationis et essentiae; sicut definitum in partes definitionis, et compositum resolvitur in materiam et formam.”

<sup>23</sup> *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: “partes integrales sunt duplices. Quaedam sunt partes quantitatis [...]. Quaedam vero sunt partes essentiae.” *STh* I, q. 8 a. 2 ad 3: “Est autem duplex pars [integralis], scilicet pars essentiae [...]; et etiam pars quantitatis, in quam scilicet dividitur aliqua quantitas.” *STh* III, q. 90 a. 2 co.: “duplex est pars [integralis], ut dicitur in V *Metaphys.* scilicet pars essentiae, et pars quantitatis.” *In Metaph.* 5, l. 21, §1093 (cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b12–25): “[Philosophus] ponit quatuor modos, quibus aliquid dicitur esse pars.” The first mode corresponds to our mode number (1); the third and fourth modes are subsumed under number (2) as (a) and (b), respectively, *ibid*: “In

1. **Parts of quantity** (► 13.9), i.e., those parts into which some quantity is divided.<sup>24</sup> These are *parts of the matter* (► 13.15); for quantity is had from the part of matter.

2. **Parts of the essence or substance.** *Naturally (speaking)*, these are **matter** and **form**; but *logically (speaking)*, **genus** and **difference**.<sup>25</sup> Whence, the parts of the essence are either: **(a) parts of the thing** (► 13.10), into which a whole is materially divided; or **(b) parts of the ratio or definition** (► 13.16).

### 13.9. Parts of Quantity

In this mode, an **integral part** is *that into which something is divided according to quantity* (*in quam dividitur aliquid secundum quantitatem* < εἰς ὃ διαιρεθεῖη ἂν τὸ ποσόν).<sup>26</sup>

This (can moreover be) in two modes:

1. (Broadly), that into which a greater quantity is divided regardless of how much lesser the quantity into which the greater is divided should be (*quantumcumque fuerit quantitas minor, in quam quantitas maior dividitur* < ὁπωσοῦν); for that which is removed from a quantity is always said to be its part, as two is—in some mode—a part of three.<sup>27</sup>

2. (Properly), *only the lesser part that measures the whole* (*solum pars quantitas minor, quae mensurat maiorem* < τὰ καταμετροῦντα τῶν τοιούτων μόνον; ► 3); and in this mode, two is not a part of three; yet, two is a part of four, since twice two is four ( $2 \times 2 = 4$ ).<sup>28</sup>

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secundo enim modo sumebatur pars pro parte subiectiva totius universalis; in aliis autem tribus pro parte integrali. Sed in primo [= (1)] pro parte quantitatis, in aliis autem duobus pro parte substantiae; ita tamen, quod pars secundum tertium modum [= (2a)] est pars rei; sive sit pars speciei, sive pars individui. Quarto autem modo [= (2b)] est pars rationis." Cf. *In Sent.* 3, d. 8 q. 1 a. 2 ad 1: "est duplex pars [integralis]. Est enim pars substantiae secundum quantitatem [...]. Sunt etiam partes substantiae, in quas dividitur totum secundum rationem, sicut materia et forma."

<sup>24</sup> *STh* III, q. 90 a. 2 co.: "quia quantitas se tenet ex parte materiae, partes quantitatis sunt partes materiae."

<sup>25</sup> *STh* III, q. 90 a. 2 co.: "Partes quidem essentiae sunt, naturaliter quidem, forma et materia." *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: "partes essentiae, sicut materia et forma, non quantitatis." *STh* I, q. 8 a. 2 ad 3: "pars essentiae, ut forma et materia dicuntur partes compositi, et genus et differentia partes speciei." *STh* III, q. 90 a. 1 co.: "partes rei sunt in quas materialiter totum dividitur, habent enim se partes ad totum sicut materia ad formam; unde in II *Physic.* partes ponuntur in genere causae materialis, totum autem in genere causae formalis. Ubi cumque igitur ex parte materiae invenitur aliqua pluralitas, ibi est invenire partium rationem."

<sup>26</sup> *In Metaph.* 5, l. 21, §1093 (cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b12–13): "Primo modo pars dicitur, in quam dividitur aliquid secundum quantitatem: et hoc dupliciter."

<sup>27</sup> *In Metaph.* 5, l. 21, §1093: "Uno enim modo quantumcumque fuerit quantitas minor, in quam quantitas maior dividitur, dicitur eius pars. Semper enim id quod aufertur a quantitate, dicitur pars eius; sicut duo aliquo modo sunt partes trium." Cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b12–15: "μέρος λέγεται ἓνα μὲν τρόπον εἰς ὃ διαιρεθεῖη ἂν τὸ ποσόν ὁπωσοῦν· αἰεὶ γὰρ τὸ ἀφαιρούμενον τοῦ ποσοῦ ἢ ποσόν μέρος λέγεται ἐκείνου, οἷον τῶν τριῶν τὰ δύο μέρος λέγεταιί πως."

<sup>28</sup> *In Metaph.* 5, l. 21, §1093: "Alio modo dicitur solum pars quantitas minor, quae mensurat maiorem. Et sic duo non sunt pars trium; sed sic duo sunt pars quatuor, quia bis duo sunt quatuor." Cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b15–17: "ἄλλον δὲ τρόπον τὰ καταμετροῦντα τῶν τοιούτων μόνον· διὸ τὰ δύο τῶν τριῶν ἔστι μὲν ὡς λέγεται μέρος, ἔστι δ' ὡς οὐ."



The parts from which a (quantitative integral) whole is constituted can be in the whole in two modes: **(a) in potency** (*in potentia* = δυνάμει), in a **continuous whole**; or **(b) in act** (*in actu* = ἐνεργεία), in a **non-continuous** (i.e., **discrete**) **whole**, as in those (parts) that are joined by contact: for example, stones are in act in a heap.<sup>29</sup>

The parts of quantity sometimes are of one and the same nature and *ratio* both to each other and with the whole, as in a homogeneous whole.<sup>30</sup> For example, the parts of a whole line (are of one and the same nature and *ratio*, both to each other and with the whole line; for any part of a whole line is itself a line), and (the parts) of a whole (geometrical) body. But sometimes they are of diverse *ratios*, as in a heterogeneous whole (e.g., a house is composed of walls, roof, and foundation, which are parts of diverse *ratios*; ► 39.19).<sup>31</sup>

There is a question of whether whole and parts are one or many.<sup>32</sup> And it concerns not only the continuous whole, but also the contiguous, whose parts are not continuous (► 39.5): for example, the parts of a house, which are one according to contact and composition. (In reply), it is evident that the whole is the same as the parts *according to something* (*secundum quid*), but not *simply* (*simpliciter*). If the whole were simply the same as one part, it would be—for the same reason—the same as another of the parts: but those that are the same as another are themselves one and the same; thus, it would follow that both parts would be the same as each other, if posited as being the same simply; and thus, it would follow that the whole would be indivisible, not having diversity of parts.

The form of the whole is perfect, while the forms of parts are imperfect.<sup>33</sup> Hence, parts are imperfect in respect of the whole. For example, the parts of a man are not a man; the parts

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<sup>29</sup> *In Metaph.* 5, l. 21, §1102 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b34): “Partes autem ex quibus constituitur totum dupliciter possunt esse in toto. Uno modo in potentia, alio modo in actu. Partes quidem sunt in potentia in toto continuo; actu vero in toto non continuo, sicut lapides actu sunt in acervo.” *In Sent.* 3, d. 8 q. 1 a. 2 ad 1: “pars substantiae secundum quantitatem [...] vel subsistit in potentia, ut in continuis: vel in actu, ut in his quae per tactum junguntur.”

<sup>30</sup> *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: “partes quantitatis; quae sunt quandoque unius rationis, ut in totis homogeneis.” *STh* I, q. 76 a. 8 co.: “Est enim quoddam totum quod dividitur in partes quantitativas, sicut tota linea vel totum corpus.” *In De caelo* 3, l. 3, n. 6: “Est autem considerandum quod ista ratio [sc., *corpus sensibile non potest componi ex rebus non habentibus gravitatem, sicut ex punctis, ex lineis, et ex superficiebus*] tenet in partibus quantitativis, quae sunt eiusdem naturae et rationis et ad invicem et cum toto.”

<sup>31</sup> *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: “partes quantitatis; quae sunt quandoque [...] diversarum rationum, ut in totis heterogeneis.”

<sup>32</sup> *In Physic.* 1, l. 3, n. 3 (cf. ARISTOTLE, *Physica* A.2, 185b11–16): “Est enim dubitatio utrum totum et partes sint unum aut plura. [...] Et non solum de totis continuis, sed etiam de totis contiguis, quorum partes non sunt continuae; sicut partes domus, quae sunt unum contactu et compositione. Et manifestum est quod totum secundum quid est idem parti, non tamen simpliciter. Si enim simpliciter totum esset idem uni partium, eadem ratione esset idem alteri partium; quae autem uni et eidem sunt eadem, sibi invicem sunt eadem; et sic sequitur quod ambae partes, si ponantur simpliciter esse idem toti, quod sint idem ad invicem. Et sic sequeretur quod totum sit indivisibile, non habens diversitatem partium.”

<sup>33</sup> *In Ethic.* 10, l. 5, 74–75: “forma totius [...] est perfecta, formae autem partium sunt imperfectae.” *ScG* 1, 18 n. 6: “partes sunt imperfectae respectu totius: sicut partes hominis non sunt homo, partes etiam

of the number six (properly, the numbers one, two, and three; ►3) do not have the perfection of six (which is considered a *perfect number*, above all, because it is equal to the sum of its parts, i.e.,  $1 + 2 + 3 = 6$ , according to EUCLID’s definition; ►3); and the parts of a line do not attain the perfection of measure (i.e., of magnitude; ►34.2) that is found in the whole line.

The continuous [whole] (►39) is more *one*—and, consequently, more *whole*—than the non-continuous.<sup>34</sup> Whence, (integral) parts must be in a whole, above all (*maxime* = μάλιστα), in potency, as in the continuous whole—and if not in potency, at least in act.

Accordingly, the most manifest integral whole is that which is divisible into (continuous) quantitative parts.<sup>35</sup> The common *ratio* of **(continuous) integral whole** is *that (whole) which is continuous and finite* (*continuum et finitum* = τὸ συνεχὲς καὶ πεπερασμένον)—that is, whole and perfect; for *infinite* does not have the *ratio* of *whole* (►25.16, ¶2), but of *part*—when something one comes to be from many (parts) that are in the whole (*quando unum aliquid ex pluribus est quae insunt* = ὅταν ἓν τι ἐκ πλειόνων ἢ ἐνυπαρχόντων)—i.e., it does not come to be from another as from a contrary (rather, from its intrinsic parts).

However, multitude does not totally deprive of unity: when the whole is (actually) divided, the part remains still undivided (►40).<sup>36</sup> Thus, while (a quantitative whole) is more whole when the parts are in it in potency than when they are in act, and every part separated from its whole is imperfect, on the other hand, if we consider the parts, they are more parts when they are in act than when they are in potency.<sup>37</sup>

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numeri senarii non habent perfectionem senarii, et similiter partes lineae non perveniunt ad perfectionem mensurae quae in tota linea invenitur.”

<sup>34</sup> *In Metaph.* 5, l. 21, §1102 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b34): “Magis autem est unum, et per consequens magis totum, continuum, quam non continuum. Et ideo dicit [Philosophus] quod oportet partes inesse toti, maxime quidem in potentia sicut in toto continuo. Et si non in potentia, saltem *energia*, idest in actu. Dicitur enim energia, interior actio.”

<sup>35</sup> *In Metaph.* 5, l. 21, §1101 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b32–34): “exponit [Philosophus] modum secundum totius qui pertinet ad totum integrale; [...] ponit rationem communem huius totius, et praecipue de toto quod dividitur in partes quantitativas, quod est manifestius; dicens, quod aliquid dicitur continuum et finitum, idest perfectum et totum. Nam infinitum non habet rationem totius, sed partis, ut dicitur in tertio Physicorum; quando scilicet unum aliquid fit ex pluribus quae insunt toti. Et hoc dicit ad removendum modum quo aliquid fit ex aliquo sicut ex contrario.”

<sup>36</sup> *De potentia*, q. 3 a. 16 ad 3: “Nec tamen multitudo privat unitatem totaliter, cum diviso toto adhuc remaneat pars indivisa; sed removet unitatem totius.”

<sup>37</sup> *In Metaph.* 5, l. 21, §1103: “Licet autem magis sit totum quando partes sunt in eo in potentia, quam quando sunt actu, tamen si respiciamus ad partes, magis sunt ipsae partes, quando sunt actu, quam quando sunt in potentia.” St. Thomas adds this clarification in the context of his criticism of less accurate versions he has before his eyes, *ibid.*: “Unde alia litera habet maxime quidem perfectione et actu. Sin autem, et potestate. Et subiungit etiam quod prius dictum est et maxime potestate. Sin autem, et energia. Unde videtur quod translator duas invenit literas et utramque transtulit, et errore factum est, sic ut coniungantur ambae quasi una litera. Et hoc patet ex alia translatione quae non habet nisi alterum tantum. Sic enim dicit continuum autem et finitum est, cum unum aliquid sit ex pluribus inhaerentibus, maxime quod potentia. Si autem non, actu sunt.” ScG 2, 83 n. 11: “Omnis pars a suo toto separata est imperfecta.”

### 13.10. Parts of the Thing

In this mode, **integral parts** are those (parts) into which some whole is divided, or from which it is composed (in quas dividitur, aut ex quibus componitur aliquod totum = εἰς ἃ διαίρεται τι ἢ ἐξ ὧν σύγκειται τὸ ὅλον), whether (the whole) should be a species (sive sit species < ἢ τὸ εἶδος) or something having a species (sive aliquid habens speciem < ἢ τὸ ἔχον τὸ εἶδος), i.e. an individual.<sup>38</sup> Whence, we must moreover distinguish:

#### 1. The parts of the species (► 13.14).

For example, a cube is a body contained by (six equal) square surfaces.<sup>39</sup> (That is, *body* and *square surfaces* are parts of the cube-species: the former, as its matter; the latter, as its terminus, which constitutes the difference of its specific form or figure; ► 4.5. Moreover, the species of cube can be multiplied in many individual matters, as in *this bronze* or *that bronze*; or even in any of the individual imaginary bodies considered by mathematicians.)

Likewise, angle is part of triangle as (a part) of the species (that is, insofar as angles are principles of the species of triangle; ► 4.4), which can be multiplied (in individuals).<sup>40</sup>

#### 2. The parts of matter (► 13.15), which are the parts of the individual (*partes individui* < τῶν καθ' ἕκαστα μέρη; i.e., these are the parts of *the individual having a species*).

For example, bronze is part of a bronze cube—or of a bronze sphere—as matter, in which the species (of cube or of sphere) is received (as its formal part); whence, bronze is not a part of the species, but a part of that which has the species (i.e., a part of the individual).<sup>41</sup>

### 13.11. Form and Matter of the Thing

Among those (causes) from which a thing is integrated, some are related according to the mode of subject (*per modum subiecti* = ὡς τὸ ὑποκείμενον), such as parts (*partes* = τὰ μέρη) and other aforesaid (causes that pertain to the *ratio* of *matter*); others are related

<sup>38</sup> *In Metaph.* 5, l. 21, §1097: “pars secundum tertium modum [= (2a)] est pars rei; sive sit pars speciei, sive pars individui.” *Ibid.*, §1095 (cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b19–20): “Tertio modo dicuntur partes, in quas dividitur, aut ex quibus componitur aliquod totum; sive sit species, sive aliquid habens speciem, scilicet individuum.”

<sup>39</sup> *In Metaph.* 5, l. 21, §1095: “Sunt enim [...] quaedam partes speciei [...]. Est autem cubus corpus contentum ex superficiebus quadratis.”

<sup>40</sup> *In Metaph.* 5, l. 21, §1095: “Angulus autem est pars trianguli sicut speciei.” Cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b22: “καὶ ἡ γωνία μέρος.” *In Metaph.* 3, l. 14, §516: “cum sint multa mathematica numero differentia in una specie, non poterunt esse mathematica principia mathematicorum determinata numero, sed determinata specie solum: puta si dicamus quod principia triangulorum sunt tria latera et tres anguli. Sed haec determinatio est secundum speciem: contingit enim quodlibet eorum in infinitum multiplicari.”

<sup>41</sup> *In Metaph.* 5, l. 21, §1095: “Sunt enim [...] quaedam partes materiae, quae sunt partes individui. Aes enim est pars sphaerae aereae, aut cubi aerei, sicut materia, in qua species est recepta. Unde aes non est pars speciei, sed pars habentis speciem.” Cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b20–22: “οἶον τῆς σφαιράς τῆς χαλκῆς ἢ τοῦ κύβου τοῦ χαλκοῦ καὶ ὁ χαλκὸς μέρος: τοῦτο δ' ἐστὶν ἡ ὕλη ἐν ἧ τὸ εἶδος.”

as essence or quiddity (*ut quod quid erat esse* = ὡς τὸ τί ἦν εἶναι): the **species** (*species* = τὸ εἶδος), the **whole** (*totum* = τὸ ὅλον), and the **composition** (*compositio* = ἡ σύνθεσις), which pertain to the *ratio* of *form*, according to which the quiddity of a thing is completed.<sup>42</sup>

Nonetheless, it should be known that sometimes a thing is the matter of something *simply* (*simpliciter*), as silver is the matter of a saucer: then, the form that corresponds to such matter can be said (to be its) **species**.<sup>43</sup> Sometimes, however, *multiple things united to each other* are the matter of something. And this can happen in three modes:

1. Sometimes, things are united *only according to an order*: for example, men in an army, or houses in a city; and thus, the form corresponds to the **whole** designated by the name *army* or *city*.<sup>44</sup>
2. Sometimes, things are united according not only to an order, but *also by contact or binding*, as the parts of a house (which are quantitative parts, and therefore parts of the matter; ► 13.8, 13.9; moreover, they are heterogenous parts); and then their **composition** corresponds to the form.<sup>45</sup>
3. Sometimes, to these (i.e., order and composition) is added the *alteration of the components*, which happens in the compounding (of elements; e.g., as common salt is a compound of sodium and chloride); and then, the form is the **compounding** (*mixtio*) itself, which is, however, some species of **composition**.<sup>46</sup>

The quiddity or essence of the thing (*quod quid est rei*) is from whichever of these three—i.e., the *species*, the *whole*, or the *composition*—, as is evident when *saucer*, *army*, and *house* are defined.<sup>47</sup> So, those (names) that convey (*important*) *whole*, *composition*, or whatever *species*, are related (to their matter) according to the *ratio* of *form* (*in ratione*

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<sup>42</sup> *In Metaph.* 5, l. 3, §779 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013b21–23): “Inter ea autem ex quibus res integratur, aliquid se habet per modum subiecti, sicut partes et alia quae praedicta sunt; alia vero se habent ut quod quid erat esse, scilicet totum, et compositio, et species, quae pertinent ad rationem formae, secundum quam quidditas rei completur.”

<sup>43</sup> *In Metaph.* 5, l. 3, §779: “Sciendum est enim, quod quandoque una res simpliciter est alicuius materia, sicut argentum phialae; et tunc forma correspondens tali materiae potest dici species. Quandoque autem plures adinvicem adunatae sunt materia alicuius rei. Quod quidem contingit tripliciter.”

<sup>44</sup> *In Metaph.* 5, l. 3, §779: “Quandoque enim adunantur secundum ordinem tantum, sicut homines in exercitu, vel domus in civitate; et sic pro forma respondet totum, quod designatur nomine exercitus vel civitatis.”

<sup>45</sup> *In Metaph.* 5, l. 3, §779: “Quandoque autem non solum adunantur ordine, sed contactu et colligatione, sicut apparet in partibus domus; et tunc respondet pro forma compositio.”

<sup>46</sup> *In Metaph.* 5, l. 3, §779: “Quandoque autem super hoc additur alteratio componentium, quod contingit in mixtione; et tunc forma est ipsa mixtio, quae tamen est quaedam compositionis species.”

<sup>47</sup> *In Metaph.* 5, l. 3, §779: “Ex quolibet autem trium horum sumitur quod quid est rei, scilicet ex compositione et specie et toto: sicut patet si definiretur exercitus, domus et phiala.” *In Physic.* 2, l. 5, n. 8: “sed ea quae important totum vel compositionem vel quamcumque speciem, se habent in ratione formae; ut species referatur ad formas simplicium, totum autem et compositio ad formas compositorum.”

*formae*), if by *species* we refer to the forms of simple things (*formas simplicium*, i.e., when a thing is the matter of something *simply*, such as silver is the matter of a saucer), and (if by) *whole* and *composition* (we refer) to the forms of composite (matters).

### 13.12. Common vs. Individual Matter

Matter is twofold:<sup>48</sup> **(1) designated** or **individual matter** (*materia signata vel individualis*), as *this flesh* and *these bones* (*hae carnes et haec ossa*; i.e., the individual matter of *this individual man*); **(2) common** or **universal matter** (*materia communis vel universalis*), as *flesh* and *bone* (*caro et os*; i.e., the common matter from which the species *man* is integrated insofar as *man* is a natural thing and not a logical species).

The parts of individual matter are parts of the composite singular (► 13.15), in which the nature of the species is taken simultaneously with individuating matter itself; but not (parts) of the species or of the form.<sup>49</sup> The parts of universal matter are parts of the species (► 13.14), but not (parts) of the form. Whence, since the universal—but not the singular—is defined, the parts of individual matter are not posited in the definition (► 13.16): only the parts of common matter simultaneously with the form or the parts of the form.

Indeed, as has been said (► 8.1), that which a definition signifies is the essence or quiddity (*quod quid erat esse*); and a definition is not assigned to individuals, but to species.<sup>50</sup> Hence, individual matter, which is the principle of individuation, is other than (*praeter*) that

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<sup>48</sup> *STh* I, q. 85 a. 1 ad 2: “materia est duplex, scilicet communis, et signata vel individualis, communis quidem, ut caro et os; individualis autem, ut hae carnes et haec ossa.” ARISTOTLE uses *flesh* and *bones* to exemplify these two kinds of matter, even if he does not have a name for them. See. e.g., *Metaphysica* I.9, 1058b6–8: “οὐκ ἀνθρώπου γὰρ εἶδη εἰσὶν οἱ ἄνθρωποι διὰ τοῦτο, καίτοι ἕτεραι αἱ σάρκες καὶ τὰ ὀστᾶ ἐξ ὧν ὄδε καὶ ὄδε.” Ibid. Z.8, 1034a5–8: “ἴκανόν τὸ γεννῶν ποιῆσαι καὶ τοῦ εἶδους αἴτιον εἶναι ἐν τῇ ὕλῃ. τὸ δ' ἅπαν ἤδη τὸ τοῖόνδε εἶδος ἐν ταῖσδε ταῖς σαρκί καὶ ὀστοῖς Καλλίας καὶ Σωκράτης· καὶ ἕτερον μὲν διὰ τὴν ὕλην, ἕτερα γάρ, ταῦτό δὲ τῷ εἶδει· ἄτομον γὰρ τὸ εἶδος.”

<sup>49</sup> *In Metaph.* 7, l. 10, §1497 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a12–13): “Partes enim materiae individuae sunt partes compositi singularis, non autem speciei, nec formae. Partes autem materiae universalis, sunt partes speciei, sed non formae. Et quia universale definitur et non singulare, ideo partes materiae individualis non ponuntur in definitione, sed solum partes materiae communis, simul cum forma vel partibus formae.” *In Metaph.* 5, l. 21, §1093: “pars secundum tertium modum [= (2a)] est pars rei; sive sit pars speciei, sive pars individui.” Ibid., §1095: “Sunt enim [...] quaedam partes speciei, et quaedam partes materiae, quae sunt partes individui.” Ibid., §1089: “Sunt enim partium, quaedam partes speciei, et quaedam partes materiae.” *In Metaph.* 7, l. 11, §1501 (cf. ARISTOTLE, *Metaphysica* Z.11, 1036a26–27): “Distinxerat enim [Philosophus], solvendo praemissam quaestionem, inter partes speciei, et partes individui, quod est compositum ex specie et ex materia. Et ideo hic quaerit, quae sint partes speciei, et quae non. [...] Dicit ergo primo, quod cum dictum sit quod partes speciei ponuntur in definitionibus, non autem partes compositi ex specie et materia, merito dubitatur quae sunt partes speciei, et quae non sunt partes speciei sed simul sumpti, idest individui, in quo simul sumitur natura speciei cum materia ipsa individuante.”

<sup>50</sup> *In Metaph.* 7, l. 11, §1535: “Sicut enim supra dictum est, quod quid erat esse est id quod significat definitio. Definitio autem non assignatur individuis, sed speciebus; et ideo materia individualis, quae est individuationis principium est praeter id quod est quod quid erat esse. Impossibile est autem in rerum natura esse speciem nisi in hoc individuo. Unde oportet quod quaelibet res naturae, si habeat materiam quae est pars speciei, quae est pertinens ad quod quid est, quod etiam habeat materiam individuaalem, quae non pertinet ad quod quid est. Unde nulla res naturae si materiam habeat, est ipsum quod quid est, sed est habens illud. Sicut Socrates non est humanitas, sed est humanitatem habens.”

which the essence is. However, in things of nature, a species can only exist in *this* individual. Whence, if a thing of nature has matter that is a part of the species, which pertains to the essence, it must also have individual matter, which does not pertain to the essence. Therefore, no natural thing (*res naturae*), if it has matter, *is* (its) essence itself: rather, it is (something) *having* it. For example, Socrates is not humanity: rather, it is (something) having humanity.

Hence, in everything that is not its own species but is some determined individual in a species, there must be some parts of matter that are not parts of the species.<sup>51</sup> Thus, because Socrates is not his humanity itself but is (something) having humanity, he has in himself material parts that are not parts of the species but are parts of *this* individual matter, which is the principle of individuation, as *this flesh* and *these bones*.

On the other hand, if some individual were itself its species, (then there would be in it no parts that would not be parts of the species).<sup>52</sup> For example, if Socrates himself were his humanity, then there would be in him no parts that would not be parts of humanity.

### 13.13. Sensible vs. Intelligible Matter

Matter, whether individual or common (► 13.12), is found in two modes:<sup>53</sup> **(1) sensible matter** (*materia sensibilis* = ὕλη αἰσθητή), which is corporeal matter insofar as it underlies sensible qualities—such as hot and cold, hard and soft—from which mathematical (things)

<sup>51</sup> *In Metaph.* 7, l. 11, §1521: “in omni eo quod non est ipsa sua species, sed est aliquod individuum determinatum in specie, oportet esse aliquas partes materiae quae non sunt partes speciei. Socrates enim, quia non est ipsa sua humanitas, sed est habens humanitatem, ideo habet in se partes materiales quae non sunt partes speciei, sed quae sunt partes huius materiae individualis quae est individuationis principium, ut has carnes et haec ossa.”

<sup>52</sup> *In Metaph.* 7, l. 11, §1522: “Si autem esset aliquod individuum quod esset ipsa sua species, sicut si Socrates esset ipsa sua humanitas, non essent in Socrate aliquae partes quae non essent partes humanitatis.”

<sup>53</sup> *In Metaph.* 7, l. 11, §1522: “Utroque enim modo [sc. sensibile et intelligibile] invenitur materia.” Cf. ARISTOTLE, *Metaphysica* Z.11, 1037a4–5: “ἔστι γὰρ ὕλη ἢ μὲν αἰσθητή ἢ δὲ νοητή.” *In Metaph.* 8, l. 5, §1760: “dicit [Philosophus] quod duplex est materia: scilicet sensibilis et intelligibilis.” Cf. ARISTOTLE, *Metaphysica* H.6, 1045a33–34: “ἔστι δὲ τῆς ὕλης ἢ μὲν νοητή ἢ δ’ αἰσθητή.” *De veritate*, q. 2 a. 6 ad 1: “duplex est materia a qua fit abstractio; scilicet materia intelligibilis et sensibilis, ut patet in VII Metaph. [...] Utraque autem dupliciter accipitur; scilicet ut signata, et ut non signata: et dico signatam secundum quod consideratur cum determinatione dimensionum, harum scilicet vel illarum; non signatam autem quae sine determinatione dimensionum consideratur.” *In De anima* 3, c. 2, 94–97: “est enim duplex materia, scilicet sensibilis, a qua abstrahunt mathematica et concernunt eam naturalia, et intelligibilis, quam etiam mathematica concernunt.” **Sensible matter:** *In Metaph.* 8, l. 5, §1760: “Sensibilis quidem [materia] est, quae concernit qualitates sensibiles, calidum et frigidum, rarum et densum, et alia huiusmodi, cum qua quidem materia concreta sunt naturalia, sed ab ea abstrahunt mathematica.” *STh* I, q. 85 a. 1 ad 2: “Materia enim sensibilis dicitur materia corporalis secundum quod subiacet qualitatibus sensibilibus, scilicet calido et frigido, duro et molli, et huiusmodi.” *STh* III, q. 77 a. 2 ad 4: “Dicitur autem materia sensibilis ex hoc quod subiicitur sensibilibus qualitatibus.” *De veritate*, q. 2 a. 6 ad 1: “et dico [...] sensibilem autem sicut est materia naturalis.” **Intelligible matter:** *In Metaph.* 8, l. 5, §1760: “Intelligibilis autem materia dicitur, quae accipitur sine sensibilibus qualitatibus vel differentiis, sicut ipsum continuum. Et ab hac materia non abstrahunt mathematica.” *STh* I, q. 85 a. 1 ad 2: “Materia vero intelligibilis dicitur substantia secundum quod subiacet quantitati.” *De veritate*, q. 2 a. 6 ad 1: “et dico [materiam] intelligibilem, ut quae consideratur in natura continui.”

abstract, but which qualities concern natural (things); and **(2) intelligible matter** (*materia intelligibilis* = ὕλη νοητή), which is substance insofar as it underlies quantity, from which mathematical (things) do not abstract.

Therefore, just as natural (things) have a form in matter (► 13.11), so, too, mathematical (things).<sup>54</sup> This is why in natural, as much as in mathematical (things), *the thing* and *that which (the thing) is* (i.e., the essence of the thing) differ. Whence, in both (i.e., in natural and in mathematical things), there are found multiple individuals under one species. For example, there are multiple men (i.e., human beings) of one species, just as (there are) also multiple triangles under one species.

### 13.14. Parts of the Species

(The expression) *part of the species* can be taken in two (modes):<sup>55</sup> (1) *according to the ratio* (► 13.16), as *biped* is part of *man* because it is a part of its definition; (2) *according to the thing* (► 13.10), and in this way (which is the one discussed here), *biped* is not part of *man*, because otherwise it would not be predicated of the whole; for it befits (*competit*) the whole man to have two feet.

Those are said to be **parts of the species** (*partes speciei* = μέρη τοῦ εἴδους) upon which the perfection of the species depends, and without which the species cannot be (a quibus dependet perfectio speciei, et sine quibus esse non potest species).<sup>56</sup> Whence, such parts are posited in the definition of the whole (► 13.16): for example, *angle* (is posited) in the definition of *triangle*; and *letter* (or *phoneme*), in the definition of *syllable*.

(In natural things, the form does not *per se* have a species; for) the species of a natural thing is constituted by the union of form and matter.<sup>57</sup> If some form were to be composed from form and matter, some species in the things of nature would be constituted from the

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<sup>54</sup> *In De anima* 3, c. 2, 117–123: “sicut naturalia habent formam in materia, ita et mathematica, et propter hoc tam in naturalibus quam in mathematicis differt res et quod quid est; unde in utrisque inveniuntur plura individua sub una specie: sicut enim sunt plures homines unius speciei, ita et plures trianguli sub una specie.”

<sup>55</sup> *In Metaph.* 5, l. 21, §1088 (cf. ARISTOTLE, *Metaphysica* Δ.24, 1023a35–b1): “Pars autem speciei potest accipi dupliciter: aut secundum rationem, aut secundum rem. Secundum rationem, sicut bipes est pars hominis, quia est pars definitionis eius, quamvis secundum rem non sit pars, quia aliter non praedicaretur de toto. Toti enim homini competit habere duos pedes.”

<sup>56</sup> *In Metaph.* 5, l. 21, §1089: “Partes quidem speciei dicuntur, a quibus dependet perfectio speciei, et sine quibus esse non potest species. Unde et tales partes in definitione totius ponuntur, sicut anima et corpus in definitione animalis, et angulus in definitione trianguli, et litera in definitione syllabae.” *In Metaph.* 5, l. 21, §1088 (cf. ARISTOTLE, *Metaphysica* Δ.24, 1023a35–36): “Secundum rem vero, sicut syllaba est ex elemento, idest ex litera sicut ex parte speciei.”

<sup>57</sup> *Q. d. de anima*, a. 6 co.: “forma materiae adveniens constituit speciem. Si ergo [aliqua forma] sit ex materia et forma composita, ex ipsa unione formae ad materiam [illae formae], constituetur quaedam species in rerum natura. Quod autem per se habet speciem, non unitur alteri ad speciei constitutionem, nisi alterum ipsorum corrumpatur aliquo modo; sicut elementa uniuntur ad componendam speciem mixti.”

union itself (of form and matter). But that which has a species by itself (*per se*) is not united to another to constitute a species—unless the other becomes corrupted in some mode, as elements are united to compose the species of a compound (body).

Although the parts of the species (i.e., form and common matter; ►13.12), which are posited in the definition (►13.16), are compared to the suppositum of nature (i.e., to the integral individual) by the mode of a formal cause, (the same parts of the species) are compared as matter to the nature itself of which they are parts (e.g., form and common matter are *parts* of the natural species; therefore, they have the *ratio* of *matter* in respect of the whole nature); for all parts are compared to the whole as imperfect to perfect, which is a comparison of matter to form (►13.1).<sup>58</sup>

### 13.15. Parts of Individual Matter

Those are said (to be) **parts of (individual) matter** (*partes materiae* < μέρη ὡς ὕλη) upon which the species does not depend, but (which) somehow befall the species (*ex quibus species non dependet, sed quodammodo accidunt speciei*).<sup>59</sup> For example, to come to be from bronze—or from any matter—befalls a statue. Likewise, to be divided into two semicircles befalls a circle; and (it befalls) a right angle that an acute angle is (its) part.

The matter that is not part of the species belongs to anything that is not the essence and species itself according to itself (*quod quid erat esse et species eadem secundum se* = ὁ μὴ ἔστι τί ἦν εἶναι καὶ εἶδος αὐτὸ καθ' αὐτό) but is *this something* (*hoc aliquid* = τόδε τι), i.e., some determined particular (*particulare aliquod demonstratum*).<sup>60</sup>

Whence, the parts of matter are not posited in the definition of the whole species: rather, conversely.<sup>61</sup> For example, *circle* is posited in the definition of *semicircle*; for *semicircle* is *a half part of the circle* (likewise, *right angle* is posited in the definition of *acute angle*;

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<sup>58</sup> *In Physic.* 2, l. 5, n. 10: “licet partes speciei quae ponuntur in definitione, comparentur ad suppositum naturae per modum causae formalis, tamen ad ipsam naturam cuius sunt partes, comparantur ut materia: nam omnes partes comparantur ad totum ut imperfectum ad perfectum, quae quidem est comparatio materiae ad formam.”

<sup>59</sup> *In Metaph.* 5, l. 21, §1089: “Partes vero materiae dicuntur ex quibus species non dependet, sed quodammodo accidunt speciei; sicut accidit statuae quod fiat ex aere, vel ex quacumque materia. Accidit etiam circulo quod dividatur in duos semicirculos: et angulo recto, quod angulus acutus sit eius pars.”

<sup>60</sup> *In Metaph.* 7, l. 11, §1521 (cf. ARISTOTLE, *Metaphysica* Z.11, 1037a1–2): “Et talis materia, quae scilicet non est pars speciei, est omnis eius quod non est quod quid erat esse et species eadem secundum se, sed est hoc aliquid, idest particulare aliquod demonstratum.”

<sup>61</sup> *In Metaph.* 5, l. 21, §1089: “Unde huiusmodi partes non ponuntur in definitione totius speciei, sed potius e converso, ut in septimo huius erit manifestum.” The reference is to ARISTOTLE, *Metaphysica* Z.12, 1037b27–1038a35. *In Polit.* 4, l. 4, n. 2: “Et eadem ratio est de aliis huiusmodi partibus, quae dicuntur partes materiae, in quarum definitione ponitur totum, sicut et in definitione semicirculi ponitur circulus. Est semicirculus media pars circuli. Secus autem est de partibus speciei, quae ponuntur in definitione totius, sicut lineae ponuntur in definitione trianguli.” *In Physic.* 2, l. 5, n. 9: “potest dici quod supra locutus est de partibus speciei, quae cadunt in definitione totius: hic autem loquitur de partibus materiae, in quarum definitione cadit totum, sicut circulus cadit in definitione semicirculi.”



► 4.4). But it is otherwise concerning the parts of the species (► 13.14), which are posited in the definition of the whole, as *line* is in the definition of *triangle*. Thus, while the parts of the species fall in the definition of the whole (species), the whole (species) falls in the definition of the parts of matter, as *circle* falls in the definition of *semicircle*.

It makes no difference whether the parts of matter are sensible or non-sensible; for also non-sensible things have some intelligible matter.<sup>62</sup> For example, in *this circle* there are *these lines* that are not parts of the species. Whence it is evident that such (lines) are not parts of the circle that is universal, but parts of singular circles. Hence, semicircles are not posited in the definition of the universal circle because they are parts of singular circles, and not of the universal (circle). And this is true both of sensible matter and of intelligible matter.

### 13.16. Parts of the Ratio

In this mode, **integral parts** are *those that are posited in the definition of whatever thing (quae ponuntur in definitione cuiuslibet rei < τὰ ἐν τῷ λόγῳ τῷ δηλοῦντι ἕκαστον)*, which are the parts of the *ratio*: e.g., *animal* and *biped* are parts of (the *ratio* of) *man*.<sup>63</sup>

As ARISTOTLE says, every definition is some **ratio** (*omnis definitio est quaedam ratio < ὁ ὀρισμὸς λόγος ἐστὶ*): that is, some *composition of names ordered by reason (quaedam compositio nominum per rationem ordinata; ► 8.13)*.<sup>64</sup> One name cannot be a definition because a definition must distinctly make known those principles of the thing that concur to constitute the essence of the thing—otherwise, the definition would not sufficiently manifest the essence of the thing.<sup>65</sup> The definition expresses distinctly the single principles

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<sup>62</sup> *In Metaph.* 7, l. 11, §1521 (cf. ARISTOTLE, *Metaphysica* Z.11, 1036b32–1037a2): “hoc nihil differt quantum ad propositum, utrum scilicet partes materiae sint sensibilia vel non sensibilia; quia etiam non sensibilia est aliqua materia intelligibilis. Et talis materia, quae scilicet non est pars speciei, est omnis eius quod non est quod quid erat esse et species eadem secundum se, sed est hoc aliquid, idest particulare aliquod demonstratum.” *In Metaph.* 7, l. 11, §1522 (cf. ARISTOTLE, *Metaphysica* Z.11, 1037a2–5): “Et similiter in hoc circulo sunt hae lineae quae non sunt partes speciei. Unde patet quod huiusmodi non sunt partes circuli qui est universalis, sed sunt partes singularium circulorum [...]. Et propter hoc semicirculi non ponuntur in definitione circuli universalis, quia sunt partes singularium circulorum, et non universalis. Et hoc est verum tam in materia sensibili, quam in materia intelligibili.”

<sup>63</sup> *In Metaph.* 5, l. 21, §1093: “Quarto autem modo [= (1b)] est pars rationis.” *Ibid.*, §1096: “Quarto modo dicuntur partes, quae ponuntur in definitione cuiuslibet rei, quae sunt partes rationis sicut animal et bipes sunt partes hominis.” Cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b23–24: “τὰ ἐν τῷ λόγῳ τῷ δηλοῦντι ἕκαστον, καὶ ταῦτα μέρη τοῦ ὅλου.”

<sup>64</sup> *In Metaph.* 7, l. 9, §1460 (cf. ARISTOTLE, *Metaphysica* Z.10, 1034b20): “Postquam Philosophus ostendit quid est quod quid erat esse, et quorum est, et quomodo se habet ad ea quorum est, et quod non oportet ponere quidditates rerum separatas propter generationem, hic intendit ostendere *ex quibus constituitur quod quid erat esse* [...]. Dicit ergo *primo*, quod «omnis definitio est quaedam ratio,» idest quaedam compositio nominum per rationem ordinata.”

<sup>65</sup> *In Metaph.* 7, l. 9, §1460: “Unum enim nomen non potest esse definitio, quia definitio oportet quod distincte notificet principia rerum quae concurrunt ad essentiam rei constituendam; alias autem definitio non sufficienter manifestaret essentiam rei. Et propter hoc dicitur in primo Physicorum, quod definitio dividit «definitum in singulare,» idest exprimit distincte singula principia definiti. Hoc autem non potest fieri nisi per plures dictiones: unde una dictio non potest esse definitio, sed potest esse manifestativa eo

of that which is defined. And this can only be done through multiple dictions. Whence, one diction cannot be a definition, although it can manifest (a thing) in the way in which a name (that is) less known is manifested by (a name that is) more know. But every *ratio* has parts because it is a composite sentence (*oratio composita*), and not a simple name.

There will be a definition—i.e., a *ratio* that signifies the essence—only of that which is the same as its essence.<sup>66</sup> This is so because the essence (*quod quid erat esse* < τὸ τί ἦν εἶναι) is the same as that of which it is: for example, the essence of circle and circle are the same. Such (definitions or *ratios*) are universal and not singular. Hence, there is no definition of those (individuals) that are composed from species and individual matter: for example, (there is no definition of) *this circle*.

A definition, therefore, is only of universals, never of singulars.<sup>67</sup> And among universals, the species is properly (defined); for a species is constituted from genus and difference, of which every definition consists, while a genus is not defined unless there is also a species. Whence, it is evident that only if one knows which part is as (individual) matter, and which (part) is not as matter but as pertaining to the species itself, will it be manifest how the definition should be assigned to a thing; for (a definition) is only assigned to the species, and (one) should posit in the definition of the species the parts of the species, and not the parts that are posterior to the species (i.e., the parts of the individual).

Consequently, even though man is not (found) in the nature of things apart from (*praeter*) singulars, (the species of man) is (found apart from singulars) in the *ratio* that pertains to logical consideration.<sup>68</sup> Thus, *man (in) common* is the same as its essence logically

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modo, quo nomen minus notum manifestatur per magis notum. Omnis autem ratio partes habet, quia est quaedam oratio composita, et non simplex nomen.” Cf. ARISTOTLE, *Metaphysica* Z.10, 1034b20: “πᾶς δὲ λόγος μέρη ἔχει.”

<sup>66</sup> *In Metaph.* 7, l. 10, §1493 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a1–2): “Cum enim quod quid erat esse sit idem cum eo cuius est, ut supra ostensum est [cf. ARISTOTLE, *Metaphysica* Z.6, 1031a15–1032a11 (*In Metaph.* 7, l. 5, §§1356–1380)], illius tantum erit definitio, quae est ratio significans quod quid erat esse, quod est idem cum suo quod quid erat esse. Huiusmodi autem sunt universalis et non singularis. Circulus enim, et id quod est circulo esse, sunt idem; et similiter anima, et id quod est animae esse. Sed ipsorum, quae sunt composita ex specie et materia individuali, sicut circuli huius, aut alicuius aliorum singularium: horum non est definitio.”

<sup>67</sup> *In Metaph.* 7, l. 11, §1502 (cf. ARISTOTLE, *Metaphysica* Z.11, 1036a27–31): “definitio nunquam est rei singularis, sed solum universalis [...]. Et inter universalis proprie est species, quae constituitur ex genere et differentia, ex quibus omnis definitio constat. Genus enim non definitur, nisi etiam sit species. Unde patet, quod nisi sciatur quae pars sit sicut materia, et quae non est sicut materia sed sicut ad speciem ipsam pertinens, non erit manifestum qualis debeat esse definitio rei assignanda, cum non assignetur nisi speciei, et oporteat in definitione speciei partes speciei ponere, et non partes quae sunt posteriores specie.”

<sup>68</sup> *In Metaph.* 7, l. 11, §1536: “Licet autem homo praeter singularia non sit in rerum natura, est tamen in ratione quae pertinet ad logicam considerationem. Et ideo superius ubi logice consideravit [Philosophus] de quod quid erat esse, non exclusit substantias materiales, quin in illis etiam esset idem quod quid est, cum eo cuius est. Homo enim communis est idem cum suo quod quid est, logice loquendo. Nunc autem postquam iam descendit ad principia naturalia quae sunt materia et forma, et ostendit quomodo diversimode comparantur ad universale et particulare quod subsistit in natura, excipit hic ab eo quod

speaking. But descending towards natural principles, which are matter and form, essence compares diversely to the universal and to the particular that subsists in nature.

Whence, it seems that just as *ratio* is related to thing, so are the parts of the *ratio* to the parts of the thing.<sup>69</sup> But it is not as though the parts of the definition were the parts of the thing.<sup>70</sup> Rather, the parts of the definition signify the parts of the thing insofar as the parts of the definition are taken from the parts of the thing. Thus, neither animal nor rational is a part of man. Rather, *animal* is taken from one part (of man), and *rational* from another; for *animal* is *that which has a sensitive nature*, while *rational* is *that which has reason*; and *sensitive nature* is as (a) material (cause) in respect of *reason*. Whence, the genus is taken from matter; the difference (is taken) from the form; and the species (is taken) from form and matter simultaneously; for *man* is *that which has reason in a sensitive nature*.

Thus, in any definition, whether in sensible or in mathematical (things), there must always be something as matter and something as form.<sup>71</sup> For example, in “circle is a superficial figure,” a definition of the mathematical circle, *surface* is as matter; and *figure*, as form.

The nature of a species constituted from *form* and *common matter* is related as formal in respect of the individual that participates of such a nature.<sup>72</sup> Whence, all the parts that are posited in the definition pertain to—and are reduced to—the formal cause; for the parts of the species are posited in the definition, but not the parts of matter.<sup>73</sup> This does not

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supra dixerat idem esse quod quid est cum unoquoque, substantias materiales in rerum natura existentes.”

<sup>69</sup> *In Metaph.* 7, l. 9, §1460: “Et ideo videtur quod sicut se habet ratio rei ad rem, ita se habent partes rationis ad partes rei.” Cf. ARISTOTLE, *Metaphysica* Z.10, 1034b20–22: “ὡς δὲ ὁ λόγος πρὸς τὸ πρᾶγμα, καὶ τὸ μέρος τοῦ λόγου πρὸς τὸ μέρος τοῦ πράγματος ὁμοίως ἔχει.”

<sup>70</sup> *In Metaph.* 7, l. 9, §1463 (cf. ARISTOTLE, *Metaphysica* Z.10, 1034b22–28): “Sed dicendum est, quod partes definitionis significant partes rei, in quantum a partibus rei sumuntur partes definitionis; non ita quod partes definitionis sint partes rei. Non enim animal est pars hominis, neque rationale; sed animal sumitur ab una parte, et rationale ab alia. Animal enim est quod habet naturam sensitivam, rationale vero quod habet rationem. Natura autem sensitiva est ut materialis respectu rationis. Et inde est quod genus sumitur a materia, differentia a forma, species autem a forma et materia simul. Nam homo est, quod habet rationem in natura sensitiva.”

<sup>71</sup> *In Metaph.* 8, l. 5, §1761 (cf. ARISTOTLE, *Metaphysica* H.6, 1045a33–35): “sive in sensibilibus, sive in mathematicis, semper oportet quod sit in definitionibus aliquid quasi materia et aliquid quasi forma. Sicut in hac definitione circuli mathematici, circulus est figura superficialis, superficies est quasi materia, et figura quasi forma. Eadem enim est ratio quare definitio mathematica est una, et quare definitio naturalis (licet in mathematicis non sit agens, sicut in naturalibus), quia utrobique alterum est sicut materia, et alterum sicut forma.”

<sup>72</sup> *In Physic.* 2, l. 5, n. 4: “Natura igitur speciei constituta ex forma et materia communi, se habet ut formalis respectu individui quod participat talem naturam; et pro tanto hic dicitur quod partes quae ponuntur in definitione, pertinent ad causam formalem.”

<sup>73</sup> *In Physic.* 2, l. 5, n. 4 (cf. ARISTOTLE, *Physica* B.3, 194b26–29): “ad hunc modum causae [sc., formalem] reducuntur omnes partes quae ponuntur in definitione: nam partes speciei ponuntur in definitione, non autem partes materiae, ut dicitur in VII *Metaphys.* Nec est hoc contra id quod supra dictum est, quod in definitione rerum naturalium ponitur materia: nam in definitione speciei non ponitur materia individualis, sed materia communis; sicut in definitione hominis ponuntur carnes et ossa, non autem hae carnes et haec ossa.” *In Metaph.* 7, l. 10, §1492 (cf. ARISTOTLE, *Metaphysica* Z.10, 1035b33–1036a1): “quia

contradict what was said earlier: that matter is posited in the definition of natural things; for it is not individual matter that is posited in the definition of the species, but common matter. For example, *flesh* and *bones* are posited in the definition of *man*, but not *this flesh* and *these bones*. This is so because the definitive *ratio* is assigned only universally.

Indeed, each thing attains the nature of a genus or of a species through its form.<sup>74</sup> The nature of a genus or of a species is that which the definition signifies, saying *what* the thing is. Thus, although some material parts are posited in the definition, that which is principal in the definition must be from the part of the form. Therefore, the form is a cause insofar as it perfects (i.e., completes) the *ratio* of the quiddity of a thing (*perficit rationem quidditatis rei*; ►9.5; 16.7).

Not only the whole definition is compared to the thing defined as a form, but also the parts of the definition (*partes definitionis* < τὰ μέρη τὰ ἐν τῷ λόγῳ): that is, those (parts) that are posited directly (*in recto*) in the definition.<sup>75</sup> For example, just as *biped*, *capable-of-walking animal* (*animal gressibile bipes*) is the form of man (i.e., human being), so is *animal* (i.e., the genus of man), *biped*, and *capable-of-walking* (i.e., specific differences). Sometimes, however, matter is posited in a definition, but indirectly (*in obliquo*), as when it is said that the *soul* is *the act of a physical, organic body having life in potency* (i.e., the act of that matter which corresponds to the soul).<sup>76</sup>

### 13.17. Integral vs. Universal Whole

According to the mode of the integral whole, the genus is an (integral) part of the species, while in a universal whole the species is a (subjective) part of the genus.<sup>77</sup> Therefore,

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materia communiter sumpta est pars speciei, haec autem materia determinata est pars individui: manifestum est, quod solum illae partes sunt partes rationis, quae sunt partes speciei; non autem quae sunt partes individui. In definitione enim hominis ponitur caro et os, sed non haec caro et hoc os. Et hoc ideo, quia ratio definitiva non assignatur nisi universaliter.”

<sup>74</sup> In *Metaph.* 5, l. 2, §764 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a27): “unumquodque consequitur naturam vel generis vel speciei per formam suam, natura autem generis vel speciei est id quod significat definitio, dicens quid est res [...]. Quamvis enim in definitione ponantur aliquae partes materiales, tamen id quod est principale in definitione, oportet quod sit ex parte formae. Et ideo haec est ratio quare forma est causa, quia perficit rationem quidditatis rei.” In *Physic.* 2, l. 5, n. 4 (cf. ARISTOTLE, *Physica* B.3, 194b26–27): “et hoc dicitur causa inquantum est ratio quidditativa rei; hoc enim est per quod scimus de unoquoque quid est.”

<sup>75</sup> In *Metaph.* 5, l. 2, §764: “Et non solum tota definitio comparatur ad definitum ut forma, sed etiam partes definitionis, quae scilicet ponuntur in definitione in recto. Sicut enim animal gressibile bipes est forma hominis, ita animal, et gressibile, et bipes. Ponitur autem interdum materia in definitione, sed in obliquo; ut cum dicitur, quod anima est actus corporis organici physici potentia vitam habentis.”

<sup>76</sup> In other words, *organic physical body having life in potency* is the matter posited in this definition of the soul, while the act that corresponds to such a matter is a form: namely, the soul that is being defined. Thus, matter is sometimes obliquely posited in definitions—even in those of forms.

<sup>77</sup> In *Metaph.* 5, l. 21, §1097 (cf. ARISTOTLE, *Metaphysica* Δ.25, 1023b24–25): “Ex quo patet, quod genus quarto modo [= (3)] est pars speciei: aliter vero, scilicet secundo modo [sc., secundum quod sumebatur pars pro parte subiectiva totius universalis], species est pars generis.” *STh* I-II, q. 67 a. 5 co.: “Genus enim et differentia non sunt partes speciei, alioquin non praedicarentur de specie. Sed sicut species

genus and difference are not (subjective) parts of the species. Otherwise they would not be predicated of the species (► 13.6). Rather, as the species signifies a (universal) whole (► 13.5)—i.e., a composite from matter and form in material things—so the difference signifies a (universal) whole; and likewise, the genus. But the genus denominates a (universal) whole from that which is as matter, while the difference (signifies a universal whole) from that which is as form; and the species (signifies a universal whole) from one and the other.

For example, in man, sensitive nature is materially related to intellective (nature).<sup>78</sup> That which has a sensitive nature is said (to be an) *animal*; that which has an intellective (nature is said to be) *rational*; and that which has both (is said to be a) *man*. And thus, the same whole is signified by these three, but not from the same (natures).

Therefore, the genus is not compared to the difference as matter to form in such a way that the substance of the genus would remain the same in number if the difference were removed, as the substance of matter remains the same if the form is removed (► 18.17).<sup>79</sup> Since the difference is designative only of the genus, if the difference is removed, the substance of the genus cannot remain the same in number. Thus, the same animality would not remain if there were some other soul constituting an animal. Likewise, if the difference constitutive of whiteness is removed, the substance of color does not remain the same in number, as though a numerically same color could sometimes be whiteness and sometimes blackness.

### 13.18. Priority of Integral Whole and Parts

If we distinguish between the parts of matter and the parts of form, then, in anything that is the same with its form, the parts of the *ratio* are prior to the parts of matter; and the parts of sensible matter are prior to the parts of intelligible matter.<sup>80</sup> For example, the right

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significat totum, idest compositum ex materia et forma in rebus materialibus, ita differentia significat totum, et similiter genus, sed genus denominat totum ab eo quod est sicut materia; differentia vero ab eo quod est sicut forma; species vero ab utroque.”

<sup>78</sup> *STh* I-II, q. 67 a. 5 co.: “Sicut in homine sensitiva natura materialiter se habet ad intellectivam, animal autem dicitur quod habet naturam sensitivam; rationale quod habet intellectivam; homo vero quod habet utrumque. Et sic idem totum significatur per haec tria, sed non ab eodem.”

<sup>79</sup> *STh* I-II, q. 67 a. 5 co.: “Non enim, remota differentia alicuius speciei, remanet substantia generis eadem numero, sicut, remota differentia constitutiva albedinis, non remanet eadem substantia coloris numero, ut sic idem numero color sit quandoque albedo, quandoque vero nigredo. Non enim comparatur genus ad differentiam sicut materia ad formam, ut remaneat substantia generis eadem numero, differentia remota; sicut remanet eadem numero substantia materiae, remota forma. [...] Unde patet quod, cum differentia non sit nisi designativa generis, remota differentia, non potest substantia generis eadem remanere, non enim remanet eadem animalitas, si sit alia anima constituens animal.”

<sup>80</sup> *In Metaph.* 7, l. 10, §1499 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a13–23): “Si enim idem est anima quod animal vel animatum, aut similiter unumquodque est idem cum forma uniuscuiusque, ut circulus idem cum forma circuli, et rectus angulus idem cum forma recti, dicendum est determinando quid sit posterius, et quo sit posterius; quia secundum hoc partes materiae sunt posteriores his, quae sunt in

angle is the same with the form of the right angle; whence, the parts of the form of the right angle, which are (posited) in (its) *ratio*, are prior to the parts of *this* right angle with singular lines, which is a right angle with intelligible matter; and the parts of *this* right angle are prior to the parts of a bronze right angle, which is a right angle with sensible matter.

This is why, on one hand, the right angle seems to be prior to the acute angle, and man (seems to be prior) to finger, in two (modes):<sup>81</sup>

1. *According to ratio* (► 13.16), in which mode those are said to be prior which are posited in their *ratios*, and not contrarily.<sup>82</sup> Thus, *acute (angle)* and *finger* are defined from (i.e., in terms of) *right (angle)* and *man* (respectively). Whence, it seems that *man* and *right (angle)* are prior to *finger* and to *right angle*. In this mode, all parts of the *ratio*, and (those) into which the *ratio* is divided, must be prior to the (whole) definition.<sup>83</sup> This must be understood of the parts of the form that belong to the necessity of the species, and not to (its) perfection. For example, sight and hearing, which are parts of the sensible soul, do not belong to the *integrity or necessity of animal*; for there can be an animal without these senses. They belong, however, to the *perfection of animal*; for a perfect animal has these senses too. And in this way, it is universally true that those parts that are posited in the definition of something are universally prior to it.

Again, the parts of the *ratio* are the parts of the form, not the parts of matter.<sup>84</sup> Wherefrom, if only the parts of the *ratio* are prior, and not the parts of matter, it follows that whichever

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ratione, et sunt etiam posteriores aliquo recto, scilicet recto communi, sed sunt priores recto singulari. Hic enim rectus qui est aereus, est cum materia sensibili. Et hic rectus qui est cum lineis singularibus, est cum materia intelligibili. Sed ille rectus qui est sine materia, idest communis, erit posterior partibus formae quae sunt in ratione, sed erit prior partibus materiae quae sunt partes singularium. Nec erit secundum hanc opinionem distinguere inter materiam communem et individualem. Sed tamen simpliciter non erit respondendum, quia erit distinguendum inter partes materiae et partes formae.”

<sup>81</sup> *In Metaph.* 7, l. 9, §1465: “Sed e contra videntur illa esse priora, scilicet rectus acuto, et homo digito. Et hoc dupliciter.”

<sup>82</sup> *In Metaph.* 7, l. 9, §1465 (cf. ARISTOTLE, *Metaphysica* Z.10, 1034b30–31): “Primo quidem secundum rationem. Per huic enim modum illa dicuntur esse priora, quae in eorum rationibus ponuntur, et non e contrario. Acutus enim et digitus dicuntur esse secundum rationem, idest definiuntur ex illis, scilicet homine et recto, ut dictum est. Unde videtur, quod homo et rectus angulus sint priores digito et acuto angulo.”

<sup>83</sup> *In Metaph.* 7, l. 10, §1482 (cf. ARISTOTLE, *Metaphysica* Z.10, 1035b4–6): “Oportet enim, quod omnes partes rationis, et in quas ratio dividitur, sint priores definito, vel omnes, vel quaedam. Et hoc dicitur propter hoc, quod partes formae quandoque non sunt de necessitate speciei, sed de perfectione; sicut visus et auditus, quae sunt partes animae sensibilis, non sunt de integritate vel necessitate animalis. Potest enim esse animal sine his sensibus. Sunt tamen de perfectione animalis, quia animal perfectum hos etiam sensus habet. Et sic universaliter est verum, quod illae partes quae ponuntur in definitione alicuius sunt universaliter priores eo.”

<sup>84</sup> *In Metaph.* 7, l. 10, §1483 (cf. ARISTOTLE, *Metaphysica* Z.10, 1035b11–14): “Dictum est enim supra, quod partes formae sunt partes rationis, non autem partes materiae. Si igitur solae partes rationis sunt priores, non autem materiae, sequitur quod quaecumque sint partes definiti, sicut materia, in quam scilicet resolvitur definitum ut compositum in materialia principia, sunt posteriora. Quaecumque vero sunt partes rationis et substantiae quae est secundum rationem, idest partes formae secundum quam sumitur ratio rei, sunt priora toto, aut omnia, aut quaedam, ratione superius dicta.”

parts of the (thing) defined that are as matter—i.e., (matter) into which the (thing) defined is resolved as the composite (is resolved) into (its) material principles—, are posterior; and whichever parts of the form, according to which the *ratio* of the thing is taken, are prior to the whole.

Hence, the acute angle, even though it is a part of the right (angle), is not posited in its definition.<sup>85</sup> Rather, conversely; for the *ratio* of *right (angle)* is not resolved into the definition of the *acute (angle)*, but conversely. Whoever defines *acute (angle)* uses *right (angle)* in defining (it); for an *acute (angle)* is *an angle that is less than a right angle* (► 4.4). Likewise, concerning the *semicircle*, which is defined through the circle; for it is *a half part of the circle* (► 4.4).<sup>86</sup> Likewise, concerning the finger and *man*, which is posited in the definition of *finger*; for *finger* is *such part of man*.<sup>87</sup>

2. Insofar as those are said to be prior *which can be without the other*; for those that can be without others, but not contrarily, are said to be prior (► 47.2).<sup>88</sup> For example, one (can be without) two (but two cannot be without one; whence, one is prior to two). And a man can be without a finger, but a finger cannot be without a man, because a cut-off finger is not a finger. Whence, it seems that man is prior to finger; and, for the same reason, the right (angle is seemingly prior to) the acute (angle).

On the other hand, we can moreover distinguish between common matter, which is a part of the species, and individual matter, which is a part of the individual.<sup>89</sup> If we consider the part of matter and not of the part of the species, the whole is necessarily prior to the part

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<sup>85</sup> *In Metaph.* 7, l. 10, §1483 (cf. ARISTOTLE, *Metaphysica* Z.10, 1035b6–8): “acutus angulus, quamvis sit pars recti, non tamen ponitur in definitione eius, sed e converso; non enim ratio recti anguli resolvitur in definitionem acuti, sed e converso. Qui enim definit acutum, utitur recto definiendo. Angulus enim acutus est angulus minor recto.”

<sup>86</sup> *In Metaph.* 7, l. 10, §1483 (cf. ARISTOTLE, *Metaphysica* Z.10, 1035b9–10): “Et similiter est de circulo et semicirculo, qui definitur per circum. Est enim media pars circuli.”

<sup>87</sup> *In Metaph.* 7, l. 10, §1483 (cf. ARISTOTLE, *Metaphysica* Z.10, 1035b10–11): “Similiter est de digito et homine, qui ponitur in definitione digiti: definitur enim digitus, quod est talis pars hominis.”

<sup>88</sup> *In Metaph.* 7, l. 9, §1466 (cf. ARISTOTLE, *Metaphysica* Z.10, 1034b31–32): “Secundo vero prout dicuntur esse aliqua priora ex eo, quod est esse sine invicem. Quae enim possunt esse sine aliis, et non e contrario, dicuntur esse priora, ut in quinto est habitum, sicut unum duobus. Homo autem potest esse sine digito. Digitus autem non potest esse sine homine, quia digitus abscisus non est digitus, ut infra dicetur. Unde videtur, quod homo sit prior digito. Et eadem ratio est de recto et acuto.”

<sup>89</sup> *In Metaph.* 7, l. 10, §1500 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a24–25): “Si autem alia opinio sit vera, scilicet quod anima sit aliud quam animal, sic erit dicendum et non dicendum partes esse priores toto, sicut determinatum est prius. Secundum enim hanc opinionem docuit superius distinguere non solum inter materiam et formam, sed inter materiam communem quae est pars speciei, et inter materiam individuaem quae est pars individui.” *In Polit.* 4, l. 4, n. 2: “Necesse est totum esse prius parte, ordine scilicet naturae et perfectionis. Sed hoc intelligendum est de parte materiae, non de parte speciei, ut ostenditur in septimo *Metaphysicae*.” *In Metaph.* 7, l. 9, §1464 (cf. ARISTOTLE, *Metaphysica* Z.10, 1034b28–30): “Omnes enim partes videntur esse priores toto, sicut simplex composito. Acutus enim angulus est pars recti anguli. Dividitur enim rectus angulus in duos vel plures angulos acutos. Et similiter digitus est pars hominis. Unde videtur, quod acutus angulus sit naturaliter prior recto, et digitus prior homine.”

in the order of nature and perfection. In this mode, all parts seem to be prior to the whole as the simple (is prior) to the composite. For example, the acute angle is part of the right angle; for the right angle is divided into two or more acute angles. Likewise, a finger is part of man. Whence, it seems that the acute angle is prior to the right (angle), and (that) finger (is prior) to man.

### 13.19. Order among Integral Parts

An order to some part can be considered in two modes: *part to part*, and *whole to parts*, to which order is assimilated the order of that which is common according to proportionality (i.e., according to an analogy of the form  $a : b :: c : d$ ).<sup>90</sup>

All integral parts have some order to each other (i.e., *part to part*, ► 39.19):<sup>91</sup>

1. Some parts have an order only in site (*in situ*; ► 39.5), whether: (a) they are related consequently (*consequenter*), as the parts of an army; (b) they touch each other (*se tangant*), as the parts of a heap; (c) they are moreover joined (*colligentur*), as the parts of a house; or (d) they are moreover continuous (*continuentur*), as the parts of a line.<sup>92</sup>
2. Some parts have moreover an order of virtue, as the parts of an animal, of which there is a first one, and the others depend one on another according to some order of virtue.<sup>93</sup>
3. Some parts are ordered according to the order of time, as (are) the parts of time and of motion.<sup>94</sup>

### 13.20. Potential Whole

The **potential whole** (*totum potentiale, totum potestativum*) is divided into parts of virtue (*dividitur in partes virtutis*).<sup>95</sup> This whole is only in one of the parts according to its complete *ratio*, while in the other parts there is some participation in the *ratio* of the whole (► 26).

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<sup>90</sup> *STh* II-II, q. 61 a. 1 co.: “Potest autem ad aliquam partem duplex ordo attendi. Unus quidem partis ad partem [...]. Alius ordo attenditur totius ad partes, et huic ordini assimilatur ordo eius quod est commune [...] secundum proportionalitatem.”

<sup>91</sup> *STh* III, q. 90 a. 3 ad 3: “omnes partes integrales habent ordinem quendam ad invicem.”

<sup>92</sup> *STh* III, q. 90 a. 3 ad 3: “quaedam [partes integrales] habent ordinem tantum in situ, sive consequenter se habeant, sicut partes exercitus; sive se tangant, sicut partes acervi; sive etiam colligentur, sicut partes domus; sive etiam continuentur, sicut partes lineae.”

<sup>93</sup> *STh* III, q. 90 a. 3 ad 3: “Quaedam vero [partes integrales] habent insuper ordinem virtutis, sicut partes animalis, quarum prima virtute est cor, et aliae quodam ordine virtutis dependent ab invicem.”

<sup>94</sup> *STh* III, q. 90 a. 3 ad 3: “Tertio modo ordinantur [partes integrales] ordine temporis, sicut partes temporis et motus.”

<sup>95</sup> *STh* I, q. 76 a. 8 co.: “Tertium autem totum est potentiale, quod dividitur in partes virtutis.” Cf. *In Sent.* 4, d. 24 q. 2 a. 1 qc. 1 ad 2: “distinctio [sacramenti] ordinum non est totius integralis in partes, neque totius universalis, sed totius potestativi; cuius haec est natura quod totum secundum completam rationem est in uno, in aliis autem est aliqua participatio ipsius.” *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: “partes essentiae [...] semper habent ordinem naturae ad invicem.”



The potential whole is as a mean (*medium*) between the universal whole and the integral whole.<sup>96</sup> The universal is present (*adest*) in whichever of its subjective parts according to its whole essence, being, and (according) to its complete, perfect virtue (*secundum esse et perfectam virtutem, secundum essentiam et completam virtutem, secundum totam suam essentiam et virtutem*).<sup>97</sup> Whence, it is equally (*aequaliter*) and properly (*proprie*) predicated of any and each of its parts: e.g., *animal* (is present) in *man* and in *horse* (and is predicated of each of them properly and equally).

The integral whole, on the other hand, is not present in any of its parts: neither according to being or to its whole essence (*secundum esse, secundum essentiam*); nor according to the whole virtue (*secundum totam virtutem*).<sup>98</sup> Whence, in no mode is it predicated of the singular parts. For example, neither the being (or essence) of the whole house, nor its whole virtue, is in a wall; whence, (the whole *house*) is in no mode predicated of *wall*. But it is predicated—albeit improperly—of all (of the parts) at once (*simul*). For example, we say that *a house* is *walls, ceiling and foundation*.

Finally, the potential whole is present in whichever part according to itself, to its whole essence, to the *ratio* of its complete essence (*secundum se, secundum totam suam essentiam, secundum essentiae suae rationem*), and not according to its whole, perfect virtue (*secundum totam suam virtutem, secundum perfectam virtutem*), in whichever of its parts, but according to some of its virtue (*secundum aliquid virtutis*).<sup>99</sup> Whence, it is related in a mean mode in predicating; for it is sometimes improperly predicated of its parts.

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<sup>96</sup> *In Sent.* 1, d. 3 q. 4 a. 2 ad 1: “Totum enim potentiale, quasi medium est inter integrale et universale.” *STh* I, q. 77 a. 1 ad 1: “medium est [totum potestativum] inter totum universale et totum integrale.” *In Sent.* 2, d. 9 q. 1 a. 3 ad 1: “totum [potentiale sive potestativum] est quasi medium inter totum universale et integrale.” *De spirit. creat.*, a. 11 ad 2: “totum potentiale [...] est medium inter haec duo [sc., *universale et integrale*].”

<sup>97</sup> *In Sent.* 1, d. 3 q. 4 a. 2 ad 1: “Universale enim [totum] adest cuilibet parti subjectivae secundum esse et perfectam virtutem, et ideo proprie praedicatur de parte sua.”

<sup>98</sup> *In Sent.* 1, d. 3 q. 4 a. 2 ad 1: “totum integrale non adest cuilibet parti, neque secundum esse, neque secundum virtutem. Non enim totum esse domus est in pariete, neque tota virtus; et ideo nullo modo praedicatur de parte.” *In Sent.* 2, d. 9 q. 1 a. 3 ad 1: “integrale [totum] nec est secundum essentiam nec secundum virtutem totam in unaquaque suarum partium, et ideo nullo modo de parte praedicatur.” *STh* I, q. 77 a. 1 ad 1: “Totum vero integrale non est in qualibet parte, neque secundum totam essentiam, neque secundum totam virtutem. Et ideo nullo modo de singulis partibus praedicatur; sed aliquo modo, licet improprie, praedicatur de omnibus simul, ut si dicamus quod paries, tectum et fundamentum sunt domus.”

<sup>99</sup> *De spirit. creat.*, a. 11 ad 2: “totum potentiale [...] adest enim suae parti secundum totam suam essentiam, sed non secundum totam suam virtutem. Unde medio modo se habet in praedicando: praedicatur enim quandoque de partibus, sed non proprie.” *STh* III, q. 90 a. 3 co.: “singulis partibus potentialibus adest totum secundum totam essentiam, sicut tota essentia animae adest cuilibet eius potentiae.” *In Sent.* 3, d. 33 q. 3 a. 1 qc. 1 co.: “potentialis vero pars neque praedicationem totius recipit, neque in constitutionem ipsius oportet quod veniat, sed aliquid de potentia totius participat.” *In Sent.* 1, d. 3 q. 4 a. 2 ad 1: “Totum autem potentiale adest cuilibet parti secundum se, et secundum aliquid virtutis, sed non secundum perfectam; immo secundum perfectam virtutem adest tantum supremae potentiae; et ideo praedicatur quidem, sed non adeo proprie sicut totum universale.” *In Sent.* 2, d. 9 q. 1 a. 3 ad 1:

### 13.21. Potential Parts

The part of a potential whole need not come into its constitution, but participates in some of the power of the whole (*aliquid de potentia totius participat*, i.e., it participates more or less of the whole virtue; ► 26).<sup>100</sup> According to its whole, perfect virtue, the potential whole is present only in the highest part or potency (*in parte suprema, suprema potentia*); in the others, some participation of it (is present); for it is in them partially; and so, it is present in a diminished way (*diminute*), because the higher power has in itself (*in se*) more completely (*completius*) those (perfections) that are in the inferior (parts). Hence, it is indeed predicated—in some mode—of any part but is not present properly (in every part), as is the universal whole. In potential parts, one of the parts (i.e., the prior) includes the virtue (*vis*) of the others, and the inferior power (*potentia inferior*) is found conjoined to the more perfect (potency).

For example, the whole essence of the soul is present in whichever of its potencies (i.e., vegetative, sensitive, and rational), but the whole virtue of the soul is found (only) in the rational (soul); in the sensible soul, however, it is found diminished; and, even more diminished, in the vegetative; for the sensible soul includes in itself the virtue of the vegetative soul, but not conversely.<sup>101</sup> Likewise, the potency (or power) of overseer (*potestas praepositi*) is much more excellent in the king.

Every form or nature that is received in diverse degrees of potencies is received according to prior and posterior.<sup>102</sup> But it is impossible for the nature of a species to be communicated

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“totum potentiale adest quidem secundum essentiam cuilibet parti, sed secundum completam virtutem est in parte suprema, quia semper superior potentia habet in se completius ea quae sunt inferioris.” *STh* I, q. 77 a. 1 ad 1: “Totum vero potentiale adest singulis partibus secundum totam suam essentiam, sed non secundum totam virtutem. Et ideo quodammodo potest praedicari de qualibet parte; sed non ita proprie sicut totum universale.” *In Sent.* 4, d. 16 q. 1 a. 1 qc. 3 co.: “in partibus potentialibus totum adest secundum essentiae suae rationem cuilibet parti completae, sicut essentia animae cuilibet potentiae; sed tota ratio [...] secundum speciem non est in quolibet horum. Praeterea unum eorum non includit in se vim omnium aliorum, quod requiritur in partibus potentialibus; sed unumquodque ad suum officium servit.” *In Sent.* 2, d. 18 q. 2 a. 3 ad 4: “in omni enim toto potestativo potentia inferior superiori conjuncta perfectior invenitur; ut potestas praepositi multo excellentior est in rege.” *In Sent.* 4, d. 15 q. 2 a. 2 qc. 2 co.: “virtus totius potentialis [invenitur] in partibus ejus, quae quidem complete in una invenitur, et in aliis diminute: sicut tota virtus animae invenitur in rationali; sed in sensibili anima invenitur diminute, et adhuc magis diminute in vegetabili: quia anima sensibilis includit in se virtutem animae vegetabilis, et non convertitur.” *In Sent.* 4, d. 38 q. 1 a. 2 qc. 2 co.: “divisio [...], est divisio totius potestativi in partes suas, cujus perfecta virtus est in una suarum partium; in aliis autem quaedam ipsius participatio, sicut anima dividitur in rationalem, sensibilem, et vegetabilem.” *In Sent.* 4, d. 44 q. 3 a. 3 qc. 1 ad 4: “potentiae animae dicuntur partes ejus potentiales. Talium autem totorum ista est natura, quod tota virtus totius consistit in una partium perfecte, in aliis autem partialiter; sicut in anima virtus animae perfecte consistit in parte intellectiva, in aliis autem partialiter.”

<sup>100</sup> Taken from the places quoted in the previous note.

<sup>101</sup> *Idem.*

<sup>102</sup> *In Sent.* 2, d. 3 q. 1 a. 4 co.: “omnis forma vel natura quae recipitur in diversis gradibus potentialium, recipitur secundum prius et posterius secundum esse. Impossibile est autem naturam speciei communicari ab individuis per prius et posterius, nec secundum esse, nec secundum intentionem; quamvis hoc sit possibile in natura generis, ut dicitur in 3 Metaph.”

in individuals according to prior and posterior: neither according to the act of being (*secundum esse*), nor according to intention (*secundum intentionem*), even if this is possible in the nature of a genus.

### 13.22. Truncated

**Truncated** (*truncatum, mancum, defectivum* = κολοβόν) is the opposite of *whole* (► 13.2, ¶1).<sup>103</sup> For something to be truncated, there are requirements from the part of the whole and from the part of the deficient part.

ARISTOTLE posits seven requirements for some whole to be said (to be) *truncated*:<sup>104</sup>

1. That the whole be a *quantum* having parts into which it is divided according to quantity (► 13.8; 13.9); for the universal whole cannot be said (to be) *truncated* if one of its species is removed.<sup>105</sup>
2. The quantum must be *partible* (*partibile* = μεριστόν), that is, having distinction; and whole (*totum* = ὅλον), that is, integrated from diverse parts.<sup>106</sup> Whence, although the last parts into which a whole is resolved—e.g., flesh and nerve—have quantity, they cannot be said (to be) *truncated*.
3. Two (parts)—i.e., (of) something having two (equal) parts—are not truncated if one is removed from the other.<sup>107</sup> This is so because that which is removed from a truncated (whole) is equal to the remainder—but the remainder must always be greater.
4. No number can be truncated, regardless of how many parts it may have, because the substance (i.e., essence) of the truncated remains when a part has been subtracted.<sup>108</sup>

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<sup>103</sup> *In Metaph.* 5, l. 21, §1109 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a11–28): “determinat [Philosophus] de eo, quod est oppositum toti, quod est colobon, pro quo alia translatio habet diminutum membro, sed non usquequaque convenienter. Nam colobon non dicitur solum in animalibus, in quibus solis sunt membra. Videtur autem esse colobon quod nos dicimus truncatum. Unde Boetius transtulit mancum, id est defectivum. Est ergo intentio Philosophi ostendere quid requiratur ad hoc quod aliquid dicatur colobon. Et primo quid requiratur ex parte totius; secundo quid requiratur ex parte partis deficientis.”

<sup>104</sup> *In Metaph.* 5, l. 21, §1110: “Ad hoc autem, quod aliquod totum dici possit colobon, septem requiruntur.”

<sup>105</sup> *In Metaph.* 5, l. 21, §1110 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a11): “Primum est, ut illud totum sit quantum habens partes in quas dividatur secundum quantitatem. Non enim totum universale potest dici colobon si una species eius auferatur.”

<sup>106</sup> *In Metaph.* 5, l. 21, §1111 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a11–12): “Secundum est quod non quodlibet quantum potest dici colobon, sed oportet quod sit partibile, idest distinctionem habens, et totum, idest ex diversis partibus integratum. Unde ultimae partes, in quas aliquod totum resolvitur, licet habeant quantitatem, non possunt dici colobae, sicut caro vel nervus.”

<sup>107</sup> *In Metaph.* 5, l. 21, §1112 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a12–14): “Tertium est, quod duo non sunt coloba, vel aliquid habens duas partes, si altera earum auferatur. Et hoc ideo quia nunquam colobonium, idest quod aufertur a colobon, est aequale residuo, sed semper oportet residuum esse maius.”

<sup>108</sup> *In Metaph.* 5, l. 21, §1113 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a14–16): “Quartum est, quod numerus nullus potest esse colobus quotcumque partes habeat; quia substantia colobi manet parte

For example, if a cup is truncated, it still remains a cup. But a number does not remain the same when any part is removed; for any unit added or subtracted varies the species of number (►16.7).

5. (The whole) must have unlike parts; for those (wholes) that are of like parts cannot be said (to be) *truncated* because the *ratio* of *whole* is preserved in whichever part; whence, if one of the parts should be removed, the other part would not be said (to be) *truncated*.<sup>109</sup> Nor can all (wholes) that are of unlike parts be said (to be) *truncated*; for a number cannot be said (to be) *truncated*, as has been said, even though in some mode it has unlike parts: e.g., twelve has two and three as parts (►3.2). However, in some mode, all numbers have like parts insofar as every number is constituted from units.

6. None of those (wholes) can be said (to be) *truncated* in which position (*positio* = θέσις) does not make a difference (►39.19): e.g., in water and fire; for truncated (wholes) must be such that they have a determinate position in their *ratio* of *substance*: e.g., *man* and *house*.<sup>110</sup>

7. A truncated (whole) must be continuous (►39).<sup>111</sup> Thus, a (whole) musical harmony, even though it is of unlike parts, cannot be said (to be) *truncated* when a note or a chord is subtracted; for (a whole harmony) is constituted from low- and high-pitch notes; and, although its parts have a determinate position, low- and high-pitch notes do not constitute a harmony when they are ordered in whatever way.

From the part of the diminished (part), according to ARISTOTLE, there are three conditions (for a whole to be) truncated:<sup>112</sup>

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subtracta; sicut si calix truncetur, adhuc manet calix; sed numerus non manet idem, ablata quacumque parte. Quaelibet enim unitas addita vel subtracta, variat numeri speciem."

<sup>109</sup> *In Metaph.* 5, l. 21, §1114 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a16–18): "Quintum est, quia oportet quod habeat partes dissimiles. Ea enim, quae sunt similium partium, non possunt dici coloba, quia ratio totius salvatur in qualibet parte: unde, si auferatur aliqua partium, altera pars non dicitur coloba. Nec tamen omnia, quae sunt dissimilium partium, possunt dici coloba: numerus enim non potest dici colobus, ut dictum est, quamvis quodammodo habeat dissimiles partes, sicut duodenarius habet pro partibus dualitatem et Trinitatem. Aliquo tamen modo omnis numerus habet partes similes, prout omnis numerus ex unitatibus constituitur."

<sup>110</sup> *In Metaph.* 5, l. 21, §1115 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a18–20): "Sextum est quod nullum eorum potest dici colobon, in quibus positio non facit differentiam, sicut aqua aut ignis. Oportet enim coloba talia esse, quod in suae ratione substantiae habeant determinatam positionem, sicut homo vel domus."

<sup>111</sup> *In Metaph.* 5, l. 21, §1116 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a20–22): "Septimum est quod oportet esse continua coloba. Harmonia enim musicalis non potest dici coloba voce vel chorda subtracta, licet sit dissimilium partium: quia constituitur ex vocibus gravibus, et acutis; et licet partes eius habeant determinatam positionem: non enim qualitercumque voces graves et acutae ordinatae, talem constituunt harmoniam."

<sup>112</sup> *In Metaph.* 5, l. 21, §1117 (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a22–23): "ostendit [Philosophus] quae sunt conditiones colobi ex parte partis diminutae; et ponit tres: dicens quod sicut non quaelibet tota possunt dici coloba, ita nec cuiuslibet particulae ablatione potest aliquid dici colobon."

8. The part removed must not be a part of the principal substance: that is, the one that constitutes the substance (i.e., the essence) of the thing, without which substance it cannot be; for the truncated (whole) must remain when the part is removed.<sup>113</sup> Whence, man cannot be said (to be) truncated when the head is cut off.

9. The part subtracted must not be everywhere, but in an extremity.<sup>114</sup> Whence, if a cup is perforated close to the middle when some part of it is removed, it cannot be said (to be) *truncated*: rather, if the handle of the cup or any other extremity (is removed). Likewise, a man is not said (to be) truncated (i.e., mutilated) if he loses some (part) of flesh in his shin, forearm, or close to the middle of his body, or if he loses his spleen, or a part of it, but if he loses one of his extremities, as a hand or a foot.

10. Not when any particle is removed from an existing extremity is some (whole) said (to be) truncated: (only) the part is such that it is not regenerated again, as a hand or a foot.<sup>115</sup> When the whole hair is cut off, it is again regenerated. Whence, even if it is in an extremity, (a whole man) is not said (to be) *truncated* by its extraction. This is why bald (men) are not said (to be) *truncated* (i.e., mutilated).

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<sup>113</sup> *In Metaph. 5, l. 21, §1117* (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a23–25): “Oportet enim primo quod pars ablata non sit pars substantiae principalis, quae scilicet rei substantiam constituit, et sine qua substantia esse non possit; quia, ut supra dictum est, colobon oportet manere ablata parte. Unde homo non potest dici colobus, capite abscisso.”

<sup>114</sup> *In Metaph. 5, l. 21, §1118* (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a24–27): “Secundo, ut pars subtracta non sit ubique, sed sit in extremitate. Unde si perforatur calix circa medium aliqua parte eius ablata, non potest dici colobus; sed, si accipiatur auris calicis, idest particula, quae est ad similitudinem auris, aut quaecumque alia extremitas. Et similiter homo non dicitur colobus, si amittat aliquid de carne, vel in tibia, vel in brachio, vel circa medium corporis; aut si amittens splenem, vel aliquam eius partem; sed si amittat aliquam eius extremitatem, ut manum aut pedem.”

<sup>115</sup> *In Metaph. 5, l. 21, §1118* (cf. ARISTOTLE, *Metaphysica* Δ.27, 1024a27–28): “Tertio vero, ut non omni particula in extremitate existente ablata, aliquid dicatur colobum; sed, si sit talis pars, quae non regeneratur iterum, si tota auferatur, sicut manus, aut pes. Capillus autem totus incisus iterum regeneratur. Unde per eorum subtractionem, licet in extremitate sint, non dicitur colobus. Et propter hoc calvi non dicuntur colobi.”



## 14. Genus

*Having determined what whole and part are, we turn our attention to the genus, which is a kind of whole. Of the greatest importance is the distinction between subject genus (which is used by the logician) and predicable genus (which is used by the philosopher-scientist).*

### 14.1. Distinction between Subject Genus and Predicable Genus

A **genus** (*genus* = γένος) is some whole (► 12).<sup>1</sup> ARISTOTLE distinguishes four modes in which *genus* is said, of which only the following two pertain to philosophical consideration:<sup>2</sup>

1. The **subject genus** (*genus subiectum* = τὸ γένος τὸ ὑποκείμενον): that which is the proper subject of accidents differing in species (*quod est proprium subiectum, specie differentium accidentium* < τὸ ὑποκείμενον ταῖς διαφοραῖς).<sup>3</sup>

<sup>1</sup> *In Metaph.* 5, l. 22, §1119: "Hic determinat [Philosophus] de quodam toto, scilicet de genere."

<sup>2</sup> *In Metaph.* 5, l. 22, §1119: "genus dicitur quatuor modis." Ibid., §1124: "Primi enim duo modi non multum pertinent ad philosophicam considerationem." The modes numbered (1) and (2) here are respectively (3) and (4) in the source. The two modes not discussed here refer to: (1) *The continuous generation of some (things) having the same species (generatio continua aliquorum habentium eandem speciem* = ἡ γένεσις συνεχῆς τῶν τὸ εἶδος ἐχόντων τὸ αὐτό). See *ibid.*, §1123 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b6–7): "Uno modo secundum generationem continuam in eadem specie, quod pertinet ad primum modum." According to St. Thomas, this is the first mode posited by PORPHYRY: namely, a multitude having a relation to one another and to one principle. For example, the genus of men (i.e., the *human genus*) for as long as it lasts. Cf. *ibid.*, §1119 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024a29–31): "Primo generatio continua aliquorum habentium eandem speciem. Sicut dicitur dum erit genus hominum, idest dum durabit generatio continua hominum. Iste est primus modus positus in Porphyrio, scilicet multitudo habentium relationem adinvicem et ad unum principium." (2) *A mover towards being—i.e., a generator—from which some things first proceed (illud a quo primo movente ad esse, idest a generante procedunt aliqua* = τὸ ἀφ' οὗ ἂν ὤσι πρώτου κινήσαντος εἰς τὸ εἶναι). See *ibid.*, §1123 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b7–8): "Alio modo secundum primum movens, quod pertinet ad secundum." For example, some are said to be of the genus of the Hellenes because they descend, as from a first generator, from someone named Hellen. According to St. Thomas, this is the second mode posited by PORPHYRY. See *ibid.*, §1120 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024a31–34): "Secundo modo dicitur genus illud a quo primo movente ad esse, idest a generante procedunt aliqua; sicut dicuntur Hellenes genere, quia descendunt a quodam Hellene nomine, et aliqui dicuntur Iones genere, quia descendunt a quodam Ione, sicut a primo generante. [...] Et iste est secundus modus generis in Porphyrio positus."

<sup>3</sup> *In Metaph.* 5, l. 22, §1121 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b3–4): "Tertio modo dicitur genus [...] quod est proprium subiectum, specie differentium accidentium." Ibid., "Genus autem hoc [...] est [...] quod est proprium subiectum, specie differentium accidentium." ARISTOTLE talks about this genus in many places, some of which were not commented by St. Thomas. For example, *De generatione et corruptione* A.7, 1024a29–31: "Τὴν μὲν γὰρ ὕλην λέγομεν ὁμοίως ὡς εἰπεῖν τὴν αὐτὴν εἶναι τῶν ἀντικειμένων ὀποτερουσῶν, ὡςπερ γένος ὄν, τὸ δὲ δυνάμενον θερμὸν εἶναι παρόντος τοῦ θερμαντικοῦ καὶ πλησιάζοντος ἀνάγκη θερμαίνεσθαι· διό, καθάπερ εἴρηται, τὰ μὲν τῶν ποιητικῶν ἀπαθῆ τὰ δὲ παθητικά." According to the anonymous continuation to St. Thomas's Commentary, in this passage ARISTOTLE says that, for each thing, there is one matter that is susceptible of contraries, which matter, although being one in subject (*una subiecto*), nevertheless differs according to being (*secundum esse*), wherefrom ARISTOTLE says, "so to say" (*ut ita dicam* = ὡς εἰπεῖν). And the same matter is said as a genus (< ὡςπερ γένος ὄν), not indeed predicabile: rather, it is said (to be a) *genus* insofar as the first subject, which underlies two or more contraries, is said (to be a) *genus*. And of the contraries, one is active, and the other is passive; hence, the matter of the active and of the passive is one. *In De gen. continuatio* 1, l. 20 n. 2: "Et dicit [Philosophus] quod dicitur esse una materia cuilibet, quae est susceptiva contrariorum; quae licet sit una subiecto, differt tamen secundum esse: et propter hoc dixit *ut ita dicam*. Et ipsa materia dicitur ut genus, non quidem praedicabile, sed dicitur genus secundum quod genus dicitur subiectum primum, quod substat duobus contrariis aut pluribus; contrariorum autem unum est in activo, alterum est in passivo: et ideo una materia est activi et passivi."

In this mode, for example, *surface* is the genus—and the subject—of all superficial figures; and *solid*—i.e., *body*—is said to be the genus of *solid*—i.e., *corporeal*—figures.<sup>4</sup>

This is not (to be confused with) the genus that signifies the essence of a species, as *animal* is the genus of *man* (i.e., the predicable genus, discussed next; ► 13.16).<sup>5</sup>

**2. The predicable genus (*genus praedicabile*):** that which is posited in the definition first, in which the essence is predicated (*quod primo ponitur in definitione, et praedicatur in eo quod quid* < ἐν τοῖς λόγοις τὸ πρῶτον ἐνυπάρχον, ὃ λέγεται ἐν τῷ τί ἐστι), and whose differences are qualities (*et differentiae sunt eius qualitates* < οὗ διαφοραὶ λέγονται αἱ ποιότητες).<sup>6</sup>

For example, in the definition of *man*, *animal* is posited first (i.e., according to the rational order, insofar as the more universal part of a *ratio* is prior to the less universal), and (then) *biped* or *rational* (i.e., as a difference), which is some substantial quality of man (► 13.16).<sup>7</sup>

The (predicable) genus is in one mode a whole (i.e., a universal whole; ► 13.5), insofar as it is predicated of many; and in another mode it is a part (i.e., an integral part; ► 13.16), insofar as a species is constituted from genus and difference.<sup>8</sup>

#### 14.2. Subject Genus and Predicable Genus Compared

The relation of (predicable) genus to differences is like that of subject to proper affections (► 15.17); for just as the genus is posited in the definition of a species (► 13.16), the proper subject is posited in the definition of an accident (► 18).<sup>9</sup> Whence, the proper subject is predicated of an accident in the likeness of a genus (*ad similitudinem generis*).

For example, any figured surface is *such* surface (*talis superficies*; e.g., a triangle is a surface *contained by three straight lines*, while a square is a surface *contained by four*

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<sup>4</sup> *In Metaph.* 5, l. 22, §1121 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024a36–b3): “sicut superficies est genus figurarum superficialium, et «solidum,» idest corpus, dicitur esse genus figurarum solidarum, idest corporearum. [...] Superficies enim est subiectum omnium figurarum superficialium.”

<sup>5</sup> *In Metaph.* 5, l. 22, §1121: “Genus autem hoc non est quod significat essentiam speciei, sicut animal est genus hominis; sed quod est proprium subiectum, specie differentium accidentium.”

<sup>6</sup> *In Metaph.* 5, l. 22, §1122 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b4–6): “Quarto modo genus dicitur, quod primo ponitur in definitione, et praedicatur in eo quod quid, et differentiae sunt eius qualitates.”

<sup>7</sup> *In Metaph.* 5, l. 22, §1122: “Sicut in definitione hominis primo ponitur animal, et bipes sive rationale, quod est quaedam substantialis qualitas hominis.” In English, of course, the difference (signified by an adjective) is placed prior to the genus (signified by a noun), but this merely is a grammatical priority.

<sup>8</sup> *In Metaph.* 7, l. 13, §1569: “genus quodammodo est totum, in quantum praedicatur de pluribus, et quodammodo est pars, in quantum ex genere et differentia constituitur species.”

<sup>9</sup> *De sub. sep.*, c. 6, 48–50: “est similis habitudo generis ad differentias, sicut subiecti ad proprias passiones.” *In Metaph.* 5, l. 22, §1121: “Et habet [subiectum] similitudinem cum genere; quia proprium subiectum ponitur in definitione accidentis, sicut genus in definitione speciei. Unde subiectum proprium de accidente praedicatur ad similitudinem generis.” *In Metaph.* 5, l. 22, §1123: “Hoc enim modo se habet genus ad differentiam, sicut subiectum ad qualitatem.”



*equal straight lines*; ►4.4), and any solid figure is *such* solid (*tale solidum*; e.g., a cube is a solid *contained by six equal squares*; ►4.5), as if *figure* should be a difference qualifying *surface* or *solid*.<sup>10</sup> Hence, *surface* is related to *figured surfaces*—and *solid* to (*figured*) *solids*—as a genus that underlies (*subiicitur*, i.e., is subject to) contraries (e.g., subject to boundaries producing contrary figures; ►4.3); for the difference (e.g., *contained by three straight lines* or *contained by four equal straight lines*) is predicated in the qualified (*in eo quod quale*; thus, *figure*, whose subject genus is *continuous quantity*, is qualified by different containing boundaries). And because of this, just as *such* animal is signified when “*rational animal*” is said, so *such* surface is signified when “*square surface*” is said.

Whence, the subject genus and the predicable genus are comprehended as under one mode; for each is related according to the mode of matter (*sicut materia, per modum materiae* = ὡς ὕλη).<sup>11</sup> Although the predicable genus is not matter, it is taken from matter, as the difference (is taken) from the form (►13.16); for something is said to be an *animal* because it has a sensitive nature; and (the same thing is said to be) *rational* because it has a rational nature, which is related to sensitive (nature) as form (is related) to matter.

### 14.3. Diversity in Subject Genus

Those are said (to be) **diverse** (*diversa* = ἕτερα) **in (subject) genus** whose first subject is diverse (*eorum primum subiectum est diversum* < ὧν ἕτερον τὸ πρῶτον ὑποκείμενον).<sup>12</sup>

For example, the first subject of colors is *surface*, while the first subject of savors is *humor* (i.e., according to ancient science).<sup>13</sup> Whence, in respect of subject genus, color and savor are diverse in genus (i.e., according not only to ancient but also to present knowledge).

<sup>10</sup> *In Metaph.* 5, l. 22, §1121 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024a1–b4): “Unaquaeque enim figurarum haec quidem, idest superficialis, est talis superficies. Hoc autem, idest figura solida, est tale solidum, ac si figura sit differentia qualificans superficiem vel solidum. Superficies enim se habet ad figuras superficiales, et solidum ad solidas, sicut genus quod subiicitur contrariis. Nam differentia praedicatur in eo quod quale. Et propter hoc, sicut cum dicitur animal rationale significatur tale animal, ita cum dicitur superficies quadrata, significatur talis superficies.”

<sup>11</sup> *In Metaph.* 5, l. 22, §1123 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b6–9): “Patet ergo quod tot modis dicitur genus. Uno modo secundum generationem continuam in eadem specie, quod pertinet ad primum modum. Alio modo secundum primum movens, quod pertinet ad secundum. Alio modo sicut materia, quod pertinet ad tertium et quartum modum. Hoc enim modo se habet genus ad differentiam, sicut subiectum ad qualitatem. Et ideo patet quod genus praedicabile, et genus subiectum, quasi sub uno modo comprehenduntur, et utrumque se habet per modum materiae. Licet enim genus praedicabile non sit materia, sumitur tamen a materia, sicut differentia a forma. Dicitur enim aliquid animal ex eo quod habet naturam sensitivam. Rationale vero ex eo, quod habet rationalem naturam, quae se habet ad sensitivam sicut forma ad materiam.”

<sup>12</sup> *In Metaph.* 5, l. 22, §1124 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b9–10): “Primo igitur modo dicuntur aliqua genere diversa, quia eorum primum subiectum est diversum. Sicut primum subiectum colorum est superficies, primum autem subiectum saporum est humor. Unde quantum ad genus subiectum, sapor et color sunt diversa genere.”

<sup>13</sup> *In Metaph.* 5, l. 22, §1124: “Sicut primum subiectum colorum est superficies, primum autem subiectum saporum est humor. Unde quantum ad genus subiectum, sapor et color sunt diversa genere.”

For two (things) to be diverse in subject, it is necessary that they be such that:<sup>14</sup>

1. One of them is not resolvable into the other (*unum non resolvatur in alterum* < μὴ ἀναλύεται θάτερον εἰς θάτερον).<sup>15</sup>

For example, *solid* is—in some mode—resolved into *surface* (i.e., insofar as *surface* is the principle of *solid*).<sup>16</sup> Whence, solid figures and superficial figures are not diverse in genus.

2. And both cannot be resolved into something (that is the) same (*et... ambo non resolvantur in aliquod idem* < μηδ' ἄμφω εἰς ταυτόν).<sup>17</sup>

For example, species and matter are diverse in genus if they are considered according to their essence (► 13.10); for there is nothing (i.e., no subject) common to both.<sup>18</sup>

Those things that do not have matter in common do not have a (subject) genus in common.<sup>19</sup> And it is impossible for one (thing) to come to be converted into another if they do not have in common (one) matter and one genus.

For example, whiteness does not come to be from a line because they are of diverse genera.<sup>20</sup> Nor can an elementary body be converted into an incorruptible body or into an incorporeal substance, or conversely; for they do not agree (*convenient*) in matter. Thus, incorruptible and corruptible bodies are diverse in (subject) genus because they do not have a common matter (► 43.25).

#### 14.4. Diversity in Predicable Genus

Those are said (to be) **diverse in (predicable) genus** *which are said according to a diverse figure of predication of being (quae dicuntur secundum diversam figuram categoriae, idest praedicationis entis* = ὅσα καθ' ἕτερον σχῆμα κατηγορίας τοῦ ὄντος

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<sup>14</sup> *In Metaph.* 5, l. 22, §1125: “Oportet autem quod duo diversa subiecta, talia sint, quorum [...]”

<sup>15</sup> *In Metaph.* 5, l. 22, §1125 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b11): “unum non resolvatur in alterum.”

<sup>16</sup> *In Metaph.* 5, l. 22, §1125: “Solidum enim quodammodo resolvitur in superficies. Unde figurae solidi, et figurae superficiales non sunt diversorum generum.”

<sup>17</sup> *In Metaph.* 5, l. 22, §1125 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b11): “Et iterum oportet quod ambo non resolvantur in aliquod idem.”

<sup>18</sup> *In Metaph.* 5, l. 22, §1125 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b12): “Sicut species et materia sunt diversa genere, si secundum suam essentiam considerentur, quod nihil est commune utrique.”

<sup>19</sup> *De veritate*, q. 8 a. 9 co.: “Ea enim quae non communicant in materia, non communicant in genere, ut patet per Philosophum in V *Metaphysic.*, et in X.” ScG 4, 31 n. 4: “Eorum quae non communicant in materia et in genere uno, impossibile est fieri conversionem in invicem.”

<sup>20</sup> ScG 4, 31 n. 4: “non enim ex linea fit albedo, quia sunt diversorum generum; neque corpus elementare potest converti in aliquod corporum caelestium, vel in aliquam incorpoream substantiam, aut e converso, cum non convenient in materia.” *In Metaph.* 5, l. 22, §1125: “Et similiter corpora caelestia et inferiora sunt diversa genere, inquantum non habent materiam communem.” According to ancient astronomy, celestial bodies, such as the sun, are incorruptible.

λέγεται).<sup>21</sup> Thus, *what (a thing) is* (*quid est* = τί ἐστι; i.e., *substance*), *how (it) is* (*quale* = ποιόν τι; i.e., *quality*), and other modes (of being), each signify diverse beings (*alia entia*).

These categories (► 33) are not resolved one into the other because one is not contained under the other.<sup>22</sup> Nor are they resolved into some one (predicable genus) because there is no genus common to all the categories (e.g., neither *being* nor *one* is a genus; ► 30.11).

#### 14.5. Rational Genus vs. Real Genus

From what has just been said, it is evident that some things are contained under one category, and are one in predicable genus insofar as they have in common (*communicant in*) the intention of a genus, and yet they are diverse in subject genus.<sup>23</sup> For example, incorruptible and corruptible bodies; and colors and savors.

Even if those things that have a diverse mode of being do not have something in common according to the (mode of) being that the natural (scientist) considers, they may have in common some intention that the logician considers.<sup>24</sup> Thus, according to the natural (scientist), corruptible and incorruptible bodies are not of one genus—but according to the logician, they are (e.g., even if they are not one in subject genus, colors and savors belong to the predicable genus of *quality*; corruptible and incorruptible bodies, to that of *body*).

The diversity in subject genus is considered more by the natural (scientist) and the (first) philosopher (i.e., the metaphysician) because it is more real (*est magis realis*; i.e., it pertains to the thing rather than to the *ratio*):<sup>25</sup> according to their consideration, nothing common is said of corruptible and incorruptible (bodies) except for the community of the

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<sup>21</sup> *In Metaph.* 5, l. 22, §1126 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b12–14): “Alio modo dicuntur diversa genere, quae dicuntur secundum diversam figuram categoriae, idest praedicationis entis. Alia namque entia significant quid est, alia quale, alia aliis modis.”

<sup>22</sup> *In Metaph.* 5, l. 22, §1126 (cf. ARISTOTLE, *Metaphysica* Δ.28, 1024b14–16): “Istae enim categoriae nec resolvuntur invicem, quia una non continetur sub alia. Nec resolvuntur in unum aliquid, quia non est unum aliquid genus commune ad omnia praedicamenta.”

<sup>23</sup> *In Metaph.* 5, l. 22, §1127: “Patet autem ex dictis quod aliqua continentur sub uno praedicamento, et sunt unum genere hoc modo secundo, quae tamen sunt diversa genere primo modo. Sicut corpora caelestia et elementaria, et colores, et sapes.” *In Sent.* 2, d. 3 q. 1 a. 1 ad 2: “aliqua sunt unius generis logice loquendo, quae naturaliter non sunt unius generis, sicut illa quae communicant in intentione generis quam logicus inspicit, et habent diversum modum essendi: unde in 10 *Metaph.* dicitur, quod de corruptibilibus et incorruptibilibus nihil commune dicitur, nisi communitate nominis.” Likewise, although all figures belong to the category *quality*, square numbers (i.e., multitudes) and square surfaces (i.e., magnitudes) belong to diverse subject genera.

<sup>24</sup> *De potentia*, q. 7 a. 7 ad s.c. 1: “Ad primum ergo dicendum, quod in contrarium obiicitur [sc., *Sed contra. Est quod Philosophus dicit, quod aeterno et temporali nihil est commune nisi nomen*], dicendum, quod Philosophus loquitur de communitate naturaliter et non logice. Ea vero quae habent diversum modum essendi, non communicant in aliquo secundum esse quod considerat naturalis; possunt tamen communicare in aliqua intentione quam considerat logicus. Et praeterea etiam secundum naturalem corpus elementare et caeleste non sunt unius generis; sed secundum logicum sunt.”

<sup>25</sup> *In Metaph.* 5, l. 22, §1127: “Primus autem modus diversitatis secundum genus consideratur magis a naturali, et etiam a philosopho, quia est magis realis. Secundus autem modus consideratur a logico, quia est rationis.”

name (i.e., *body*). The diversity in predicable genus is considered by the logician because it is (a diversity) of *ratio* (*rationis*; i.e., it pertains to the *ratio* rather than to the thing).

#### 14.6. Subject of Predication

(Logically speaking) **subject** is said (to be) *that of which others are predicated* (*de quo alia dicuntur* = καθ' οὗ τὰ ἄλλα λέγεται), while the subject itself is not predicated of others (*ipsum autem subiectum non praedicatur de alio* < ἐκεῖνο δὲ αὐτὸ μηκέτι κατ' ἄλλου).<sup>26</sup>

This (i.e., that the subject itself is not predicated of others) is to be understood (as referring to predication) *by itself* (*per se*; ►17), since nothing prevents *Socrates* from being predicated by accident (*per accidens*) of *this white (thing)*, of *(this) animal*, or of *(this) man*; for that (individual) in which white, animal, or man is, is *Socrates*. However, (*Socrates*) is predicated by itself of itself when one says, “*Socrates is Socrates*.”

(Something is predicated of a subject) either:<sup>27</sup>

1. *As superiors (are predicated) of inferiors*: (that is), as (predicable) genera (are said of species and of individuals), species (are said of individuals), and differences (are said of species and of individuals).

2. *As an accident is predicated of a subject*: (that is), as common accidents (are predicated of any subject), and (as) proper (i.e., proper accidents or affections, also called *properties*, are predicated of their proper subjects).

For example, (the following are said) of *Socrates*: *man* (i.e., the species of *Socrates*), *animal* (i.e., the proximate genus of man), *rational* (i.e., the specific difference of man), *risible* (i.e., capable of laughing, a property of man), and *white* (i.e., an accident common to man and other subjects, and whose proper subject is the colored surface).<sup>28</sup>

#### 14.7. Subject-Matter

Properly speaking (i.e., in metaphysics), **subject** is *that which is in potency to accidental being* (*quod est in potentia ad esse accidentale*), while **matter** is *that which is in potency to substantial being* (*quod est in potentia ad esse substantiale*).<sup>29</sup>

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<sup>26</sup> *In Metaph.* 7, l. 2, §1273 (cf. ARISTOTLE, *Metaphysica* Z.3, 1028b36–37): “Dicitur autem subiectum de quo alia dicuntur [...]; ipsum autem subiectum non praedicatur de alio. Quod est intelligendum per se. Per accidens enim nihil prohibet Socratem de hoc albo praedicari, vel de animali, vel de homine; quia id, cui inest album, aut animal, aut homo, Socrates est. De seipso autem praedicatur per se, cum dicitur, Socrates est Socrates.”

<sup>27</sup> *In Metaph.* 7, l. 2, §1273: “vel sicut superiora de inferioribus, ut genera et species et differentiae; vel sicut accidens praedicatur de subiecto, ut accidentia communia et propria.”

<sup>28</sup> *In Metaph.* 7, l. 2, §1273: “sicut de Socrate praedicatur homo, animal, rationale, risibile et album.”

<sup>29</sup> *De prin. nat.* §1, 20–23: “proprie loquendo quod est in potentia ad esse accidentale dicitur subiectum, quod uero est in potentia ad esse substantiale dicitur proprie materia.”

As ARISTOTLE says, those (things) that are according to nature (*secundum naturam* < φύσει) and are not substances, but accidents, do not have a **matter from which** they should be, but they have a substance (as their) **subject**.<sup>30</sup> And the subject has something like matter insofar as it is apt to receive an accident.

However, subject differs from matter in that a subject does not have (its act of) being (*esse*) from that which befalls it (*ex eo quod advenit*); for a subject is not constituted in being through an accident: rather, the subject has a complete being by itself (*per se*).<sup>31</sup> For example, man does not have being from whiteness. On the other hand, matter—of itself—has an incomplete being: it has (its act of) being from that which befalls it; for matter has being in act (*habet actu esse*) only through form (*per formam*). Whence, simply speaking, form gives (the act of) being to matter (*forma dat esse materiae*), while the subject (gives its act of being) to the accident, although sometimes one is taken for the other: that is, *matter* for *subject*, and conversely.

#### 14.8. Matter from Which vs. Matter in Which

Again, **matter from which** (*ex qua* = ἐξ οὗ, i.e., the material cause: ►9.3) is in potency toward substantial being (*in potentia ad esse substantiale*; e.g., sodium and chloride are in potency of becoming common salt, which has substantial being), while **matter in which** (*in qua*, i.e., the subject; ►14.7) is in potency toward accidental being (*in potentia ad esse accidentale*; e.g., substances—such as sodium, chloride, and common salt—are in potency of becoming hotter or whiter); for substance is the subject in which accidents (e.g., hotness or whiteness) exist.<sup>32</sup>

Substance (►15.1) and accident (►15.16) cannot be reduced into one matter; for matter is not a part of an accident (e.g., salt is not a part of hotness or of whiteness), and thus, they do not agree in a *matter from which*. However, accident and substance, in some

<sup>30</sup> *In Metaph.* 8, l. 4, §1743 (cf. ARISTOTLE, *Metaphysica* H.4, 1044b8–9): “Ostendit [Philosophus] quomodo materia attribuitur accidentibus; et dicit, quod illa, quae sunt secundum naturam, non tamen sunt substantiae, sed accidentia, non habent materiam ex qua sint, sed substantia est eis subiectum. Subiectum autem habet aliquid simile materiae, in quantum est receptibile accidentis.”

<sup>31</sup> *De prin. nat.* §1, 27–32: “Et secundum hoc differt materia a subiecto, quia subiectum est quod non habet esse ex eo quod aduenit, sed per se habet esse completum, sicut homo non habet esse ab albedine; sed materia habet esse ex eo quod ei aduenit, quia de se habet esse incompletum.” *In Metaph.* 8, l. 4, §1743: “Differt autem [subiectum] a materia, in quantum materia non habet actu esse nisi per formam; subiectum autem non constituitur in esse per accidens.” *De prin. nat.* §1, 32–35: “Vnde simpliciter loquendo forma dat esse materiae, sed subiectum accidenti, licet aliquando unum sumatur pro altero, scilicet materia pro subiecto et e conuerso.”

<sup>32</sup> *In Physic.* 1, l. 14, n. 8 (cf. ARISTOTLE, *Physica* A.8, 191b27–29): “contingit aliqua eadem dicere et secundum potentiam et secundum actum, ut certius determinatum est in aliis, scilicet in IX Metaphys. Ex ente igitur in potentia fit aliquid per se; ex ente autem in actu, vel ex non ente, fit aliquid per accidens. Hoc autem dicit [Philosophus] quia materia, quae est ens in potentia, est id ex quo fit aliquid per se: haec est enim quae intrat substantiam rei factae.” *De prin. nat.* §1, 16–19: “materia que est in potentia ad esse substantiale dicitur materia ex qua, que autem est in potentia ad esse accidentale dicitur materia in qua.”

mode, can be said to agree (*convenire*) in a *matter in which* insofar as the accident (e.g., hotness or whiteness) is *in* the substance (e.g., salt).<sup>33</sup>

#### 14.9. Object-Matter

Matter *from which* (►9.3) is moreover distinguished from the **matter in respect of which** (*materia circa quam*), or **object** (*objectum*).<sup>34</sup> The object is *the matter in respect of which an act is terminated* (*materia circa quam terminatur actus*), *the end of an act* (*finis actus*). Thus, it is the same as the *end* (►9.8), for it has the *ratio* of *end* insofar as the intention of the agent (i.e., that towards which the agent's action tends) is produced in it.

Although the object is *matter*—not indeed *from which* but *in respect of which*—, it also has—in some mode—the *ratio* of *form* insofar as it gives the species (►48.21).<sup>35</sup>

Some actions pass over into an external matter *in respect of which* some effect is operated.<sup>36</sup> This is evident in natural actions: e.g., fire heats wood (i.e., wood is the matter in respect of which fire acts); and in artificial things: e.g., a builder makes a house from matter. In such things, the action is received according to the mode of an affection (*per modum passionis*) in that which comes to be, insofar as motion is in the thing moved (*motus est in moto*) as in a subject. Thus, in such things, there must be found an action in the thing that is acting (*in re agente*); and an affection in the thing being affected (*in re patiente*, i.e., in the thing that is acted upon).

Other actions do not pass over into an external matter in such a way that they would produce some effect *in respect of* (*circa*) them.<sup>37</sup> This is evident in vision, which, being the act of he who sees, does not produce an effect in the thing seen. And such actions, which

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<sup>33</sup> *In Sent.* 2, d. 12 q. 1 a. 5 co.: “Substantia enim et accidens non reducuntur in unam materiam, quia accidentis pars materia non est; et ideo non conveniunt in materia ex qua. Potest tamen dici aliquo modo accidens convenire cum substantia in materia in qua, secundum quod accidens est in substantia.”

<sup>34</sup> *In Sent.* 2, d. 36 q. 1 a. 5 ad 4: “duplex materia: ex qua, vel in qua, et materia circa quam: et primo modo materia dicta non incidit in idem cum fine: sed secundo modo est idem cum fine: quia objectum finis actus est.” *STh* I-II, q. 73 a. 3 ad 1: “objectum, etsi sit materia circa quam terminatur actus, habet tamen rationem finis, secundum quod intentio agentis fertur in ipsum.”

<sup>35</sup> *STh* I-II, q. 18 a. 2 ad 2: “objectum non est materia ex qua, sed materia circa quam, et habet quodammodo rationem formae, in quantum dat speciem.”

<sup>36</sup> *In Sent.* 1, d. 40 q. 1 a. 1 ad 1: “actionum quaedam transeunt in exteriorem materiam circa quam aliquem effectum operantur, ut patet in actionibus naturalibus sicut ignis calefacit lignum, et in artificialibus, sicut aedificator facit domum ex materia; et in talibus actio est recepta in eo quod fit, per modum passionis, secundum quod motus est in moto ut in subjecto: et ideo in talibus est invenire actionem in re agente, et passionem in re patiente.”

<sup>37</sup> *In Sent.* 1, d. 40 q. 1 a. 1 ad 1: “Quaedam vero sunt quae in exteriorem materiam non transeunt ut effectum aliquem circa ipsam producant, ut patet in visione, quae cum sit actio videntis, nullum effectum in re visa efficit; et tales actiones, quae proprie operationes dicuntur, in ipsis operantibus tantum sunt. Unde non potest fieri conversio passionis ad actionem acceptam a re exteriori, secundum quod in se est, sed solum secundum quod in operante est: etsi enim oculus videt lapidem, lapis tamen non videtur nisi secundum quod est in oculo per sui similitudinem.”

are properly called **operations** (*operationes*), exist only in those (agents) that realize the operations. Whence, a conversion cannot be made of *affection* into *action received from an external thing* insofar as it is in (the affected thing) itself, but only insofar as it is in that which produces the operation. Thus, even if the eye sees a stone, the stone is only seen insofar as it is in the eye by its likeness (*per sui similitudinem*).

(Objects have a diverse *ratio* depending on the act to which they are compared):

1. Objects have the *ratio* of **end** insofar as they are compared to *the internal act*.<sup>38</sup> It is from this that (objects) give species to the act (► 48.22, ¶1).
2. Objects have the *ratio* of **matter in respect of which** insofar as they are compared to *the external act*.<sup>39</sup> Objects have the *ratio* of *termini from which motions are specified* also insofar as they are matter *in respect of which*; for also the termini of motion give species to motions insofar as they have the *ratio* of *end* (e.g., motion that ends in a place receives the species of *locomotion*; motion that ends in heat receives that of *heating*; ► 48.21).

#### 14.10. From Which: Subject vs. Privation

Something is said to come to be *from something* in two (modes; ► 42; 48):<sup>40</sup>

1. **From a privation** (*ex privatione* = ἐκ τῆς στερήσεως).<sup>41</sup> For example, it is said that *the afflicted* (*laborans* = ὁ κάμνων; i.e., the man afflicted by a sickness) comes to be healthy (*fit sanus* = γίγνεται ὑγιής).
2. **From a subject** (*ex subiecto* = ἐκ τοῦ ὑποκειμένου), which is said (to be) *matter* (*quod dicitur materia* = ὃ λέγομεν τὴν ὕλην; ► 14.7).<sup>42</sup> For example, it is said that *the man* (*homo* = ὁ ἄνθρωπος) comes to be healthy.

Something is said to come to be **from a privation** more (*magis* = μᾶλλον) than *from a subject*.<sup>43</sup> For example, something is more (properly) said to come to be healthy *from the*

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<sup>38</sup> *STh* I-II, q. 72 a. 3 ad 2: "obiecta [...] secundum quod comparantur ad actum interiorem voluntatis, habent rationem finium; et ex hoc habent quod dent speciem actui."

<sup>39</sup> *STh* I-II, q. 72 a. 3 ad 2: "obiecta, secundum quod comparantur ad actus exteriores, habent rationem materiae circa quam [...]. Quamvis etiam secundum quod sunt materia circa quam, habeant rationem terminorum; a quibus motus specificantur, ut dicitur in V Physic. et in X Ethic. Sed tamen etiam termini motus dant speciem motibus, inquantum habent rationem finis."

<sup>40</sup> *In Metaph.* 7, l. 5, §1415 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a8–10): "dupliciter dicitur aliquid fieri ex aliquo."

<sup>41</sup> *In Metaph.* 7, l. 5, §1415 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a8–10): "ex privatione [...] sicut dicitur [...] quod laborans fit sanus."

<sup>42</sup> *In Metaph.* 7, l. 5, §1415 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a8–10): "ex subiecto quod dicitur materia: sicut dicitur quod homo fit sanus."

<sup>43</sup> *In Metaph.* 7, l. 5, §1415 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a11–13): "Dicitur autem magis aliquid fieri ex privatione quam ex subiecto; sicut magis dicitur aliquid fieri sanus ex laborante, quam ex homine."

*afflicted* than *from the man*. On the other hand, we say (that) *this comes to be this* (*hoc fieri hoc*) more **in a subject** than *in a privation*. For example, we more properly say that *the man* comes to be healthy than *the afflicted*. Hence, it is not *the afflicted* who is more (properly) said (to be) *healthy*, but *the man*; and conversely, the man is said (to be) *healthy* (more properly than the afflicted). Therefore, *that which comes to be* (*id quod fit*) is predicated of a subject, but not of a privation.

#### 14.11. Matter vs. Unnamed Privation

In some (things) the privation is non-manifest and unnamed (*non manifesta et innominata* = ἄδηλος καὶ ἀνόνομος).<sup>44</sup> For example, the privation in bronze of whatever figure does not have a name; nor (does) the privation of *house* in *bricks and timber*. In such cases, we use *matter* simultaneously for *matter* and for *privation*. For this reason, just as we say that the healthy comes to be from the afflicted (i.e., from the privation of health), so do we say that the statue comes to be from bronze (i.e., from the matter of the statue, which is anonymously deprived of a figure); and the house, from stones and timber.

For the same reason, just as *that from which something comes to be as from a privation* is not said of a subject—for we do not say that the healthy (man) is an afflicted (man)—, so do we not say that *the statue is wood* (*lignum* = ξύλον): rather, the abstract is predicated in the concrete, saying that (the statue) is not *wood* but *wooden* (*lignea* = ξύλινος).<sup>45</sup> Likewise, the house is not *bricks* (*lateres* = πλίνθοι) but *of bricks* (*lateritia* = πλινθίνη).

This is also the reason why *that from which something comes* (or *is coming*) *to be*—as *from matter*—is sometimes predicated in a denominative—rather than abstract—way, for some (things) are not said (to be) *that* (*illud* = ἐκεῖνο)—i.e., (*that*) *matter*—but *of that* (*illiusmodi* = ἐκεῖνινον).<sup>46</sup> For example, a statue is not said (to be) *stone* (*lapis* = λίθος) but *of stone* (*lapidea* = λίθινος).

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Sed hoc fieri hoc, magis dicimus in subiecto quam in privatione. Magis enim dicimus proprie quod homo fit sanus, quam quod laborans. Et ideo ille qui est sanus, non dicitur laborans, sed magis dicitur homo; et e converso homo dicitur sanus. Sic ergo id quod fit, praedicatur de subiecto, non autem de privatione.”

<sup>44</sup> *In Metaph.* 7, l. 5, §1416 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a13–16): “Sed in quibusdam privatio est non manifesta et innominata; sicut privatio cuiuscumque figurae in aere, non habet nomen, nec etiam privatio domus in lateribus et in lignis. Et ideo utimur materia, pro materia et privatione simul. Et propter hoc, sicut illic dicimus, quod sanus fit ex laborante, ita hic dicimus quod statua fit ex aere, et domus ex lapidibus et lignis.”

<sup>45</sup> *In Metaph.* 7, l. 5, §1416 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a16–18): “Et propter hoc etiam, sicut ibi id ex quo fit aliquid, sicut ex privatione, non praedicatur de subiecto, quia non dicimus quod sanus sit laborans, ita nec hic dicimus quod statua sit lignum; sed praedicatur abstractum in concreto, dicendo quod non est lignum, sed lignea, nec aes, sed aerea, nec lapis, sed lapidea. Et similiter domus non est lateres, sed lateritia.”

<sup>46</sup> *In Metaph.* 7, l. 5, §1414 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a5–7): “Illud enim ex quo aliquid fit ut ex materia, quandoque praedicatur non in abstracto, sed denominative. Quaedam enim dicuntur non esse «illud,» idest materia, sed «illiusmodi.» Sicut statua non dicitur lapis, sed lapidea.”



On the other hand, a convalescent man (*homo convalescens* = ὁ ἄνθρωπος ὁ ὑγιαίνων; i.e., one who is *actually becoming* healthy) is not said (to be) *that from which* (*illud ex quo* = ἐκεῖνο ἐξ οὗ).<sup>47</sup> That is, (a convalescent man) does not receive the predication of *that from which* (something) is said to come to be; for a convalescent (man) comes to be from a sick (man); yet, a convalescent (man) is not said (to be) *sick* (i.e., insofar as he is actually becoming healthy, the convalescent man is not said to be sick; for a man is said to be sick precisely insofar as he is deprived of health).

If one considers this diligently, neither the statue is made from wood, nor the house from bricks, *simply speaking* (*simpliciter loquendo* < οὐκ ἂν ἀπλῶς εἴπειεν), but *by some permutation* (*per aliquam permutationem* < διὰ τὸ δεῖν μεταβάλλοντος); and not as *from* (something) *permanent* (*ex permanente* = [ἐξ] ὑπομένοντος; e.g., not *from bricks*, which remain when the house is built).<sup>48</sup> This is the reason why such predication comes about.

#### 14.12. Common vs. Determinate Form

As just discussed, since a privation is (sometimes) unnamed, *matter with privation* is sometimes signified by the name of the matter.<sup>49</sup> For example, *bronze* (i.e., the matter) is taken for *figureless bronze* (i.e., the matter of the statue with the privation of form) when we say that the statue comes to be *from bronze* (i.e., for the statue does not come to be from bronze simply, but from such bronze that is deprived of the form of the statue: indeed, it is impossible for bronze to become the statue if it already has the form of the statue; and a statue can only come to be from a matter that is susceptible of the intended form).

Likewise, when a form is unnamed, what is understood by the simple name of the matter is the composite from matter and form.<sup>50</sup> not indeed a **determinate (form)**, but a **common (form)**. And it is in this way that (the name of the matter) is taken as a genus; for just as **species** is *the composite from (common) matter and determinate form*, so too **genus** is *the composite from matter and common form*.

<sup>47</sup> *In Metaph.* 7, l. 5, §1414 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a5–8): “Sed homo convalescens «non dicitur illud ex quo,» idest non recipit praedicationem eius ex quo fieri dicitur. Fit enim convalescens ex infirmo. Nec dicitur quod convalescens sit infirmus.”

<sup>48</sup> *In Metaph.* 7, l. 5, §1416 (cf. ARISTOTLE, *Metaphysica* Z.7, 1033a18–23): “Quia si quis diligenter inspiciat, nec fit statua ex ligno, nec domus ex lateribus simpliciter loquendo, sed per aliquam permutationem. Fiunt enim ista ex istis sicut ex aliquo permutato, et non sicut ex permanente. Aes enim figuratum non manet dum fit statua, nec lateres incompositi dum fit domus. Et propter hoc in praedictis ita dicitur, idest talis fit praedicatio.”

<sup>49</sup> *In Metaph.* 7, l. 12, §1546: “Sicut enim propter hoc quod est innominata privatio, aliquando simplici nomine materiae significatur materia cum privatione, ut supra dictum est, quod aes accipitur pro aere figurato, cum dicimus quod ex aere fit statua.”

<sup>50</sup> *In Metaph.* 7, l. 12, §1546: “ita etiam quando forma est innominata, simplici nomine materiae intelligitur compositum ex materia et forma, non quidem determinata, sed communi; et sic accipitur ut genus. Sicut enim compositum ex materia et forma determinata est species, ita compositum ex materia et forma communi est genus.”

This is evident in many (things).<sup>51</sup> For example, *body* is said in multiple modes, and can be taken as the *genus* or as the *matter* (or as a quantitative accident) of *animal*:

1. *Body* is the **genus** (i.e., a composite from common matter and common form) if in the understanding of *body* is understood (to be) a substance completed by a last form (*substantia completa ultima forma*) having in itself three dimensions (*habens in se tres dimensiones*).<sup>52</sup> Here, *body* signifies something that has a form such that, from it, three dimensions can be designated in the thing, whatever the form may be, and whether some ulterior perfection from it can proceed or not.

It may be possible for a thing that has one perfection to attain an ulterior perfection.<sup>53</sup> For example, man has a sensitive nature, but also an ulterior intellective (nature). Likewise, over the perfection of *having such a form that three dimensions can be designated in the thing*, another perfection can be added, such as *life*, or something like that. It is in this mode that the species (i.e., the composites from common matter and determinate form) of *body* will be the substances perfected by the last determinate forms, whatever these may be: for example, by the form of gold, silver, olive, or man.

Thus, in this mode, *body* is the genus of *animal*, since there will be nothing that can be taken in *animal* that is not contained implicitly in *body*, for the soul (of the animal) is the same form than *that by which three dimensions would be designated in the thing*.<sup>54</sup> And the form of *animal* is contained implicitly in the form of *body* insofar as *body* is its genus.

2. *Body* is **matter** if only *having three dimensions with an aptitude to an ultimate form* is taken in the understanding of *body*.<sup>55</sup> Here, *body* signifies something that has a form such

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<sup>51</sup> *In Metaph.* 7, l. 12, §1547: "Et hoc in pluribus patet. Corpus enim potest accipi, et ut materia animalis, et ut genus." *De ente*, c. 2, 109–110: "Hoc igitur nomen quod est corpus multipliciter accipi potest."

<sup>52</sup> *In Metaph.* 7, l. 12, §1547: "Si enim in intellectu corporis intelligatur substantia completa ultima forma, habens in se tres dimensiones, sic corpus est genus." *De ente*, c. 2, 135–140: "Potest etiam hoc nomen corpus hoc modo accipi ut significet rem quandam que habet talem formam ex qua tres dimensiones in ea possunt designari, quecumque forma sit illa, siue ex ea possit provenire aliqua ulterior perfectio, siue non."

<sup>53</sup> *De ente*, c. 2, 115–123: "Contingit autem in rebus ut quod habet unam perfectionem, ad ulteriorem etiam perfectionem pertingat; sicut patet in homine, qui et naturam sensitivam habet, et ulterius intellectivam. Similiter etiam et super hanc perfectionem que est habere talem formam ut in ea possint tres dimensiones designari, potest alia perfectio adiungi, ut uita uel aliquid huiusmodi." *In Metaph.* 7, l. 12, §1547: "species eius erunt substantiae perfectae per has ultimas formas determinatas, sicut per formam auri, vel argenti, aut olivae, aut hominis." *De ente*, c. 2, 144–148: "et ideo cum dicebatur quod 'corpus est quod habet talem formam ex qua possunt designari tres dimensiones in eo', intelligebatur quecumque forma esset: siue anima, siue lapideitas, siue quecumque alia."

<sup>54</sup> *De ente*, c. 2, 135–150: "et hoc modo corpus erit genus animalis, quia in animali nichil erit accipere quod non implicite in corpore contineatur. Non enim anima est alia forma ab illa per quam in re illa poterant designari tres dimensiones." *Ibid.*, 135–150: "Et sic forma animalis implicite in forma corporis continetur, prout corpus est genus eius."

<sup>55</sup> *In Metaph.* 7, l. 12, §1547: "Si vero in intellectu corporis non accipiatur nisi hoc, quod est habens tres dimensiones cum aptitudine ad formam ultimam, sic corpus est materia." *De ente*, c. 2, 123–129: "Potest

that the designability of three dimensions follows from it in the thing, (but) *with precision* (*cum praecisione*): that is, such that no other perfection follows from that form; and if something were to be added over, it would be (some form having a) signification other than (*praeter*) *body* so-said.

In this mode, *body* will be an integral and material part of *animal* (► 13.8; 13.10); for, thus, the soul (i.e., the form) will be other than that which is signified by the name *body*, and will be coming over (*superveniens*) the body itself, such that, from these two—namely, soul and body (i.e., form and matter)—, an animal would be constituted as from parts.<sup>56</sup>

3. *Body* is (an accident) in the genus of **quantity** if it signifies the three dimensions that are designated in the body-substance (i.e., in the composite of matter and form).<sup>57</sup> *Body* is in the genus of substance insofar as it is composed of matter and a form (i.e., the form of corporeity), from which dimensions follow in corporeal matter.<sup>58</sup> However, the dimensions themselves—which pertain to the genus of quantity—are not substances but accidents whose subject is the substance composed from matter and form.

Quantity, which is the closest accident to substance (► 35.6), properly follows upon matter.<sup>59</sup> In turn, figure is a quality founded over (continuous) quantity: its *ratio* consists in the termination of magnitude; for **figure** is *that (magnitude) which is comprehended by a terminus or by termini* (► 4.3). Thus, figure is an (accidental) form that follows upon the (substantial) form and upon quantity; and among all accidents, it is closest to the form of the substance (► 36.14). (Whereby, *body* in this mode is the subject-matter of figures.)

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ergo hoc nomen corpus significare rem quandam que habet talem formam ex qua sequitur in ipsa designabilitas trium dimensionum, cum precisione: ut scilicet ex illa forma nulla ulterior perfectio sequatur, sed si quid aliud superadditur, sit praeter significationem corporis sic dicti.”

<sup>56</sup> *De ente*, c. 2, 129–134: “Et hoc modo corpus erit integralis et materialis pars animalis: quia sic anima erit praeter id quod significatum est nomine corporis, et erit superueniens ipsi corpore, ita quod ex ipsis duobus, scilicet anima et corpore, sicut ex partibus constituetur animal.”

<sup>57</sup> *De ente*, c. 2, 110–115: “Corpus enim secundum quod est in genere substantie dicitur ex eo quod habet talem naturam ut in eo possint designari tres dimensiones; ipse enim tres dimensiones designate sunt corpus quod est in genere quantitatis.”

<sup>58</sup> *In Metaph.* 3, l. 13, §514: “In genere enim substantiae [corpus] est secundum quod componitur ex materia et forma, quam consequuntur dimensiones in materia corporali. Ipsae autem dimensiones pertinent ad genus quantitatis, quae non sunt substantiae, sed accidentia, quibus subiicitur substantia composita ex materia et forma.”

<sup>59</sup> *In Physic.* 3, l. 5, n. 15: “quantitas proprie consequitur materiam [...]; consequitur formam [...] praedicamentum qualitatis (unde et qualitates fundantur super quantitatem, sicut color in superficie, et figura in lineis vel in superficiebus).” *STh I*, q. 78 a. 3 ad 2: “Figura autem est qualitas circa quantitatem; cum consistat ratio figurae in terminatione magnitudinis.” *In Sent.* 4, d. 10 q. 1 a. 3 qc. 1 co.: “figura autem est qualitas circa quantitatem.” *STh I*, q. 7 a. 3 ad 3: “figura, quae consistit in terminatione quantitatis, est quaedam forma circa quantitatem.” *STh I*, q. 85 a. 1 ad 2: “quantitas propinqua est substantiae, et figura etiam consequitur quantitatem.” *In Physic.* 7, l. 5, n. 3: “figura importat terminationem quantitatis; est enim figura, quae termino vel terminis comprehenditur.” *In Physic.* 7, l. 5, n. 5: “sicut quantitas propinquissime se habet ad substantiam inter alia accidentia, ita figura, quae est qualitas circa quantitatem, propinquissime se habet ad formam substantiae.”

### 14.13. Genus vs. Matter

Although genus and matter can be the same according to the name (as just discussed), (they are) not the same (when) taken in the same mode; for matter is an integral part of the thing (► 13.8); and, therefore, it cannot be predicated of the thing.<sup>60</sup> For example, it cannot be said that man is *flesh and bone*. On the other hand, the genus is predicated of a species; whence, it must signify the whole in some mode (► 13.5).

### 14.14. No Genus Without Species

There is no genus apart from (*praeter*) those (things) that are species of the genus.<sup>61</sup> For example, no animal is found which is neither man nor ox nor something of this mode.

If something should be found which is a genus apart from species, thus taken—as apart from the species—it would not be taken as a genus, but as matter; for something can be both the genus and the matter of some things (as just discussed; ► 14.12; 14.13).<sup>62</sup>

For example, voice (*vox*) is the (subject) genus and the matter of phonemes (*literarum*).<sup>63</sup> Voice is evidently a genus because differences added to voice produce (*faciunt*) the species of phoneme voices (*species vocum literatarum*; i.e., by adding differences to voice, different species of simple phonemes and of voices composed from phonemes are produced). And voice is evidently matter because phonemes are produced from voice as something is produced from matter.

(Therefore, just as *body* can be taken as the genus and as the matter), it is likewise of *voice*.<sup>64</sup> Thus, if in the understanding of *voice* is included the formation itself of a voice in

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<sup>60</sup> *In Metaph. 7*, l. 12, §1546: “Sciendum est autem quod, licet idem secundum nomen possit esse genus et materia, non tamen idem eodem modo acceptum. Materia enim est pars integralis rei, et ideo de re praedicari non potest. Non enim potest dici quod homo sit caro et os. Genus autem praedicatur de specie. Unde oportet quod significet aliquo modo totum.”

<sup>61</sup> *In Metaph. 7*, l. 12, §1545 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a5–6): “Genus enim non est praeter ea quae sunt species generis. Non enim invenitur animal, quod non sit nec homo, nec bos, nec aliquid aliud huiusmodi. Aut si inveniat quod est genus praeter species, sic acceptum ut est praeter species, non accipitur ut genus, sed ut materia. Contingit enim aliquod et esse genus aliquorum, et materiam.”

<sup>62</sup> *In Metaph. 7*, l. 12, §1545 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a5–6): “Genus enim non est praeter ea quae sunt species generis. Non enim invenitur animal, quod non sit nec homo, nec bos, nec aliquid aliud huiusmodi. Aut si inveniat quod est genus praeter species, sic acceptum ut est praeter species, non accipitur ut genus, sed ut materia. Contingit enim aliquod et esse genus aliquorum, et materiam.”

<sup>63</sup> *In Metaph. 7*, l. 12, §1545 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a6–8): “Sicut vox est genus literarum, et est materia. Et quod sit genus, patet per hoc quod differentiae additae voci faciunt species vocum literatarum. Et quod etiam sit materia, patet; quia «ex hac,» scilicet ex voce «faciunt elementa,» idest literas, sicut aliquid fit ex materia.”

<sup>64</sup> *In Metaph. 7*, l. 12, §1548: “Et similiter est de voce. Si enim in intellectu vocis includatur ipsa vocis formatio in communi secundum formam quae distinguitur in diversas formas literarum et syllabarum, sic vox est genus. Si autem in intellectu vocis accipitur solum substantia soni, cui possibile est advenire praedictam formationem, sic vox erit materia literarum.”

common, according to a form that is distinguished into diverse forms of phonemes (i.e., elementary voices) and of syllables (i.e., syllables composed from such elements), then *voice* is the (subject) genus (of phonemes and syllables). On the other hand, if in the understanding of *voice* is taken only the substance of sound, in which the aforesaid formation can come about, then *voice* is the matter of phonemes.

Whence, it is evident that *voice*, insofar as it is a genus, cannot be without species; for there cannot be a formed sound unless it has some determinate form, (be it) of *this* or of *that* phoneme.<sup>65</sup> But if it should altogether lack the form of a phoneme, insofar as it is matter, then it would be found without phonemes, just as bronze is found without those (artifacts) that come to be (or are produced, made) from bronze.

#### 14.15. Genus vs. Species

The essence of Sortes and the essence of man differ only according as the signed (differs from) the unsigned (► 13.12; 13.15).<sup>66</sup> The essence of the species and of the genus differ also only according to the signed and the unsigned (► 14.12), although the designation is diverse; for the designation of the individual with respect to the species is by matter determined by dimensions, while the designation of the species in respect of the genus is by a constitutive difference, which is taken from the form of the thing.<sup>67</sup>

This determination or designation that is in the species in respect of the genus, is not by something that exists in the essence of the species but in no way is in the essence of the genus.<sup>68</sup> On the contrary, whatever is in the species is also in the genus as non-determined. Thus, if *animal* should not be the whole of what man is but a part of it, (*animal*) would not be predicated of (*man*), since no integral part is predicated of its whole (► 13.8).

In what mode this may happen can be seen if one considers how *body* differs insofar as it is posited (as) a part of an animal and insofar as it is posited (as) a genus; for a genus

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<sup>65</sup> *In Metaph.* 7, l. 12, §1548: “Ex quo etiam patet quod vox, secundum quod est genus, non potest esse sine speciebus. Non enim potest esse sonus formatus, quin aliquam determinatam formam habeat huius vel illius literae. Sed si omnino careret forma literali prout est materia, sic inveniretur sine literis, sicut aes invenitur absque his quae fiunt ex aere.”

<sup>66</sup> *De ente*, c. 2, 85–89: “essentia hominis et essentia Sortis non differt nisi secundum signatum et non signatum; unde Commentator dicit super VII Methaphisice «Sortes nichil aliud est quam animalitas et rationalitas, que sunt quiditas eius».”

<sup>67</sup> *De ente*, c. 2, 90–96: “Sic etiam essentia generis et speciei secundum signatum et non signatum differunt, quamvis alius modus designationis sit utrobique: quia designatio individui respectu speciei est per materiam determinatam dimensionibus, designatio autem speciei respectu generis est per differentiam constitutivam que ex forma rel sumitur.”

<sup>68</sup> *De ente*, c. 2, 96–104: “Hec autem determinatio uel designatio que est in specie respectu generis, non est per aliquid in essentia speciei existens quod nullo modo in essentia generis sit; immo quicquid est in specie est etiam in genere ut non determinatum. Si enim animal non esset totum quod est homo sed pars eius, non predicaretur de eo, cum nulla pars integralis de suo toto predicetur.”

cannot be posited in the mode of that which is an integral part (► 14.12; 14.13).<sup>69</sup> Such is the relation of *animal* to *man*; for if only something which has such perfection that it can sense and move by a principle existing in it should be named *animal* with precision (i.e., cutting-off) of other perfections, then whatever other ulterior perfection should come over it would be related to *animal* by the mode of a co-part, and not as contained implicitly in the *ratio* of *animal*.<sup>70</sup> And *animal* would not be a genus so. But it is a genus insofar as it signifies something from whose form—whatever it may be—can proceed sense and motion, whether it is only a sensible soul or at once sensible and rational.

#### 14.16. Genus vs. Difference

The difference is compared to the genus as form to matter insofar as (the difference) makes the genus be in act.<sup>71</sup> But the genus is also considered as more formal than the species insofar as it is more absolute and less contracted; whence, also the parts of the definition are reduced to the genus of formal cause; and according to this, the genus is a formal cause of the species—and it will be more formal the more it is common.

The difference is not more noble than the genus as one nature is nobler than another, or as one form is nobler than another; for the difference does not convey (*dicit*) any form that is not implicitly contained in the nature of the genus, since the genus does not signify a part of the essence of the thing, but the whole, as AVICENNA says.<sup>72</sup> Rather, (the difference) is said to be nobler than the genus as the determinate (is said to be nobler) than the indeterminate.

Again, the difference names the whole nature of the species; otherwise, it would not be predicated of the species, as AVICENNA says.<sup>73</sup> However, it does not name (it) from the

<sup>69</sup> *De ente*, c. 2, 105–109: “Hoc autem quomodo contingat uideri poterit, si inspiciatur qualiter differt corpus secundum quod ponitur pars animalis, et secundum quod ponitur genus; non enim potest esse eo modo genus quo est pars integralis.”

<sup>70</sup> *De ente*, c. 2, 151–163: “Et talis est etiam habitudo animalis ad hominem. Si enim animal nominaret tantum rem quandam que habet talem perfectionem ut possit sentire et moueri per principium in ipso existens, cum precisione alterius perfectionis, tunc quecumque alia perfectio ulterior superueniret haberet se ad animal per modum compartis, et non sicut implicite contenta in ratione animalis: et sic animal non esset genus. Sed est genus secundum quod significat rem quandam ex cuius forma potest prouenire sensus et motus, quecumque sit illa forma: siue sit anima sensibilis tantum, siue sensibilis et rationalis simul.”

<sup>71</sup> *STh* I-II, q. 18 a. 7 ad 3: “differentia comparatur ad genus ut forma ad materiam, in quantum facit esse genus in actu. Sed etiam genus consideratur ut formalius specie, secundum quod est absolutius, et minus contractum. Unde et partes definitionis reducuntur ad genus causae formalis, ut dicitur in libro *Physic*. Et secundum hoc, genus est causa formalis speciei, et tanto erit formalius, quanto communius.”

<sup>72</sup> *In Sent.* 2, d. 3 q. 1 a. 6 ad 1: “differentia non est nobilior genere, sicut natura una est nobilior altera, vel sicut forma una nobilior est alia: quia differentia nullam formam dicit, quae implicite in natura generis non contineatur, ut dicit Avicenna: genus enim non significat partem essentiae rei, sed totum. Sed dicitur genere nobilior, sicut determinatum indeterminato.”

<sup>73</sup> *In Sent.* 3, d. 5 q. 1 a. 2 ad 2: “sicut dicit Avicenna, differentia nominat totam naturam speciei; alias non praedicaretur de specie; sed non nominat ex toto, sed ex parte, scilicet formali principio: dicitur enim rationale habens rationem. Genus autem e converso nominat totum ex principio materiali. Unde

whole, but from a part: that is, (from) the formal principle; for that is said (to be) *rational* which has reason. The genus, conversely, names the whole from the material principle. Whence, a difference is not added to a difference because a nature is added to a nature, but because a further formal principle is added: e.g., the intellective (formal principle is added) over the sensitive (formal principle).

A genus signifies indeterminately the whole that is in the species; for it does not signify only matter (as just explained).<sup>74</sup> Likewise, also the difference signifies the whole; and it does not signify only the form. The definition or species also signifies the whole; but diversely; for the genus signifies the whole as some denomination determining that which is material in the thing without determination of the proper form; and so, the genus is taken from matter—although it is not matter, as is evident because *body* is said from its having such a perfection *that three dimensions can be designated*; and this perfection is related as matter (*materialiter*) to an ulterior perfection (► 14.12).

Conversely, a difference is as some denomination taken from a determinate form without there being a determinate matter in its first understanding, as is evident when *animate*—i.e., that which has a soul—is said; yet, what (that matter) should be is not determined: whether a body or something else.<sup>75</sup> Whence, AVICENNA says that the genus is not understood in the difference as a part of its essence, but only as a being outside of the essence, as also the subject belongs to the understanding of (its) affections.<sup>76</sup>

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differentia non additur differentiae per hoc quod natura additur naturae, sed per hoc quod ulterius principium formale additur, sicut intellectivum supra sensitivum.”

<sup>74</sup> *De ente*, c. 2, 164–177: “Sic ergo genus significat indeterminate totum id quod est in specie, non enim significat tantum materiam. Similiter etiam et differentia significat totum, et non significat tantum formam; et etiam diffinitio significat totum, uel etiam species. Sed tamen diuersimode: quia genus significat totum ut quedam denominatio determinans id quod est materiale in re sine determinatione proprie forme, unde genus sumitur ex materia—quamuis non sit materia—; ut patet quia corpus dicitur ex hoc quod habet talem perfectionem ut possint in eo designari tres dimensiones, que quidem perfectio est materialiter se habens ad ulteriorem perfectionem.”

<sup>75</sup> *De ente*, c. 2, 177–187: “Differentia uero e conuerso est sicut quedam denominatio a forma determinata sumpta, preter hoc quod de primo intellectu eius sit materia determinata; ut patet cum dicitur animatum, scilicet illud quod habet animam, non enim determinatur quid sit, utrum corpus uel aliquid aliud: unde dicit Avicenna quod genus non intelligitur in differentia sicut pars essentie eius, sed solum sicut ens extra essentiam, sicut etiam subiectum est de intellectu passionum.”

<sup>76</sup> See AVICENNA, *The Metaphysics of The Healing*, ed. Daniel C. Peterson, trans. Michael E. Marmura, Islamic Translation Series Al-Hikma (Provo, Utah: Brigham Young University Press, 2005), 177, 11–17: “ونقول أيضا إن الجنس يحمل على النوع على أنه جزء من ماهيته، ويحمل على الفصل على أنه لازم له لا على أنه جزء من ماهيته. “ أمثاله الحيوان يحمل على الإنسان على أنه جزء من ماهيته، ويحمل على الناطق على أنه لازم له لا على أنه جزء من ماهيته. وإنما يعنى بالناطق شيء له نطق وشيء له نفس ناطقة من غير أن يتضمن نفس قولنا الناطق بيانا لذلك الشيء أنه جوهر أو غير جوهر. إلا أنه يلزم أن لا يكون هذا الشيء إلا جوهرًا وإلا جسمًا وإلا حساسًا، فتكون هذا الأمور مقولة عليه قول اللازم على الملزوم لأنها غير “داخلة في مفهوم الناطق أي الشيء ذي النطق. Cf. AVICENNA, *Liber de philosophia prima*, 5.6, 281.94–282.4: “Dicemus etiam quod genus praedicatur de specie, ita quod est pars quidditatis eius, et praedicatur de differentia, ita quod comitans eam, non pars quidditatis eius: verbi gratia, animal praedicatur de homine quoniam est pars quidditatis eius, et praedicatur de rationali, quoniam est comitans ipsum <...>. Non enim intelligimus rationale, nisi quod est habens rationalitatem et quod est habens animam rationalem, ita quod hoc nomen *rationale* non significat an illud sit substantia an non, sed comitatur ipsum non esse

Therefore, speaking by itself (►17), the genus is not predicated of the difference either: unless, perhaps, as a subject is predicated of an affection.<sup>77</sup> In turn, the definition or species comprehends both: that is, a determinate matter that the name of the genus designates, and a determinate form that the name of the difference designates.

As ARISTOTLE says (►16.5), the differences that divide some genus and constitute a species in that genus must divide it by themselves (*per se*); for if (the differences divide the genus) by accident, the division does not proceed correctly.<sup>78</sup> For example, if someone says, “of animals, one rational and the other irrational; and of irrational animals, one winged and another non-winged,” *winged* and *non-winged* are not determinative of that which is irrational. Instead, one must divide thus: “of animals, one having feet, another not having feet; and of (those) having feet, one has two, another four, another many”; for these determine by themselves the prior differences.

#### 14.17. Relation of Genus-Difference-Species to Matter-Form-Composite

Genus, difference, and species are related proportionately to matter, form, and composite in nature, although they are not the same; for neither the genus is the matter, but is taken from the matter as signifying a whole, nor is the difference the form, but is taken from the form as signifying a whole (concerning the species, see below; ►14.18).<sup>79</sup>

Whence, we say that man *is a rational animal*, and not (that it is) *from animal and rational*, as we say that (man) is *from soul and body*; for man is said to be *from soul and body* as if from two things were constituted a third thing that is neither of them; for man is neither soul nor body.<sup>80</sup> But if man is said to be, in some mode, *from animal and rational*, it is not

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nisi substantiam et nisi corpus et nisi sensibile; haec igitur praedicantur de illo, sicut praedicatur comitans de suo comitato: non enim continetur in intellectu rationalis, scilicet rei habentis rationalitatem.”

<sup>77</sup> *De ente*, c. 2, 187–194: “Et ideo etiam genus non predicatur de differentia per se loquendo, ut dicit Philosophus in III Methaphisice et in IV Topicorum, nisi forte sicut subiectum predicatur de passione. Sed diffinitio uel species comprehendit utrumque, scilicet determinatam materiam quam designat nomen generis, et determinatam formam quam designat nomen differentie.”

<sup>78</sup> *STh* I-II, q. 18 a. 7 co.: “Oportet autem, ut Philosophus dicit in VII Metaphys. quod differentiae dividentes aliquod genus, et constituentes speciem illius generis, per se dividant illud. Si autem per accidens, non recte procedit divisio, puta si quis dicat, animalium aliud rationale, aliud irrationale; et animalium irrationalium aliud alatum, aliud non alatum, alatum enim et non alatum non sunt per se determinativa eius quod est irrationale. Oportet autem sic dividere, animalium aliud habens pedes, aliud non habens pedes; et habentium pedes, aliud habet duos, aliud quatuor, aliud multos, haec enim per se determinant priorem differentiam.”

<sup>79</sup> *De ente*, c. 2, 195–201: “Et ex hoc patet ratio quare genus, species et differentia se habent proportionaliter ad materiam et formam et compositum in natura, quamuis non sint idem quod illa: quia neque genus est materia, sed a materia sumptum ut significans totum; neque differentia forma, sed a forma sumpta ut significans totum.”

<sup>80</sup> *De ente*, c. 2, 201–217: “Et ex hoc patet ratio quare genus, species et differentia se habent proportionaliter ad materiam et formam et compositum in natura, quamuis non sint idem quod illa: quia neque genus est materia, sed a materia sumptum ut significans totum; neque differentia forma, sed a forma sumpta ut significans totum. Vnde dicimus hominem esse animal rationale, et non ex animali et rationali sicut dicimus eum esse ex anima et corpore: ex anima enim et corpore dicitur esse homo sicut



as a third thing (is constituted) from two things, but as a third understanding (is constituted) from two understandings (*sicut intellectus tertius ex duobus intellectibus*); for the understanding of *animal* is without the determination of a special form, expressing the nature of a thing from that which is material in respect of an ultimate perfection. On the other hand, the understanding of the difference *rational* consists in the determination of a special form. And from these two understandings is constituted the understanding of the species or definition.

Hence, just as a thing constituted from some things does not receive the predication of those things from which it is constituted (i.e., integrated), neither does an understanding receive the predication of those understandings from which it is constituted; for we do not say that the definition is the genus or the difference.<sup>81</sup>

Although the genus signifies the whole essence of the species, it is not necessary, however, for diverse species of the same genus to have one essence; for the unity of the genus proceeds from indetermination or indifference itself.<sup>82</sup> But not in such a way that that which is signified by the genus would be a numerically-one nature in diverse species, to which there should supervene (*superveniat*) another thing that would be its determining difference, as a form determines a matter that is one in number. Rather, this is because the genus signifies some form—not, however, determinately *this* or *that* (*form*)—that the difference expresses determinately, which is no other (form) than that which was signified indeterminately by the genus.

Hence, AVERROES says that first matter is said (to be) *one* by the removal of all forms, while the genus is said (to be) *one* by the community of the form signified.<sup>83</sup> Thus, it is

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ex duabus rebus quedam res tertia constituta que neutra illarum est, homo enim neque est anima neque corpus. Sed si homo aliquo modo ex animali et rationali esse dicatur, non erit sicut res tertia ex duabus rebus, sed sicut intellectus tertius ex duobus intellectibus. Intellectus enim animalis est sine determinatione specialis forme, exprimens naturam rei ab eo quod est materiale respectu ultime perfectionis; intellectus autem huius differentie rationalis consistit in determinatione forme specialis: ex quibus duobus intellectibus constituitur intellectus speciei uel diffinitionis.”

<sup>81</sup> *De ente*, c. 2, 217–222: “Et ideo sicut res constituta ex aliquibus non recipit predicationem earum rerum ex quibus constituitur, ita nec intellectus recipit predicationem eorum intellectuum ex quibus eonstituitur: non enim dicimus quod diffinitio sit genus aut differentia.”

<sup>82</sup> *De ente*, c. 2, 223–236: “Quamuis autem genus significet totam essentiam speciei, non tamen oportet ut diuersarum specierum quarum est idem genus, sit una essentia, quia unitas generis ex ipsa indeterminatione uel indifferentia procedit. Non autem ita quod illud quod significatur per genus sit una natura numero in diuersis speciebus, cui superueniat res alia que sit differentia determinans ipsum, sicut forma determinat materiam que est una numero; sed quia genus significat aliquam formam—non tamen determinate hanc uel illam—, quam determinate differentia exprimit, que non est alia quam illa que indeterminate significabatur per genus.”

<sup>83</sup> *De ente*, c. 2, 236–242: “Et ideo dicit Commentator in XI Methaphisice quod materia prima dicitur una per remotionem omnium formarum, sed genus dicitur unum per communitatem forme significate. Vnde patet quod per additionem differentie remota illa indeterminatione que erat causa unitatis generis, remanent species per essentiam diuerse.”

evident that, when the indetermination that was the cause of the unity of the genus is removed by the addition of differences, there remain species diverse by (their) essence.

#### 14.18. Species vs. Individual

Just as the nature of the genus (is undetermined) in respect of a species, (so, too), the nature of the species is indeterminate in respect of an individual.<sup>84</sup> Thus, just as that which is a genus—insofar as it is predicated of a species—implies in its signification—although indistinctly—the whole that is in the species determinately, so too that which is a species—insofar as it is predicated of an individual—must signify the whole that is essentially in the individual—although indistinctly. In this mode, the essence of the species is signified by the name *man*; whence *man* is predicated of *Sortes*.

If, on the other hand, we should signify the nature of the species with precision (i.e., cutting off) of designated matter, which is the principle of individuation, (the species) would then be related according to the mode of part (►13.12).<sup>85</sup> And in this mode is signified the name *humanity*; for *humanity* signifies *that whence man is man (id unde homo est homo)*. Designated matter is not *that whence man is man*; and, hence, it is not contained in any mode among those (principles) from which *man* has its being *man*. Therefore, since *humanity* includes in its understanding only those (principles) from which *man* has its being *man*, it is evident that designated matter is excluded or cut-off (*praeciditur*) from the signification. And since the part is not predicated of the whole, hence, *humanity* is not predicated of *man*; nor (is *humanity* predicated) of *Sortes*.

Whence, AVICENNA says that the quiddity of the composite is not the composite itself of which the quiddity is, although the quiddity itself is a composite, too.<sup>86</sup> For example,

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<sup>84</sup> *De ente*, c. 2, 243–254: “Et quia, ut dictum est, natura speciei est indeterminata respectu individui sicut natura generis respectu speciei: inde est quod, sicut id quod est genus prout predicabatur de specie implicabat in sua significatione, quamvis indistincte, totum quod determinate est in specie, ita etiam et id quod est species secundum quod predicatur de individuo oportet quod significet totum id quod est essentialiter in individuo, licet indistincte. Et hoc modo essentia speciei significatur nomine hominis, unde homo de Sorte predicatur.”

<sup>85</sup> *De ente*, c. 2, 254–267: “Si autem significetur natura speciei cum precisione materie designate que est principium individuationis, sic se habebit per modum partis; et hoc modo significatur nomine humanitatis, humanitas enim significat id unde homo est homo. Materia autem designata non est id unde homo est homo, et ita nullo modo continetur inter illa ex quibus homo habet quod sit homo. Cum ergo humanitas in suo intellectu includat tantum ea ex quibus homo habet quod est homo, patet quod a significatione excluditur uel praeciditur materia designata; et quia pars non predicatur de toto, inde est quod humanitas nec de homine nec de Sorte predicatur.”

<sup>86</sup> *De ente*, c. 2, 267–273: “Vnde dicit Avicenna quod quidditas compositi non est ipsum compositum cuius est quidditas, quamvis etiam ipsa quidditas sit composita; sicut humanitas, licet sit composita, non est homo: immo oportet quod sit recepta in aliquo quod est materia designata.” See AVICENNA, *The Metaphysics of The Healing*, 177, 1–4: “وأما الماهية فهي ما بها هي ما هي، وإنما هي ما هي بكون الصورة مقارنة للمادة، وهو أزيد من معنى الصورة. والمركب ليس هذا المعنى أيضاً، بل هو مجموع الصورة والمادة؛ فإن هذا هو ما هو المركب، والماهية هذا التركيب.” Cf. AVICENNA, *Liber de philosophia prima*, 5.5, 275.69–73: “quidditas vero est id quod est quicquid est, forma existente coniuncta materiae, quod quidem amplius est quam intentio formae;

although humanity is a composite, it is not a man. On the contrary, (humanity) must be received in something, which is designated matter.

As just said, the designation of the species in respect of the genus is by (a determinate) form, while the designation of the individual in respect of the species is by (designated) matter.<sup>87</sup> Therefore, the name that signifies *that whence the nature of the genus is taken*—with precision (i.e., cutting-off) of the determinate form that perfects the species—must signify a material part of the whole, as *body* is the material part of man (► 14.12). And the name that signifies *that whence the nature of the species is taken*, with precision (i.e., cutting-off) of designated matter, signifies the formal part.

Thus, humanity is signified as some form, and is said (to be) *the form of the whole*: not indeed as (if it were) added over the essential parts—i.e., form and matter—as the form of the house is added over its integral parts; rather, it is the form that is the whole that encompasses also matter, although with precision of those (principles) by which matter is naturally apt to be designated.<sup>88</sup>

Therefore, it is evident that the name *man* and the name *humanity* signify the essence of man—but diversely.<sup>89</sup> The name *man* signifies (the essence of man) as a whole: that is, insofar it does not cut off the designation of matter, but indistinctly contains it, too, as the genus contains the difference; whence, the name *man* is predicated of individuals. On the other hand, the name *humanity* signifies (the essence of man) as a part; for it only contains in its signification that which belongs to man insofar as it is a man; and cuts off all designation; whence, it is not predicated of individual men. And this is the reason why the name *essence* is sometimes found predicated of a thing; for we say that *Sortes* is some

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compositio etiam non est haec intentio quia composita est ex forma et materia; haec enim est quidditas compositi et quidditas est haec compositio.”

<sup>87</sup> *De ente*, c. 2, 274–283: “Sed quia, ut dictum est, designatio speciei respectu generis est per formam, designatio autem individui respectu speciei est per materiam, ideo oportet ut nomen significans id unde natura generis sumitur, cum precisione forme determinate perficientis speciem, significet partem materialem totius, sicut corpus est pars materialis hominis; nomen autem significans id unde sumitur natura speciei, cum precisione materie designate, significat partem formalem.”

<sup>88</sup> *De ente*, c. 2, 283–291: “Et ideo humanitas significatur ut forma quedam, et dicitur quod est forma totius; non quidem quasi superaddita partibus essentialibus, scilicet forme et materie, sicut forma domus superadditur partibus integralibus eius: sed magis est forma que est totum, scilicet formam complectens et materiam, tamen cum precisione eorum per que nata est materia designari.”

<sup>89</sup> *De ente*, c. 2, 292–308: “Sic igitur patet quod essentiam hominis significat hoc nomen homo et hoc nomen humanitas, sed diuersimode, ut dictum est: quia hoc nomen homo significat eam ut totum, in quantum scilicet non precidit designationem materie sed implicite continet eam et indistincte, sicut dictum est quod genus continet differentiam; et ideo predieatur hoc nomen homo de individuis. Sed hoc nomen humanitas significat eam ut partem, quia non continet in significatione sua nisi id quod est hominis in quantum est homo, et precidit omnem designationem; unde de individuis hominis non predicatur. Et propter hoc nomen essentie quandoque inuenitur predicatum de re, dicimus enim Sortem esse essentiam quandam; et quandoque negatur, sicut dicimus quod essentia Sortis non est Sortes.”

essence; and sometimes it is negated, as when we say that the essence of Sortes is not Sortes.

#### 14.19. Order between Genus and Species

Supposing that genera are the principles of things, there is a question as to whether:<sup>90</sup>

1. The principles (of things) are the universals said of the most specific species (*species specialissimae*), which Platonists call *genera* because they contain under themselves multiple individuals, just as genera (contain under themselves) multiple species.
2. Or the first, most general (genera) are more the principles (of things).

For example, which is more a principle: *animal* or *man*? Which (universal), according to Platonists, is some principle more truly existing than the singular.

Since that which is the last terminus of division seems always to be the principle and element in composition, this question arises because of two divisions of *ratio*:

1. Insofar as we divide genera into species.
2. Insofar as we resolve species into genera.

According to the metaphorical *ratio* of *element* (► 12.12), it is evident that a genus is more an element than a species because they are more universal and more indivisible; for there is no *ratio* or definition of genera that could be composed from genus and difference: rather, definitions are properly given of species.<sup>91</sup> And if some genus is defined, it is not defined insofar as it is a genus, but insofar as it is a species. Thus, a species is divided into diverse (i.e., a species is divided into genus and difference, two principles that are

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<sup>90</sup> *In Metaph.* 3, l. 3, §356 (cf. ARISTOTLE, *Metaphysica* B.1, 995b29–31): “*Secunda* quaestio est, supposito quod genera sint principia rerum, utrum principia sint universalia dicta de individuis, scilicet species specialissimae, quas genera appellat secundum Platoniorum consuetudinem, quia continent sub se plura individua, sicut genera plures species; aut magis sint principia prima generalissima, ut puta quid sit magis principium, utrum animal vel homo, qui est principium quoddam secundum Platonicos, et magis vere existens quam singulare. Oritur autem haec dubitatio propter duas divisiones rationis. Quarum una est secundum quam genera dividimus in species. Alia vero est secundum quam species resolvimus in genera. Semper enim videtur illud quod est ultimus terminus divisionis esse primum principium et elementum in componendo.”

<sup>91</sup> *In Metaph.* 5, l. 4, §805 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014b9–11): “Hac autem transumptiva elementi ratione constituta, patet solutio cuiusdam quaestionis in tertio libro disputatae; scilicet quid sit magis elementum, utrum genus vel species, et utrum genus magis quam differentia. Patet enim consequi quod genera magis sunt elementa, quia genera magis sunt universalia et indivisibilia. Non enim est ratio eorum et definitio, quam oporteat componi ex genere et differentia; sed definitiones proprie dantur de speciebus. Et si aliquod genus definitur, non definitur in quantum est genus, sed in quantum est species; et ideo species dividitur in diversa, et propter hoc non habent rationem elementi. Genus autem non dividitur in diversa: et ideo dixerunt genera esse elementa magis quam species. Alia translatio habet «Una enim est eorum ratio» idest indivisibilis, quia genera, etsi non habeant definitionem, tamen id quod significatur per nomen generis, est quaedam conceptio intellectus simplex, quae ratio dici potest.”

diverse in species); and, because of this, they do not have the *ratio* of element (► 12.9, ¶4). On the other hand, the genus is not divisible into (principles) diverse (in species); whence, (Platonists) said that genera are more elements than species. Moreover, even if genera do not have a definition, that which is signified by the name of the genus is some simple conception of the intellect (► 19.1, ¶1), which can be said (to be a) *ratio* (► 8.1).

And just as the genus is more an element than the species; for it is simpler; so is it also more (an element) than the difference, even if (the difference) is simple, since (the genus) is more universal.<sup>92</sup> This is evident because, in whatever there is a difference, in it there is a genus, since differences by themselves (*per se*) do not transcend a genus; and it is not necessary for a difference to follow upon everything to which a genus befits (*convenit*).

(Therefore, to answer the above question, we must consider that) the principles of the genus precede the principles of the species.<sup>93</sup> Whence, absolutely considered, a genus is naturally prior to its species insofar as the latter are included in the former.<sup>94</sup> But insofar as the genus is compared to its species as potency to act (i.e., insofar as the genus, which is some whole, is divisible into its species and contains them only potentially), species are naturally prior to their genus (i.e., because act is prior to potency).

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<sup>92</sup> *In Metaph.* 5, l. 4, §806 (cf. ARISTOTLE, *Metaphysica* Δ.3, 1014b11–14): “Et sicut genus est magis elementum quam species, quia est simplicius; ita etiam magis quam differentia, licet ipsa simplex sit, quia genus est universalius. Quod ex hoc patet: quia cuicumque inest differentia, inest genus, cum per se differentiae non transcendant genus: non tamen oportet quod ad omne id sequatur differentia cui convenit genus.”

<sup>93</sup> *In Sent.* 4, d. 14 q. 1 a. 2 qc. 3 co.: “principia generis praecedunt principia speciei.”

<sup>94</sup> *Quodlibet* 5, q. 10 a. 1 co.: “in consiliis necesse est ut includantur praecepta [...]; sed non convertitur. Erit ergo una comparatio consiliorum ad praecepta absolute considerata. Et sic hoc modo praecepta erunt ordine naturae priora consiliis, sicut genus est naturaliter prius specie; consilia autem e converso priora naturaliter praeceptis, sicut species sunt priores secundum naturam quam genera, ut patet per Philosophum, I Phys. Comparatur enim genus ad speciem sicut potentia ad actum.”



## 15. Substance and Accident

Since matter and subject are in potency to substantial and accidental being respectively (► 14.7, 14.8), and since the genus is taken from such matter or subject (► 14.12), we must determine what substance and accident are, and how they are related.

### 15.1. Substance

As ARISTOTLE says, there are at least four modes—if not more—in which **substance** (*substantia* = οὐσία) is said (we follow here the division posited in *Metaphysics* Z.3):<sup>1</sup>

1. The **essence, quiddity** or **nature** of a thing («*quod quid erat esse*,» *idest quidditas, vel essentia, sive natura rei* = τὸ τί ἦν εἶναι), whose *ratio* is the definition (► 8.1).<sup>2</sup> In this mode, substance—as also essence—is found in all the genera. This is what is signified when one asks, “What is whiteness? A color.”

It should be noted that *substance* is said (as per *Metaphysics* Δ.8; cf. Z.13) of *that which is the cause of being* (*quae est causa essendi* < ὃ ἂν ἦ αἴτιον τοῦ εἶναι) of particular substances (see number 4, below), which are not said of a subject (*quae non dicuntur de subiecto* < ὅσα μὴ λέγεται καθ’ ὑποκειμένου):<sup>3</sup> not indeed of extrinsic (causes), such as the efficient (or moving cause), but intrinsic to them (*intrinseca eis* < ἐνυπάρχον ἐν τοῖς τοιοῦτοις), as the form. For example, the soul is said (to be the) *substance* of *animal*.

Indeed, essence pertains to form (i.e., it is a formal part of the whole individual; ► 13.10).<sup>4</sup> However, the *quiddity* or *essence* of a thing—whose *ratio* is the definition—differs from

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<sup>1</sup> *In Metaph.* 7, l. 2, §1270 (cf. ARISTOTLE, *Metaphysica* Z.3, 1028b33–34): “Dicit ergo [Philosophus] primo, quod substantia ad minus dicitur quatuor modis, si non dicatur «multiplicius,» idest pluribus modis. Sunt enim plures modi, quibus aliqui substantiam nominant; ut patet de dicentibus terminos corporis esse substantias, qui modus hic praetermittitur.” *In Metaph.* 5, l. 10, §898 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b10–26): “ostendit [Philosophus] quot modis dicitur substantia: [...] ponit quatuor modos.” *In Sent.* 1, d. 25 q. 1 a. 1 ad 7: “substantia dicitur quatuor modis.”

<sup>2</sup> *In Metaph.* 7, l. 2, §1270 (cf. ARISTOTLE, *Metaphysica* Z.3, 1028b34): “Quorum quidem modorum *primus* est secundum quod «quod quid erat esse,» idest quidditas, sive essentia, sive natura rei dicitur eius substantia.” *In Metaph.* 5, l. 10, §902 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b21–22): “Quartum modum [...] dicit [Philosophus] quod etiam quidditas rei, quam significat definitio, dicitur substantia uniuscuiusque.” <sup>2</sup> *In Metaph.* 7, l. 2, §1299 (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b1–3): “dicit [Philosophus], quod cum prius divisum sit, quot modis dicatur substantia, inter istos modos unus modus est prout quod quid erat esse, idest quidditas et essentia rei, dicitur substantia.” *In Metaph.* 7, l. 13, §1566 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b2–3): “Et alio modo dicitur substantia quod quid erat esse.” *In Sent.* 1, d. 25 q. 1 a. 1 ad 7: “Uno modo substantia idem est quod essentia; et sic substantia invenitur in omnibus generibus, sicut et essentia; et hoc significatur, cum quaeritur: quid est albedo? Color.”

<sup>3</sup> *In Metaph.* 5, l. 10, §899 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b14–16): “alio modo dicitur substantia quae est causa essendi praedictis substantiis quae non dicuntur de subiecto; non quidem extrinseca sicut efficiens, sed intrinseca eis, ut forma. Sicut dicitur anima substantia animalis.”

<sup>4</sup> *In Metaph.* 7, l. 13, §1566: “dicitur substantia quod quid erat esse, quod pertinet ad formam.” *In Metaph.* 5, l. 10, §902: “Haec autem quidditas sive rei essentia, cuius definitio est ratio, differt a forma quam dixit [Philosophus] esse substantiam in secundo modo, sicut differt humanitas ab anima. Nam forma est pars essentiae vel quidditatis rei. Ipsa autem quidditas vel essentia rei includit omnia essentialia principia.”

form—which ARISTOTLE (also) calls *substance* (in *Metaphysics* Δ.8)—as *humanity* differs from *soul*; for form is part of the essence or quiddity of the thing, and the quiddity or essence of the thing includes itself all essential principles (► 13.12; 14.18).

Thus, in this mode, the (predicable) genus and the species are said to be the substance of those things of which they are predicated, for genus and species do not signify only the form, but the whole essence of the thing.<sup>5</sup>

2. The **universal** (*universale* = τὸ καθόλου), in the opinion of those (Platonists) who posit Ideas (to be) the species (of things).<sup>6</sup> These are the universals predicated of singulars, and (these singular things) are their particular substances (¶4).

3. The **first genus** (*primum genus* < τὸ γένος) of each thing.<sup>7</sup> In this mode, *one* (*unum*) and *being* (*ens*) were posited (by Platonists; ► 30.11; erroneously) to be the substance of all things as the first genera of all.

4. The **subject** (*subiectum* = τὸ ὑποκείμενον), i.e., the *particular substance* (*substantia particularis*).<sup>8</sup> Particular substances are said (to be) *substances* because they are not said (i.e., predicated) of another subject: rather, others are said of them (► 14.6). For example, simple bodies such as elements (are said to be *substances*); and universally, all bodies, even if they are not simple, as compound bodies of like parts: for example, stone, blood, flesh, and other such; also, animals, and their parts, such as hands and feet.

5. Any of the (intrinsic) particles in the aforesaid (particular) substances that are their termini.<sup>9</sup> These, according to the opinion of Platonists and Pythagoreans, signify *this*

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<sup>5</sup> In *Metaph.* 5, l. 10, §902: “Et ideo genus et species dicuntur esse substantia eorum, de quibus praedicantur, hoc ultimo modo. Nam genus et species non significant tantum formam, sed totam rei essentiam.”

<sup>6</sup> In *Metaph.* 7, l. 2, §1271 (cf. ARISTOTLE, *Metaphysica* Z.3, 1028b34): “Secundus modus est prout «universale» dicitur substantia esse, secundum opinionem ponentium ideas species, quae sunt universalis de singularibus praedicata, et sunt horum particularium substantiae.” In *Metaph.* 7, l. 13, §1566 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b3): “Et quarto modo dicitur substantia a quibusdam universale.”

<sup>7</sup> In *Metaph.* 7, l. 2, §1272 (cf. ARISTOTLE, *Metaphysica* Z.3, 1028b35): “Tertius modus est secundum quod «primum genus videtur esse substantia uniuscuiusque.» Et per hunc modum unum et ens ponebant substantias esse omnium rerum, tanquam prima omnium genera.”

<sup>8</sup> In *Metaph.* 7, l. 2, §1273 (cf. ARISTOTLE, *Metaphysica* Z.3, 1028b35–36): “Quartus modus est secundum quod «subiectum,» idest substantia particularis dicitur esse substantia.” In *Metaph.* 5, l. 10, §898 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b10–14): “primus est secundum quod substantiae particulares dicuntur substantiae, sicut simplicia corpora, ut terra et ignis et aqua et huiusmodi. Et universaliter omnia corpora, etiam si non sint simplicia, sicut mixta similium partium, ut lapis, sanguis, caro, et huiusmodi. Et iterum animalia quae constant et huiusmodi corporibus sensibilibus, et partes eorum, ut manus et pedes et huiusmodi [...]. Haec enim omnia praedicta dicuntur substantia, quia non dicuntur de alio subiecto, sed alia dicuntur de his.”

<sup>9</sup> In *Metaph.* 5, l. 10, §900 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b17–21): “ponit [Philosophus] tertium modum, secundum opinionem Platoniorum et Pythagoricorum, dicens, quod quaecumque particulae sunt in praedictis substantiis, quae sunt termini earum, et significant hoc aliquid secundum opinionem



*something*; and, if destructed, the whole is destructed too. For example, if the surface is destroyed, the body is destroyed; and if the line is destroyed, the surface is destroyed. Evidently, the surface is the terminus of the body; and the line (is the terminus) of the surface (►4). According to their position (i.e., according to the opinion of Platonists and Pythagoreans), the line is a part of the surface; and the surface (is a part of) of the body; for they posited bodies to be composed from surfaces; surfaces, from lines; and lines, from points; and so too of other (things). According to this position, number seems to wholly be the substance of all things because, if number is removed, nothing remains in things; for that which is not one is nothing; and likewise, those that are not many are not. Also, number is found to terminate all (things), since all (things) are measured by number.

However, this (fifth) mode is not true; for it is impossible for the substance of a thing to be that which is found commonly (*communiter*) in all (things) and without which the thing cannot be.<sup>10</sup> Rather, (that which is found commonly) can be some property that follows upon the substance of the thing, or a principle of the substance. Their error arises specially in respect to *one* and *number*; for they did not distinguish between the *one* that is convertible with being, and the *one* that is the principle of number (►38.1).

## 15.2. Reduction to First (Particular) and Second (Universal) Substance

ARISTOTLE reduces the aforesaid modes (►15.1) to two (modes):<sup>11</sup>

**1. First or particular substance, or hypostasis:**<sup>12</sup> that which ultimately underlies in propositions, such that it would not be predicated of others (*id quod ultimo subiicitur in*

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eorum, in quibus destructis destruitur totum, dicuntur etiam substantiae. Sicut superficie destructa destruitur corpus, ut quidam dicunt, et destructa linea destruitur superficies. Patet etiam, quod superficies est terminus corporis, et linea terminus superficiei. Et secundum dictorum positionem, linea est pars superficiei, et superficies pars corporis. Ponebant enim corpora componi ex superficiebus et superficies ex lineis, et lineas ex punctis. Unde sequebatur, quod punctum sit substantia lineae, et linea superficiei, et sic de aliis. Numerus autem secundum hanc positionem videtur esse substantia totaliter omnium rerum, quia remoto numero nihil remanet in rebus: quod enim non est unum, nihil est. Et similiter quae non sunt plura, non sunt. Numerus etiam invenitur terminare omnia, eo quod omnia mensurantur per numerum.”

<sup>10</sup> *In Metaph.* 5, l. 10, §901: “Iste autem modus non est verus. Nam hoc quod communiter invenitur in omnibus, et sine quo res esse non potest, non oportet quod sit substantia rei, sed potest esse aliqua proprietas consequens rei substantiam vel principium substantiae. Provenit etiam eis error specialiter quantum ad unum et numerum, eo quod non distinguebant inter unum quod convertitur cum ente, et unum quod est principium numeri.”

<sup>11</sup> *In Metaph.* 5, l. 10, §898 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017b23–26): “reducit [Philosophus] omnes [modos] ad duos.” *Ibid.*, §903 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b23): “reducit [Philosophus] dictos modos substantiae ad duos; dicens, quod ex praedictis modis considerari potest, quod substantia duobus modis dicitur.” *De potentia*, q. 9 a. 1 co.: “Philosophus ponit substantiam dupliciter dici.” *In Sent.* 2, d. 37 q. 1 a. 1 co.: “substantia dupliciter dicitur, ut ex 5 Metaph. patet.”

<sup>12</sup> *In Metaph.* 5, l. 10, §903 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b23–24): “unus [modus] est secundum quod substantia dicitur id quod ultimo subiicitur in propositionibus, ita quod de alio non praedicetur, sicut substantia prima. Et hoc est, quod est hoc aliquid, quasi per se subsistens, et quod est separabile, quia est ab omnibus distinctum et non communicabile multis.” *In Sent.* 1, d. 25 q. 1 a. 1 ad 7: “Alio modo significat individuum in genere substantiae, quod dicitur substantia prima, vel hypostasis.”

*propositionibus, ita quod de alio non praedicetur* < τὸ ὑποκείμενον ἔσχατον, ὃ μῆκέτι κατ' ἄλλου λέγεται). This is that which *this something* is (*quod est hoc aliquid* = ὃ τὸδε τι ὄν), as subsisting by itself, and which is separable (*separabile* = χωριστόν, i.e., capable of existing apart), because it is distinct from all (others) and is not communicable to many.

**2. Second or universal substance:** *the form and the species of each thing (forma et species uniuscuiusque rei* = ἐκάστου ἢ μορφή καὶ τὸ εἶδος).<sup>13</sup> This is the form or nature of the subject: that which signifies the *what* in all things, as when we say that the definition signifies the substance of the thing. In this mode, whatever is positively said, in whatever genus it may be, either *is* a substance or *has* a substance; for, in this mode, *substance* is taken for **essence**.

### 15.3. Substance in Common

*Substance* can also be taken in common insofar as it abstracts from *first* and *second* substance.<sup>14</sup> In this way, *substance* is contracted (*trahitur*, lit., *is drawn*) by *individual*, as by a difference, to stand for *first substance*. This is just as when *animal*, in “rational, mortal animal,” signifies the nature of *animal* insofar as it is abstracted from all species; and it is contracted to a determinate species by an added difference (i.e., *rational, mortal*).

### 15.4. Distinction between First and Second Substance

The reason for the distinction between first and second substance is that multiple subjects are found to agree (*convenire*) in one nature.<sup>15</sup> For example, multiple men (are found to agree) in one nature of *man*. Whence, it is necessary to distinguish that which is one from that which is multiplied; for the common nature is what the definition signifies, indicating *what* the thing is. Whence, the common nature itself is said (to be the) *essence* or *quiddity*.

Therefore, anything that is in the thing pertaining to the common nature is contained under the signification of *essence*.<sup>16</sup> But not anything that is in the particular substance is of such

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<sup>13</sup> *In Metaph.* 5, l. 10, §904 (cf. ARISTOTLE, *Metaphysica* Δ.8, 1017b24–26): “Sed etiam forma et species uniuscuiusque rei, dicitur tale, idest substantia.” *In Sent.* 1, d. 25 q. 1 a. 1 ad 7: “Tertio modo dicitur substantia secunda.” *De potentia*, q. 9 a. 1 co.: “alio modo dicitur substantia forma vel natura subiecti.” *In Sent.* 2, d. 37 q. 1 a. 1 co.: “Alio modo dicitur substantia illud quod significat quid in omnibus rebus, sicut dicimus, quod definitio significat rei substantiam: et hoc modo quidquid positive dicitur, in quocumque genere sit, substantia est vel substantiam habet; sic enim substantia pro essentia sumitur.”

<sup>14</sup> *In Sent.* 1, d. 25 q. 1 a. 1 ad 7: “Quarto modo dicitur substantia communiter prout abstrahit a substantia prima et secunda, et sic sumitur hic, et per individuum, quasi per differentiam, trahitur ad standum pro substantia prima; sicut cum dicitur animal rationale mortale, significat animal naturam animalis prout abstrahitur ab omnibus speciebus, et per differentiam additam trahitur in determinatam speciem.”

<sup>15</sup> *De potentia*, q. 9 a. 1 co.: “Huius autem distinctionis ratio est, quia inveniuntur plura subiecta in una natura convenire, sicut plures homines in una natura hominis. Unde oportuit distingui quod est unum, ab eo quod multiplicatur: natura enim communis est quam significat definitio indicans quid est res; unde ipsa natura communis, essentia vel quidditas dicitur.”

<sup>16</sup> *De potentia*, q. 9 a. 1 co.: “Quidquid ergo est in re ad naturam communem pertinens, sub significatione essentiae continetur, non autem quidquid est in substantia particulari, est huiusmodi. Si enim quidquid

a mode; for if anything that is in the particular substance were to pertain to the common nature, there could be no distinction between particular substances of the same nature.

In a particular substance, that which is other than the common nature is individual matter (► 13.12), which is the principle of singularity; and, consequently, (it consists in) individual accidents that determine the aforesaid matter.<sup>17</sup> Therefore, essence is compared to particular substance as its formal part, as *humanity* (is compared) to *Socrates*. Hence, in things composed from matter and form, the essence is not altogether the same as the subject; whence, it is not predicated of the subject: for example, it is not said that *Socrates* is *one humanity*.

On the other hand, in simple substances (i.e., those not composed from matter and form), there is no difference of essence and subject, since there is in them no individual matter that individuates the common nature: rather, the essence itself is in them a subsistence.<sup>18</sup> This is evident from ARISTOTLE; and from AVICENNA, who says in his *Metaphysics* that the quiddity of a simple (thing) is the simple (thing) itself.

### 15.5. First and Second Substance Compared

Particular substance differs from universal substance in three respects:<sup>19</sup>

1. Particular substance is not predicable—as (is) universal (substance)—of something inferior (e.g., *man* is predicable of *Peter*, but *Peter* is not predicable by itself of anything).<sup>20</sup>
2. Universal substance subsists only in the *ratio* of the singular that subsists by itself.<sup>21</sup>
3. Universal substance is in many; but not the singular (substance), which instead is separable from all and distinct.<sup>22</sup>

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est in substantia particulari ad naturam communem pertineret, non posset esse distinctio inter substantias particulares eiusdem naturae.”

<sup>17</sup> *De potentia*, q. 9 a. 1 co.: “Hoc autem quod est in substantia particulari praeter naturam communem, est materia individualis quae est singularitatis principium, et per consequens accidentia individualia quae materiam praedictam determinant. Comparatur ergo essentia ad substantiam particularem ut pars formalis ipsius, ut humanitas ad Socratem. Et ideo in rebus, ex materia et forma compositis, essentia non est omnino idem quod subiectum; unde non praedicatur de subiecto: non enim dicitur quod Socrates sit una humanitas.”

<sup>18</sup> *De potentia*, q. 9 a. 1 co.: “In substantiis vero simplicibus, nulla est differentia essentiae et subiecti, cum non sit in eis materia individualis naturam communem individuans, sed ipsa essentia in eis est subsistentia. Et hoc patet per Philosophum et per Avicennam, qui dicit, in sua *Metaphysica*, quod quidditas simplicis est ipsum simplex.”

<sup>19</sup> *In Metaph.* 5, l. 10, §903: “Et quantum ad haec tria differt substantia particularis ab universali.”

<sup>20</sup> *In Metaph.* 5, l. 10, §903: “Primo quidem, quia substantia particularis non praedicatur de aliquo inferiori, sicut universalis.”

<sup>21</sup> *Ibid.*: “Secundo, quia substantia universalis non subsistit nisi ratione singularis quae per se subsistit.”

<sup>22</sup> *In Metaph.* 5, l. 10, §903: “Tertio, quia substantia universalis est in multis, non autem singularis, sed est ab omnibus separabilis et distincta.”

## 15.6. Accident Logically Speaking

**Accident** (*accidens* = συμβεβηκός) is taken by philosophers in two (modes):<sup>23</sup>

1. Insofar as it is co-divided with (first) substance and contains under itself nine genera of things (i.e., *quantity, quality, relation, etc.*).<sup>24</sup>

If *accident* is taken according as it is divided against *substance*, then there can be no mean between *substance* and *accident*; for *substance* and *accident* divide *being (ens)* by affirmation and negation: indeed, it is proper of substance **not to be in a subject** (*non esse in subiecto*), while it is (proper) of accident **to be in a subject** (*esse in subiecto*).<sup>25</sup>

2. Insofar as *accident* signifies an accidental relation of the predicate to the subject, or (an accidental relation) of the common to those that are contained under the common; but it does not signify what is common to the nine (accidental) genera (i.e., to be in a subject).<sup>26</sup> This is the accident that ARISTOTLE posits as one of four predicaments in *Topics* (i.e., ὄρος = definition, ἴδιον = proper, γένος = genus, and συμβεβηκός = accident); and PORPHYRY posits (it in his *Isagoge*) as one of the five universals (i.e., γένος = genus, διαφορά = difference, εἶδος = species, ἴδιον = proper, and συμβεβηκός = accident).

If this were the same acceptation as the former, since *accident* taken in this mode is divided against *genus* and *species*, it would follow that nothing that is in the nine (accidental) genera could be said (to be a) *genus* or *species*.<sup>27</sup> But this is evidently false; for color (which is in the genus of *quality*) is the genus of whiteness; and number (which is in the genus of *quantity*, is the genus) of two.

Taking *accident* in this mode, there is, therefore, some mean between *substance* and *accident*: that is, (something) between a substantial and an accidental predicate, which is

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<sup>23</sup> *De spirit. creat.*, a. 11 co.: “accidens a philosophis dupliciter accipitur.”

<sup>24</sup> *De spirit. creat.*, a. 11 co.: “Uno modo, secundum quod condividitur substantiae, et continet sub se novem rerum genera.”

<sup>25</sup> *STh* I, q. 77 a. 1 ad 5: “si accidens accipitur secundum quod dividitur contra substantiam, sic nihil potest esse medium inter substantiam et accidens, quia dividuntur secundum affirmationem et negationem, scilicet secundum esse in subiecto et non esse in subiecto.” *De spirit. creat.*, a. 11 co.: “Non enim inter substantiam et accidens potest esse aliquid medium, cum substantia et accidens dividantur per affirmationem et negationem; cum proprium substantiae sit non esse in subiecto, accidentis vero sit in subiecto esse.”

<sup>26</sup> *De spirit. creat.*, a. 11 co.: “Alio modo accipitur accidens, secundum quod ponitur ab Aristotele unum de quatuor praedicamentis in I Topicorum, et secundum quod a Porphyrio ponitur unum quinque universalium. Sic enim accidens non significat id quod commune est novem generibus, sed habitudinem accidentalem praedicati ad subiectum, vel communis ad ea quae sub communi continentur.” See ARISTOTLE, *Topica* A.5, 101b38: “Λεκτέον δὲ τί ὄρος, τί ἴδιον, τί γένος, τί συμβεβηκός.” Cf. PORPHYRY, *Isagoge*, 1.4–5: “τί γένος καὶ τί διαφορά τί τε εἶδος καὶ τί ἴδιον καὶ τί συμβεβηκός.”

<sup>27</sup> *De spirit. creat.*, a. 11 co.: “Si enim haec esset eadem acceptio cum prima, cum accidens sic acceptum dividatur contra genus et speciem, sequeretur quod nihil quod sit in novem generibus posset dici vel genus vel species; quod patet esse falsum, cum color sit genus albedinis, et numerus binarii.”

the **proper** (*proprium* = ἴδιον; i.e., the *necessary accident* or *property*).<sup>28</sup> Indeed, whatever is essential to the thing pertains to substance. However, not everything that is outside the essence (of the thing) can be said (to be an) *accident*, but only that which is not caused from the essential principles of the species. Now, the *proper* is not of the essence of the thing; but is caused from the essential principles of the species (► 15.17). Whence, (the proper) is a mean between essence (i.e., second substance) and accident thus said.

The *proper* agrees (*convenit*) with the substantial predicate insofar as it is caused from the essential principles of the species.<sup>29</sup> Hence, the properties of the subject are demonstrated by the definition that signifies the essence. On the other hand, it agrees with the accidental predicate in that it is neither the essence nor a part of the essence of the thing, but something other than it (i.e., other than the essence of the thing).

On the other hand, the proper differs from the accidental predicate because the accidental predicate is not caused from the essential principles of the species: rather, it happens (*accidit*) to the individual as the proper (happens) to the species.<sup>30</sup> However, (it happens) sometimes in a separable, (and) sometimes in an inseparable, mode (► 15.18).

### 15.7. Logical vs. Real First Substance

It could seem to someone that, since ARISTOTLE posits all the modes in which *substance* is said, this would suffice to know what *substance* is.<sup>31</sup> For this reason, he adds that *what substance is*—namely, *that which is not predicated of a subject, but of which others are predicated*—has been said only *in universal* («*typo*,» *idest... in universali* = τύπω). It is necessary to know substance—and other things—not only by a universal and logical definition.<sup>32</sup> (A logical definition) is not sufficient to know the nature of a thing because that

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<sup>28</sup> *STh* I, q. 77 a. 1 ad 5: “Si vero accipiatur accidens secundum quod ponitur unum quinque universalium, sic aliquid est medium inter substantiam et accidens. Quia ad substantiam pertinet quidquid est essenziale rei, non autem quidquid est extra essentiam, potest sic dici accidens, sed solum id quod non causatur ex principiis essentialibus speciei. Proprium enim non est de essentia rei, sed ex principiis essentialibus speciei causatur, unde medium est inter essentiam et accidens sic dictum.” *De spirit. creat.*, a. 11 co.: “Sic igitur accipiendo accidens, est aliquid medium inter substantiam et accidens, id est inter substantiale praedicatum et accidentale; et hoc est proprium.”

<sup>29</sup> *De spirit. creat.*, a. 11 co.: “Quod quidem [proprium] convenit cum substantiali praedicato, in quantum causatur ex principiis essentialibus speciei; et ideo per definitionem significantem essentiam demonstratur proprietas de subiecto. Cum accidentali vero praedicato convenit in hoc quod nec est essentia rei, nec pars essentiae, sed aliquid praeter ipsam.”

<sup>30</sup> *De spirit. creat.*, a. 11 co.: “Differt autem [proprium] ab accidentali praedicato, quia accidentale praedicatum non causatur ex principiis essentialibus speciei, sed accidit individuo sicut proprium speciei; quandoque tamen separabiliter, quandoque inseparabiliter.”

<sup>31</sup> *In Metaph.* 7, l. 2, §1280 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a7–9): “quia posset alicui videri, quod ex quo Philosophus ponit omnes modos, quibus dicitur substantia, quod hoc sufficeret ad sciendum quid est substantia; ideo subiungit dicens, quod nunc dictum est quid sit substantia «solum typo,» idest dictum est solum in universali, quod substantia est illud, quod non dicitur de subiecto, sed de quo dicuntur alia.”

<sup>32</sup> *In Metaph.* 7, l. 2, §1280 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a9–10): “sed oportet non solum ita cognoscere substantiam et alias res, scilicet per definitionem universalem et logicam: hoc enim non est sufficiens ad cognoscendum naturam rei, quia hoc ipsum quod assignatur pro definitione tali, est

which is assigned as a definition of such (a nature) is manifest; but the principles of the thing—from which the cognition of the thing depends—are not touched upon through such a definition: rather, (what) is touched upon (is) some common condition of the thing by which such a notification is given (i.e., *that it is not predicated of a subject* is as a sign whereby we can more readily determine whether something is a substance).

Thus, substance is not only the last subject that is not predicated of another (► 14.6), but also the particular or individual in the genus of substance.<sup>33</sup> In this mode, substance signifies the *ratio* of the first category (► 33.2). And this is either the form, the matter, or the composite, which (composite) is in the genus (of substance) by itself (► 29.9, ¶1).

### 15.8. Division of First Substance

ARISTOTLE subdivides the **subject** (*subiectum* = τὸ ὑποκείμενον), which is first, particular substance, into three (parts): matter, form, and the composite from them.<sup>34</sup>

**1. Matter** (*materia* = ὕλη) is that which of itself is not *this something* (*quae secundum se non est hoc aliquid* = ὁ καθ' αὐτὸ οὐκ ἔστι τόδε τι), but (is) only in potency of being *this something* (*in potentia tantum ut sit hoc aliquid* < ἔστι δ' ἡ μὲν ὕλη δύνάμις).<sup>35</sup>

**2. Form** (*forma* = ἡ μορφή), also named **ratio** (*ratio* = ὁ λόγος), because the *ratio* of the species (*species* = εἶδος) is taken from it, is *that whereby this something is already in act* (*secundum quam iam est hoc aliquid in actu* < καθ' ἣν ἤδη λέγεται τόδε τι...; ἔστι... τὸ δ' εἶδος ἐντελέχεια).<sup>36</sup> Form is as a being separable from matter according to *ratio* (*quasi ens separabile secundum rationem a materia* < τῷ λόγῳ χωριστόν ἐστιν), even if it is not separable (from matter) according to thing (*secundum rem*).

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manifestum. Non enim huiusmodi definitione tanguntur principia rei, ex quibus cognitio rei dependet; sed tangitur aliqua communis conditio rei per quam talis notificatio datur.”

<sup>33</sup> *De potentia*, q. 9 a. 1 co.: “dicitur enim uno modo substantia ipsum subiectum ultimum, quod non praedicatur de alio: et hoc est particulare in genere substantiae.” *In Sent.* 2, d. 37 q. 1 a. 1 co.: “Uno enim modo dicitur substantia, secundum quod significat rationem primi praedicamenti: et hoc est vel forma, vel materia, vel compositum, quod per se in genere est.”

<sup>34</sup> *In Metaph.* 7, l. 2, §1276 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a2–3): “subdividit [Philosophus] quartum modum praemissae divisionis; hoc scilicet quod dixerat subiectum [...]. Dicit ergo primo, quod subiectum, quod est prima substantia particularis, in tria dividitur; scilicet in materiam, et formam, et compositum ex eis.” *In Metaph.* 8, l. 1, §1687 (cf. ARISTOTLE, *Metaphysica* H.1, 1042a26–31): “Sed sciendum est, quod materia aliter dicitur substantia, et aliter forma, et aliter compositum.” *In De anima* 2, c. 1, 96–97 (cf. ARISTOTLE, *De anima* B.1, 412a6–9): “substantia diuiditur in materiam et formam et compositum.”

<sup>35</sup> *In De anima* 2, c. 1, 99–100 (cf. ARISTOTLE, *De anima* B.1, 412a7–9): “materia quidem est que *secundum se non est hoc aliquid*, set est in potencia tantum ut sit hoc aliquid.” *In Metaph.* 8, l. 1, §1687 (cf. ARISTOTLE, *Metaphysica* H.1, 1042a27–28): “Materia enim dicitur substantia non quasi ens aliquid actu existens in se considerata, sed quasi in potentia, ut sit aliquid actu, haec dicitur esse hoc aliquid.”

<sup>36</sup> *In De anima* 2, c. 1, 100–101 (cf. ARISTOTLE, *De anima* B.1, 412a9–10): “forma autem est secundum quam iam est hoc aliquid in actu.” *In Metaph.* 8, l. 1, §1687 (cf. ARISTOTLE, *Metaphysica* H.1, 1042a28–29): “Forma vero, quae et ratio nominatur, quia ex ipsa sumitur ratio speciei, dicitur substantia quasi ens aliquid actu, et quasi ens separabile secundum rationem a materia, licet non secundum rem.”

**3. The composite substance** (*substantia composita* < τὸ ἐκ τούτων) is that which is *this something*, something designated (*aliquid demonstratum*), that is complete in being and in species (*completum in esse et specie*); and this belongs, in material things, only to the composite substance.<sup>37</sup> The composite is separable simply (*simpliciter* = ἀπλῶς): that is, it can exist by itself in the nature of things, to which generation and corruption pertain.

For example, among artifacts: (¶1) bronze is as matter; (¶2) the figure (or shape), as the form that gives (bronze) the species (of statue); (¶3) the statue (is as) the composite from them.<sup>38</sup> This example, however, should not be taken according to the truth (of the things), but according to a likeness of proportion; for the figure (of the statue) and other artificial forms are not substances, but accidents (of) some (sort).<sup>39</sup> Nevertheless, since figure is to bronze, in artifacts, as substantial form is to matter, in natural (things), this example is used to demonstrate the unknown through the manifest.

### 15.9. Order Among the Parts of First Substance

The aforesaid (sub)division of substance is not (a division) of genus into species, but of something predicated analogically, which is predicated according to prior and posterior (*per prius et posterius*) of those that are contained under it; for not only particular form and matter, but also the composite (from them), is said (to be a) *substance*, though not in the same order.<sup>40</sup> Hence, ARISTOTLE inquires which of them is substance priorly (*per prius*).

Although substance is said of form, of matter, and of the composite, the composite from matter and form—for example, man—is not a nature itself, but something *from nature* (*a natura* < φύσει); for *nature* has the *ratio* of *principle* (► 12.1), while *composite* has the *ratio* of *that which is from principle(s)* (*habet rationem principiati*).<sup>41</sup>

<sup>37</sup> *In De anima* 2, c. 1, 101–108: “substantia uero composita est que est hoc aliquid. Dicitur enim esse hoc aliquid aliquid demonstratum quod est completum in esse et specie, et hoc competit soli substantie compositae in rebus materialibus; nam substantie separate, quamuis non sint compositae ex materia et forma, sunt tamen hoc aliquid, cum sint subsistentes in actu et complete in natura sua.” *In Metaph.* 8, l. 1, §1687 (cf. ARISTOTLE, *Metaphysica* H.1, 1042a29–31): “Compositum uero ex his dicitur esse substantia quasi separabile simpliciter, idest separatim per se existere potens in rerum natura; et eius solius est generatio et corruptio.”

<sup>38</sup> *In Metaph.* 7, l. 2, §1277 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a3–5): “Exemplificat autem [Philosophus] hic membra in artificialibus, in quibus aes est ut materia, figura ut «forma speciei,» idest dans speciem, statua compositum ex his.”

<sup>39</sup> *In Metaph.* 7, l. 2, §1277: “Quae quidem exemplificatio non est accipienda secundum veritatem, sed secundum similitudinem proportionis. Figura enim et aliae formae artificiales non sunt substantiae, sed accidentia quaedam. Sed quia hoc modo se habet figura ad aes in artificialibus, sicut forma substantialis ad materiam in naturalibus, pro tanto utitur hoc exemplo, ut demonstret ignotum per manifestum.”

<sup>40</sup> *In Metaph.* 7, l. 2, §1276 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a2–3): “Quae quidem divisio non est generis in species, sed alicuius analogice praedicati, quod de eis, quae sub eo continentur, per prius et posterius praedicatur. Tam enim compositum quam materia et forma particularis substantia dicitur, sed non eodem ordine; et ideo posterius inquit quid horum per prius sit substantia.”

<sup>41</sup> *In Physic.* 2, l. 2, n. 4 (cf. ARISTOTLE, *Physica* B.1, 193b5–6): “Posset autem aliquis credere quod quia materia dicitur natura et etiam forma, quod compositum possit dici natura; quia substantia dicitur de

Form is prior to matter because matter is a being in potency, while the species (i.e., the form) is its act; and act is naturally prior to potency.<sup>42</sup> Simply (*simpliciter*) speaking, (act is) prior (to potency not only in the order of being but also) in time; for (something) is moved from potency into act only by a being in act, even if, in time, potency precedes act in one and the same (thing) that is sometimes in potency (and) sometimes in act (► 46.29). Whence, it is evident that form is prior to matter. And (form) is also more a being than (matter) because *that by which each (thing is, is) also more it (propter quod unumquodque et illud magis*; i.e., that by which each thing comes to be or is such, is also more such than that which comes to be or is such by it). Thus, matter comes to be a being in act only by form; whence, form must be more a being than matter.

It follows from this that, for the same reason, form is prior to the composite from one and the other (i.e., from matter and form) insofar as something of matter is in the composite.<sup>43</sup> And thus, (the composite) participates (in) some (mode or quantity) of that which is posterior according to nature—namely, of matter (► 26; 8.9).

Moreover, the composite substance is posterior—according to nature—to both matter and form for two reasons.<sup>44</sup> Firstly, (every) composite (whole) is posterior to (any of) the simple (parts) from which it is composed (► 13.2). It is evident that matter and form are principles of the composite (substance); and since the principles of something are prior to it, if form is prior to matter, it will be prior to the composite. Whence, the cognition of matter and of form precedes the cognition of the composite substance (*cognitio materiae et formae praecedit cognitionem substantiae compositae*).

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forma et materia et de composito. Sed hoc excludit [Philosophus] dicens quod compositum ex materia et forma, ut homo, non est ipsa natura, sed est aliquid a natura; quia natura habet rationem principii, compositum autem habet rationem principii.

<sup>42</sup> *In Metaph.* 7, l. 2, §1278 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a5–6): “Dicit ergo [Philosophus] primo, quod species, idest forma, prior est materia. Materia enim est ens in potentia, et species est actus eius. Actus autem naturaliter prior est potentia. Et simpliciter loquendo prior tempore, quia non movetur potentia ad actum nisi per ens actu; licet in uno et eodem quod quandoque est in potentia, quandoque in actu, potentia tempore praecedat actum. Unde patet, quod forma est prior quam materia, et etiam est magis ens quam ipsa, quia propter quod unumquodque et illud magis. Materia autem non fit ens actu nisi per formam. Unde oportet quod forma sit magis ens quam materia.”

<sup>43</sup> *In Metaph.* 7, l. 2, §1279 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a6–7): “Et ex hoc ulterius sequitur, quod eadem ratione forma sit prior composito ex utrisque, in quantum est in composito aliquid de materia. Et ita participat aliquid de eo quod est posterius secundum naturam, scilicet de materia.”

<sup>44</sup> *In Metaph.* 7, l. 2, §1279 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a6–7): “Et iterum patet, quod materia et forma sunt principia compositi. Principia autem alicuius sunt eo priora. Et ita, si forma est prior materia, erit prior composito.” *Ibid.*, l. 2, §1294 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a30–31): “Ostendit [Philosophus] *quomodo sit procedendum circa partes huius divisionis* substantiae, quam prosecutus est, prout scilicet dividitur in materiam et in formam et compositum: et dicit, quod licet tam species quam compositum sit magis substantia quam materia, tamen ad praesens dimittenda est substantia quae «ex ambobus composita,» scilicet ex materia et forma. Et hoc propter duas rationes.” *Ibid.*, §1295: “Una ratio est, quia ipsa est posterior secundum naturam utraque, scilicet quam materia et quam forma; sicut compositum est posterius simplicibus, ex quibus componitur. Et ideo cognitio materiae et formae praecedit cognitionem substantiae compositae.”



Secondly, (the composite substance is naturally posterior to matter and form) because such a substance is evident, since it underlies sense (cognition).<sup>45</sup> Therefore, cognition concerning it cannot be hindered. Although form is a principle of cognition, while matter—according to its essence—does not have that whence it would be known, matter is known by some likeness of proportion; for just as sensible substances are related to artificial forms as wood (is related) to the form of the bench, so, too, first matter is related to sensible forms. Whence, ARISTOTLE says in the *Physics* that first matter is knowable according to analogy (►41.11, ¶1; 15.8; 46.6).

### 15.10. Properties of First Substance

The substance that is the subject has two proper(ities):<sup>46</sup>

1. It does not need an extrinsic foundation in which it would be sustained; rather, *it is sustained in itself*.<sup>47</sup> Whence, it is said **to subsist** (*subsistere*), as existing by itself (*per se*) and not in another (*in alio*). Insofar as it subsists, the substance that is the subject is called (in Greek) *ousiosis* (οὐσίωσις < οὐσία) or *subsistence* (*subsistentia* < *substantia*).
2. *It is the foundation of accidents* (*fundamentum accidentibus*), sustaining (*substantans*) them.<sup>48</sup> Whence, it is said **to underlie** (*substare*). Insofar as it underlies, the substance that is the subject is called *hypostasis* (ὑπόστασις), according to the Greeks; or *first substance* (*substantia prima*), according to the Latins.

Evidently, therefore, *hypostasis* and *substance* differ in *ratio*, but are the same in thing.<sup>49</sup> However, essence in material (things) is evidently not the same as them according to thing

<sup>45</sup> *In Metaph.* 7, l. 2, §1296 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a32–33; *Physica* A.7, 191a7–12): “Alia ratio est, quia huiusmodi substantia «est aperta,» idest manifesta, cum sensui subiaceat. Et ideo circa eius cognitionem non oportet immorari. Materia autem, licet non sit posterior sed quodammodo prior, tamen aliquantulum est manifesta. Dicit autem «aliquantulum» quia secundum essentiam suam non habet unde cognoscatur, cum cognitionis principium sit forma. Cognoscitur autem per quamdam similitudinem proportionis. Nam sicut huiusmodi substantiae sensibiles se habent ad formas artificiales, ut lignum ad formam scanni, ita prima materia se habet ad formas sensibiles. Propter quod dicitur primo Physicorum, quod materia prima est scibilis secundum analogiam.”

<sup>46</sup> *De potentia*, q. 9 a. 1 co.: “Substantia vero quae est subiectum, duo habet propria.”

<sup>47</sup> *De potentia*, q. 9 a. 1 co.: “primum est quod non indiget extrinseco fundamento in quo sustentetur, sed sustentatur in seipso; et ideo dicitur subsistere, quasi per se et non in alio existens. [...] Sic ergo substantia quae est subiectum, in quantum subsistit, dicitur ousiosis vel subsistentia.” Cf. BOETHIUS, *The Theological Tractates* (Cambridge, Massachusetts: Harvard University Press, 1968), *Contra Eutychem et Nestorium*, III.42–43: “quod Graeci οὐσίωσιν uel οὐσιῶσθαι dicunt, id nos subsistentiam uel subsistere appellamus.”

<sup>48</sup> *De potentia*, q. 9 a. 1 co.: “Aliud vero est quod est fundamentum accidentibus substantans ipsa; et pro tanto dicitur substare. Sic ergo substantia quae est subiectum [...] in quantum vero substare, dicitur hypostasis secundum Graecos, vel substantia prima secundum Latinos.” Cf. BOETHIUS, *The Theological Tractates, Contra Eutychem et Nestorium*, III.43–45: “quod uero illi [sc., Graeci] ὑπόστασιν uel ὑφίστασθαι [dicunt], id nos substantiam uel substare interpretamur.”

<sup>49</sup> *De potentia*, q. 9 a. 1 co.: “Patet ergo quod hypostasis et substantia differunt ratione, sed sunt idem re. Essentia uero in substantiis quidem materialibus non est idem cum eis secundum rem, neque penitus diversum, cum se habeat ut pars formalis; in substantiis uero immaterialibus est omnino idem secundum

(*secundum rem*); nor (is it) thoroughly diverse, since it is related as a formal part. And in immaterial substances, it is altogether the same according to thing, but differs in *ratio*. *Person*, in turn, adds over *hypostasis* a determinate nature; for it is a hypostasis (i.e., an individual substance or *suppositum*) of rational nature.

### 15.11. The Subject and its Forms

As discussed above (► 14.7), *subject* is said in two modes:<sup>50</sup>

1. As *that which is (this) something (id quod est aliquid < τόδε τι ὄν) and a being in act (ens actu)—as animal—underlies its affections (subiicitur suis passionibus < ὑπόκειται... τοῖς πάθεσιν); and (as) whatever particular substance (underlies) its accidents.*<sup>51</sup>

2. As the first matter (i.e., prime matter; ► 46.7) underlies (its) act, that is, (underlies) substantial forms (*sicut materia prima «subiicitur actui,» idest formae substantiali < ὑπόκειται... ἡ ὕλη τῆ ἐντελεχείᾳ).*<sup>52</sup>

### 15.12. Substantial vs. Accidental Form

Matter and form are to one another a cause of being (► 10.6), either *simply (simpliciter)* or *according to something (secundum quid)*:<sup>53</sup>

1. A **substantial form** gives (the act of) being to matter simply and causes (a being) to be in act simply (*facit esse actu simpliciter*).<sup>54</sup>

2. An **accidental form** does not make a being in act simply (*simpliciter*), but, insofar as it, too, is a form, (it gives an act of being to its subject-matter) according to something, making it to be *such* or *so much (tale vel tantum)* in act: for example, *white* or *great*, or something of this sort.<sup>55</sup>

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rem, sed differens ratione. Persona vero addit supra hypostasim determinatam naturam: nihil enim est aliud quam hypostasis rationalis naturae.”

<sup>50</sup> *In Metaph.* 7, l. 13, §1568 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b4–6): “Dictum est enim [...] de subiecto, quod dicitur dupliciter.”

<sup>51</sup> *In Metaph.* 7, l. 13, §1568 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b5–6): “Uno modo sicut id quod est aliquid, et ens actu, sicut animal subiicitur suis passionibus, et quaecumque substantia particularis suis accidentibus.”

<sup>52</sup> *In Metaph.* 7, l. 13, §1568 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b6): “Alio modo sicut materia prima «subiicitur actui,» idest formae substantiali.”

<sup>53</sup> *In Metaph.* 5, l. 2, §775: “forma dat esse, materia autem recipit. [...] Forma autem et materia sibiinvicem sunt causa quantum ad esse. Forma quidem materiae in quantum dat ei esse actu; materia vero formae in quantum sustentat ipsam. Dico autem utrumque horum sibi invicem esse causam essendi vel simpliciter vel secundum quid.”

<sup>54</sup> *In Metaph.* 5, l. 2, §775: “forma substantialis dat esse materiae simpliciter.” *In De anima* 2, c. 1, 246–247: “forma autem substancialis facit [ens] esse actu simpliciter.”

<sup>55</sup> *In Metaph.* 5, l. 2, §775: “Forma autem accidentalis [dat esse materiae] secundum quid, prout etiam forma est.” *In De anima* 2, c. 1, 244–246: “forma accidentalis non facit ens actu simpliciter, set ens actu tale uel tantum, ut puta magnum uel album uel aliquid aliud huiusmodi.”

◀ Thus, substantial and accidental form agree (*conveniunt*) in that both are in act; and in that something is in act in some mode according to each of them.<sup>56</sup> However, they differ in two ways.

First, a substantial form makes (something) to be simply, while an accidental form does not make (something) to be simply, but to be *such*, or *so much*, or *related in some mode* (*aliquo modo se habens*).<sup>57</sup> Moreover, an accidental form befalls (*advenit*) a subject already existent in act, while a substantial form does not befall a subject that is already existent in act, but an existent in potency only: i.e., the first (i.e., prime) matter. Whence, it is evident that actuality (*actualitas*) is found priorly (*per prius*) in the substantial form than in its subject.<sup>58</sup> Since that which is first is the cause in any genus (▶ 27.4), the substantial form causes being in act in its subject. Conversely, however, actuality is found priorly in the subject of the accidental form than in the accidental form. Whence, the actuality of the accidental form is caused by the actuality of the subject.

Secondly, since the less principal is for the sake of (*propter*) the more principal, substantial and accidental form differ in that matter is for the sake of the substantial form, while, conversely, the accidental form is for the sake of the completion of the subject.<sup>59</sup>

### 15.13. Oneness of the Substantial Form

Every form gives some (act of) being; but it is impossible for one thing to have multiple substantial forms; for the first form that befalls matter gives to it a substantial (act of) being, making a being in act simply, while the second, supervenient form, as all others, give an accidental (act of) being, befalling a subject already existent in act.<sup>60</sup> Whence, the form by which fire is fire, is not—as AVICENNA would have it—other than that by which it is a body.

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<sup>56</sup> *STh* I, q. 77 a. 6 co.: “forma substantialis et accidentalis partim conveniunt, et partim differunt. Conveniunt quidem in hoc, quod utraque est actus, et secundum utramque est aliquid quodammodo in actu. Differunt autem in duobus.”

<sup>57</sup> *STh* I, q. 77 a. 6 co.: “Primo quidem, quia forma substantialis facit esse simpliciter, et eius subiectum est ens in potentia tantum. Forma autem accidentalis non facit esse simpliciter; sed esse tale, aut tantum, aut aliquo modo se habens, subiectum enim eius est ens in actu.” *In De anima* 2, c. 1, 247–251: “unde forma accidentalis aduenit subiecto iam existenti in actu, forma autem substancialis non aduenit subiecto iam preexistenti in actu, set existenti in potencia tantum, scilicet materie prime.”

<sup>58</sup> *STh* I, q. 77 a. 6 co.: “Unde patet quod actualitas per prius invenitur in forma substantiali quam in eius subiecto, et quia primum est causa in quolibet genere, forma substantialis causat esse in actu in suo subiecto. Sed e converso, actualitas per prius invenitur in subiecto formae accidentalis, quam in forma accidentali, unde actualitas formae accidentalis causatur ab actualitate subiecti.”

<sup>59</sup> *STh* I, q. 77 a. 6 co.: “Secundo autem differunt substantialis forma et accidentalis, quia, cum minus principale sit propter principalius, materia est propter formam substantialem; sed e converso, forma accidentalis est propter completionem subiecti.”

<sup>60</sup> *In De anima* 2, c. 1, 251–257: “Ex quo [sc., forma accidentalis aduenit subiecto iam existenti in actu, forma autem substancialis aduenit subiecto existenti in potencia tantum] patet quod impossibile est unius rei esse plures formas substanciales, quia prima faceret ens actu simpliciter et omnes alie aduenirent subiecto iam existenti in actu; unde accidentaliter aduenirent: non enim facerent ens actu simpliciter, set secundum quid.” *In Sent.* 2, d. 18 q. 1 a. 2 co.: “cum omnis forma det aliquod esse, et impossibile sit

It is true that AVERROES says that the genus is not matter, but a mean form (*forma media*) between matter and the ultimate form.<sup>61</sup> However, this is not said to signify the order of forms according to thing (*secundum rem*), but according to *ratio* (*secundum rationem*; see the *form of corporeity*, which is the first form according to *ratio*; ► 46.11); for, although the genus signifies the whole, as AVICENNA says, it signifies (the whole) as indistinct; and, in this way, it is proximately related to the *ratio* of *matter* (► 14.12; 14.13).

Therefore, no substantial form is united to matter by means of another substantial form.<sup>62</sup> Rather, the more perfect form gives to matter whatever the inferior form gives—and then more. Matter, insofar as it is perfected by it (i.e., by the more perfect form) in that mode of perfection by which it is perfected by inferior forms, is considered as the proper matter also in the mode of perfection that the more perfect form adds over the others. However, this distinction is not understood in forms according to essence, but only according to the intelligible *ratio*.

Thus, it is one and the same substantial form by which *this individual* is *this something* or *this substance*, and by which it is a body, an animated body, and all the rest; for the more perfect form gives to matter what the less perfect form gives—and more.<sup>63</sup> In this way, therefore, matter itself is the proper subject of the soul insofar as it is understood as perfect(ed) in a corporeal (act of) being susceptible of life.

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unam rem habere duplex esse substantiale, oportet, si prima forma substantialis adveniens materiae det sibi esse substantiale, quod secunda superveniens det esse accidentale: et ideo non est alia forma qua ignis est ignis, et qua est corpus, ut Avicenna vult.” See also *De spirit. creat.*, a. 1 ad 9 (vs. AVICEBRON).

<sup>61</sup> *In Sent.* 2, d. 18 q. 1 a. 2 co.: “Et si Commentator dicat in 2 Metaph. genus non esse materiam sed formam mediam inter materiam et ultimam formam: hoc non dicitur ad significandum ordinem formarum secundum rem sed secundum rationem: quia genus quamvis significet totum, ut Avicenna dicit, significat tamen ut indistinctum, et ita propinque se habet ad rationem materiae.”

<sup>62</sup> *Q. d. de anima*, a. 11 co.: “nulla forma substantialis unitur materiae mediante alia forma substantiali; sed forma perfectior dat materiae quidquid dabit forma inferior, et adhuc amplius.” *De spirit. creat.*, a. 3 ad 2: “cum forma perfectissima det omnia quae dant formae imperfectiores, et adhuc amplius; materia, prout ab ea perficitur eo modo perfectionis quo perficitur a formis imperfectioribus, consideratur ut materia propria, etiam illiusmodi perfectionis quam addit perfectior forma super alias; ita tamen quod non intelligatur haec distinctio in formis secundum essentiam, sed solum secundum intelligibilem rationem.”

<sup>63</sup> *De spirit. creat.*, a. 3 ad 2: “Sic ergo ipsa materia secundum quod intelligitur ut perfecta in esse corporeo susceptivo vitae, est proprium subiectum animae.” *In De anima* 2, c. 1, 265–270: “Oportet enim secundum premissa dicere quod una et eadem forma substantialis sit per quam hoc individuum est hoc aliquid siue substantia et per quam est corpus et animatum corpus et sic de aliis: forma erum perfectior dat materie et hoc quod dat forma minus perfecta et adhuc amplius.” St. Thomas says this after referring us to AVICEBRON’s *Fons vitae*, explaining (in *ibid.*, 258–264) that the opinion is false of those who posit that, in one and the same thing, there is an order of multiple substantial forms that follows upon the order of genera and species: for example, that in this individual human being there is a form by which it is a substance; another one by which it is a body; a third one by which it is an animated body; and so on of the other (with all the specific differences taken as though they were substantial forms added to one another). See Clemens BAEUMKER (ed.), *Avicembrolis (Ibn Gebirol) Fons Vitae*, Bd. 1, Heft 2-4 (Münster in Westfalen: Aschendorff, 1895), 4.3, 215.26–216.6: “Non putavi quod tu opponeres de dubitatione huiusmodi propter praemissas probationes de assignatione diuersitatis in aubstantiis simplicibus, tamquam si certum tibi non fuisset quod forma naturae est aliud a forma animae uegetabilis, et quod forma animae uegetabilis alia est a forma animae sensibilis, et quod forma animae sensibilis alia est a forma animae rationalis, et quod forma animae rationalis alia est a forma intelligentiae.”

#### 15.14. Conjunction of Matter and Form

Just as a substantial form does not have by itself (*per se*) an absolute (act of) being (*esse absolutum*) without matter, nor does the matter it befalls.<sup>64</sup> It is from the conjunction of one and the other that results that (act of) being in which the thing subsists by itself; (that something) one by itself (*unum per se*) is caused (*efficitur*) from it; and (that) some essence results from their conjunction (► 16.3). Hence, although, considered in itself, form does not have a complete *ratio* of *essence*, it is, however, a part of a complete essence.

On the other hand, that to which an accident befalls is a complete being in itself (*ens in se completum*), subsisting in its (act of) being (*subsistens in suo esse*), which (act of) being precedes that accident that befalls it.<sup>65</sup> Hence, from its conjunction with that which it befalls, the supervenient accident does not cause the (act of) being in which the thing subsists, by which the thing is a being by itself (*per quod res est ens per se*). Rather, it causes some second (act of) being without which the subsistent thing can be understood to be, as a first can be understood without a second.

#### 15.15. Form, Matter, and the Composite

In composite things, either one of the (parts) from which there is composition is in potency (in respect) to the other, as matter (is in potency in relation) to form, subject to accident, and genus to difference; or, at least, all the parts are in potency to the whole.<sup>66</sup>

Physical and natural composition is multiple.<sup>67</sup> There is a composition of the compound from elements, of which ARISTOTLE says that the form of the compound must altogether be other than the elements themselves. There is also a composition of substantial form and matter, from which a third (thing) results: i.e., the form of the species, which certainly is not altogether other than matter and form; rather, it is related to them as whole to parts.

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<sup>64</sup> *De ente*, c. 6, 23–33: “Sed tamen inter formas substantiales et accidentales tantum interest quia, sicut forma substantialis non habet per se esse absolutum sine eo cui aduenit, ita nec illud cui aduenit, scilicet materia; et ideo ex coniunctione utriusque relinquitur illud esse in quo res per se subsistit, et ex eis efficitur unum per se: propter quod ex coniunctione eorum relinquitur essentia quedam. Vnde forma, quamvis in se considerata non habeat completam rationem essentie, tamen est pars essentie complete.”

<sup>65</sup> *De ente*, c. 6, 33–42: “Sed illud cui aduenit accidens est ens in se completum subsistens in suo esse, quod quidem esse naturaliter precedit accidens quod superuenit. Et ideo accidens superueniens ex coniunctione sui cum eo cui aduenit non causat illud esse in quo res subsistit, per quod res est ens per se; sed causat quoddam esse secundum sine quo res subsistens intelligi potest esse, sicut primum potest intelligi sine secundo.”

<sup>66</sup> *De potentia*, q. 7 a. 1 co.: “In compositis enim vel unum eorum ex quibus est compositio est in potentia ad alterum, ut materia ad formam, subiectum ad accidens, genus ad differentiam; vel saltem omnes partes sunt in potentia ad totum.”

<sup>67</sup> *De veritate*, q. 16 a. 1 ad 16: “compositio physica et naturalis est multiplex. Est enim compositio mixti ex elementis; et in hac compositione loquitur Philosophus quod oportet formam mixti esse aliud omnino ab ipsis elementis. Est etiam compositio formae substantialis et materiae, ex qua resultat tertium, scilicet forma speciei: quae quidem non est aliud omnino a materia et forma, sed se habet ad eas ut totum ad partes. Est etiam compositio subiecti et accidentis in qua non resultat aliquid tertium ex utroque.”

There is also a composition of subject to accident, in which some third (thing) does not result from one and the other.

Although forms and accidents do not have a part of their matter from which (*ex qua*) they should be, they have, however, a matter in which (*in qua*) they are (► 14.8), and from whose potency they are educed.<sup>68</sup> Whence, even when they cease to be, they are not altogether annihilated, but remain in the potency of matter, as before (they actually were).

For example, no matter could be assigned if one were to ask, “what is the cause of an eclipse?”<sup>69</sup> However, the moon is the subject that undergoes such an affection; for the *ratio of eclipse is the privation of light in the moon*. This is evident, likewise, in the accident of sleep, even if the first subject of sleep is not manifest: e.g., whether the organ of sleep is the brain; for it is evident that *animal* is the (ultimate) subject of this affection.<sup>70</sup> But if sleep is *the rest of sensible operations*, then its first subject must be posited in its definition, just as any accident is defined through its first, proper subject (► 18).

Sometimes, however, matter does not sustain a (substantial) form simply according to (its act of) being (*non sustentat formam secundum esse simpliciter*), but insofar as it is its form, having (its act of) being *in this* (*habens esse in hoc*, i.e., as *matter in which*, rather

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<sup>68</sup> *De potentia*, q. 5 a. 4 ad 9: “formae et accidentia etsi non habeant materiam partem sui ex qua sint, habent tamen materiam in qua sunt et de cuius potentia educuntur; unde et cum esse desinunt, non omnino annihilantur, sed remanent in potentia materiae, sicut prius.”

<sup>69</sup> *In Metaph.* 8, l. 4, §1744 (cf. ARISTOTLE, *Metaphysica* H.4, 1044b9–11; 14): “Si ergo quaeratur quae sit causa eclipsis, non est assignare quae sit materia; sed luna est subiectum patiens talem passionem. [...] ratio eclipsis lunae est privatio luminis in luna.” ARISTOTLE adds other causes to this definition. As St. Thomas comments, the Earth—diametrically interposed between the Sun and the Moon—is the moving cause that blocks (lit., *corruptit*) light. A final cause might not be assigned, for those that pertain to defect are not for the sake of an end: rather, they proceed from the necessity of nature, or of the agent cause; and the consideration of causes concerning singular (things) that happen in celestial motions it is quite difficult. On the other hand, the formal cause of the eclipse is its definition; and this definition is not evident if no cause is posited in it. But if to this definition were added that this privation is *due to the earth being positioned diametrically between the sun and the moon*, then the definition will be with a cause. See *ibid.* (cf. ARISTOTLE, *Metaphysica* H.4, 1044b11–15): “Causa autem movens, quae corrumpit lumen, est terra interposita diametraliter inter solem et lunam. Causam vero finalem forsitan non est assignare. Ea enim, quae ad defectum pertinent, non sunt propter finem, sed magis proveniunt ex necessitate naturae, vel causae agentis. Dicit autem [Philosophus] forsitan, quia consideratio causarum circa singula quae contingunt in motibus caelestibus est valde difficilis. Causa vero formalis eclipsis est definitio eius. Sed haec definitio non est manifesta, nisi in ea ponatur causa; [...]. Sed, si addatur, quod ista privatio est a terra in medio obiecta inter solem et lunam diametraliter, haec definitio erit cum causa.”

<sup>70</sup> *In Metaph.* 8, l. 4, §1745 (cf. ARISTOTLE, *Metaphysica* H.4, 1044b15–20): “Similiter hoc patet in hoc accidente quod est somnus. Sed in somno non est manifestum quid est primum subiectum patiens hanc passionem; sed hoc est manifestum quod animal est subiectum somni. Sed secundum quid primo somnus insit animali, utrum sit cor, vel aliquid aliud tale, non est manifestum; cum quidam ponant primum instrumentum sensus esse cerebrum, quidam vero cor. Somnus autem est quies operationis sensibilis. Deinde oportet considerare, habito subiecto somni, a quo sicut a causa agente sit somnus; utrum ab evaporatione alimenti, aut labore, aut aliquo huiusmodi. Deinde oportet considerare quae passio sit somnus, illius scilicet secundum quod primo inest somnus animali, et non totius animalis; quia somnus est quaedam immobilitas; sed ea competit animali per aliquod primum, quod est subiectum talis passionis. Et illud primum oportet poni in definitione somni, sicut et quodlibet accidens definitur per proprium suum primum subiectum. Color enim definitur per superficiem et non per corpus.”

than *matter from which*; ► 14.8), as the human body is related to the rational soul (or *mind*).<sup>71</sup>

In contrast, the form of a house, as also (all) other artificial forms, is an accidental form.<sup>72</sup> Whence, it does not give the (act of) being and the species to the whole and to whichever part; nor is the whole (something) one simply (*simpliciter*), but (something) one according to aggregation (*aggregatione*; ► 13.11).

### 15.16. Causes of Accidents

Whatever is in something as in a subject, must have some cause.<sup>73</sup> Speaking **in common**, *the subject is the cause of all accidents insofar as accidents are sustained (sustentantur) upon the (act of) being of the subject*—not, however, in such a way that all accidents would be educed from the principles of the subject.

Whatever is in something that is other than its essence must be caused either from the principles of the essence, as proper accidents follow upon the species—as risible follows upon man and is caused from the essential principles of the species—or by something exterior, as heat is caused in water by fire.<sup>74</sup> Hence, whatever is in something as in a subject is caused either *from the principles of the subject or from some extrinsic cause*.

### 15.17. Proper Affection (Property), Natural Accident, Habit (Possession)

The **natural accident**, also called **proper affection** (*passio* = πάθος) or **habit** (*habitus* = ἔξις, i.e., possession) is caused from the principles of the subject, which are form and matter (► 15.8); for each thing is placed in a genus or in a species by its form; and is individuated by matter (► 13.10).<sup>75</sup>

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<sup>71</sup> *In Metaph.* 5, l. 2, §775: “Materia etiam quandoque non sustentat formam secundum esse simpliciter, sed secundum quod est forma huius, habens esse in hoc, sicut se habet corpus humanum ad animam rationalem.”

<sup>72</sup> *Q. d. de anima*, 10 ad 16: “forma domus, sicut et aliae formae artificiales, est forma accidentalis: unde non dat esse et speciem toti et cuilibet parti; neque totum est unum simpliciter, sed unum aggregatione.”

<sup>73</sup> *ScG* 3, c. 13, n. 2: “Quicquid enim est in aliquo ut in subiecto, oportet quod habeat aliquam causam.” *In Sent.* 1, d. 17 q. 1 a. 2 ad 2: “subjectum diversimode se habet ad diversa accidentia. [...] Tamen sciendum, quod omnibus accidentibus, communiter loquendo, subjectum est causa quodammodo, in quantum scilicet accidentia in esse subjecti sustentantur; non tamen ita quod ex principiis subjecti omnia accidentia educantur.”

<sup>74</sup> *STh* 1, q. 3 a. 4 co.: “quidquid est in aliquo quod est praeter essentiam eius, oportet esse causatum vel a principiis essentiae, sicut accidentia propria consequentia speciem, ut risibile consequitur hominem et causatur ex principiis essentialibus speciei; vel ab aliquo exteriori, sicut calor in aqua causatur ab igne.” *ScG* 3, c. 13, n. 2: “causatur enim vel ex subiecti principiis, vel ex aliqua extrinseca causa.” *In Sent.* 1, d. 17 q. 1 a. 2 ad 2: “subjectum diversimode se habet ad diversa accidentia. Quaedam autem sunt accidentia naturalia quae creantur ex principiis subjecti [...]. Quaedam autem sunt quae quidem causantur ab extrinseco.” *De veritate*, q. 3 a. 7 co.: “Quaedam enim sunt accidentia propria ex principiis subiecti causata. [...] Quaedam vero sunt accidentia, quae non sequuntur inseparabiliter suum subiectum, nec ex eius principiis dependent.”

<sup>75</sup> *In Physic.* 4, l. 23, n. 2: “accidens autem consuevit [Philosophus] nomine *habitus* et *passionis* nominari.” Cf. ARISTOTLE, *Physica* Δ.15, 223a18–19: “πάθος ἢ ἔξις.” *In Sent.* 1, d. 17 q. 1 a. 2 ad 2: “Quaedam autem sunt accidentia naturalia quae creantur ex principiis subjecti; et hoc dupliciter.” *In*

Accidents that follow upon form are the *proper affections* either **of the genus** or **of the species**.<sup>76</sup> Whence, they are found in all those (subjects) that participate (in) the nature of the genus or of the species (►26). For example, in the species *man*, *risible* follows upon the form; for laughter happens from some apprehension of man's soul.

Accidents that follow upon (individual) matter are accidents or affections **of the individual**, insofar as individuals—even of the same species—differ one from another.<sup>77</sup>

Some proper accidents, such as male and female, have a permanent cause in their subject, are produced into being in one operation with it, and are never separated—according to being (*secundum esse*; i.e., as opposed to according to *ratio*, *secundum rationem*)—from it.<sup>78</sup> There are, however, other (accidents) that do not have a permanent cause in the subject, and are, therefore, separable (►15.18). For example, *to sit down* or *to walk*.

### 15.18. Separable (Non-Necessary) vs. Inseparable (Necessary) Accident

ARISTOTLE posits two modes in which **accident** (*accidens* = συμβεβηκός) is said:<sup>79</sup>

1. The **non-necessary** or **separable accident** (►15.20): *that which is in something, and which can be truly affirmed [of it] (id quod inest alicui, et quod contingit vere affirmare < ὁ ὑπάρχει μὲν τινι καὶ ἀληθῆς εἶπειν); not, however, of necessity (non tamen ex necessitate < οὐ μέντοι οὔτ' ἐξ ἀνάγκης; ►9.9), nor as in most (nec... ut in pluribus = οὔτε <ὧς> ἐπὶ τὸ πολὺ) but as in fewer (sed ut in paucioribus).*<sup>80</sup>

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*Physic.* 5, l. 3, n. 4: "Manifestum est enim quod propriae passiones causantur ex principiis subiecti, quae sunt materia et forma." *De ente*, c. 6, 87–89: "unaqueque res indiuiduatur ex materia et collocatur in genere uel specie per suam formam."

<sup>76</sup> *De ente*, c. 6, 92–95: "accidentia uero que consequuntur formam sunt proprie passiones uel generis uel speciei, unde inueniuntur in omnibus participantibus naturam generis uel speciei." *In Sent.* 1, d. 17 q. 1 a. 2 ad 2: "vel causantur ex principiis speciei, et sic sunt propriae passiones, quae consequuntur totam speciem." *De ente*, c. 6, 95–97: "sicut risibile consequitur in homine formam, quia risus contingit ex aliqua apprehensione anime hominis." *Q. d. de anima*, a. 12 ad 7: "quaedam enim [accidentia] causantur ex principiis speciei, et dicuntur propria sicut risibile homini."

<sup>77</sup> *De ente*, c. 6, 89–92: "accidentia que consequuntur materiam sunt accidentia indiuidui, secundum que indiuidua etiam eiusdem speciei ad inuicem differunt." *In Sent.* 1, d. 17 q. 1 a. 2 ad 2: "vel [causantur] ex principiis indiuidui, et sic sunt communia consequentia principia naturalia indiuidua."

<sup>78</sup> *Q. d. de anima*, a. 12 ad 7: "quaedam uero [accidentia] causantur ex principiis indiuidui. Et hoc dicitur quia, vel habent causam permanentem in subiecto, et haec sunt accidentia inseparabilia, sicut masculinum et femininum et alia huiusmodi; quaedam uero habent causam non permanentem in subiecto, et haec sunt accidentia separabilia, ut sedere et ambulare." *De ueritate*, q. 3 a. 7 co.: "Quaedam enim sunt accidentia propria ex principiis subiecti causata, quae secundum esse nunquam a suis subiectis separantur. Et huiusmodi una operatione in esse producuntur cum suo subiecto."

<sup>79</sup> *In Metaph.* 5, l. 22, §1139 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a14–34): "ponit [Philosophus] duos modos, quibus dicitur hoc nomen accidens." *In Physic.* 1, l. 6, n. 10 (cf. ARISTOTLE, *Physica* A.3, 186b18–23): "accidens dicitur dupliciter." *De prin. nat.* §2, 15: "duplex est accidens."

<sup>80</sup> *In Metaph.* 5, l. 22, §1139 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a14–15): "quorum *primus* est, quod accidens dicitur id quod inest alicui, et quod contingit vere affirmare, non tamen ex necessitate, nec «secundum magis,» idest ut in pluribus, sed ut in paucioribus."



2. The **necessary or inseparable accident**: that which is in something according to itself (*quod inest alicui secundum se* < ὅσα ὑπάρχει ἐκάστῳ καθ' αὐτὸ), and yet it does not belong to its substance (*et tamen non est de substantia eius* < μὴ ἐν τῇ οὐσίᾳ ὄντα). In this mode, (by) accident (*accidens*) is opposed to *substantially* (*substantialiter*).<sup>81</sup>

### 15.19. The Inseparable Accident

The **inseparable and by itself** (*inseparabile et per se*) **accident** is that (accident) in which is posited the subject it inheres (in cuius definitione ponitur subiectum cui accidit = οὗ ἐν τῷ λόγῳ ὑπάρχει τὸ ᾧ συμβέβηκεν); for (such an accident) is necessary (► 9.9, ¶1), since cannot be separated from the thing.<sup>82</sup>

For example, *snub* is an accident by itself of *nose*; for *nose* is posited in the definition of *snub*: indeed, *snub* is a *curved nose*. Likewise, *risible* (i.e., capable of laughing) is a necessary accident that is not separable from *man*.

Separable accidents differ from the inseparable in that the latter can be sempiternal.<sup>83</sup> Thus, a triangle always has three angles equal to two right (angles, =180°). No separable accidents can be sempiternal because they always are as in fewer (subjects); and their *ratio* is had in others (i.e., in their proper subjects, which are posited in their *ratio*).

That an accident that is not by itself is not necessarily in (a subject) can be had from this: if an accident (*accidens* = συμβεβηκός) is of necessity and always (*ex necessitate et semper*) in a subject (*insit subiecto*), it must have a cause in the subject; this posited, the accident cannot but be in it.<sup>84</sup> And this can happen in two modes: **(1)** when the accident is *caused from the principles of the species*; and such an accident is said to be an affection by itself or proper (► 15.17); **(2)** when the accident is *caused from the principles of the individual*, and this is an inseparable accident.

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<sup>81</sup> *In Metaph.* 5, l. 22, §1142 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a30–32): “Secundo modo dicitur accidens, quod inest alicui secundum se, et tamen non est de substantia eius.” *In Metaph.* 5, l. 22, §1143: “Accidens vero secundo modo opponitur ad substantialiter.”

<sup>82</sup> *In Physic.* 1, l. 6, n. 10 (cf. ARISTOTLE, *Physica* A.3, 186b20; 22–23): “alio modo accidens inseparabile et per se. Et hoc est accidens in cuius definitione ponitur subiectum cui accidit: sicut simum est per se accidens nasi quia in definitione simi ponitur nasus; est enim simum nasus curvus.” *De prin. nat.* §2, 15–16: “accidens, scilicet necessarium quod non separatur a re, ut risibile hominis.”

<sup>83</sup> *In Metaph.* 5, l. 22, §1143 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a32–34): “Differt autem hic modus a primo, quia accidentia hoc secundo modo contingit esse sempiterna. Semper enim triangulus habet tres angulos aequales duobus rectis. Accidentium vero secundum primum modum, nullum contingit esse sempiternum, quia sunt semper ut in paucioribus: et huius ratio habetur in aliis, sicut infra in sexto huius, et in secundo Physicorum.”

<sup>84</sup> *In Post. an.* 1, l. 14, 29–39: “Quod autem accidens quod non est ‘per se’, non necessario insit, ex hoc potest haberi: Si enim aliquod accidens ex necessitate et semper insit subiecto, oportet quod causam habeat in subiecto, qua posita, non possit accidens non inesse. Quod quidem contingit dupliciter: uno modo, quando ex principiis speciei accidens causatur, et tale accidens dicitur per se passio uel proprium; alio modo quando accidens causatur ex principiis individui, et hoc est accidens inseparabile.”

## 15.20. The Separable Accident

The **separable accident** does not have a determinate cause, but a contingent (cause) or some indeterminate, fortuitous cause.<sup>85</sup> Thus, it is *that which may or may not be in a subject* (*quod contingit inesse et non inesse* = ὁ ἐνδέχεται ὑπάρχειν καὶ μὴ ὑπάρχειν). For example, (to be) *white*—or *sitting down*—is separable from *man*.

Just as something is in some determinate subject, so, too, is something considered to be in some determinate place and in some determinate time.<sup>86</sup> Therefore, in all (things), it is possible (for something) to be in (some subject) by accident (i.e., contingently) if it is not in (the subject) as such (*huiusmodi*): for example, if *white* is said of a musical (or musician), this is by accident; for (white) is not in a musician insofar as such (i.e., insofar as it is a musician or is musical).

Likewise, if there is abundance of rain in the summer, this is by accident; for it does not happen in the summer insofar as it is summer.<sup>87</sup> Also, if the heavy is on high, this is by accident; for it is not in such a place insofar as it is that place, but by some external cause.

Accidents that neither inseparably follow upon their subject nor depend upon its principles are produced into being by an operation other than the operation whereby the subject is produced.<sup>88</sup> For example, to be a grammarian does not follow upon there coming to be a man; rather, (the grammarian comes to be) from some other operation.

## 15.21. Separable in Respect of Being vs. in Respect of Coming-To-Be

*Separable accident* can be taken in respect of being (*quantum ad esse*) or in respect of coming-to-be (*quantum ad fieri*).<sup>89</sup>

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<sup>85</sup> *In Metaph.* 5, l. 22, §1141 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a24–25): “Et sciendum, quod accidentis hoc modo dicti [sc., separabile, quod contingit inesse et non inesse], non est aliqua causa determinata, «sed contingens,» idest qualiscumque contingat, vel «quia forte,» idest causa fortuita, quae est causa indeterminata.” *In Physic.* 1, l. 6, n. 10 (cf. ARISTOTLE, *Physica* A.3, 186b19–22): “uno modo accidens separabile, quod contingit inesse et non inesse, ut sedere.” *De prin. nat.* §2, 15–18: “accidens [...] non necessarium quod separatur, ut album ab homine.”

<sup>86</sup> *In Metaph.* 5, l. 22, §1140 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a21–24): “Quia ergo sicut aliquid inest alicui subiecto determinate, ita et aliquid consideratur «esse alicubi,» idest in aliquo loco determinato, et «quandoque,» idest in aliquo tempore determinato, in omnibus contingit inesse per accidens, si non insit secundum quod huiusmodi. Sicut si album dicitur de musico, hoc est per accidens, quia non inest musico inquantum huiusmodi.”

<sup>87</sup> *In Metaph.* 5, l. 22, §1140 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a21–24): “Et similiter si sit abundantia pluviae in aestate, hoc est per accidens, quia non accidit in aestate inquantum est aestas; et similiter si grave sit sursum, hoc est per accidens, non enim est in tali loco secundum quod talis locus est, sed per aliquam causam extraneam.”

<sup>88</sup> *De veritate*, q. 3 a. 7 co.: “Quaedam vero sunt accidentia, quae non sequuntur inseparabiliter suum subiectum, nec ex eius principiis dependent. Et talia producuntur in esse alia operatione praeter operationem qua producitur subiectum; sicut non ex hoc ipso quod homo fit homo sequitur quod sit grammaticus, sed per aliquam aliam operationem.”

<sup>89</sup> *In Metaph.* 5, l. 22, §1139: “Differt autem hoc exemplum a primo. Nam in primo exemplo sumebatur accidens quantum ad fieri; in secundo vero quantum ad esse.”

1. **In respect of being** (*quantum ad esse*): for example, as when a musician (or musical) is said to be white; for this is not of necessity; nor does it come to be as in most (subjects); whence, we say this is by accident (►11.7).<sup>90</sup>

2. **In respect of coming-to-be** (*quantum ad fieri*): for example, if someone were to find a treasure (while) digging some fosse to plant some plant (►11.8).<sup>91</sup> Thus, to find a treasure (while) digging a fosse is some accident; for neither is one the cause of the other of necessity, nor does one follow the other of necessity, as day follows upon night although one is not a cause of the other; nor does it happen, according to more or as in most, that one who plants finds a treasure.

Likewise, it may happen (*accidit*) that someone comes into a town even if he does not begin to move in order to reach that terminus, but is led there due to some external cause: e.g., because he is pushed by a winter storm at sea; or is captured by thieves, and is led there against his intention.<sup>92</sup> Whence, it is evident that this is by accident; and can be caused from diverse causes. But that this (person) reaches that place (while) navigating is not insofar as he is navigating; for he intended to navigate to another place. Rather, this happens according to some other, external cause; for a winter storm—or thieves, or something such—is the cause of his coming.

## 15.22. The Subject by Itself

There are some accidents by themselves (*per se*; ►15.17) that always follow in act upon their subject.<sup>93</sup> Such accidents are caused from the essential principles according to a perfect act (*secundum actum perfectum*). For example, heat (follows) in fire, which is always hot (i.e., according to ancient science, this is a necessary property of the element).

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<sup>90</sup> *In Metaph.* 5, l. 22, §1139 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a19–21): “Et simili modo musicus dicitur esse albus, sed tamen hoc non est ex necessitate, nec fit ut in pluribus; ideo dicimus hoc per accidens.”

<sup>91</sup> *In Metaph.* 5, l. 22, §1139 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a15–19): “sicut, si aliquis fodiens aliquam fossam ad plantandum aliquam plantam, inveniatur thesaurum. Hoc ergo, quod est fodientem fossam invenire thesaurum, est quoddam accidens. Neque enim unum est causa alterius ex necessitate, ut hoc sit ex hoc necessario. Neque etiam de necessitate se comitantur, ut hoc sit post hoc, sicut dies consequitur noctem, quamvis unum non sit causa alterius. Neque etiam secundum magis hoc contingit, sive ut in pluribus, hoc contingit, ut ille qui plantat, inveniatur thesaurum.”

<sup>92</sup> *In Metaph.* 5, l. 22, §1141 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a25–30): “Sicut accidit alicui quod «veniat Aeginam,» id est ad illam villam, si non propter hoc advenit «ut illuc veniat,» id est si non propter hoc incepit moveri ut ad hunc terminum perveniret, sed ab aliqua extranea causa illuc adductus est, sicut quia impulsus est ab hieme concitante tempestatem in mari, aut etiam captus est a latronibus, et illuc perductus praeter intentionem. Unde patet, quod hoc est per accidens, et causari potest ex diversis causis; sed tamen quod iste navigans ad hunc locum perveniat non est «inquantum ipsum,» id est inquantum erat navigans, cum intenderet ad alium locum navigare; sed hoc contingit «inquantum alterum,» id est secundum aliquam aliam causam extraneam. Hiems enim est causa veniendi «quo non navigabat,» id est ad Aeginam, aut latrones, aut aliquid aliud huiusmodi.”

<sup>93</sup> *In Sent.* 2, d. 26 q. 1 a. 2 ad 2: “quaedam accidentia sunt per se, quae semper actu consequuntur suum subjectum.” *De ente*, c. 6, 98–101: “Sciendum etiam est quod accidentia aliquando ex principiis essentialibus causantur secundum actum perfectum, sicut calor in igne qui semper est calidus.”

Whence, when that which is by itself in (a subject) is always in (it), the subject is said to be a **subject by itself** (*per se subjectum*) in respect of those accidents: e.g., as fire is the subject by itself of heat.<sup>94</sup> Such an accident is caused from the principles of the subject not only in respect of an aptitude, but also in respect of the essence of the accident.

### 15.23. Aptitude or Ability in a Subject

Some accidents do not always follow in act upon their subject; but are always caused from the essential principles of their subject *in ability, according to an aptitude (in habilitate, secundum aptitudinem)*, while a complement (*complementum*) supervenes (*accidit*) from an exterior agent.<sup>95</sup>

In such subjects, the aptitude is an inseparable accident; but the complement that supervenes (*advenit*) from some principle that is outside the essence of the thing or which does not enter the constitution of the thing—e.g., *to be moved*—is separable.<sup>96</sup>

For example, air, which is not always illuminated in act, is, however, always illuminable (*illuminabilis*).<sup>97</sup> This illuminability (*illuminabilitas*) is caused from the principles of the subject, even though light is caused from (something) extrinsic. Thus, transparency in air is completed (i.e., perfected) by an external luminous body.

### 15.24. Accidents Extrinsicly Caused

Since substantial forms are the principles of qualities and of all accidents, a quality is received in some subject according to a proper and natural (act of) being which disposes the subject to a natural form of which it is susceptible.<sup>98</sup>

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<sup>94</sup> *In Sent.* 2, d. 26 q. 1 a. 2 ad 2: “Unde cum illud quod per se inest, semper inest, subjectum aliquando dicitur esse per se subjectum respectu ipsius accidentis, sicut ignis est per se subjectum caloris; et tale accidens ex principiis subjecti causatur, non solum quantum ad habilitatem, sed etiam quantum ad essentiam accidentis.”

<sup>95</sup> *In Sent.* 2, d. 26 q. 1 a. 2 ad 2: “quaedam autem [accidentia] non semper in actu [consequuntur suum subjectum], semper autem in habilitate. [...] aliquando respectu habilitatis tantum.” *De ente*, c. 6, 101–108: “aliquando uero [accidentia ex principiis essentialibus causantur] secundum aptitudinem tantum, sed complementum accidit ex agente exteriori.”

<sup>96</sup> *De ente*, c. 6, 104–108: “in talibus [subiectis] aptitudo est accidens inseparabile, sed complementum quod aduenit ex aliquo principio quod est extra essentiam rei, uel quod non intrat constitutionem rei, est separabile, sicut moueri et huiusmodi.”

<sup>97</sup> *In Sent.* 2, d. 26 q. 1 a. 2 ad 2: “sicut aer qui non semper illuminatur in actu, semper tamen illuminabilis est; et haec illuminabilitas ex principiis subjecti causatur, quamvis lumen ab extrinseco sit.” *De ente*, c. 6, 103–104: “sicut dyaphaneitas in aere que completur per corpus lucidum exterius.”

<sup>98</sup> *In De sensu* 1, c. 15, 229–234: “quia uero forme substantiales sunt principia qualitatum et omnium accidentium, illa qualitas recipitur in subiecto aliquo secundum esse proprium et naturale que disponit subiectum ad formam naturalem cuius est susceptiuum.” St. Thomas offers an example from ancient science: water—by reason of its matter—is susceptible of the substantial form of fire, which is a principle of heat. Hence, heat is received in water, disposing it to the form of fire; and when fire is removed, water still remains hot, (and) capable of heating. *Ibid.*, 234–238: “sicut aqua ratione sue materie est susceptiua forme substantialis ignis que est principium caloris, et ideo calor recipitur in aqua disponens ipsam ad formam ignis et remoto igne adhuc aqua remanet calida calefacere potens.”

The subject is susceptible of an accidental form insofar as it is in potency.<sup>99</sup> But insofar as it is in act, it is productive of the proper and by itself accident. In respect of the extraneous accident, the subject is only susceptible, while an external agent is productive of such an accident.

(Extrinsically caused accidents either):<sup>100</sup>

1. *Resist the principles of the subject (repugnantia principiis subjecti)* and are induced (in it) through violence, as heat (is violently induced) in water.
2. *Do not resist the principles of the subject: rather, they perfect it.* For example, light (is induced) in air (which is non-violently perfected by light).

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<sup>99</sup> *STh* I, q. 77 a. 6 co.: "subiectum, in quantum est in potentia, est susceptivum formae accidentalis, in quantum autem est in actu, est eius productivum. Et hoc dico de proprio et per se accidente, nam respectu accidentis extranei, subiectum est susceptivum tantum; productivum vero talis accidentis est agens extrinsecum."

<sup>100</sup> *In Sent.* 1, d. 17 q. 1 a. 2 ad 2: "Sunt etiam quaedam accidentia per violentiam inducta, sicut calor in aqua, et ista sunt repugnantia principiis subjecti. Quaedam autem sunt quae quidem causantur ab extrinseco non repugnantia principiis subjecti, sed magis perficientia ipsa, sicut lumen in aere."



## 16. Essence and Definition

Before we determine what the principle in any genus is (► 27), we must delve deeper into the essence and definition of substances and of accidents.

### 16.1. Essence

That by which a thing is constituted in its proper genus or species is what is signified by the definition that indicates *what the thing is* (*quid est res*; ► 8.1).<sup>1</sup> Therefrom (i.e., from *quid, what*), the name *essence* has been changed (*mutatur*) by philosophers into the name **quiddity** (*quidditas*, i.e., *what-ness*).

This is also what ARISTOTLE frequently calls **what something was to be** (*quod quid erat esse* = τὸ τί ἦν εἶναι): i.e., that by which something is what it is (*hoc per quod aliquid habet esse quid*).<sup>2</sup>

It is also called **form** insofar as by *form* is signified the certitude (*certitudo* = حقيقة *ḥaqīqah*, i.e., *true nature, essence*) of any one thing (*uniuscuiusque rei*), as AVICENNA says.<sup>3</sup>

It is also called by another name **nature**, taking *nature* according to the first of the four modes that BOETHIUS assigns (to this name) in his *De duabus naturis*: that is, insofar as everything that can somehow be grasped (*capi*) by the intellect is called *nature*; for a thing is only intelligible by its definition and essence.<sup>4</sup>

In this way, ARISTOTLE, too, says that every substance is a nature (► 12.6).<sup>5</sup> However, the name *nature* taken in this mode seems to signify the essence of a thing insofar as it has

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<sup>1</sup> *De ente*, c. 1, 26–31: “Et quia illud per quod res constituitur in proprio genere uel specie est hoc quod significatur per diffinitionem indicantem quid est res, inde est quod nomen essentie a philosophis in nomen quiditatis mutatur.”

<sup>2</sup> *De ente*, c. 1, 31–34: “et hoc est etiam quod Philosophus frequenter nominat quod quid erat esse, idest hoc per quod aliquid habet esse quid.”

<sup>3</sup> *De ente*, c. 1, 34–36: “Dicitur etiam forma, secundum quod per formam significatur certitudo uniuscuiusque rei, ut dicit Auicenna in II Methaphisice sue.” See AVICENNA, *The Metaphysics of The Healing*, 24, 9–10: “فإن لكل أمر حقيقة بها ما هو، فللمثلث حقيقة أنه مثلث، وللبياض حقيقة أنه بياض.” Ibid., 54, 15: “وهذه” Cf. AVICENNA, *Liber de philosophia prima*, 1.5, 34.55–57: “unaquaeque enim res habet certitudinem qua est id quod est, sicut triangulus habet certitudinem qua est triangulus, et albedo habet certitudinem qua est albedo.” Ibid., 2.2, 78.73: “haec certitudo <extrinsecus adueniens> est forma.”

<sup>4</sup> *De ente*, c. 1, 36–43: “Hoc etiam alio nomine natura dicitur, accipiendo naturam secundum primum modum illorum quatuor quod Boetius in libro De duabus naturis assignat secundum scilicet quod natura dicitur omne illud quod intellectu quoquo modo capi potest, non enim res est intelligibilis nisi per diffinitionem et essentiam suam.” See BOETHIUS, *De persona et duabus naturis* I: “Natura, est earum rerum quae, cum sint, quoquomodo intellectu capi possent. In hac igitur definitione et accidentia et substantiae definiuntur; haec enim omnia intellectu capi possunt.” (PL 64, 1341B).

<sup>5</sup> *De ente*, c. 1, 43–50: “et sic etiam Philosophus dicit in V Methaphisice quod omnis substantia est natura. Tamen nomen nature hoc modo sumpte uidetur significare essentiam rei secundum quod habet ordinem ad propriam operationem rei, cum nulla res propria operatione destituatur; quiditatis uero nomen sumitur ex hoc quod per difinitionem significatur.”

an order to the proper operation of the thing; for nothing is destitute of its proper operation. In contrast, the name *quiddity* is taken from its being signified by the definition.

In turn, **essence** (*essentia*) is said *insofar as a being (ens) has (its act of) being (esse) by it and in it*. However, *being (ens; ▶ 30.1)* is said absolutely (*absolute*) and firstly (*primo*) of substance; and posteriorly (*per posterius*) and as according to something (*quasi secundum quid*), of accidents (▶ 30.14, ¶1).<sup>6</sup> Whence, essence too, properly and truly, is in substances; but in accidents, it is in some mode (*quodammodo*) and according to something (*secundum quid; ▶ 18*).

### 16.2. Essence of Substances

Of substances, some are simple, and some composite.<sup>7</sup> There is essence in both; but, in simple (substances, there is essence) in a truer and nobler mode (*veriori et nobiliori modo*) insofar as they also have a nobler act of being (*esse nobilius habent*); for they are the cause of those that are composite—at least the first, simple substance that is God. But since the essences of those substances are more concealed to us, one must begin from the essences of composite substances, so that, in learning (▶ 66), one may proceed more conveniently from what is easier.

### 16.3. Essence of Composite Substances

In composite substances, form and matter have been noted (*nota est; ▶ 15.8; 15.15*): for example, soul and body in man. However, it cannot be said that one or the other alone is said to be the essence.<sup>8</sup>

That matter alone is not the substance of a thing is evident because a thing is both knowable and ordered in a species or a genus by its essence, while neither matter is a principle of cognition nor is anything determined to a genus or species according to it: rather, something (is knowable and determined) insofar as it is in act.<sup>9</sup>

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<sup>6</sup> *De ente*, c. 1, 50–57: “Sed essentia dicitur secundum quod per eam et in ea ens habet esse. Sed quia ens absolute et primo dicitur de substantiis, et per posterius et quasi secundum quid de accidentibus, inde est quod etiam essentia proprie et uere est in substantiis, sed in accidentibus est quodammodo et secundum quid.”

<sup>7</sup> *De ente*, c. 1, 57–67: “Substantiarum uero quedam sunt simplices et quedam composite, et in utrisque est essentia; sed in simplicibus ueriori et nobiliori modo, secundum quod etiam esse nobilius habent: sunt enim causa eorum que composita sunt, ad minus substantia prima simplex que Deus est. Sed quia illarum substantiarum essentie sunt nobis magis occulte, ideo ab essentia substantiarum compositarum incipiendum est, ut a facillioribus conuenientior fiat disciplina.”

<sup>8</sup> *De ente*, c. 2, 1–4: “In substantiis igitur compositis forma et materia nota est, ut in homine anima et corpus. Non autem potest dici quod alterum eorum tantum essentia esse dicatur.”

<sup>9</sup> *De ente*, c. 2, 4–10: “Quod enim materia sola rei non sit essentia, planum est, quia res per essentiam suam et cognoscibilis est, et in specie ordinatur uel genere; sed materia neque cognitionis principium est, neque secundum eam aliquid ad genus uel speciem determinatur, sed secundum id quod aliquid actu est.”



Nor can form alone be said to be the essence of a composite substance, although some have ventured to assert this.<sup>10</sup> From what has been said, it is evident that essence is that which is signified by the definition of the thing. And the definition of natural substances does not contain only form, but also matter (i.e., sensible, common matter; ► 13.12; 13.13; 13.16). Otherwise, the definition of natural and mathematical (things) would not differ.

Nor can it be said that matter is posited in the definition of natural substances as (though it should be) added to its essence, or (as though it were) a being outside of its essence (*ens extra essentiam eius*); for this mode of definitions is proper of accidents (► 18), which do not have a perfect essence; whence, in their definition, they must receive a subject that is outside their genus (e.g., in the definition of figures, which are in the genus of quality, a continuous quantity is posited as their proper subject-matter; ► 14.2).<sup>11</sup>

Therefore, it is evident that the essence comprehends both matter and form.<sup>12</sup> However, it cannot be said that *essence* signifies the relation that is between matter and form (► 15.14), or something added to them, because this would necessarily be an accident, and extraneous to the thing; nor would the thing be known through them—all of which befit essence (*essentiae conveniunt*). By the form, which is the act of matter, matter becomes a being in act (*efficitur ens actu*), and *this something (hoc aliquid)*. Hence, that which comes over (it) does not give to matter being in act simply, but being *such* in act, as also accidents do (► 15.13). For example, whiteness makes (a subject to be) white in act. Therefore, also when such a form is acquired, (the thing) is not said to come to be simply (*simpliciter*), but according to something (*secundum quid*).

It remains, therefore, that the name **essence** in composite substances signifies *that which is a composite from matter and form*.<sup>13</sup> This is what the Greek οὐσία signifies. AVICENNA,

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<sup>10</sup> *De ente*, c. 2, 10–17: “Neque etiam forma tantum essentia substantie composite dici potest, quamvis hoc quidam asserere conentur. Ex hiis enim que dicta sunt patet quod essentia est illud quod per diffinitionem rei significatur; diffinitio autem substantiarum naturalium non tantum formam continet sed etiam materiam, aliter enim diffinitiones naturales et mathematice non differrent.”

<sup>11</sup> *De ente*, c. 2, 18–24: “Nec potest dici quod materia diffinitione substantie naturalis ponatur sicut additum essentie eius uel ens extra essentiam eius, quia hic modus diffinitionum proprius est accidentibus, que perfectam essentiam non habent; unde oportet quod diffinitione sua subiectum recipiant, quod est extra genus eorum.”

<sup>12</sup> *De ente*, c. 2, 24–37: “Patet ergo quod essentia comprehendit et materiam et formam. Non autem potest dici quod essentia significet relationem que est inter materiam et formam, uel aliquid superadditum ipsis, quia hoc de necessitate esset accidens et extraneum a re, nec per eam res cognosceretur: que omnia essentie conueniunt. Per formam enim, que est actus materie, materia efficitur ens actu et hoc aliquid; unde illud quod superaduenit non dat esse actu simpliciter materie, sed esse actu tale, sicut etiam accidentia faciunt, ut albedo facit actu album. Vnde et quando talis forma acquiritur, non dicitur generari simpliciter sed secundum quid.”

<sup>13</sup> *De ente*, c. 2, 38–44: “Relinquitur ergo quod nomen essentie substantiis compositis significat id quod ex materia et forma compositum est. Et huic consonat uerbum Boetii in commento Predicamentorum, ubi dicit quod usya significat compositum; usya enim apud Grecos idem est quod essentia apud nos, ut ipsemet dicit in libro De duabus naturis.” This is not found in BOETHIUS, but in ALBERT the Great.

too, says that **the quiddity** (*quidditas* = ماهية *māhīyah*, i.e., *what-ness*)<sup>14</sup> of composite substances is *the composition* (*compositio* = تركيب *tarkīb*) *itself of matter and form*.<sup>15</sup>

AVERROES too, in his *Commentary* on (ARISTOTLE's) *Metaphysics*, says, "the nature that species have in generable things is a mean thing [شيء متوسط *šay' mutawassiṭ*]: that is, composed from matter and form (مركب من مادة وصورة *murakkab min māddah wa-ṣūrah*)."<sup>16</sup>

The *ratio* (of essence) agrees (*concordat*) with this, too; for **essence** is (*that*) *according to which a thing is said to be* (*secundum quam res esse dicitur*); and the (act of) being (*esse*, i.e., the *to be*) of a composite substance belongs neither to form alone nor to matter alone, but of the composite itself (► 15.14).<sup>17</sup> Whence, the essence, whereby a thing (*res*) is denominated *being* (*ens*), must not be form alone, nor matter alone, but one and the other, even though form alone is the cause of (the act of) being of this mode (i.e., form alone is the cause of being insofar as form gives the act of being to matter).

In this way, we see, in other (things) that are constituted from multiple principles, that the thing is not denominated from one or the other of its principles alone, but from that which encompasses one and the other.<sup>18</sup> (For example, a square is denominated neither from its boundary alone nor from its surface alone, but from one and the other.)<sup>19</sup>

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<sup>14</sup> The abstract ماهية *māhīyah* derives from ما هي *mā hīya* (or perhaps is assimilated from ما هو *mā huwa*), meaning *what it is* (and, in questions, *what is it?*), just as كمية *kammīyah*, *quantity*, derives from كم *kamm*, meaning *quantum* (and, in questions, *how much?*). See Amélie Marie GOICHON, *Lexique de la Langue Philosophique d'ibn Sīnā (Avicenne)* (Paris: Desclée de Brouwer, 1938), 386: "MĀHĪYA, quiddité, substance seconde, substance-attribut. Mot qui semble un mot composé formé de *mā*, ce que, et de *hīya*, pronom personnel de la troisième personne ayant le sens de *elle est*; il a été choisi par Ḥimṣī et Kindī pour rendre le grec τὸ τί dans la prétendue *Théologie* d'Aristote."

<sup>15</sup> *De ente*, c. 2, 45–47: "Avicenna etiam dicit quod quidditas substantiarum compositarum est ipsa compositio forme et materie." See AVICENNA, *The Metaphysics of The Healing*, 188, 1–4: "وأما الماهية فهي: ما بها هي ما هي، وإنما هي ما هي بكون الصورة مقارنة للمادة، وهو أزيد من معنى الصورة. ولمركب ليس هذا المهني أيضاً، بل هو مجموع الصورة والمادة؛ فإن هذا هو ما هو المركب، والماهية هذا التركيب." Cf. AVICENNA, *Liber de philosophia prima*, 5.5, 275.69–73: "quidditas vero est id quod est quicquid est, forma existente coniuncta materiae, quod quidem amplius est quam intentio formae; compositio etiam non est haec intentio quia composita est ex forma et materia; haec enim est quidditas compositi et quidditas est haec compositio."

<sup>16</sup> *De ente*, c. 2, 47–50: "Commentator etiam dicit super VII Methaphisice «Natura quam habent species in rebus generabilibus est aliquod medium, id est compositum ex materia et forma»." See Maurice BOUYGES (ed.), *Averroès: tafsir ma ba'd at-tabī'at*, Bibliotheca Arabica Scholasticorum (Beirut: Dar El-Machreq, 1938–1952), Comm. 27 on Book VII (cf. ARISTOTLE, *Metaphysica* Z.8, 1033b14–16), Tome VI, 863.19–864.2: "الطبيعة التي تكون الانواع في الاشياء المتناسلة هي شيء متوسط اي مركب من مادة وصورة."

<sup>17</sup> *De ente*, c. 2, 50–57: "Huic etiam ratio concordat, quia esse substantie composite non est tantum forme neque tantum materie, sed ipsius compositi; essentia autem est secundum quam res esse dicitur: unde oportet ut essentia qua res denominatur ens non tantum sit forma, neque tantum materia, sed utrumque, quamvis huiusmodi esse suo modo sola forma sit causa."

<sup>18</sup> *De ente*, c. 2, 57–61: "Sic emm in aliis uidemus que ex pluribus principiis constituuntur, quod res non denominatur ex altero illorum principiorum tantum, sed ab eo quod utrumque complectitur."

<sup>19</sup> St. Thomas offers (in *ibid.*, 61–66) a different example in the order of savors, explaining that sweetness (according to ancient science) is caused from the action of the hot that digests the humid; and although, in this mode, heat is a cause of sweetness, a body is not denominated *sweet* due to heat, but due to the savor that hot and humid encompasses.

Since the principle of individuation is matter, it would perhaps seem that essence, which at once encompasses in itself (both) matter and form, is only particular and not universal.<sup>20</sup> From this, it would follow that universals would not have a definition, if *essence* is *that which is signified by the definition*. Hence, we must note that matter is not taken as the principle of individuation in whatever mode, but only *designated matter* (*materia signata*), which is considered under determined dimensions (► 13.12; 35.10, ¶2). This matter is not posited in the definition of *man* insofar as it is a man—through it would be posited in the definition of *Sortes* if *Sortes* had a definition. In the definition of *man*, undesignated matter (*materia non signata*) is posited; for, in the definition of *man*, *this bone* and *this flesh* are not posited, but *bone* and *flesh* absolutely, which are the undesignated matter of *man*.

#### 16.4. Definition of Substances

True definitions must be investigated first; for they signify the substances of things.<sup>21</sup> In such definitions, there is nothing other than *a first genus and differences*. There are also some definitions that do not signify the substance of a thing, which are given by some accidents or by some properties; or even by some extrinsic causes (► 18).

Sometimes, some intermediate genera are posited in (true) definitions between the first genus, which is the most general, and the last species that are defined.<sup>22</sup> However, those mean genera are nothing other than the first genus and the differences comprehended with the first genus in the understanding of the mean genera.

For example, if *animal*, which is an intermediate genus, is posited in the definition of *man*, it is evident that *animal* is nothing other than *substance*, which is the first genus, with some differences; for *animal* is a *sensible, animated substance* (*substantia animata sensibilis*;

<sup>20</sup> *De ente*, c. 2, 67–84: “Sed quia indiuiduationis principium materia est, ex hoc forte uideretur sequi quod essentia, que materiam in se complectitur simul et formam, sit tantum particularis et non uniuersalis: ex quo sequeretur quod uniuersalia diffinitionem non haberent, si essentia est id quod per diffinitionem significatur. Et ideo sciendum est quod materia non quolibet modo accepta est indiuiduationis principium, sed solum materia signata; et dico materiam signatam que sub determinatis dimensionibus consideratur. Hec autem materia in diffinitione que est hominis in quantum est homo non ponitur, sed poneretur in diffinitione Sortis si Sortes diffinitionem haberet. In diffinitione autem hominis ponitur materia non signata: non enim in diffinitione hominis ponitur hoc os et hec caro, sed os et caro absolute que sunt materia hominis non signata.”

<sup>21</sup> *In Metaph.* 7, l. 12, §1542 (cf. ARISTOTLE, *Metaphysica* Z.12, 1037b27–29): “Dicit ergo [Philosophus] primo, quod ad investigandum unitatem definitionum oportet primum intendere de definitionibus quae dantur secundum divisionem generis in differentias. Ista enim sunt definitiones verae, in quibus non est aliud quam primum genus et differentiae. Dantur enim et quaedam definitiones per aliqua accidentia, vel per aliquas proprietates, vel etiam per aliquas causas extrinsecas, quae non significant substantiam rei. Et ideo huiusmodi definitiones non sunt ad propositum, cum hic agatur de definitionibus ad substantias rerum investigandas.”

<sup>22</sup> *In Metaph.* 7, l. 12, §1543 (cf. ARISTOTLE, *Metaphysica* Z.12, 1037b29–32): “Ideo autem dico quod in definitione est primum genus cum differentiis, quia etsi aliquando in definitionibus ponantur aliqua genera intermedia inter genus primum quod est generalissimum, et species ultimas quae definiuntur, tamen illa genera media nihil aliud sunt quam genus primum, et differentiae comprehensae in intellectu generis medii «cum hoc,» idest cum genere primo.”

i.e., *substance* is the first genus; *animated* is a difference; and *sensible* is a posterior difference).<sup>23</sup> Likewise, (this is true) if we understand the first genus to be *animal*, (the second genus to be) *biped animal*, and the third genus (to be) *non-winged, biped animal*.

If some genus is determined by multiple differences, always the posterior genus comprehends the prior with some differences.<sup>24</sup> Whence, it is evident that every definition is resolved into a *first genus* and some differences. It makes no difference whether some defined (thing), is defined by many or by few (terms); or (even) by (only) two, such that one of them would be the genus, and the other a difference: for example, of *biped animal*, *animal* is the genus; and the other—namely, *biped*—is the difference.<sup>25</sup>

Hence, it is evident that a definition is some *ratio* that has (its) unity from differences, such that the whole essence of the definition is—in some mode—comprehended in the differences.<sup>26</sup>

Whence, *animal*, which is a genus, cannot be without species (► 14.14); for the forms of the species that are differences are not forms other than the form of the genus: rather, they are forms of the genus with determination (► 14.12).<sup>27</sup>

Thus, it is evident that *animal* is *that which has a sensitive soul*, while *man* is *that which has such a sensitive soul*—that is, (a soul) *with reason*.<sup>28</sup> And the same can be said of

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<sup>23</sup> *In Metaph.* 7, l. 12, §1543 (cf. ARISTOTLE, *Metaphysica* Z.12, 1037b32–33): “Sicut si in definitione hominis ponatur animal, quod est genus intermedium, patet quod animal nihil aliud est quam substantia, quae est genus primum, cum aliquibus differentiis. Est enim animal substantia animata sensibilis. Et similiter si intelligamus primum genus esse animal, «habitum bipes;» et iterum tertium genus, «animal bipes non alatum.»”

<sup>24</sup> *In Metaph.* 7, l. 12, §1543 (cf. ARISTOTLE, *Metaphysica* Z.12, 1037b33–1038a1): “Et similiter si aliquod genus per plures differentias determinatur. Semper enim posterius genus comprehendit prius cum aliqua differentia. Et sic patet quod omnis definitio resolvitur in primum genus et aliquas differentias.”

<sup>25</sup> *In Metaph.* 7, l. 12, §1544 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a1–4): “Omnino autem non differt, utrum per plura aut per pauca definiatur aliquod definitum. Quare non differt, utrum per pauca, vel per duo, ita quod illorum duorum unum sit genus et aliud differentia. Sicut eius quod est animal bipes, animal est genus; et alterum, scilicet bipes, est differentia.”

<sup>26</sup> *In Metaph.* 7, l. 12, §1549 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a8–9): “Si ergo praedicta sunt vera, palam est quod definitio est quaedam ratio ex differentiis unitatem habens; ita quod tota essentia definitionis, in differentia quodammodo comprehenditur.”

<sup>27</sup> *In Metaph.* 7, l. 12, §1549: “Ex hoc enim animal, quod est genus, non potest esse absque speciebus, quia formae specierum quae sunt differentiae, non sunt aliae formae a forma generis, sed sunt formae generis cum determinatione. Si ergo praedicta sunt vera, palam est quod definitio est quaedam ratio ex differentiis unitatem habens; ita quod tota essentia definitionis, in differentia quodammodo comprehenditur. Ex hoc enim animal, quod est genus, non potest esse absque speciebus, quia formae specierum quae sunt differentiae, non sunt aliae formae a forma generis, sed sunt formae generis cum determinatione. Sicut patet quod animal est quod habet animam sensitivam. Homo autem est qui habet animam sensitivam «talem,» scilicet cum ratione. Leo vero qui «habet talem,» scilicet cum abundantia audaciae. Et sic de aliis.”

<sup>28</sup> *In Metaph.* 7, l. 12, §1549: “Sicut patet quod animal est quod habet animam sensitivam. Homo autem est qui habet animam sensitivam «talem,» scilicet cum ratione. Leo vero qui «habet talem,» scilicet cum abundantia audaciae. Et sic de aliis.”

*lion* and of other (animals): that they have *such* a sensitive soul (with their respective specific qualities).

Whence, when a difference is added to a genus, it is not added as some essence diverse from the genus, but as contained implicitly, as the determinate is contained in the indeterminate: as (the determinate) *white* (is contained) in (the indeterminate) *colored*.<sup>29</sup>

Therefore, nothing prevents the same genus from containing in itself diverse differences, as the indeterminate contains in itself diverse determinates.<sup>30</sup> Thus, a difference does not befall a genus according to the mode by which *white* befalls *man*, as an essence that is diverse from that (to which it befalls).

### 16.5. Order Among Substantial Differences

In those definitions in which there are multiple differences, not only must the genus be divided into differences, but also the first difference (must be divided) into a second difference.<sup>31</sup>

For example, a difference of *animal* is *footedness* (*pedalitas*), according to which an *animal* is said (to be) *that which has feet* (*habens pedes*), or (*that which*) *is able to walk* (*gressibile*).<sup>32</sup> But, since also this difference is found in multiple (modes), it is necessary, again, to know the difference of the footed animal, which is its difference insofar as it has feet—that is, (the difference) by itself and not by accident.

Hence, since *having wings* happens to *the footed*, if someone wants to correctly divide differences, he must not say, “of the footed, one is winged; and the other, non-winged.”<sup>33</sup>

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<sup>29</sup> *In Metaph.* 7, l. 12, §1549: “Unde cum differentia additur generi, non additur quasi aliqua diversa essentia a genere, sed quasi in genere implicite contenta, sicut determinatum continetur in indeterminato, ut album in colorato.”

<sup>30</sup> *In Metaph.* 7, l. 12, §1550: “Per quod etiam solvitur ratio superius inducta; quia nihil prohibet idem genus in se continere diversas differentias, sicut indeterminatum continet in se diversa determinata. Et etiam propter hoc solvitur, quia non hoc modo advenit differentia generi, ut diversa essentia ab eo existens, sicut advenit album homini.”

<sup>31</sup> *In Metaph.* 7, l. 12, §1551 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a9–10): “Dicit ergo [Philosophus] primo, quod in definitionibus in quibus sunt multae differentiae, oportet non solum dividi genus in differentiam, sed etiam dividi differentiam primam in differentiam secundam.”

<sup>32</sup> *In Metaph.* 7, l. 12, §1551 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a10–11): “Sicut animalis differentia est *pedalitas*, secundum quam animal dicitur *habens pedes*, vel *gressibile*. Sed quia etiam haec differentia multipliciter invenitur, iterum oportet scire differentiam animalis habentis pedes, quae sit differentia eius, «inquantum est habens pedes,» scilicet per se et non per accidens.”

<sup>33</sup> *In Metaph.* 7, l. 12, §1552 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a12–14): “Et ideo, quia habenti pedes accidit habere alas, non est dicendum, dividendo differentiam, quod habentis pedes aliud est alatum, aliud non alatum, si homo bene velit dicere divisionem differentiarum. Sed tamen quandoque aliquis dividens differentias «facit hoc» ut scilicet dividat per ea quae sunt secundum accidens, propter hoc quod non potest invenire proprias et per se differentias. Aliquando enim necessitas cogit, ut utamur, loco per se differentiarum, differentis per accidens, inquantum sunt signa quaedam differentiarum essentialium nobis ignotarum.”

However, someone who is dividing differences sometimes does this—that is, he divides (a genus) by those (differences) that are according to accident—because he cannot find the proper and by themselves differences; for sometimes it is necessary to use differences by accident insofar as they are some (kind of) signs of the essential differences that are unknown to us.

Rather, the mode in which these differences ought to be divided is this: “of footed animal, one has cloven feet; and the other, non-cloven”; for these—i.e., cloven and non-cloven—are differences (by themselves) of foot.<sup>34</sup> Hence, having cloven feet divides by itself the difference of having feet; for a cloven foot is some (kind of) footedness: that is, the difference of having *cloven* feet is something contained under *having feet*; and (these) are related to each other as the determinate and the indeterminate—as has been said of the difference (which is a determinate form) and of the genus (which is indeterminate).

In the division of differences, one ought always to proceed until the last differences, which are not ultimately divided into other differences.<sup>35</sup> Thus, the species of *foot* will be as many as the differences; and the species of animals having feet (will be) equal to the (number of) differences; for any individual difference constitutes one, most-specific species.

#### 16.6. The Unity of a Substantial Definition Is Taken from Its Last Difference

It is evident that, if differences are always taken by themselves (*per se*), and not by accident (*per accidens*), the last difference will be the whole substance of the thing and (its) whole definition; for it includes in itself all the preceding particles (► 16.4).<sup>36</sup>

That the difference is included in the genus has been shown from this: that there is no genus without differences.<sup>37</sup> And that the last (difference) includes all the precedents is

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<sup>34</sup> *In Metaph. 7*, l. 12, §1553 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a14–15): “Sed hoc modo est haec differentia dividenda «habens pedes:» scilicet: huiusmodi animalium, aliud est habens pedes scissos, et aliud non scissos. Ista enim «sunt differentiae pedis,» scilicet scissum et non scissum. Et ideo habens pedes scissos, per se dividet hanc differentiam quae est habens pedes. Scissio enim pedis «est quaedam pedalitas:» idest haec differentia quae est habere pedes scissos, est quoddam contentum sub hoc quod est habere pedes; et habent se adinvicem sicut determinatum et indeterminatum, sicut diximus de genere et differentia.”

<sup>35</sup> *In Metaph. 7*, l. 12, §1554 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a15–18): “Et ita semper procedendum est in divisione differentiarum, donec dividens «veniat ad non differentia,» idest ad ultimas differentias, quae non dividuntur ulterius in alias differentias; et tunc tot erunt species pedis quot differentiae: et species animalium habentium pedes aequales differentiis. Quaelibet enim individualis differentia constituet unam speciem specialissimam.”

<sup>36</sup> *In Metaph. 7*, l. 12, §1555 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a18–20): “Dicit ergo primo, quod si sic se habent differentiae acceptae in definitione «sicut dictum est,» scilicet quod semper sumantur per se differentiae et non per accidens, palam est quod ultima differentia erit tota substantia rei, et tota definitio. Includit enim in se omnes praecedentes particulas.”

<sup>37</sup> *In Metaph. 7*, l. 12, §1556 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a20–21): “Quod enim in differentia includatur genus, ostensum est, ex hoc quod genus non est sine differentiis. Sed quod ultima includat omnes praecedentes, palam est ex hoc quod nisi hoc dicatur, sequitur quod oporteat «in terminis,» idest definitionibus, multoties eadem dicere. Et hoc erit superfluum et nugatorium.”

evident from this: that, otherwise, it would follow that, in definitions, one would have to say the same multiple times, which is superfluous and nugatory.

Since these (consequences) would be unbefitting, it is, therefore, manifest that there will be a **last difference** that comprehends the substance and the species of the (thing) defined (► 8.8, ¶4); and, *from its unity, the definition will be one*.<sup>38</sup>

This cannot be said if, in dividing and defining, someone takes a difference according to accident.<sup>39</sup> For example, if one were to divide thus, “of those that have feet, one is white, and the other is black.” Then, the last differences would be as many as the divisions made; for one would not include the other. Such differences, taken by accident, would only be one in subject, which does not suffice for the unity of the definition.

From what has been said, it is evident that, although genus and difference are posited in the definition, the definition is nonetheless a *ratio* (constituted) *only from differences*; for the genus is not apart from (or other than, *praeter*) the differences, as has been said.<sup>40</sup> Although many differences are posited in the definition, nonetheless, the whole definition depends on—and is constituted from—the last (difference) when the division is done from the most common to the less common, descending according to differences by themselves, and not taking—as from a side—differences by accident.

A sign that the whole definition is constituted from the last difference is offered by ARISTOTLE: that, evidently, unbefitting (consequences) would follow if someone should transpose the parts of such definitions.<sup>41</sup> For example, if one should say that the definition

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<sup>38</sup> *In Metaph. 7, l. 12, §1559* (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a25–26): “Et quia ista sunt inconvenientia, igitur manifestum est quod si in definitione accipiantur differentiae, una erit ultima, scilicet «quae est species et substantia,» id est quae substantiam et speciem definiti comprehendet, et ab eius unitate definitio erit una.”

<sup>39</sup> *In Metaph. 7, l. 12, §1560* (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a26–28): “Ostendit [Philosophus], quod *hoc non potest dici si differentiae per accidens sumantur*; dicens, quod si aliquis in dividendo et definiendo accipiat differentiam secundum accidens, sicut si dividatur quod habentium pedes, aliud est album, aliud est nigrum, tot erunt ultimae differentiae, quot factae sunt divisiones; quia una earum alteram non includet. [...] Huiusmodi enim differentiae sic per accidens acceptae non essent unum nisi subiecto; quod non sufficit ad unitatem definitionis.”

<sup>40</sup> *In Metaph. 7, l. 12, §1561* (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a28–30): “ponit [Philosophus] conclusionem; dicens, quod palam est ex praedictis quod quamvis in definitione ponatur genus et differentia, tamen definitio est ratio ex differentiis tantum, quia genus non est praeter differentias, ut supra dictum est. Et quamvis ponantur multae differentiae in definitione, tamen tota definitio dependet et constituitur ex ultima, quando fit divisio «secundum rectum,» id est a communi ad minus commune descendendo secundum per se differentias, et non accipiendo quasi a latere differentias per accidens.”

<sup>41</sup> *In Metaph. 7, l. 12, §1562* (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a30–33): “Secundo ibi, «palam autem» *Manifestat conclusionem inductam per quoddam signum*, dicens, «palam autem erit,» scilicet quod tota definitio constituatur ex ultima differentia, ex hoc quod, si quis transponat partes talium definitionum, sequetur inconveniens. Sicut si aliquis dicat definitionem hominis esse animal bipes, habens pedes. Ex quo enim dictum est bipes, superfluum est apponere, pedes habens. Sed si diceretur primo pedes habens, adhuc restaret inquirendum, utrum esset bipes, dividendo pedes habens.”

of *man* is *biped animal having feet*, it would be superfluous to add *having feet*, since *biped* has (already) been said; but if *having feet* should be said first (i.e., as the genus of *man*), one would still have to inquire whether (*man*) would be *biped* (by properly) dividing *having feet*.

Therefore, it is evident that those differences, insofar as they are many, have a determinate order among themselves.<sup>42</sup> However, one should not understand by this that there would be some order in the substance of the thing; for it cannot be said that *this substance* is prior, and *that (substance)* is posterior, since a substance is whole and simultaneous, and not by succession—except in some defective (beings; ► 30.14, ¶3), such as motion and time.

Whence, it is evident that the multiple parts of the definition do not signify multiple parts of the essence—from which the essence would be constituted as from diverse (material principles).<sup>43</sup> Rather, they all signify (something) one that is determined by the last difference.

This is also evident because there is only one substantial form of whichever species (► 15.13).<sup>44</sup> For example, of the (species of) *lion*, one is the form by which it is a substance, a body, and living body, an animal, and a lion; for, if there should be multiple forms, according to all the foresaid, they could not be comprehended by one difference; nor would (something) one be constituted from them.

### 16.7. Essences, Forms, Species, Definitions are Like Numbers

While PLATO posited forms (as the principles) and substances of things, reducing forms to numbers through some mode of assimilation, ARISTOTLE determines (the truth) concerning forms in comparison to numbers; for it is evident that, if numbers are in some mode the substances and forms of things, they are not, as Platonists say, *numbers of units (numeri unitatum = ἀριθμοὶ... μονάδων)*.<sup>45</sup>

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<sup>42</sup> *In Metaph.* 7, l. 12, §1563 (cf. ARISTOTLE, *Metaphysica* Z.12, 1038a33–34): “Ex hoc patet quod illae differentiae, secundum quod sunt multae, habent inter se ordinem determinatum. Non autem hoc potest intelligi quod in substantia rei sit aliquis ordo. Non enim potest dici, quod hoc substantiae sit prius, et illud posterius; quia substantia est tota simul et non per successionem, nisi in quibusdam defectivis, sicut sunt motus et tempus.”

<sup>43</sup> *In Metaph.* 7, l. 12, §1564: “Unde patet quod multae partes definitionis non significant multas partes essentiae ex quibus essentia constituatur sicut ex diversis; sed omnes significant unum quod determinatur ultima differentia.”

<sup>44</sup> *In Metaph.* 7, l. 12, §1564: “Patet etiam ex hoc, quod cuiuslibet speciei est una tantum forma substantialis; sicut leonis una est forma per quam est substantia, et corpus, et animatum corpus, et animal, et leo. Si enim essent plures formae secundum omnia praedicta, non possent omnes una differentia comprehendi, nec ex eis unum constitueretur.”

<sup>45</sup> *In Metaph.* 8, l. 3, §1722 (cf. ARISTOTLE, *Metaphysica* H.3, 1043b32–34): “determinat [Philosophus] de formis per comparisonem ad numeros. Plato enim ponebat formas et substantias rerum, reducendo per modum cuiusdam assimilationis formas ad numeros. [...] Dicit ergo primo, quod manifestum est, quod si



(To understand this, we should note that) a *simple and absolute* (*simplex et absolutus*; ► 34.4, ¶1) number is said (to be a) **number of units** (*numerus unitatum*), while a number *applied to things* (*applicatus ad res*; ► 34.4, ¶2) is said (to be a) **number of things** (*numerus rerum*): for example, *four dogs*, or *four men*.<sup>46</sup>

There are four modes in which ARISTOTLE assimilates forms to numbers, such that the substances (i.e., essences) of things, which the definitions signify, can be said (to be) *numbers* according to the mode of the *number of things* (► 34.4, ¶2).<sup>47</sup>

**1. Number is divisible into indivisibles** (► 2.1; 3.5; 7.2).<sup>48</sup> A definition, in turn, is divisible into two, of which one is related as form and the other as matter. Yet, it is divisible into indivisibles, too; for the division of a definition must be terminated by some indivisibles (i.e., the differences), since definitions do not proceed indefinitely (*in infinitum*). Whence, the division of a definition is not assimilated to the division of continuous quantity (► 3.2), which is indefinite (*in infinitum*).

For example, if the definition of *man* is divided into *animal* and *rational*, (and) the definition of *animal* (is divided) into *animate* and *sensible*, this does not proceed indefinitely in material and formal causes (► 11.6).<sup>49</sup>

**2. If something is added to, or subtracted from, a number, even if it is minimal, it will not be the same according to species.**<sup>50</sup> This is so because **the last difference gives**

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numeri aliquo modo sint substantiae rerum et formae, sic sunt, sicut ex praemissis accipi potest; non autem sunt numeri unitatum sicut Platonici dicunt.”

<sup>46</sup> *In Metaph.* 8, l. 3, §1722: “Dicitur autem numerus unitatum, numerus simplex et absolutus. Numerus autem applicatus ad res, dicitur numerus rerum, sicut quatuor canes vel quatuor homines.”

<sup>47</sup> *In Metaph.* 8, l. 3, §1722 (cf. ARISTOTLE, *Metaphysica* H.3, 1043b32–1044a11): “Et dividitur in quatuor, secundum quod quatuor modis assimilatur [Philosophus] formas numeris. [...] numerus rerum [...], quo quidem modo substantiae rerum, quas significant definitiones, possunt dici numeri.”

<sup>48</sup> *In Metaph.* 8, l. 3, §1722 (cf. ARISTOTLE, *Metaphysica* H.3, 1043b34–36): “Est enim definitio divisibilis in duo: quorum unum se habet ut forma, aliud ut materia, ut superius dictum est. Et iterum est in indivisibilia divisibilis. Divisio enim definitionis oportet quod per aliqua indivisibilia terminetur: non enim definitiones procedunt in infinitum. [...] Et sic definitionis divisio non assimilatur divisioni quantitatis continuae, quae est in infinitum; sed divisioni numeri, qui est divisibilis in indivisibilia.”

<sup>49</sup> *In Metaph.* 8, l. 3, §1722: “Putat, si definitio hominis dividatur in animal et rationale, definitio animalis in animatum et sensibile; non procedet hoc in infinitum, cum non sit procedere in infinitum in causis materialibus et formalibus, ut in secundo probatum est.” ARISTOTLE proves that causes do not proceed indefinitely in *Metaphysica* α.2, 994a11–b31 (cf. *In Metaph.* 2, l. 2–4, §§300–330).

<sup>50</sup> *In Metaph.* 8, l. 3, §1723 (cf. ARISTOTLE, *Metaphysica* H.3, 1043b36–38): “ponit [Philosophus] secundam assimilationem substantiae, quam significat definitio, ad numeros. Et dicit, quod si aliquid addatur vel subtrahatur alicui numero, etiam si sit minimum, non erit id idem numerus secundum speciem. [...] Et hoc ideo, quia illa ultima differentia dat speciem numero.” *In Metaph.* 8, l. 3, §1724 (cf. ARISTOTLE, *Metaphysica* H.3, 1043b38–1044a2): “Et similiter est in definitionibus, et in quod quid erat esse, quod significat definitio; quia quocumque minimo addito vel ablato, est alia definitio, et alia natura speciei.” St. Thomas refers to this principle in many places. For example, *In Sent.* 3, d. 2 q. 1 a. 3 qc. 1 co.: “secundum Philosophum 8 Metaph., definitio in hoc convenit cum numero, quod sicut in numeris contingit quod semper subtracta vel addita unitate, fit alius numerus; ita etiam in definitionibus, si addatur vel subtrahatur aliqua differentia, semper fit alia species. Cum ergo omnes differentiae sumantur ex

**the species** to a number. Likewise, in definitions, and in the essence that the definition signifies, if any minimal (difference) is added or removed, the definition is other—and other is the nature of the species.

Thus, in numbers, the minimum is *the unit*, which, if added to *three*, *four*—which is another species of number—arises; and if subtracted from it, *two*—which is also another species of number—results.<sup>51</sup>

Likewise, the definition of *animal* is *animated, sensible substance*.<sup>52</sup> And if *rational* is added to it, the species of *man* is constituted. But if *sensible* is subtracted, the species of *plant* is constituted, for—again—the last difference gives the species.

**3.** Number is that which is **one** (*numerus est id quod est unum < numerum oportet esse aliquid quo unus = τὸν ἀριθμὸν δεῖ εἶναι τι ᾧ εἷς*); for number is by itself one insofar as **the last unit gives** species and **unity** to the number, as also, in things composed from matter and form, something one—a *unity and a species*—results from the form.<sup>53</sup> Likewise, a *definition is one* (*definitio est una = ὁ ὀρισμὸς εἷς ἐστίν*) by itself (*per seipsam*; ► 16.6).

This is why those who speak of the unity of number, and (of) whether a number is not (something) one by itself (*unus per seipsum*), cannot say wherefrom it is one—if it is one.<sup>54</sup>

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essentialibus principiis, oportet quod si homini subtrahatur aliquid de essentialibus ejus, non remaneat eadem species." ScG 1, 54 n. 3: "Ut enim Philosophus dicit, in VIII Metaph., formae et definitiones rerum, quae eas significant, sunt similes numeris. Nam in numeris, una unitate addita vel subtracta, species numeri variatur: ut patet in binario et ternario. Similiter autem est et in definitionibus: nam una differentia addita vel subtracta variat speciem; substantia enim sensibilis absque rationali, et rationali addito, specie differt." *De veritate*, q. 21 a. 6 ad 3: "secundum Philosophum in VIII Metaphys., sicut in numeris quaelibet unitas vel addita vel remota variat numeri speciem; ita in definitionibus quodlibet additum vel remotum diversam speciem constituit." *STh I*, q. 25 a. 6 co.: "Respondeo dicendum quod bonitas alicuius rei est duplex. Una quidem, quae est de essentia rei; sicut esse rationale est de essentia hominis. Et quantum ad hoc bonum, Deus non potest facere aliquam rem meliorem quam ipsa sit, licet possit facere aliquam aliam ea meliorem. Sicut etiam non potest facere quaternarium maiorem, quia, si esset maior, iam non esset quaternarius, sed alius numerus. Sic enim se habet additio differentiae substantialis in definitionibus, sicut additio unitatis in numeris, ut dicitur in VIII Metaphys. Alia bonitas est, quae est extra essentiam rei; sicut bonum hominis est esse virtuosum vel sapientem. Et secundum tale bonum, potest Deus res a se factas facere meliores. Simpliciter autem loquendo, qualibet re a se facta potest Deus facere aliam meliorem."

<sup>51</sup> *In Metaph.* 8, l. 3, §1723: "Minimum enim in numeris est unitas; quae si addatur in ternario, surgit quaternarius, quae est alia species numeri: si vero abstrahatur ab eodem, remanet binarius, qui est etiam alia species numeri."

<sup>52</sup> *In Metaph.* 8, l. 3, §1724: "Sicut enim substantia animata sensibilis tantum, est definitio animalis: cui si addas et rationale, constituis speciem hominis: si autem subtrahas sensibile, constituis speciem plantae, quia etiam ultima differentia dat speciem."

<sup>53</sup> *In Metaph.* 8, l. 3, §1725 (cf. ARISTOTLE, *Metaphysica* H.3, 1044a2–3): "ponit [Philosophus] tertiam assimilationem; et dicit, quod numerus est id quod est unum. Est enim per se unum numerus, in quantum ultima unitas dat numero speciem et unitatem; sicut etiam in rebus compositis ex materia et forma, per formam est aliquid unum, et unitatem et speciem sortitur." *In Metaph.* 8, l. 3, §1726 (cf. ARISTOTLE, *Metaphysica* H.3, 1044a5–6): "Et similiter definitio est una per seipsam."

<sup>54</sup> *In Metaph.* 8, l. 3, §1725 (cf. ARISTOTLE, *Metaphysica* H.3, 1044a3–5): "Et propter hoc loquentes de unitate numeri, ac si numerus non esset unus per seipsum, non possunt dicere quo est unus, si est unus. Cum enim componatur ex multis unitatibus, aut non est unus simpliciter, sed unitates aggregantur in eo

Since (a number) is composed from multiple units, either: **(a)** it is not (something) *one* simply (*simpliciter*), but the units are aggregated in it by the mode of a heap that does not make (from its parts something) *one* simply; (and), consequently, nor do (the aggregated units) constitute a being in some species; and, in this way, a number is not some species of being; or **(b)** if a number is (something) *one* simply, and not by itself (*non per seipsum*), one ought to say *what* makes it (something) *one* from multiple units—which they cannot assign.

Likewise, they do not have something to assign wherefrom a definition comes to be one.<sup>55</sup> This happens reasonably; for the substance (i.e., the essence) that the definition signifies is (something) *one* for the same reason that a number (is something one): that is, *by itself* (*per se*), because one of its parts is as the form of the other. And it is not (something) *one* as (something) indivisible—e.g., the unit and the point—, as some have said; rather, (it is something one) because any one of them is *one form* (*una forma*) and *some nature* (*natura quaedam*).

**4.** Just as number is **not susceptible of more or less** (*non suscipit magis aut minus* = οὐ... ἔχει τὸ μᾶλλον καὶ ἥττον), so (is this true of) the substance (i.e., essence) that is said according to species (*substantia quae dicitur secundum speciem* < ἡ κατὰ τὸ εἶδος οὐσία), although that which is said *according to matter* (*secundum materiam* < ἡ μετὰ τῆς ὕλης) may (be susceptible of more and less).<sup>56</sup>

Thus, just like the *ratio* of *number* consists in something determinate, to which (something) cannot be added or subtracted, so, too, the *ratio* of *form*.<sup>57</sup> On the other hand, *more and less* happen because matter participates more or less (in) form (► 26). Whence, *whiteness* (i.e., the form itself) is not susceptible of more or less either; but *the white*, is (i.e., that which participates in whiteness is susceptible of being more or less white, but whiteness itself, considered without a subject, is unlimited; ► 24.8, ¶2; 26.10).

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per modum coacervationis, quae non facit simpliciter unum, et per consequens nec ens in aliqua specie constituunt: et sic numerus non est aliqua species entis; aut si numerus est unus simpliciter, et non per seipsum, dicendum est quid facit eum unum ex multis unitatibus: quod non est assignare.”

<sup>55</sup> *In Metaph.* 8, l. 3, §1726 (cf. ARISTOTLE, *Metaphysica* H.3, 1044a5–9): “Et similiter definitio est una per seipsam: et sic non habent aliquid assignare per quod fiat unum. Et hoc rationabiliter accidit: quia per eandem rationem substantia, quam significat definitio, est ita unum sicut et numerus, scilicet per se, ex hoc quod una pars eius est ut forma alterius. Et non est una ut indivisibile, sicut unitas ac punctum, sicut quidam dixerunt; sed quia unaquaeque earum est una forma et natura quaedam.”

<sup>56</sup> *In Metaph.* 8, l. 3, §1727 (cf. ARISTOTLE, *Metaphysica* H.3, 1044a9–11): “ponit [Philosophus] quartam assimilationem; et dicit quod sicut numerus non suscipit magis aut minus, ita nec substantia quae dicitur secundum speciem, licet forte illa quae dicitur secundum materiam.”

<sup>57</sup> *In Metaph.* 8, l. 3, §1727: “Sicut enim ratio numeri in aliquo determinato consistit, cui non est addere nec subtrahere, ut dictum est, ita et ratio formae. Sed magis et minus contingit ex hoc quod materia perfectius vel minus perfecte formam participat. Unde etiam albedo non suscipit magis et minus, sed album.”

## 16.8. Order in Considering the Essence of Things

The process and order in which the essences of things are to be considered is thus:<sup>58</sup>

1. The **principles** of the things.
2. The **substance** of the thing constituted from the principles.
3. The determination of the thing to its **proper species**, which is by the form.
4. The perfection of the thing follows upon the form: not only in the specific being (*in esse specifico*), but also in respect of the **proper operation and end**.
5. The diverse things that singularly have some perfection in themselves, **united** in some **order**, perfect (*perficiunt*) some **whole**.

## 16.9. From Substance to the Other Genera

The same proportion (*proportio*, i.e., analogical relation) that is found between genus and difference in the genus of substance is found in the other genera.<sup>59</sup> Just as in the genus of *substance* the difference, which is predicated of the genus and befalls it (*advenit ei*) in order to constitute a species, is compared to it (i.e., to the genus of substance) as an act and a form, so, too, in other definitions.

However, it should not be understood that the difference is a form or that the genus is matter; for the genus and the difference are predicated of the species, while matter and form are not predicated of the composite (► 14.13).<sup>60</sup> Rather, this is said because the genus is taken from that which is material in the thing, while the difference (is taken) from that which is formal (in the thing).

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<sup>58</sup> *In De div. nom.*, c. 2, l. 5: "Circa primum [sc., causam eorum quae ad essentiam rerum pertinent], considerandum est quod, in rerum essentiis, talis quidem processus et ordo considerantur: nam, primo, sunt rerum principia; secundo, substantia rei, ex principiis constituta; tertio, determinatio rei ad propriam speciem quae est per formam; quarto, ex forma consequitur res perfectionem, non solum in esse specifico, sed etiam quantum ad propriam operationem et finem: quinto, res diversae quae singulae quamdam perfectionem habent in seipsis, quodam ordine adunatae, aliquod totum perficiunt."

<sup>59</sup> *In Metaph.* 8, l. 2, §1697: "Sicut enim in genere substantiae, differentia, quae praedicatur de genere, et advenit ei ad constitutionem speciei, comparatur ad ipsum ut actus et forma, ita etiam in aliis definitionibus." Cf. *ibid.*, §1696 (cf. ARISTOTLE, *Metaphysica* H.2, 1043a2–5): "Ostendit [Philosophus] quomodo praedictae differentiae se habeant ad substantias: et dicit: ex praedictis iam manifestum est, quod in praedictis differentiis est quaerendum, quae sit causa formalis essendi cuiuslibet praedictorum, quorum sunt differentiae, si ita est quod substantia formalis vel quod quid est, est causa cuiuslibet essendi, ut in septimo manifestum fuit. Praedictae enim differentiae significant formam, et quod quid est praedictarum rerum. Nulla autem differentiarum praedictarum est substantia, neque aliquid substantiae affine, quasi pertinens ad genus substantiae. Sed eadem proportio invenitur in eis, quae est in substantia."

<sup>60</sup> *In Metaph.* 8, l. 2, §1697: "Non enim est intelligendum, quod differentia sit forma, aut genus sit materia, cum genus et differentiae praedicentur de specie, materia autem et forma non praedicentur de composito: sed hoc dicitur, quia genus sumitur ab eo quod est materiale in re, differentia vero ab eo quod est formale."

For example, the genus of *man* is *animal* because it signifies something having a sensitive nature, which is materially related to the intellectual nature from which *rational*—which is the difference of *man*—is taken; and **rational** signifies *something having an intellectual nature*.<sup>61</sup>

It is thence that the genus has differences potentially (*potestate*), and that the genus and the difference are proportionate to matter and form, as PORPHYRY says.<sup>62</sup> And because of this, too, ARISTOTLE says that *act*—that is, the difference—*is predicated of potency*—that is, of the genus. And, likewise, (this is the true) in the other genera.

For example, if someone should want to define *threshold*, he would say that it is *stone or wood posited in such (a mode)*; in which definition, *stone or wood* is as matter, while *position (is)* as form.<sup>63</sup> Likewise, in the definition of *house*, *stones and wood* is as matter, and *such a mode of composition (is)* as form. Likewise, in the definition of (*ice*) *crystal*, *water* is as matter, while *congealing (is)* as form. And in the definition of *concord* (*symphonia* = συμφωνία), high-pitch and low-pitch (notes) are as matter, and the mode of mixing (is) as form (► 6.3).

Beyond that, in (the definition of) other (things), the end (*finis* = τὸ οὐ ἔνεκα)—upon which the necessity of the form depends—is added (► 14.9).<sup>64</sup> (In the practical order, e.g., if *firefighting* were defined in terms of *bringing fires under control*, this would be its end, upon which will necessarily depend the intended form of controlled fires in flammable matter.)

Thus, the act and form of diverse matters is diverse: in some, the act is a composition; in others, a compounding; or something (i.e., some form) of the aforesaid (► 13.11).<sup>65</sup>

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<sup>61</sup> *In Metaph.* 8, l. 2, §1697: “Sicut genus hominis est animal, quia significat aliquid habens naturam sensitivam; quae quidem materialiter se habet ad naturam intellectivam, a qua sumitur rationale, quae est differentia hominis. Rationale vero significat aliquid habens naturam intellectivam.”

<sup>62</sup> *In Metaph.* 8, l. 2, §1697 (cf. ARISTOTLE, *Metaphysica* H.2, 1043a5–7; 11–12): “Et inde est quod genus habet differentias potestate, et quod genus et differentia proportionantur materiae et formae, ut Porphyrius dicit. Et propter hoc etiam hic dicitur «quod actus,» idest differentia, praedicatur «de materia,» idest de genere; et similiter est in aliis generibus.” See PORPHYRY, *Isagoge*, 11.12–17: “τῶν γὰρ πραγμάτων ἐξ ὕλης καὶ εἶδους συνεστώτων ἢ ἀνάλογόν γε ὕλη καὶ εἶδει τὴν σύστασιν ἐχόντων, ὡσπερ ὁ ἀνδριάς ἐξ ὕλης μὲν τοῦ χαλκοῦ, εἶδους δὲ τοῦ σχήματος, οὕτως καὶ ὁ ἄνθρωπος ὁ κοινός τε καὶ εἰδικός ἐξ ὕλης μὲν ἀναλόγου συνέστηκεν τοῦ γένους, ἐκ μορφῆς δὲ τῆς διαφορᾶς, τὸ δὲ ὅλον τοῦτο, ζῶον λογικὸν θνητόν, ὁ ἄνθρωπος, ὡς ἐκεῖ ὁ ἀνδριάς.”

<sup>63</sup> *In Metaph.* 8, l. 2, §1698 (cf. ARISTOTLE, *Metaphysica* H.2, 1043a7–12): “Si quis enim velit limen definire, dicet, quod est lapis vel lignum taliter positum: in qua definitione lapis vel lignum est ut materia, positio vero ut forma. Et similiter in definitione domus, lapides et ligna sunt materia, et talis modus compositionis est ut forma. [...] Et similiter in definitione crystalli, aqua est sicut materia, congelatio vero ut forma. Et in definitione symphoniae acutum et grave ut materia, et modus commixtionis ut forma; et ita est in omnibus aliis.”

<sup>64</sup> *In Metaph.* 8, l. 2, §1698: “Et etiam ulterius in quibusdam additur finis, a quo necessitas formae dependet.” Cf. ARISTOTLE, *Metaphysica* H.2, 1043a7: “ἢ ἔτι καὶ τὸ οὐ ἔνεκα ἐπὶ ἐνίων ἔστιν.”

<sup>65</sup> *In Metaph.* 8, l. 2, §1699 (cf. ARISTOTLE, *Metaphysica* H.2, 1043a12–14): “Concludit ergo [Philosophus] ex praedictis duo corollaria: quorum primum est quod diversarum materiarum diversi sunt actus et formae. In quibusdam enim est actus compositio, in quibusdam commixtio, aut aliquid dictorum.”



## 17. Predication by Itself vs. by Accident

*In order to determine how accidents are defined, we must first examine the modes in which the predicate and the subject are related by themselves (per se, such that one is posited in the definition of the other), and the modes in which they are related by accident.*

### 17.1. The Preposition *By* (*Per*)

The preposition *by* (*per*) designates a relation of cause (*designat habitudinem causae*), although sometimes it also designates a situation (*situs*), as when someone is said to be *by himself* (*per se*) when he is alone (*solitarius*; ► 17.6).<sup>1</sup>

When *by* (*per*) designates a relation of cause, sometimes it designates **(1)** a relation of **formal cause** (► 17.4), as when one says that the body lives *by the soul*.<sup>2</sup> Sometimes, **(2)** a relation of **material cause** (► 17.5), as when one says that the body is colored *by the surface*: i.e., because the surface is the proper subject of color. It also designates **(3)** a relation of **extrinsic cause** (► 17.7); and, above all, of an efficient (cause), as when one says that water is heated *by fire*.

### 17.2. According to (Something)

ARISTOTLE posits four modes in which *according to* (*secundum quod* = τὸ καθ' ὃ)—which is more common (i.e., applies to more things) than *according to itself* (► 17.3)—is said:<sup>3</sup>

1. Insofar as the **form** and **essence** («*species*,» *idest forma, et* «*substantia rei*,» *idest essentia* = τὸ εἶδος καὶ ἡ οὐσία ἐκάστου πράγματος) is *that according to which* (something) is said to be.<sup>4</sup> For example, according to the Platonists, the Idea of Good («*per se bonum*,» *idest idea boni* = αὐτὸ ἀγαθόν) is that *according to which* something is said (to be) good (<*est illud*,> *secundum quod* <*aliquid*> *bonum* <*dicitur*> = καθ' ὃ ἀγαθός).

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<sup>1</sup> *In Post. an.* 1, l. 10, 8–11: “sciendum est quod hec prepositio ‘per’ designat habitudinem cause, designat etiam interdum et situm, sicut cum dicitur aliquis esse ‘per se’ quando est solitarius.” In English, *per* is often used to denote a causal relation in the genus of efficient causality (including instrumental causality), meaning “by the means or agency of,” or in that of formal causality (typically extrinsic), meaning “according to,” as in “per instructions.” However, it also has the sense of “for each,” somewhat akin to *alone* (see *Merriam-Webster Dictionary*, entry for *per*). Compare this to the use of prepositions derived from the Latin *per* in romance languages: e.g., *de por sí* in Spanish, *par lui même* in French, *di per sé* in Italian, *per si* in Catalan, etc.

<sup>2</sup> *In Post. an.* 1, l. 10, 11–19: “Cause autem habitudinem designat aliquando quidem formalis, sicut cum dicitur quod corpus uiuit per animam; quandoque autem habitudinem cause materialis, sicut cum dicitur quod corpus est coloratum per superficiem, quia scilicet proprium subiectum coloris superficies est; designat etiam habitudinem cause extrinsece, et precipue efficientis, sicut cum dicitur quod aqua calescit per ignem.”

<sup>3</sup> *In Metaph.* 5, l. 19, §1050 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a14–24): “determinat [Philosophus] de hoc, *quod dicitur secundum quod*; quod est communius quam secundum se. [...] ponit quatuor modos eius quod dicitur secundum quod.”

<sup>4</sup> *In Metaph.* 5, l. 19, §1050 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a14–16): “quorum *primus* est, prout «*species*,» *idest forma, et* «*substantia rei*,» *idest essentia, est id, secundum quod aliquid esse dicitur*; sicut secundum Platonicos, «*per se bonum*,» *idest idea boni, est illud, secundum quod aliquid bonum dicitur.*”

2. Insofar as the (proper) **subject**, in which something is first naturally apt to come to be (*in quo primo aliquid natum est fieri* = ἐν ᾧ πρώτῳ πέφυκε γίνεσθαι) is said (to be) *that according to which* (*secundum quod*).<sup>5</sup> For example, color comes to be in surface first. Whence, a body is said to be colored *according to surface*.

This latter mode (¶2) differs from the former (¶1) in that the former pertains to form, while the latter (pertains) to matter.<sup>6</sup>

3. Insofar as, universally, any cause is said (to be) *that according to which* (*secundum quod*).<sup>7</sup> Whence, *according to* (*secundum quod*) is said in as many (modes) as *cause* (is said); for it is the same to ask, “according to what does he come?” and “for what cause does he come?” Likewise, (it is the same to ask), “according to what has he reasoned incorrectly?” and, “by what cause have the reasonings come to be?”

4. Insofar as *according to* (*secundum quod*) signifies *position* and *place*.<sup>8</sup> For example, when one says, “this one stands according to this,” i.e., next to this, and “that one goes according to that,” all of which signify a position and a place. But this appears to be more manifest in the Greek idiom.

### 17.3. By Itself or According to Itself

Just as the preposition *by* (*per*) designates a relation of cause when something extrinsic is the cause of that which is attributed to the subject, so, too, *by itself* (*per se*) signifies that a subject—or something of it—is a cause of that which is attributed to it.<sup>9</sup>

Thus, *by itself* (*secundum se*) is opposed to the *separable accident* (i.e., *that which is in something, and which can be truly affirmed; not, however, of necessity, nor as in most but as in fewer*; ► 15.18).<sup>10</sup> (i.e., insofar as it does not have a determinate cause.)

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<sup>5</sup> *In Metaph.* 5, l. 19, §1051 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a16–17): “*Secundus* modus est, prout subiectum, in quo primo aliquid natum est fieri, dicitur secundum quod, sicut color primo fit in superficie; et ideo dicitur, quod corpus est coloratum secundum superficiem.”

<sup>6</sup> *In Metaph.* 5, l. 19, §1051 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a17–19): “Hic autem modus differt a praedicto, quia praedictus pertinet ad formam, et hic pertinet ad materiam.”

<sup>7</sup> *In Metaph.* 5, l. 19, §1052 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a19–22): “*Tertius* modus est, prout universaliter quaelibet causa dicitur secundum quod. Unde toties dicitur secundum quod quoties et causa. Idem enim est quaerere secundum quod venit, et cuius causa venit; similiter secundum quod paralogizatum, aut syllogizatum est, et qua causa facti sunt syllogismi.”

<sup>8</sup> *In Metaph.* 5, l. 19, §1053 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a22–24): “*Quartus* modus est prout secundum quod significat positionem et locum; sicut dicitur, iste «stetit secundum hunc,» idest iuxta hunc, et ille «vadit secundum hunc,» idest iuxta hunc; quae omnia significant positionem et locum. Et hoc manifestius in Graeco idiomate apparet.”

<sup>9</sup> *In Post. an.* 1, l. 10, 19–24: “Sicut autem hec prepositio ‘per’ designat habitudinem cause quando aliquid extrinsecum est causa eius quod attribuitur subiecto, ita quando subiectum uel aliquid eius est causa eius quod attribuitur ei, et hoc significat ‘per se’.”

<sup>10</sup> *In Metaph.* 5, l. 22, §1143: “Accidens ergo secundum primum modum opponitur ad secundum se.”



Whence, ARISTOTLE posits four modes in which *by itself* or *according to itself* (*per se*, vel *secundum se* = καθ' αὐτό) is said:<sup>11</sup>

1. When that which is attributed to something pertains to its **form** (*quando id quod attribuitur alicui pertinet ad formam eius*; ► 17.4).<sup>12</sup> In this mode, *by itself* (*secundum se*) is said of something that is posited in the definition of the thing: e.g., *animal*, which (is posited in the definition of *man*, and) in no mode is an accident of *man*.
2. When the preposition *by* (*per*) signifies a relation of **material cause** (► 17.5): insofar as that to which something is attributed is its *proper matter* (*propria materia*) and *proper subject* (*proprium subiectum*).<sup>13</sup> This corresponds to the *inseparable accident* (► 15.20). Thus, *having two right angles* is *by itself* in *triangle*, but does not belong to its substance.
3. When *by itself* signifies **something alone** (*aliquid solitarium*; ► 17.6).<sup>14</sup>
4. When *by* signifies a **relation of (extrinsic) cause** (► 17.7), efficient or other.<sup>15</sup>

#### 17.4. First Mode: When *by Itself* Pertains to the Form

Since a definition signifies the form and essence of a thing (► 8.1), this first mode occurs when the definition—or something posited in the definition—is predicated of something, whether it is posited directly (*in recto*) or indirectly (*in obliquo*).<sup>16</sup>

ARISTOTLE adds that, universally, whatever is in the *ratio* that says *what* something is, is attributed by itself to it (< καὶ ἐν τῷ λόγῳ τῷ λέγοντι τί ἐστὶν ἐνυπάρχει).<sup>17</sup> But this may

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<sup>11</sup> *In Metaph.* 5, l. 19, §1054 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a24–36): “Concludit [Philosophus] ex praedictis, *quatuor modos dicendi per se*, vel *secundum se*.”

<sup>12</sup> *In Post. an.* 1, l. 10, 25–27: “Primus ergo modus dicendi per se est quando id quod attribuitur alicui pertinet ad formam eius.” *In Metaph.* 5, l. 22, §1142: “primus [modus dicendi per se] erat prout secundum se dicitur de aliquo quod in eius definitione ponitur, ut animal de homine, quod nullo modo est accidens.”

<sup>13</sup> *In Post. an.* 1, l. 10, 51–54: “Secundus modus dicendi per se est, quando hec prepositio ‘per’ designat habitudinem cause materialis, prout scilicet id cui aliquid attribuitur est propria materia et proprium subiectum ipsius.” *In Metaph.* 5, l. 22, §1142 (cf. ARISTOTLE, *Metaphysica* Δ.30, 1025a32): “Et hic est secundus modus dicendi per se [...] triangulo inest per se duos rectos habere, et non est de substantia eius; unde est accidens.”

<sup>14</sup> *In Post. an.* 1, l. 10, 99–103: “ponit [Philosophus] alium modum eius quod est ‘per se’, prout ‘per se’ significat aliquid solitarium.”

<sup>15</sup> *In Post. an.* 1, l. 10, 122–125: “ponit [Philosophus] quartum modum, secundum quod hec prepositio ‘per’ designat habitudinem cause efficientis uel cuiuscunque alterius <extrinsece>.”

<sup>16</sup> *In Post. an.* 1, l. 10, 25–34 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a34–35): “Primus ergo modus dicendi per se est quando id quod attribuitur alicui pertinet ad formam eius, et quia diffinitio significat formam et essentiam rei, primus modus eius quod est ‘per se’ est quando predicatur de aliquo diffinitio uel aliquid in diffinitione positum. Et hoc est quod dicit quod *per se sunt quaecunque* insunt *in eo quod quid est*, idest in diffinitione indicante quid est, siue ponatur in recto siue in obliquo.”

<sup>17</sup> *In Post. an.* 1, l. 10, 48–50 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a36–37): “Et subiungit quod *quaecunque* uniuersaliter *insunt in ratione dicente quid est*, per se attribuuntur alicui.” *In Metaph.* 5, l. 19, §1054: “Et hi duo modi sub uno comprehenduntur. Nam eadem ratione, definitio et pars definitionis per se de unoquoque praedicantur.”

happen in two modes, which are comprehended under one (mode) because the (whole) definition and (any) part of the definition are predicated by themselves of each thing for the same reason:

1. When the (whole) definition that signifies that which is the being of each thing (*quid est esse uniuscuiusque* = τὸ τί ἦν εἶναι ἐκάστῳ) is said to be in it (*dicitur ei inesse*) according to itself (*secundum se*).<sup>18</sup>

For example, Callias and that which is to be Callias—i.e., the essence of the thing—are related in such a way that one (i.e., the essence of Callias) is in the other (i.e., in Callias, the individual) according to itself.<sup>19</sup>

2. When whatever (parts) that are in the definition (►13.16) that says what (the thing defined) is (*quaecumque insunt in definitione dicente quid est* < ὅσα ἐν τῷ τί ἐστιν ὑπάρχει), are predicated by themselves of the (thing) defined.<sup>20</sup> This responds to the first mode of that which is said *according to something* (*secundum quod*; ►17.2, ¶1).<sup>21</sup>

For example, Callias is, according to itself, an animal; for *animal* is in the *ratio* of Callias, since (*animal*) would be posited in his definition if singulars could have a definition.<sup>22</sup>

Likewise, *multitude* (*multitudo*) or *divisible* (*divisibile*) is predicated of *number* and is posited in its definition (i.e., number is defined as *multitude measurable by one* [πλήθος ἐνὶ μετρητόν], ►2.1; or as *finite multitude divisible into indivisibles*).<sup>23</sup> Hence, *multitude* (or *divisible*) is by itself in *number*.

Likewise, *line* is posited in the definition of *triangle*; hence, *line* is by itself in *triangle*.<sup>24</sup> And *point* is posited in the definition of *line*; hence, *point* is by itself in *line*. These are posited

<sup>18</sup> *In Metaph.* 5, l. 19, §1054 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a25–26): “Quorum *primus* est, quando definitio significans quid est esse uniuscuiusque, dicitur ei inesse secundum se. [...] Est enim hic primus modus per se, qui ponitur in libro Posteriorum.”

<sup>19</sup> *In Metaph.* 5, l. 19, §1054 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a26–27): “sicut Callias «et quod quid erat esse Calliam,» idest et essentia rei, ita se habent quod unum inest secundum se alteri.”

<sup>20</sup> *In Metaph.* 5, l. 19, §1054 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a27–28): “Non autem solum tota definitio dicitur de definito secundum se; sed aliquo modo etiam quaecumque insunt in definitione dicente quid est, praedicantur de definito secundum se.”

<sup>21</sup> *In Metaph.* 5, l. 19, §1054: “hic primus modus per se [...] respondet primo modo eius quod dicitur secundum quod.”

<sup>22</sup> *In Metaph.* 5, l. 19, §1054 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a28–29): “sicut Callias est animal secundum se. Animal enim inest in ratione Calliae. Nam Callias est quoddam animal; et poneretur in eius definitione, si singularia definitionem habere possent.”

<sup>23</sup> *In Post. an.* 1, l. 35, 56–59 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a16–17): “*Multitudo* autem uel *diuisibile* predicatur de numero, et ponitur in diffinitione eius, unde huiusmodi predicantur per se de numero primo modo.”

<sup>24</sup> *In Post. an.* 1, l. 10, 34–41 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a35–36): “sicut in diffinitione trianguli ponitur linea, unde *linea* per se *inest triangulo*, et similiter in diffinitione lineae ponitur punctum, unde *punctum* per se inest *lineae*. Rationem autem quare ista ponantur in diffinitione subiungit, dicens:

in the definition because the essence (*substantia, idest essentia* < οὐσία) that the definition of *triangle* signifies is (composed) from (*ex*) *line*; and the definition of *line*, from *point*.

By this, however, one should not understand that the line is composed of points (► 34.23), but that *point* belongs to the *ratio* (*sit de ratione*) of *line*, as *line* (belongs to the *ratio*) of *triangle*.<sup>25</sup> ARISTOTLE says this (i.e., that the point is posited in the definition of the line) to exclude those (parts) that are parts of matter—which are not posited in the definition—and (are) not (parts) of the species: e.g., *semicircle* is not posited in the definition of *circle*, nor (is) *finger* (posited) in the definition of *man* (► 13.10).

### 17.5. Second Mode: When *by Itself* Pertains to Matter

The second mode occurs when that to which something is attributed is its *proper matter* (*propria materia*) and *proper subject* (*proprium subiectum*).<sup>26</sup>

Since the (act of) being (*esse*) of an accident depends on (its) subject (► 15.16), its definition, which signifies its being, must also contain within itself the subject.<sup>27</sup> Hence, this mode of saying something *by itself* occurs when the subject (e.g., the subject genus; ► 14.1, ¶1) is posited in the definition of the predicate; for the first and proper subject is posited in the definition of the proper accident (► 15.17). Thus, when something is shown to be in something as in (its) first subject (*quando aliquid ostenditur esse in aliquo, sicut in primo subiecto* < εἰ ἐν αὐτῷ δέδεκται πρώτῳ), then it is in it *by itself*.

This can happen in one of two (modes):<sup>28</sup>

1. The first subject of the accident is the whole subject itself of which it is predicated.<sup>29</sup>

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*Substantia, idest essentia, quam significat diffinitio ipsorum, idest trianguli et lineae, est ex his, idest ex linea et punctis.*"

<sup>25</sup> *In Post. an.* 1, l. 10, 41–48: "(quod non est intelligendum quod linea ex punctis componatur, sed quod punctum sit de ratione lineae, sicut linea de ratione trianguli; et hoc dicit ad excludendum ea que sunt partes materie et non speciei, que non ponuntur in diffinitione, sicut semicirculus non ponitur in diffinitione circuli nec digitus in diffinitione hominis, ut dicitur in VII Metaphysice)."

<sup>26</sup> *In Post. an.* 1, l. 10, 51–54 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a37–38): "Secundus modus dicendi per se est, quando hec prepositio 'per' designat habitudinem cause materialis, prout scilicet id cui aliquid attribuitur est propria materia et proprium subiectum ipsius."

<sup>27</sup> *In Metaph.* 5, l. 19, §1055 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a29–30): "Secundus modus est, quando aliquid ostenditur esse in aliquo, sicut in primo subiecto, cum inest ei per se. [...] Et hic est secundus modus dicendi per se in Posterioribus positus, quando scilicet subiectum ponitur in diffinitione praedicati. Subiectum enim primum et proprium, ponitur in diffinitione accidentis proprii." *In Post. an.* 1, l. 10, 61–66: "Cuius quidem ratio est quia, cum esse accidentis dependeat a subiecto, oportet etiam quod diffinitio eius significans esse ipsius contineat in se subiectum. Vnde secundus modus dicendi per se est quando subiectum ponitur in diffinitione predicati quod est proprium accidens eius."

<sup>28</sup> *In Metaph.* 5, l. 19, §1055: "Quod quidem contingit dupliciter."

<sup>29</sup> *In Metaph.* 5, l. 19, §1055 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a29–31): "vel primum subiectum accidentis est ipsum totum subiectum de quo praedicatur."

For example, a surface is said to be colored or white according to itself, for the first subject of color is surface; and hence, a body is said to be colored by reason of (its) surface.<sup>30</sup>

Likewise, *straight* and *circular* are by themselves in *line*; for *line* is posited in their definition.<sup>31</sup> And, for the same reason, *even* and *odd* are by themselves in *number*, for *number* is posited in their definition (► 3.1): *even* is a *number that has a mean (numerus medium habens*: i.e., can be divided into two equal parts); and *odd* is a *number that lacks a mean (numerus medio carens)*.

Likewise, *first* (i.e., prime) and *composite* are predicated by themselves of *number*; and *number* is posited in their definition (► 3.3); for, in numbers, *first (primum = πρῶτον*, i.e. prime) is a number that is measured by no other number, but only by the unit: e.g., seven (*septenarius*); and *composite* is a number that is measured also by another number: e.g., nine (*novenarius*; i.e., nine is measured not only by the unit, but also by another number: i.e., by the number three).<sup>32</sup>

Likewise, *equilateral* and *scalene*, i.e., *three unequal sides*, are by themselves in *triangle*; and *triangle* is posited in their definition.<sup>33</sup>

Whence, ARISTOTLE adds that the subject in which the aforesaid accidents are (*insunt*) is in the *ratio* that says *what* it is: i.e., in their definition.<sup>34</sup> Thus, in some, there is *line*; in others, *number*.

2. (The first subject of the accident is) some part of it (*aliqua pars eius* < τῶν αὐτοῦ τινί [...] μέρος, i.e., some part of the subject itself of which it is predicated).<sup>35</sup>

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<sup>30</sup> *In Metaph.* 5, l. 19, §1055 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a30–31): “sicut superficies dicitur colorata vel alba secundum seipsam. Primum enim subiectum coloris est superficies, et ideo corpus dicitur coloratum ratione superficiei.”

<sup>31</sup> *In Post. an.* 1, l. 10, 72–74 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a38–39): “sicut *rectum et circulare* insunt *linee* per se, nam *linea* ponitur in diffinitione eorum.” *In Post. an.* 1, l. 10, 74–76 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a39–40): “et eadem ratione *par et impar* per se insunt *numero*, quia *numerus* in eorum diffinitione ponitur, nam *par* est *numerus medium habens*.” Ibid., l. 35, 53–56 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a14–16): “*impar* predicatur de *numero* per se secundo modo, quia *numerus* ponitur in diffinitione ipsius *inparis*: est enim *impar numerus medio carens*.”

<sup>32</sup> *In Post. an.* 1, l. 10, 77–83 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a40): “et similiter *primum et compositum* per se predicantur de *numero* et *numerus* in diffinitione eorum ponitur: est enim *primum* in *numeris* *numerus* qui nullo alio *numero* mensuratur, set sola *unitate*, ut *septenarius*, *compositus* autem *numerus* est quem etiam alius *numerus* mensurat, sicut *novenarius*.”

<sup>33</sup> *In Post. an.* 1, l. 10, 83–86 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a38–b1): “et similiter *ysopleuros*, id est *equilaterum*, et *scalenum*, id est *trium inequalium laterum*, et *altera parte longius*, per se insunt *triangulo* et *triangulus* ponitur in diffinitione eorum.”

<sup>34</sup> *In Post. an.* 1, l. 10, 83–90 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b1–3): “Et ideo subiungit [Philosophus] quod subiecta *que insunt omnibus* premissis accidentibus *in ratione dicente quid est*, id est in diffinitione, sicut alicui predictorum accidentium inest *linea*, alicui uero *numerus*.”

<sup>35</sup> *In Metaph.* 5, l. 19, §1055 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a31–32): “Vel etiam *aliqua pars eius*.”

For example, man is said to be a living (thing) according to itself because some part of it—namely, the soul—is the first subject of life.<sup>36</sup>

The proper subject must be posited in the definition of an accident.<sup>37</sup> However, sometimes it is posited indirectly (*in obliquo*), as when an accident is defined abstractly (*in abstracto*; ► 18.9). For example, when we say that *snubness* (*simitas*) is a *curvedness of the nose* (*curvitas nasi*). Sometimes, it is posited directly (*in recto*), as when an accident is defined concretely (*in concreto*). For example, when we say that a *snub nose* (*simum*) is a *curved nose* (*nasus curvus*).

### 17.6. Third Mode: When by *Itself* Signifies *Alone*

This (mode of) *by itself* is said according to the *ratio* of *aloneness* (*ratione solitudinis*); for this *according to itself* signifies something separated (*separatum* = κερχωρισμένον).<sup>38</sup> When *by itself* signifies something alone (*aliquid solitarium*), it is *something particular in the genus of substance*, which is not predicated of some subject (► 15.2, ¶1).<sup>39</sup>

This mode is (had) insofar as those are said to be in something according to themselves *which are alone as such* (*quae ei soli inquantum soli insunt* = ὅσα μόνῳ ὑπάρχει καὶ ἢ μόνον).<sup>40</sup> And this (i.e., *insofar as they are alone*) is said to differentiate (this mode) from the other modes, in which “to be in [something] by itself” was not said (precisely) because it is in (itself) by itself, even though (in the other modes) there should also be something alone in (another), as the definition (is alone) in the (thing) defined (► 17.4).

For example, man is said to be *according to itself* when it is (man) alone.<sup>41</sup> Thus, when we say *walker* (*ambulans*) or *white* (*album*), we do not signify *walker* or *white* as though it

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<sup>36</sup> *In Metaph.* 5, l. 19, §1055 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a31–32): “sicut homo dicitur vivens secundum se, quia aliqua pars eius est primum subiectum vitae, scilicet anima.”

<sup>37</sup> *In Post. an.* 1, l. 10, 55–61 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a37–38): “Oportet autem quod proprium subiectum ponatur in diffinitione accidentis, quandoque quidem in obliquo, sicut cum accidens in abstracto diffinitur, ut cum dicimus quod simitas est curvitas nasi; quandoque uero in recto, ut cum accidens diffinitur in concreto, ut cum dicimus quod simus est nasus curuus.”

<sup>38</sup> *In Metaph.* 5, l. 19, §1057 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a35–36): “Hic autem secundum se dicitur ratione solitudinis. Nam hoc quod dico secundum se, significat aliquid separatum. [...] Et ad hunc reducitur tertius modus in Posterioribus positus.”

<sup>39</sup> *In Post. an.* 1, l. 10, 99–103 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b5–6): “ponit [Philosophus] alium modum eius quod est ‘per se’, prout ‘per se’ significat aliquid solitarium: sic enim dicitur ‘per se’ esse aliquod particulare quod est in genere substantie, quod *non* predicatur *de* aliquo *subiecto*.”

<sup>40</sup> *In Metaph.* 5, l. 19, §1057 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a35): “*Quartus* modus est, prout illa dicuntur secundum se inesse alicui, quae ei soli inquantum soli insunt. Quod dicit [Philosophus] ad differentiam priorum modorum, in quibus non dicebatur secundum se inesse ex eo quod est soli inesse. Quamvis etiam ibi aliquid soli inesset, ut definitio definito.”

<sup>41</sup> *In Metaph.* 5, l. 19, §1057: “sicut dicitur homo secundum se esse, quando solus est.” *In Post. an.* 1, l. 10, 103–112 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b6–8): “et huius ratio est quia, cum dico *ambulans* uel *album*, non significo ‘ambulans’ uel ‘album’ quasi aliquid per se solitarium existens, *cum* intelligatur aliquid aliud esse quod *sit ambulans* uel *album*; <set in substantiis,> et precipue in hiis que

should be something *by itself*, alone, since something else (i.e., man, the subject of the action of walking or of the quality of being white) is understood to be walking (*ambulans*) or (to be) white (*album*). But this does not happen in those names that signify (*significant* = σημαίνει) *this something* (*hoc aliquid* = τόδε τι): that is, in first substances (*in primis substantiis*). Thus, when we say *Sortes* or *Plato*, we do not understand that there is something else—other than what they truly are—which would be their subject.

In this mode, therefore, those are *by themselves* which are not predicated of a subject, while those that are said of a subject—i.e., as (things) existing in a subject—are accidents (*accidentia*); for those that are said of a subject as universals (are said) of inferiors, are not always accidents (e.g., *animal* and *white* are said of *Plato*, but *animal* is not an accident of *Plato*).<sup>42</sup>

This mode, however, is not a mode of predicating (*modus praedicandi*), but a mode of existing (*modus existendi*). Whence, in the beginning ARISTOTLE does not say, “those are said by themselves” (*per se dicuntur*), but “those are by themselves” (*per se sunt*).<sup>43</sup>

To this mode is reduced the fourth mode of saying *according to something* (*secundum quod*), which conveys (*importabat*) *position* (► 17.2, ¶4).<sup>44</sup>

### 17.7. Fourth Mode: When *by Itself* Pertains to an Extrinsic Cause

In this mode, that is said to be according to itself *of which there is not some other cause* (*cuius non est <aliqua> alia causa* = οὐ μὴ ἔστιν ἄλλο αἴτιον).<sup>45</sup>

This is insofar as the preposition *by* signifies a relation of extrinsic cause.<sup>46</sup> Hence, ARISTOTLE says that whatever is in (another) owing to itself (*quicquid inest unicuique*

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*significant hoc aliquid*, scilicet in primis substantiis, hoc non contingit: cum enim dicitur *Sortes* uel *Plato*, non intelligitur quod sit *aliquid alterum quam* id quod ipsa *uere sunt*, quod scilicet sit subiectum eorum.”

<sup>42</sup> *In Post. an.* 1, l. 10, 112–117 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b8–10): “Sic igitur hoc modo que non predicantur de subiecto, per se sunt, que uero dicuntur de subiecto, scilicet sicut in subiecto existencia, accidentia sunt. Nam que dicuntur de subiecto sicut uniuersalia de inferioribus, non semper accidentia sunt.”

<sup>43</sup> *In Post. an.* 1, l. 10, 117–121 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a34): “Sciendum est autem quod iste modus non est modus predicandi, sed modus existendi. Unde etiam in principio non dixit: «Per se dicuntur,» set: «Per se sunt.»”

<sup>44</sup> *In Metaph.* 5, l. 19, §1057: “Et ad hunc reducitur [...] quartus modus dicendi secundum quod, qui positionem importabat.”

<sup>45</sup> *In Metaph.* 5, l. 19, §1056 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a32–33): “Tertius modus est prout secundum se esse dicitur illud, cuius non est aliqua alia causa.”

<sup>46</sup> *In Post. an.* 1, l. 10, 122–128 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b10–11): “ponit [Philosophus] quartum modum, secundum quod hec prepositio ‘per’ designat habitudinem cause efficientis uel cuiuscunque alterius <extrinsece>. Et ideo dicit quod quicquid inest unicuique propter se ipsum, per se dicitur de eo, quod uero non propter ipsum inest alicui, per accidens dicitur.” *In Metaph.* 5, l. 19, §1056: “Et ad hunc modum reducitur quartus modus dicendi per se in Posterioribus positus, quando effectus praedicatur de causa; ut cum dicitur interfectus interiit propter interfectionem, vel infrigidatum infriguit vel refriguit propter refrigerium.”

*propter se ipsum* < τὸ μὲν δι' αὐτὸ ὑπάρχον ἐκάστω καθ' αὐτό) is said of it *by itself*; and whatever is in another, but not owing to itself, is said by accident (*per accidens* = συμβεβηκός).

Thus, something is *by itself* in this mode if that which is predicated is in the subject owing to itself.<sup>47</sup> For example, when one says, “the cooled was cooled owing to cooling,” this is so by itself. Likewise, when one says, “what is slaughtered dies” (*interfectum interiit* < εἴ τι σφαπτόμενον ἀπέθανε); for it is manifest that, because it is slaughtered, it dies; and it is no accident that that which is slaughtered should die. On the other hand, when we say, “while he was walking it lightened” (*ambulante coruscat* < εἰ βαδίζοντος ἤστραψε), this is said by accident; for it is not owing to someone walking that it should lighten.

Therefore, all immediate propositions (►54), which are not proven through some mean, are *by themselves*; for the mean is a cause of the predicate being in the subject (►55.7) in demonstrations *on account of something* (*propter quid*; ►64.2).<sup>48</sup> Whence, although *man* has many causes, such as *animal* and *biped*, which are its formal causes, however, there is no cause of the proposition “man is a man,” since it is immediate; and *on account of this* (*propter hoc*), a man is a man according to itself.

### 17.8. By Itself Reduced to Two Modes

Since something is said *by itself* by comparison to (its) subject, the above modes are reduced to two:<sup>49</sup>

#### 1. When predicates are posited in the definition of the subject.<sup>50</sup>

For example, when we say, “man is (an) animal”; for *animal* falls in the definition of *man*; and because that which is in the definition of something is in some mode its cause, the

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<sup>47</sup> *In Post. an.* 1, l. 10, 128–135 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b11–16): “sicut cum dico: «Hoc ambulante coruscat»: non enim propter id quod ambulat, coruscauit, set hoc dicitur secundum accidens. Si uero quod predicatur insit subiecto propter seipsum, per se est, ut si dicamus quod interfectum interiit: manifestum est quod propter id quod interfectum est, interiit, et non est accidens quod interfectum interieat.” *In Metaph.* 5, l. 19, §1056: “ut cum dicitur interfectus interiit propter interfectionem, vel infrigidatum infriguit vel refriguit propter refrigerium.”

<sup>48</sup> *In Metaph.* 5, l. 19, §1056 (cf. ARISTOTLE, *Metaphysica* Δ.18, 1022a33–35): “sicut omnes propositiones immediatae, quae scilicet per aliquod medium non probantur. Nam medium in demonstrationibus propter quid est causa, quod praedicatum insit subiecto. Unde, licet homo habeat multas causas, sicut animal et bipes, quae sunt causae formales eius; tamen huius propositionis, homo est homo, cum sit immediata, nihil est causa; et propter hoc homo est homo secundum se.”

<sup>49</sup> *In Post. an.* 1, l. 35, 46–47 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a12): “ponit [Philosophus] duos modos predicandi per se.” *Ibid.*, 59–60: “Alii autem modi quos supra posuit reducantur ad hos.” *In De anima* 2, c. 14, 42–43: “Per se autem dicitur dupliciter.” *In Post. an.* 1, l. 9, 58–60: “per se autem dicitur aliquid predicari per comparisonem ad ipsum subiectum, quia ponitur in eius diffinitione uel e conuerso.”

<sup>50</sup> *In Post. an.* 1, l. 35, 47–50 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a13): “nam primo quidem predicantur per se *quecunque insunt* subiectis *in eo quod quid est*, scilicet cum predicata ponuntur in diffinitione subiecti.” *In De anima* 2, c. 14, 43–45: “Vno enim modo dicitur propositio per se cuius predicatum cadit in diffinitione subiecti.”

predicate is a cause of the subject in these (propositions) that are thus said by themselves.<sup>51</sup>

## 2. When **subjects** are posited in the definition of predicates.<sup>52</sup>

For example, when we say, “the nose is snub,” or “the number is even”; for *snub* (*nose*) is nothing other than a *curved nose*; and *even* is nothing than a *number having a mean* (► 3.1). In such (propositions), the subject is a cause of the predicate.<sup>53</sup>

### 17.9. Predication by Accident

Those are predicated *by accident* (as opposed to *by themselves*) which are neither posited in the definition of their subjects, nor are their subjects posited in their definitions.<sup>54</sup> For example, *musical* and *white* are predicated by accident of *animal*.

According to ARISTOTLE, there are three modes in which *being* (*ens*) is said by accident:<sup>55</sup>

1. When **an accident** is predicated **of an accident**, as in “the just is musical” (*iustus est musicus* < δίκαιον μουσικὸν εἶναι φαμεν; or, “the just is a musician”).<sup>56</sup>

2. When **an accident** is predicated **of a subject**, as in “the man is musical” (*homo est musicus* < τὸν ἄνθρωπον μουσικὸν εἶναι φαμεν]; or, “the man is a musician”), or in “the man is white” (*homo est albus* < τὸ λευκὸν ποτ’ ἐκεῖνό φαμεν εἶναι ἄνθρωπον).<sup>57</sup>

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<sup>51</sup> *In De anima* 2, c. 14, 45–49: “sicut ista: Homo est animal; animal enim cadit in diffinitione hominis; et quia id quod est in diffinitione alicuius est aliquo modo causa eius, in hiis que sic per se dicuntur, predicatum est causa subiecti.”

<sup>52</sup> *In Post. an.* 1, l. 35, 50–53 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a13–14): “secundo quando ipsa subiecta insunt predicatis in eo quod quid est, id est quando subiecta ponuntur in diffinitione predicatorum.” *In De anima* 2, c. 14, 49–51: “Alio modo dicitur propositio per se, cuius e contrario subiectum ponitur in diffinitione predicatorum.”

<sup>53</sup> *In De anima* 2, c. 14, 51–56: “sicut si dicatur: Nasus est simus, uel: Numerus est par; simum enim nichil aliud est quam nasus curuus, et par nichil aliud est quam numerus medietatem habens; et in istis subiectum est causa predicatorum.”

<sup>54</sup> *In Post. an.* 1, l. 10, 90–97 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b3–5): “Et similiter in aliis, unicuique, inquam, ipsorum subiectorum, per se inesse dico suum accidens, que uero predicata neutraliter insunt, id est neque ita quod ponantur in diffinitione subiectorum neque subiecta in diffinitione eorum, sunt accidentia, id est per accidens predicantur, sicut musicum et album predicantur de animali per accidens.”

<sup>55</sup> *In Metaph.* 5, l. 9, §886 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a8–10): “Ostendit [Philosophus] quot modis dicitur ens per accidens; et dicit, quod tribus.” *In Post. an.* 1, l. 31, 86–87 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b25–29): “dupliciter autem aliquid secundum accidens predicatur.” In the latter work, ARISTOTLE does not consider the mode in which an accident is predicated of an accident. Also, the modes are inverted.

<sup>56</sup> *In Metaph.* 5, l. 9, §886 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a8–9): “quorum unus est, quando accidens praedicatur de accidente, ut cum dicitur, iustus est musicus.” Although St. Thomas does not say it here, it is evident that this is the most remote form of predication in relation to predication by itself.

<sup>57</sup> *In Metaph.* 5, l. 9, §886 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a9): “Secundus, cum accidens praedicatur de subiecto, ut cum dicitur, homo est musicus.” *In Post. an.* 1, l. 31, 89–91 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b25–26): “alio modo dissimiliter, quando accidens predicatur de subiecto, sicut cum dicitur: «Homo est albus».”



When an accident is predicated of a subject, one says, (e.g.), “the man is white” not because something else is white, but because the man itself is white.<sup>58</sup> Nevertheless, the proposition is by accident because *white* does not befit *man* according to its proper *ratio*; for neither is (*white*) posited in its definition nor conversely.

**3. When a subject is predicated of an accident**, as in “the musical is a man” (*musicus est homo* < τὸν μουσικὸν ἄνθρωπον; or, “the musician is a man”), or in “the white is a man” (*album est homo* < τὸν ἄνθρωπον λευκόν).<sup>59</sup>

On the other hand, when one says, “the white is a man,” this is not said because *man* is in *white* (as in a subject), but because being a man (*esse hominem*) is in the subject of white, which (subject) happens to be white (*accidit* [homini] *esse album* < συμβέβηκε τῷ ἀνθρώπῳ εἶναι λευκῷ).<sup>60</sup>

Mode (¶3) differs from mode (¶2) because it is more remote from predication by itself.<sup>61</sup>

### 17.10. By Accident: From Cause to Predication

It has already been manifested (► 11.7) in what mode a cause by accident differs from a cause by itself; and being by accident can be manifested through the cause by accident.<sup>62</sup>

Thus, when we assign a cause by accident saying that the musical (or the musician) builds—because (being) musical (or musician) happens to the builder, or contrarily—, it is evident that *this is this*—i.e., that *the musical builds*—signifies only that *this happens to this* (*hoc accidere huic* = συμβεβηκέναι τῷδε τόδε).<sup>63</sup>

Likewise, in the aforesaid modes of being by accident, when we say that the man is musical—predicating an accident of a subject—or that the musical is a man—predicating

<sup>58</sup> *In Post. an.* 1, l. 31, 92–98 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b27–29): “quando accidens predicatur de subiecto, dicitur: «Homo est albus», non quia *aliquid alterum sit album*, set quia ipse homo est albus, et tamen est propositio per accidens, quia album non conuenit homini secundum propriam rationem (neque enim ponitur in diffinitione eius neque e conuerso).”

<sup>59</sup> *In Metaph.* 5, l. 9, §886 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a9–10): “Tertius, cum subiectum praedicatur de accidente, ut cum dicitur *musicus est homo*.” *In Post. an.* 1, l. 31, 87–89 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b26–27): “uno modo, quando subiectum predicatur de accidente, puta cum dicimus: «Album est homo».”

<sup>60</sup> *In Post. an.* 1, l. 31, 98–103 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b28–29): “set quando dicitur: «Album est homo», *hoc* non dicitur quia esse hominem insit albo, set quia esse hominem inest subiecto albi, cui scilicet *accidit esse album*; unde hic modus est magis remotus a predicatione per se quam primus.”

<sup>61</sup> *In Post. an.* 1, l. 31, 91; 101–103 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b26–29): “differt hic modus a primo, quoniam [...] hic modus est magis remotus a predicatione per se quam primus.”

<sup>62</sup> *In Metaph.* 5, l. 9, §886: “Et, quia superius iam manifestauit [Philosophus] quomodo causa per accidens differt a causa per se, ideo nunc consequenter per causam per accidens manifestat ens per accidens.”

<sup>63</sup> *In Metaph.* 5, l. 9, §887: “assignantes causam per accidens dicimus quod *musicus aedificat*, eo quod *musicum accidit aedificatori*, vel e contra, constat enim «quod hoc esse hoc,» idest *musicum aedificare*, nihil aliud significat quam «hoc accidere huic.»”

a subject of an accident—or that the white is a musical, or conversely—predicating an accident of an accident—, in all of these (cases), *to be* (*esse*) only signifies *to happen*.<sup>64</sup>

Thus, when an accident is predicated of an accident, (*is*) signifies that both accidents happen to the same subject.<sup>65</sup>

When an accident is predicated of a subject, *to be* is said because the accident happens to the subject.<sup>66</sup>

On the other hand, we say that the musical is a man because the predicate happens to be musical, which is posited in the subject.<sup>67</sup>

Now, when a subject is predicated of an accident, and (when) an accident (is predicated) of an accident, the reason for predicating is—as it were—alike.<sup>68</sup> For just as a subject is predicated of an accident because of that reason—because a subject is predicated of that to which an accident happens in the posited subject—, so an accident is predicated of an accident because it is predicated of the subject of an accident. Because of this, just as the musical is said to be a man, likewise, a musician is said to be white: namely, because that to which happens to be musical—namely, the subject—is white.

It is evident, therefore, that those (things) that are said to be *according to accident* are said (to be so) for three reasons:<sup>69</sup>

1. Because both—i.e., subject and predicate—are in the same (subject): e.g., when an accident is predicated of an accident.<sup>70</sup>

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<sup>64</sup> *In Metaph. 5, l. 9, §887* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a10–15): “ita est etiam in praedictis modis entis per accidens, quando dicimus hominem esse musicum, accidens praedicando de subiecto: vel musicum esse hominem, praedicando subiectum de accidente: vel album esse musicum, vel e converso, scilicet musicum esse album, praedicando accidens de accidente. In omnibus enim his, esse, nihil aliud significat quam accidere.”

<sup>65</sup> *In Metaph. 5, l. 9, §887* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a15–16): “quando accidens de accidente praedicatur, significat quod ambo accidentia accidunt eidem subiecto.”

<sup>66</sup> *In Metaph. 5, l. 9, §887* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a16–17): “cum accidens praedicatur de subiecto, dicitur esse, «quia enti» idest subiecto accidit accidens.”

<sup>67</sup> *In Metaph. 5, l. 9, §887* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a17–18): “Sed musicum esse hominem dicimus, «quia huic,» scilicet praedicato, accidit musicum, quod ponitur in subiecto.”

<sup>68</sup> *In Metaph. 5, l. 9, §887* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a18–19): “Sed musicum esse hominem dicimus, «quia huic,» scilicet praedicato, accidit musicum, quod ponitur in subiecto. Et est quasi similis ratio praedicandi, cum subiectum praedicatur de accidente, et accidens de accidente. Sicut enim subiectum praedicatur de accidente ea ratione, quia praedicatur subiectum de eo, cui accidit accidens in subiecto positum; ita accidens praedicatur de accidente, quia praedicatur de subiecto accidentis. Et propter hoc, sicut dicitur musicum est homo, similiter dicitur musicum esse album, quia scilicet illud cui accidit esse musicum, scilicet subiectum, est album.”

<sup>69</sup> *In Metaph. 5, l. 9, §888* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a19–22): “Patet igitur, quod ea, quae dicuntur esse secundum accidens, dicuntur triplici ratione.”

<sup>70</sup> *In Metaph. 5, l. 9, §888* (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a20–21): “aut eo «quod ambo,» scilicet subiectum et praedicatum, insunt eidem, sicut cum accidens praedicatur de accidente.”

2. Because the predicate, such as *musical*, is in the subject, which is said to be musical: and this is when an accident is predicated of the subject.<sup>71</sup>

3. Because the subject posited in the predicate is that in which the accident is, of which the subject is predicated; and this is when a subject is predicated of an accident: e.g., when we say that the musical is a man.<sup>72</sup>

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<sup>71</sup> *In Metaph.* 5, l. 9, §888 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a21): “aut «quia illud,» scilicet praedicatum, ut musicum, «inest enti,» idest subiecto, quod dicitur esse musicum; et hoc est cum accidens praedicatur de subiecto.”

<sup>72</sup> *In Metaph.* 5, l. 9, §888 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a21–22): “aut «quia illud,» scilicet subiectum in praedicato positum, est illud cui inest accidens, de quo accidente illud, scilicet subiectum, praedicatur. Et hoc est scilicet cum subiectum praedicatur de accidente, ut cum dicimus, musicum est homo.”



## 18. Essence and Definition in Accidents

Before we determine what the principle in any genus is (► 27), we must clarify how—if at all—there is essence and definition in accidents.

### 18.1. Whether Accidents Have Essence and Definition

ARISTOTLE posits two (seemingly contradictory) solutions to the question of whether accidents have essence and definition.<sup>1</sup> However, he shows that it makes no difference how one wants to answer it; for we can (truly) say either of the following:

1. **Accidents do not have a definition**, if by this we understand **priorly** and **simply** (*per prius et simpliciter*; ► 18.2).
2. Accidents **have a definition**, but **posteriorly** (and) **according to something** (*per posterius secundum quid*; ► 18.10; 18.11).

### 18.2. Accidents Have Neither Essence nor Definition (*Simply*)

As ARISTOTLE says, (according to the first solution), essence (*quod quid est* = τὸ τί ἐστι) and definition (*definitio* = ὁρισμός) does not pertain to accidents, but to substances.<sup>2</sup>

What must be known first about *essence* is that (logically speaking, λογικῶς) it must be predicated by itself (*secundum se*; ► 17.3); for those that are predicated of something by accident (*per accidens*; ► 17.9) do not pertain to its essence (*quod quid erat esse*).<sup>3</sup> We understand by *the essence of something* that which can conveniently answer the question “what is it?” And when we ask of something *what* it is, we cannot conveniently respond, “those that are in it by accident.”

For example, when we ask, “what is man?” we cannot answer that it is *white*, *sitting*, or *musical* (i.e., *musician*).<sup>4</sup> Hence, none of those (predicates) that are predicated by

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<sup>1</sup> *In Metaph.* 7, l. 4, §1338 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b3–4): “Et quia posuerat [Philosophus] duas solutiones, subiungit quod nihil differt qualitercumque aliquis velit dicere de praemissa quaestione; sive dicatur quod accidentia non habent definitionem, sive quod habent, sed per posterius secundum quid. Quod tamen dicitur in prima solutione quod non habent definitionem accidentia, intelligitur per prius et simpliciter.”

<sup>2</sup> *In Metaph.* 7, l. 4, §1331: “ostendit [Philosophus] quomodo definitio et quod quid est invenitur in substantia et accidentibus. [...] Dicit ergo primo, quod dicendum est [...], quod quod quid est et definitio non sit accidentium, sed substantiarum.” Cf. ARISTOTLE, *Metaphysica* Z.4, 1030a16–17: “ὁρισμὸς δ’ οὐκ ἔσται οὐδὲ τὸ τί ἦν εἶναι.”

<sup>3</sup> *In Metaph.* 7, l. 3, §1309 (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b12–14; 15–16): “Hoc autem primo sciendum est de eo quod quid erat esse, quod oportet quod praedicetur secundum se. Illa enim quae praedicantur de aliquo per accidens, non pertinent ad quod quid erat esse illius. Hoc enim intelligimus per quod quid erat esse alicuius, quod convenienter responderi potest ad quaestionem de eo factam per quid est. Cum autem de aliquo quaerimus quid est, non possumus convenienter respondere ea quae insunt ei per accidens.”

<sup>4</sup> *In Metaph.* 7, l. 3, §1309 (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b14–15): “sicut cum quaeritur quid est homo, non potest responderi, quod sit album vel sedens vel musicus. Et ideo nihil eorum, quae

accident of something pertain to the essence of that thing; for *to be musical* is not *for you to be* (*non enim musicum esse, est tibi esse* < οὐ γάρ ἐστι τὸ σοὶ εἶναι τὸ μουσικῶ εἶναι).<sup>5</sup>

Indeed, the *to be musical* (or *musician*)—that is, the *what* that the musical is—does not pertain to the *what* that you are.<sup>6</sup> And if we should ask, “what are you?” one could not respond that you are a musical. It follows, then, that *to be musical* is not *for you to be*; for those that pertain to the quiddity of musical are outside your quiddity, even if *musical* is predicated of you; for *musical* is not predicated of you by itself (► 17.3), but by accident (► 17.9). Therefore, that which is predicated of you by itself and not by accident pertains to the *what* that you are: for example, *substance*, *rational*, *sensible*, and other such (predicates), all of which pertain to the *what* that you are (► 17.8, ¶1).

### 18.3. Proper Affections Do Not Have Essence (*Simply*)

ARISTOTLE (moreover) excludes from essence any affections that are predicated of a subject, even if they are predicated by themselves.<sup>7</sup>

He says that not everything that is predicated by itself of something pertains to its essence; for an affection is predicated by itself of (its) proper subject—as *color* (is predicated by itself) of *surface*—, and nonetheless, essence is not that which is in something by itself as white is in a surface; for *to be a surface* is not *to be white*: that is, the essence of surface is not the essence of white; for the quiddity of surface is other than (the quiddity) of whiteness.<sup>8</sup>

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praedicantur per accidens de aliquo, pertinent ad quod quid erat esse illius rei: non enim musicum esse, est tibi esse.”

<sup>5</sup> Such expressions are notoriously difficult to translate. As St. Thomas observes, it should be known that when ARISTOTLE says, “to be this” (*hoc esse*; e.g., *musicum esse, to be musical* [or *musician*], translation of τὸ μουσικῶ εἶναι) or “for this to be” (*huic esse*; e.g., *\*musico esse*, which arguably would be a more accurate translation of τὸ μουσικῶ εἶναι: literally, *the to-be for the musical* [or *musician*]) he understands (by such expressions) the essence of that thing (compare τὸ μουσικῶ εἶναι and τὸ τί ἦν εἶναι). For example, (by) “for man to be” (*homini esse*) or “to be man” (*hominem esse*) he understands that which pertains to what man is. *In Metaph.* 7, l. 3, §1310: “Sciendum autem est, quod in omnibus sequentibus per hoc quod dicit [Philosophus] hoc esse, vel huic esse, intelligit quod quid erat esse illius rei; sicut homini esse vel hominem esse, intelligit id quod pertinet ad quod quid est homo.”

<sup>6</sup> *In Metaph.* 7, l. 3, §1310 (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b14–15): “Quod est autem «musicum esse,» idest hoc ipsum quod quid est musicus, non pertinet ad hoc quod quid es tu. Si enim quaeratur, tu quid sis, non potest responderi quod tu sis musicus. Et ideo sequitur quod musicum esse non est tibi esse; quia ea quae pertinent ad quidditatem musici, sunt extra quidditatem tuam, licet musicus de te praedicetur. Et hoc ideo, quia «tu non secundum teipsum es musicus,» idest quia musicum non praedicatur de te per se, sed per accidens. Illud ergo pertinet ad quod quid est tui, quod tu es «secundum teipsum,» idest quia de te praedicatur per se et non per accidens; sicut de te praedicatur per se homo, animal, substantia, rationale, sensibile, et alia huiusmodi, quae omnia pertinent ad quod quid est tui.”

<sup>7</sup> *In Metaph.* 7, l. 3, §1311: “Excludit [Philosophus] ab eo quod est quod quid est, quod praedicatur secundum se, sicut passiones de subiectis.”

<sup>8</sup> *In Metaph.* 7, l. 3, §1311 (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b16–18): “dicens: neque etiam hoc omne quod praedicatur secundum se de aliquo, pertinet ad hoc quod quid erat esse eius. Praedicatur enim per se passio de proprio subiecto, sicut color de superficie. Non tamen quod quid erat esse est, quod ita inest alicui secundum se, sicut superficiei inest album; quia non superficiei esse est «album esse,» idest

Not only the essence of white is not the essence of surface.<sup>9</sup> The composite from one and the other—i.e., the composite of surface and whiteness that is *to be a white surface* or *to be of white surface*—is not its essence either. Indeed, the quiddity or essence of *white surface* is not the quiddity or essence of *surface*. And if we should ask why, one could respond that because *this is present in it*. i.e., because when one says, “white surface,” one says that something adheres to surface as extrinsic, and not as entering into its essence. Whence, the whole *white surface* does not pertain to the essence of *surface*.

ARISTOTLE proves that those (predicates) that are predicated by themselves of something in the way that proper affections (are predicated) of (their) subject do not pertain to the essence (by) reducing (the argument) to a disagreement (*ad inconueniens*); for multiple, diverse affections may be predicated by themselves of the same subject.<sup>10</sup> For example, of the same subject is predicated by itself the proper affection *colored, rough* (i.e., uneven), and *light* (i.e., as opposed to heavy), which are affections of surface. And all such predicates pertain to the essence of the subject according to the same *ratio*.

Thus, if whiteness pertains to the essence of surface, for the same reason also lightness; for those that are the same to one are the same to each other (i.e., in this case, multiple affections have the same proper subject).<sup>11</sup> If it were always and universally true that the quiddity of proper affections should be the same with the quiddity of the proper subject, it would follow that *to be white* and *to be light* would be one and the same: that is, that the quiddity of *whiteness* and of *lightness* would be one and the same. But this is evidently false. It remains, therefore, that the essence of proper affections and the essence of the subject is not one and the same.

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hoc ipsum quod quid est superficies, non est quod quid est album. Alia enim est quidditas superficiei et albedinis.”

<sup>9</sup> *In Metaph. 7, l. 3, §1312* (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b18–19): “Et non solum hoc quod est esse album non est quod quid est superficiei; sed nec ipsum compositum ex utrisque, scilicet superficiei et albedine, quod est esse superficiem albam vel esse superficiei albae. Quidditas enim vel essentia superficiei albae, non est quidditas vel essentia superficiei. Et si quaeratur quare? Responderi potest quia hoc adest ei, idest, quia cum dico superficiem albam, dicitur aliquid quod adhaeret superficiei tamquam extrinsecum, et non tamquam intrans essentiam eius. Unde hoc totum quod est superficiei alba, non est de essentia superficiei.”

<sup>10</sup> *In Metaph. 7, l. 3, §1314*: “Probat autem [Philosophus] deducendo ad inconueniens, quod ea quae praedicantur per se de aliquo sicut propria passio de subiecto, non pertineant ad quod quid est. Contingit enim de eodem subiecto plures passionis diversas per se praedicari; sicut per se praedicatur propria passio, coloratum et asperum et leve, quae sunt passionis superficiei. Eiusdem autem rationis est omnia huiusmodi praedicata ad quod quid est subiecti pertinere.”

<sup>11</sup> *In Metaph. 7, l. 3, §1314* (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b21–22): “Ergo si albedo pertinet ad quod quid est superficiei, pari ratione et levitas. Quae autem uni et eidem sunt eadem, sibiinvicem sunt eadem. Quare si superficiei album esse est superficiei esse semper, idest si semper et universaliter hoc verum est quod quidditas propriae passionis sit idem cum quidditate proprii subiecti, sequitur quod albo esse et levi esse, sit idem et unum, idest quod quidditas albedinis et levitas sit una et eadem. Hoc autem patet falsum esse. Relinquitur ergo quod quod quid erat esse propriae passionis et subiecti non est idem et unum.”

#### 18.4. Predicates Pertaining to Essence (*Simply*)

Affections are predicated of proper subjects because (their) proper subjects are posited in their definitions, as *nose* is posited in the definition of *snub*; and *number* (is posited) in the definition of *even* (► 17.5).<sup>12</sup> On the other hand, some (predicates) are predicated by themselves in such a way that (their) subjects are not posited in their definitions (► 17.8), as *animal* (is predicated) by itself of *man*, and *man* is not posited in the definition of *animal*.

Since those (predicates) do not pertain to essence which are predicated by accident, or which are predicated by themselves and yet (their) subjects are posited in their definitions, it remains, therefore, that those (predicates) pertain to essence *in whose definitions are not posited subjects* (i.e., ► 17.8, ¶1; but not ¶2).<sup>13</sup>

Whence, ARISTOTLE concludes that the *ratio* of essence in each (thing) will be that descriptive *ratio* in whose predicate there is no subject, as *man* is not in the *ratio* of *animal*; whence, *animal* pertains to the essence of *man*.<sup>14</sup>

#### 18.5. Definition by Addition

(Definitions, properly speaking, are only of species; ► 13.16.) And it belongs to the *ratio* of species to be related to a genus by addition.<sup>15</sup> However, something can be added to a genus in two modes:

1. *As that which pertains by itself (per se) to it and is contained virtually (virtute) in it.* Such an addition produces a true species of some genus. For example, *rational* is added to *animal* (to produce the true species of *man*).
2. *As something external (extraneum) is added to its ratio.* Such an addition does not produce a true species of the genus in the way that we commonly speak of genus and species. For example, if *white*—or something of this mode—should be added to *animal*.

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<sup>12</sup> *In Metaph. 7, l. 3, §1313*: “Praedicantur autem passiones de propriis subiectis ea ratione, quia propria subiecta in earum definitionibus ponuntur, sicut nasus ponitur in definitione simi, et numerus in definitione paris. Quaedam vero ita praedicantur per se, quod subiecta in eorum definitionibus non ponuntur, sicut animal per se de homine; nec homo ponitur in definitione animalis.”

<sup>13</sup> *In Metaph. 7, l. 3, §1313*: “Cum ergo ea quae praedicantur per accidens non pertineant ad quod quid est, nec illa quae praedicantur per se in quorum definitionibus ponuntur subiecta, relinquitur quod illa pertineant ad quod quid est, in quorum definitionibus non ponuntur subiecta.”

<sup>14</sup> *In Metaph. 7, l. 3, §1313* (cf. ARISTOTLE, *Metaphysica* Z.4, 1029b19–21): “Et ideo concludit dicens, quod haec erit ratio in singulis, quod quid erat esse, in qua ratione dicente ipsum, idest describente praedicatum non inerit ipsum, idest subiectum; sicut in ratione animalis, non inest homo. Unde animal pertinet ad quod quid est homo.”

<sup>15</sup> *STh I, q. 3 a. 5 co.*: “ad rationem speciei pertinet quod se habeat ex additione ad genus. Sed generi potest aliquid addi dupliciter. Uno modo, quod per se ad ipsum pertinet, et virtute continetur in ipso, sicut rationale additur animali. Et talis additio facit veras species alicuius generis, ut per Philosophum patet, in VII et VIII Metaphys. Aliquid vero additur generi quasi aliquid extraneum a ratione ipsius, sicut si album animali addatur, vel aliquid huiusmodi. Et talis additio non facit veras species generis, secundum quod communiter loquimur de genere et speciebus.”



There is a **definition by addition** (*definitio per additionem, ex additione* = [ὀρισμὸς] ἐκ προσθέσεως) whenever a subject is posited—in whatever way—in the definition of an accident (► 17.8, ¶2).<sup>16</sup>

Whence, a **definition** is said (to be) **by addition** *when something is posited in the definition which is outside the essence of that which is defined*; and this is so on account of the natural dependency of an accident upon a subject (► 15.16).<sup>17</sup> For example, *nose* is posited in the definition of *snub*.

## 18.6. Simple vs. Coupled Accidents

Some accidents are *simple*, while others are *coupled*.<sup>18</sup>

1. Those accidents are said (to be) **simple** (*simplicia* < ὀρισμὸς τῶν ἀπλῶν) *which do not have a determinate subject that should be posited in their definition*.<sup>19</sup> For example, *curved*, *concave*, and other mathematical (accidents).

2. Those accidents are said (to be) **coupled** (*copulata* < ὀρισμὸς τῶν οὐχ ἀπλῶν ἀλλὰ συνδευασμένων) *which have a determinate subject without which they cannot be defined*.<sup>20</sup>

## 18.7. Definition of Simple and of Coupled Accidents

For simple and coupled accidents to be defined, it is necessary that their definitions be made by addition, since they cannot be defined without their proper subjects.<sup>21</sup>

For example, if we take **nose** (*nasus* = ῥίς), **concavity** (*concauitas* = κοιλότης), and **snubness** (*simitas* = σιμότης):

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<sup>16</sup> *Quodlibet* 9, q. 3 ad 1: “qualitercumque ponatur subiectum in definitione accidentis, intelligitur esse definitio per additionem, ut probatur in VII Metaph.” For the origin of this discussion, see *In Metaph.* 7, l. 4, §1342 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b14–27): “quidam dicebant nullam definitionem esse «ex additione,» idest quod in nulla definitione ponitur aliquid, quod sit extra essentiam definiti. Et videbantur pro se habere hoc, quod definitio significat essentiam rei. Unde illud quod est extra essentiam rei, non debet poni in eius definitione, ut videtur.”

<sup>17</sup> *Quodlibet* 9, q. 3 ad 1: “Et dicitur definitio per additionem, quando in definitione ponitur aliquid quod est extra essentiam definiti, sicut nasus ponitur in definitione simi. Hoc autem est propter naturalem dependentiam accidentis a subiecto.”

<sup>18</sup> *In Metaph.* 7, l. 4, §1343: “quaedam accidentia sunt simplicia, et quaedam copulata.”

<sup>19</sup> *In Metaph.* 7, l. 4, §1343: “Simplicia [accidentia] dicuntur, quae non habent subiectum determinatum, quod in eorum definitione ponatur, sicut curvum et concavum et alia mathematica.”

<sup>20</sup> *In Metaph.* 7, l. 4, §1343: “Copolata autem [accidentia] dicuntur, quae habent determinatum subiectum, sine quo definiri non possunt.”

<sup>21</sup> *In Metaph.* 7, l. 4, §1344 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b14–17): “Est ergo dubitatio, si aliquis velit dicere quod ratio, quae est ex additione, non est definitio illorum accidentium quae sunt simplicia, sed copulatum erit definitio. Videtur enim, quod nullius eorum possit esse definitio. Palam est ergo, quod si illa definiuntur, necesse est eorum definitionem ex additione facere, cum sine propriis subiectis definiri non possint. Sicut si accipiamus haec tria, idest nasus, et concavitas, et simitas.”

1. **Concavity** is an accident simply (*simpliciter*); and above all, in comparison to nose, since **nose** does not belong to the understanding of *concave*.<sup>22</sup>

2. **Snubness**, on the other hand, is a composite accident, since **nose** belongs to its understanding.<sup>23</sup> And thus, *snubness* will be something said from both (i.e., from *concavity* and *nose*), insofar as it signifies *this in this* (*hoc in hoc* = τόδε ἐν τῷδε): that is, a determinate accident (i.e., concavity) in a determinate subject (i.e., in a nose).<sup>24</sup>

3. Neither **concavity** nor **snubness** is an affection of **nose** by accident (*secundum accidens*) in the way that *white* is in *Callias* and in *man* by accident: that is, insofar as Callias, who happens (*accidit*) to be a man, is white.

4. **Snub** (*simum*) or **aquiline** (*aquilinum*) is, instead, an *affection by itself* of **nose**; for it befits (*competit*) a nose as such to be snub; and *nose* is posited in the definition of *aquiline*.<sup>25</sup> In the same way, *male* by itself befits (*competit*) *animal*, and *equal* (befits) *quantity*.<sup>26</sup>

◀ Likewise, any other (accidents) are said to exist *by themselves* in something because of the same reason: the name of that in which the affection exists—i.e., (their) substance—is posited in their *ratio*.<sup>27</sup> And (not only the name, but) also the *ratio*; for the *ratio* can always be posited in definitions instead of the name: for example, when it is said that *man* is an *animated, sensible, rational, mortal substance*.<sup>28</sup> Likewise, if we should say that *male* is an *animal that can generate in another*, we can also say that *male* is an *animated sensible substance that can generate in some other*.

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<sup>22</sup> *In Metaph.* 7, l. 4, §1344: “concauitas est simpliciter accidens, praecipue in comparatione ad nasum, cum non sit nasus de intellectu concavi.”

<sup>23</sup> *In Metaph.* 7, l. 4, §1344 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b17–20): “Simitas autem est accidens compositum, cum sit nasus de intellectu eius. Et ita simitas erit quoddam dictum ex duobus, in quantum significat «hoc in hoc,» idest determinatum accidens in determinato subiecto.”

<sup>24</sup> *In Metaph.* 7, l. 4, §1344 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b20–21): “nec concauitas nec simitas est passio nasi secundum accidens, sicut album inest Calliae et homini per accidens, in quantum Callias est albus, cui accidit hominem esse.”

<sup>25</sup> *In Metaph.* 7, l. 4, §1344 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b19–20): “Sed simum est passio nasi secundum se. Naso enim in quantum huiusmodi competit esse simum.” St. Thomas reports another translation that has *aquiline* instead of *that which is concave*, “and the sense is clearer, for *nose* is posited in the definition of *aquiline*.” Ibid.: “Alia autem translatio loco eius quod est concauum, habet aquilinum. Et est planior sensus; quia in definitione aquilini ponitur nasus, sicut in definitione simi.”

<sup>26</sup> *In Metaph.* 7, l. 4, §1344 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b21–22): “Sed sicut masculinum per se competit animali, et aequale quantitati.”

<sup>27</sup> *In Metaph.* 7, l. 4, §1344 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b22–24): “et omnia alia quaecumque secundum se dicuntur existere in aliquo, quia de omnibus est eadem ratio, et «huiusmodi sunt in quibus,» idest in quorum rationibus existit nomen eius «cuius est passio,» idest substantia.”

<sup>28</sup> *In Metaph.* 7, l. 4, §1344: “aut etiam ratio eius. Semper enim in definitionibus potest poni ratio loco nominis: sicut si dicimus quod homo est animal rationale mortale, potest poni loco nominis animalis definitio, ut dicatur quod homo est substantia animata sensibilis rationalis mortalis. Similiter si dicam quod masculus est animal potens generare in alio, possum etiam dicere quod masculus est substantia animata sensibilis potens generare in aliquo alio.”

## 18.8. Alternative Solution to the Question

ARISTOTLE concludes, from the aforesaid, that it is evident that there is definition, which is the *ratio* of *essence*, and essence itself, only of substances, as in the first solution.<sup>29</sup> Or, alternatively, there is definition and essence first and simply of substances; and of accidents, posteriorly and according to something, as in the second solution.

Thus, it is evident that coupled accidents cannot be manifested separately in the way that *white* can be manifested without positing *man* in its definition or *ratio*.<sup>30</sup> Likewise, *female* cannot be so manifested without *animal*; for *animal* must be posited in the definition of *female*, as also in the definition of *male*. Whence, it is evident that there is no true essence and definition of the aforesaid coupled accidents if no definition is by addition, as happens in the definitions of substances.

Alternatively, if there is some definition of them, since they can only be defined by addition, their definition will be diverse from that of substances.<sup>31</sup> And thus, in his conclusion ARISTOTLE hints at the solution to the proposed question: that *no definition is by addition* is true of definition insofar as it is found in substances; for the aforesaid accidents do not have a definition in this mode, but in another mode: that is, *posteriorly* (*per posterius*). It is evident, therefore, as it seems, that there is definition only of substance.<sup>32</sup> And if there is definition of the other categories, it must be by addition to a subject, as the definition of *equality* and the definition of *odd* must be taken from the definition of their subjects; for there is no definition of *odd* without *number*; nor is there a definition of *female*, which signifies some quality of *animal*, without *animal*.

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<sup>29</sup> *In Metaph.* 7, l. 4, §1355 (cf. ARISTOTLE, *Metaphysica* Z.5, 1031a11–14): “Ultimo concludit [Philosophus] ex praedictis, quod palam est, quod definitio quae est ratio eius quod quid erat esse, et ipsum quod quid erat esse, solum est substantiarum, sicut prima solutio habebat. Vel est primo et simpliciter earum, et per posterius et secundum quid accidentium, ut in secunda solutione dicebatur.”

<sup>30</sup> *In Metaph.* 7, l. 4, §1345 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b24–26): “Et sic patet, quod non contingit separatim «ostendere,» id est notificare aliquod praedictorum accidentium quae diximus copulata, sicut contingit notificare album sine hoc quod in eius definitione sive ratione ponatur homo. Sed non contingit ita notificare femininum sine animali; quia oportet quod animal ponatur in definitione feminini sicut et in definitione masculini. Quare patet, quod non est alicuius praedictorum accidentium copulatum quod quid erat esse et definitio vera, si nulla definitio est ex additione, sicut contingit in definitionibus substantiarum.”

<sup>31</sup> *In Metaph.* 7, l. 4, §1346 (cf. ARISTOTLE, *Metaphysica* Z.5, 1030b26–27): “Aut si est aliqua definitio eorum, cum non possint nisi ex additione definiri, aliter erit definitio eorum quam substantiarum, quemadmodum diximus in solutione secunda. Et sic in hac conclusione innuit solutionem dubitationis praemissae. Quod enim dicebatur, quod nulla definitio est ex additione, verum est de definitione prout invenitur in substantiis. Sic autem praedicta accidentia non habent definitionem, sed alio modo per posterius.”

<sup>32</sup> *In Metaph.* 7, l. 4, §1350 (cf. ARISTOTLE, *Metaphysica* Z.5, 1031a1–4): “Palam est itaque, ut videtur, quod solius substantiae est definitio. Si enim esset aliorum praedicamentorum, oporteret quod esset ex additione subiecti, sicut definitio aequalitatis et definitio imparis oporteret quod sumeretur ex definitione suorum subiectorum. Non enim definitio imparis est sine numero; nec definitio feminini, quod significat quamdam qualitatem animalis, est sine animali.”

From what has been said, there will only be definition and essence, simply and priorly, of substance.<sup>33</sup> But according to something, and posteriorly, there will also be (definition and essence) of the other (categories). Substance, which has an absolute quiddity, does not depend in its quiddity upon another. An accident, on the other hand, depends on a subject, even though the subject does not pertain to the essence of the accident.

Accidents only have an (act of) being because they are in a subject (► 15.16).<sup>34</sup> Whence, their quiddity depends on a subject; and, because of this, a subject must be posited in the definition of accidents: sometimes directly (*in recto*), and sometimes indirectly (*in obliquo*).

### 18.9. Concrete vs. Abstract Definition of Accidents

A subject must be posited in the definition of an accident; for, in whatever mode the accident is signified, it has a dependency upon a subject according to its *ratio*; but diversely.<sup>35</sup>

1. An accident signified **abstractly** (*in abstracto*) conveys a relation to a subject (*importat habitudinem ad subiectum*) that begins from the accident and is terminated in the subject.<sup>36</sup> Whence, that is said (to be) **whiteness** (*albedo*) whereby something is white (*qua aliquid est album*).

Taken in this mode, the accident is considered according to its proper *ratio*; for it is in this mode that we assign in accidents a genus and a species.<sup>37</sup> Thus, when an accident is

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<sup>33</sup> *In Metaph.* 7, l. 4, §1352 (cf. ARISTOTLE, *Metaphysica* Z.5, 1031a10–11): “Quare «sic quidem,» idest simpliciter per prius, nullius erit definitio nisi substantiae, nec etiam quod quid erat esse. «Sic autem,» idest secundum quid et posterius, erit etiam aliorum. Substantia enim quae habet quidditatem absolutam, non dependet in sua quidditate ex alio. Accidens autem dependet a subiecto, licet subiectum non sit de essentia accidentis; sicut creatura dependet a creatore et tamen creator non est de essentia creaturae, ita quod oporteat exteriorem essentiam in eius definitione poni.”

<sup>34</sup> *In Metaph.* 7, l. 4, §1352: “Accidentia vero non habent esse nisi per hoc quod insunt subiecto: et ideo eorum quidditas est dependens a subiecto: et propter hoc oportet quod subiectum in accidentis definitione ponatur, quandoque quidem in recto, quandoque vero in obliquo.”

<sup>35</sup> *In De sensu* 1, c. 5, 173–175: “Est autem considerandum quod semper oportet subiectum ponere in diffinitione accidentis, ut dicitur in VII Methaphisice, differenter tamen.” *In Peri.* 1, l. 4, 61–62: “Cum autem in diffinitione omnium accidentium oporteat poni subiectum [...]” *STh* I-II, q. 53 a. 2 ad 3: “quocumque modo significetur accidens, habet dependentiam ad subiectum secundum suam rationem, aliter tamen et aliter.” *De veritate*, q. 3 a. 7 ad 2: “accidens dupliciter potest accipi.”

<sup>36</sup> *STh* I-II, q. 53 a. 2 ad 3: “accidens significatum in abstracto, importat habitudinem ad subiectum quae incipit ab accidente, et terminatur ad subiectum, nam albedo dicitur qua aliquid est album.”

<sup>37</sup> *De veritate*, q. 3 a. 7 ad 2: “accidens [...] potest accipi. Uno modo in abstracto; et sic consideratur secundum propriam rationem; sic enim assignamus in accidentibus genus et speciem; et hoc modo subiectum non ponitur in definitione accidentis ut genus, sed ut differentia, ut cum dicitur: simitas est curvitas nasi.” *In Metaph.* 7, l. 4, §1353: “Quando vero accidens significatur per modum substantiae in abstracto, tunc subiectum ponitur in definitione eius in obliquo, ut differentia; sicut dicitur, simitas est concavitas nasi.” *STh* I-II, q. 53 a. 2 ad 3: “Et ideo in definitione accidentis abstracti non ponitur subiectum quasi prima pars definitionis, quae est genus; sed quasi secunda, quae est differentia; dicimus enim quod simitas est curvitas nasi.” *In Peri.* 1, l. 4, 62–66: “necesse est quod, si qua nomina accidens in abstracto significant, quod in eorum diffinitione ponatur accidens in recto quasi genus, et subiectum in obliquo quasi differentia, ut cum <dicitur>: «Simitas est curvitas nasi.»” *In De sensu* 1, c. 5, 176–180: “si accidens diffiniatur in abstracto, subiectum ponitur [in] loco differentie, id autem quod pertinet ad

signified abstractly, by the mode of a substance, the subject is not posited as the first part of the definition, which is the genus. Instead, the subject is posited **indirectly** (*in obliquo*) as the second part of the definition, which is the difference; and that which pertains to the essence of the accident is posited directly (*in recto*) as the genus. For example, we say that *snubness* is *a concavity of the nose*.

2. An accident signified **concretely** (*in concreto*) conveys a relation to a subject that begins from the subject and is terminated in the accident.<sup>38</sup> Whence, that is said (to be) **white** (*album*) which has whiteness (*quod habet albedinem*).

In this mode, the accident is taken insofar as it is one, with the subject, by accident (*per accidens*; ► 18.14); and neither a genus nor a species is assigned to it.<sup>39</sup> Thus, when an accident is signified concretely by the mode of an accident, the matter or subject is posited **directly** (*in recto*) as the genus, which is the first part of the definition; and the accident is posited as the difference. This is done to designate that accidents only have subsistence from the subject. For example, we say that *snub* is *a concave nose*.

It is, therefore, evident that when we say *snub nose* (i.e., when the accident is signified concretely with its proper subject), it is not necessary to take *concave nose* instead of *snub* as pertaining to its essence, but as added to its essence.<sup>40</sup> Whence, *snub* and *concave* are the same by essence (*per essentiam*); but *snub* adds over *concave* a relation to a determinate subject; and, in this way, having determined that the subject is *nose*,

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essenciam accidentis ponitur loco generis, sicut cum dicitur: «Simitas est curvitas nasi.» *De veritate*, q. 3 a. 7 ad 2: “accidens [...] potest accipi. Uno modo in abstracto; [...] sic enim assignamus in accidentibus genus et speciem; et hoc modo subiectum non ponitur in definitione accidentis ut genus, sed ut differentia, ut cum dicitur: simitas est curvitas nasi.”

<sup>38</sup> *STh* I-II, q. 53 a. 2 ad 3: “Sed in concretis incipit habitudo a subiecto, et terminatur ad accidens, dicitur enim album quod habet albedinem.”

<sup>39</sup> *De veritate*, q. 3 a. 7 ad 2: “Alio modo possunt accipi in concreto; et sic accipiuntur secundum quod sunt unum per accidens cum subiecto; unde sic non assignantur eis nec genus nec species, et ita verum est quod subiectum ponitur ut genus in definitione accidentis.” *In Metaph.* 7, l. 4, §1353: “In recto quidem, quando accidens significatur ut accidens in concreione ad subiectum: ut cum dico, simus est nasus concavus. Tunc enim nasus ponitur in definitione simi quasi genus, ad designandum quod accidentia non habent subsistentiam, nisi ex subiecto.” *STh* I-II, q. 53 a. 2 ad 3: “Propter quod in definitione huiusmodi accidentis ponitur subiectum tanquam genus, quod est prima pars definitionis, dicimus enim quod simum est nasus curvus.” *In Peri.* 1, l. 4, 67–70: “si qua uero nomina accidens significant in concreto, in eorum diffinitione ponitur materia uel subiectum quasi genus, et accidens quasi differentia, ut cum dicitur: «Simum est nasus curuus.»” *In De sensu* 1, c. 5, 180–182: “cum autem accidens diffinitur in concreto, e conuerso subiectum ponitur loco generis, sicut cum dicitur: «Simus est nasus curuus.»” *De veritate*, q. 3 a. 7 ad 2: “Alio modo possunt accipi in concreto; et sic accipiuntur secundum quod sunt unum per accidens cum subiecto; unde sic non assignantur eis nec genus nec species, et ita verum est quod subiectum ponitur ut genus in definitione accidentis.”

<sup>40</sup> *In Metaph.* 7, l. 4, §1354: “Patet igitur quod cum dico, nasum simum, non oportet loco simi accipere nasum concavum; quia nasus non ponitur in definitione simi, quasi sit de essentia eius; sed quasi additum essentiae. Unde simum et concavum per essentiam idem sunt. Sed simum addit supra concavum, habitudinem ad determinatum subiectum: et sic determinato subiecto quod est nasus, nihil differt simus a concavo; nec oportet aliquid loco simi ponere nisi concavum: et sic non erit dicere loco eius, nasus concavus, sed solum concavus.”

*snub* differs in nothing from *concave*; and it is not necessary to posit something instead of *snub* other than *concave*. Thus, there will be no need to say, “concave nose” in its stead, but only “concave.”

### 18.10. Accidents Have Essence and Definition *Posteriorly*

We can, therefore, say that *essence* and *definition* is said in multiple modes, such that *essence* (*quod quid est* = τὸ τί ἐστίν) itself signifies:<sup>41</sup>

1. **Substance and *this something*** (*substantiam et hoc aliquid* = οὐσίαν καὶ τὸ τὸδε τι).<sup>42</sup>

2. **Each of the other categories** (*singula aliorum praedicamentorum* = ἕκαστον τῶν κατηγορουμένων), such as *quality*, *quantity*, and the others.<sup>43</sup>

(As already explained), ARISTOTLE proves that definition and essence pertain first and simply to substances; but not only to substances, since also accidents have—in some mode—definition and essence—though not first.<sup>44</sup>

Thus, *being* is predicated of all categories, but not likewise (► 30.14).<sup>45</sup> (It is predicated) **first** (*primum*) of *substance* and **posteriorly** (*per posterius*) of the other categories. And in the same way, *essence* simply (*simpliciter*) befits (*convenit*) substance. But (it befits) the other (categories) in another mode: that is, according to something (*secundum quid*).

### 18.11. Accidents Have Essence and Definition *According to Something*

That essence befits the other (categories) in some mode—that is, according to something—is evident, because in each of the categories something is responded to the question posed by “what?”<sup>46</sup> Thus, we ask of a qualified (thing) or quality (*de quali sive*

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<sup>41</sup> *In Metaph.* 7, l. 4, §1331: “aut oportet secundum alium modum solvendi dicere, quod definitio dicitur multipliciter sicut et quod quid est. Ipsum enim quod quid est, uno modo significat [...]. Alio modo significat [...].” Cf. ARISTOTLE, *Metaphysica* Z.4, 1030a17–19: “ἢ καὶ ὁ ὀρισμὸς ὡσπερ καὶ τὸ τί ἐστὶ πλεοναχῶς λέγεται· καὶ γὰρ τὸ τί ἐστὶν ἓνα μὲν τρόπον σημαίνει [...], ἄλλον δὲ [...].”

<sup>42</sup> *In Metaph.* 7, l. 4, §1331 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a18–19): “Ipsium enim quod quid est, uno modo significat substantiam et hoc aliquid.”

<sup>43</sup> *In Metaph.* 7, l. 4, §1331 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a19–20): “Alio modo significat singula aliorum praedicamentorum, sicut qualitatem et quantitatem et alia huiusmodi talia.”

<sup>44</sup> *In Metaph.* 7, l. 4, §1339 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b4–7): “Probat [Philosophus] secundo positam solutionem, dicens, illud palam esse quod definitio et quod quid erat esse, primo et simpliciter est substantiarum, non tamen solum et substantiarum, cum etiam accidentia aliquo modo habeant definitionem et quod quid erat esse, non tamen primum.”

<sup>45</sup> *In Metaph.* 7, l. 4, §1331: “Sicut autem ens praedicatur de omnibus praedicamentis, non autem similiter, sed primum de substantia, et per posterius de aliis praedicamentis, ita et quod quid est, simpliciter convenit substantiae, aliis autem alio modo, idest secundum quid.” Cf. ARISTOTLE, *Metaphysica* Z.4, 1030a21–23: “ὡσπερ γὰρ καὶ τὸ ἔστιν ὑπάρχει πᾶσιν, ἀλλ’ οὐχ ὁμοίως ἀλλὰ τῷ μὲν πρῶτως τοῖς ὀ ἐπομένως, οὕτω καὶ τὸ τί ἐστὶν ἀπλῶς μὲν τῇ οὐσίᾳ πῶς δὲ τοῖς ἄλλοις.”

<sup>46</sup> *In Metaph.* 7, l. 4, §1332 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a23–24): “Quod enim aliquo modo, idest secundum quid aliis conveniat quid est, ex hoc patet, quod in singulis praedicamentis respondetur aliquid ad quaestionem factam per quid. Interrogamus enim de quali sive qualitate quid est, sicut quid

*qualitate*) what it is (*quid est*). For example, “what is whiteness?” And we respond that (whiteness) is a color. Whence, it is evident that quality is counted among those (things) in which there is essence.

In quality, however, the *what-is* (*quid est*, i.e., essence) is not (found) simply: rather, (what is found is) the *what-is of quality* (*quid est qualitatis*).<sup>47</sup> When we ask, “what is man?” and one responds, “an animal,” this *animal*, since it is in the genus of substance, not only says *what* man is, but also absolutely signifies a *what*, i.e., a *substance*. On the other hand, when we ask, “what is whiteness?” and one responds, “a color,” although (*color*) signifies *what* whiteness is, it does not signify a *what* absolutely, but a *how*. And thus, quality does not have a *what* simply, but according to something; for a *what* is found in quality in such a mode as when we say that color is *the what* of whiteness. And this *what* is more a *substantial* (i.e., something pertaining to substance) than a *substance*.

All other categories have the *ratio* of *being* from *substance*.<sup>48</sup> Hence, the mode of entity of substance—i.e., *to be a what* (*esse quid*)—is participated according to some likeness of proportion in all other categories (► 33.1). For example, just as we say that *animal* is *the what* of *man*, so *color* (is *the what*) of *whiteness*, and *number* (is *the what*) of *two*; and thus, we say that quality has a *what* not simply, but of *this*. Just as some say, speaking logically of non-being, “non-being is,” not because non-being simply is, but because non-being is non-being, so, too, quality does not have a *what* simply, but *the what of quality*.

### 18.12. Analogical Predication of *Essence* and *Definition*

ARISTOTLE shows in what mode *essence* and *definition* are predicated of that which is found in substances and accidents.<sup>49</sup> He says that, because definition and essence is

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est albedo, et respondemus quod est color. Unde patet, quod qualitas est de numero eorum, in quibus est quod quid est.”

<sup>47</sup> *In Metaph.* 7, l. 4, §1333 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a24–25): “Non tamen simpliciter in qualitate est quid est, sed quid est qualitatis. Cum enim quaero quid est homo, et respondetur, animal; ly animal, quia est in genere substantiae, non solum dicit quid est homo, sed etiam absolute significat quid, id est substantiam. Sed cum quaeritur quid est albedo, et respondetur, color, licet significet quid est albedo, non tamen absolute significat quid, sed quale. Et ideo qualitas non habet quid simpliciter, sed secundum quid. Invenitur enim in qualitate quid huiusmodi, ut cum dicimus quod color est quid albedinis. Et hoc quid, magis est substantiale quam substantia.”

<sup>48</sup> *In Metaph.* 7, l. 4, §1334 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a25–27): “Propter hoc enim quod omnia alia praedicamenta habent rationem entis a substantia, ideo modus entitatis substantiae, scilicet esse quid, participatur secundum quamdam similitudinem proportionis in omnibus aliis praedicamentis; ut dicamus, quod sicut animal est quid hominis, ita color albedinis, et numerus dualitatis; et ita dicimus qualitatem habere quid non simpliciter, sed huius. Sicut aliqui dicunt logice de non ente loquentes, non ens est, non quia non ens sit simpliciter, sed quia non ens est non ens. Et simpliciter qualitas non habet quid simpliciter, sed quid qualitatis.”

<sup>49</sup> *In Metaph.* 7, l. 4, §1335 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a27–28): “Ostendit [Philosophus] quomodo quod quid est et definitio praedicetur de eo quod invenitur in substantiis et accidentibus; et dicit, quod ex quo definitio et quod quid est invenitur aliquo modo in accidentibus et in substantia, oportet igitur intendere ad considerandum quomodo oportet «dicere,» id est praedicare definitionem circa

found—in some mode—in accidents and in substance, it is therefore necessary to intend to consider in what mode *definition* must be predicated of each: not, however, more than in what mode they are had (*quomodo se habent* < τὸ πῶς ἔχει). (He says this), evidently, so that we do not say that those (things) of which the *ratio* is not one *in being* (*in essendo*) are predicated univocally (► 14.5).

Now, what has been said of *definition* and *essence* in substance and in accidents is manifest: i.e., that essence—first and simply—is in (*inest*) substance; and in other (categories), consequently (► 18.5).<sup>50</sup> Not indeed in such a way that *essence simply* would be in other (categories), but *the essence of quantity* or (*the essence*) of *quality* (► 18.11).

Hence, it is manifest that *definition* and *essence* must be predicated either **(a) equivocally** (*aequivoce* = ὁμωνύμως) in substance and in accidents; or **(b) by adding and removing** (*addentes et auferentes* = προστιθέντας καὶ ἀφαιροῦντας), according to more and less (*secundum magis et minus*), or according to prior and posterior (*secundum prius et posterius*): e.g., as *being* is said of *substance* and of *accident*; and as we say that the non-knowable (*non scibile* = μὴ ἐπιστητόν) is knowable according to something (*scibile secundum quid*): that is, posteriorly (*per posterius*); for we can know of the non-knowable that it is not known; and likewise, we can say of non-being that it is not.<sup>51</sup>

What is right (*rectum* = ὀρθόν) is for *essence* and *definition* to be said of substance and of accidents neither equivocally nor simply and univocally, but as *medical* (*medicabile* = ἰατρικόν) is said of diverse particulars in respect of one and the same (*per respectum ad unum et idem* = πρὸς τὸ αὐτὸ... καὶ ἓν); yet, it neither signifies one and the same of all those of which they are said; nor is it said equivocally.<sup>52</sup> Thus, (1) a body (*corpus* = σῶμα) is said (to be) *medical* because it is the subject of (the art of) medicine; (2) an operation (*opus* = ἔργον), e.g., a purgation, (is said to be) *medical* because it is exerted by (the art

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singula; non tamen magis quam quomodo se habent; ut videlicet, non ea dicamus univoce praedicari quorum non est una ratio in essendo.”

<sup>50</sup> *In Metaph.* 7, l. 4, §1336 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a28–32): “Quapropter id quod dictum est de definitione et quod quid est in substantia et accidentibus, est manifestum: scilicet quod quid erat esse primo et simpliciter inest substantiae, et consequenter aliis: non quidem ita quod in aliis sit simpliciter quod quid erat esse, sed «quod quid erat esse huic vel illi,» scilicet quantitati vel qualitati.”

<sup>51</sup> *In Metaph.* 7, l. 4, §1336 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a32–34): “Manifestum est enim quod oportet definitionem et quod quid est vel aequivoce praedicari in substantia et accidentibus, vel addentes et auferentes secundum magis et minus, sive secundum prius et posterius, ut ens dicitur de substantia et accidente. Et sicut dicimus, quod «non scibile est scibile secundum quid,» idest per posterius, quia de non scibili hoc scire possumus quod non scitur; sic et de non ente hoc dicere possumus, quia non est.”

<sup>52</sup> *In Metaph.* 7, l. 4, §1337 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030a34–b2): “Non enim est rectum quod quod quid est et definitio dicatur de substantia et de accidentibus, neque aequivoce, neque simpliciter et eodem modo, idest univoce. Sed sicut medicabile dicitur de diversis particularibus per respectum ad unum et idem, non tamen significat unum et idem de omnibus de quibus dicitur, nec etiam dicitur aequivoce. Dicitur enim corpus medicabile, quia est subiectum medicinae; et opus medicabile, quia exercetur a medicina, ut purgatio et vas medicinale, quia eo utitur medicina, ut clystere.”



of) medicine; and (3) a vessel (*vas* = σκεῦος), e.g., a syringe, (is said to be) *medical* because it is used in (the art of) medicine.

Thus, it is evident that *medical* is not said altogether equivocally of these three; for, in equivocal (things), no respect is had to something *one*.<sup>53</sup> Nor is it said univocally, according to one *ratio*; for the *ratio* (of *medical*) is not the same insofar as *that which is used in medicine* and *that which medicine does* is said (to be) *medical*. Rather, (*medical*) is said *analogically* (*analogice*) in respect of one (*per respectum ad unum* = πρὸς ἓν): namely, (in respect) of (the art of) *medicine*.

Likewise, *essence* or *definition* is said neither equivocally nor univocally of substance and accident, but **(analogically) in respect of one** (►20); for it is said of accident in respect of substance.<sup>54</sup>

### 18.13. Certitude (Precision) in Definition

If coupled accidents have terms—i.e., some *ratios*—, they must have terms in some mode other than (that mode in which) definitions (have terms); or (else) definition and essence, which is what is signified by the definition, are said in multiple modes (*multipliciter* = πολλαχῶς; ►18.10).<sup>55</sup> Indeed, the *ratios* of accidents are not said with **certitude** (*certitudinaliter* = ἀκριβῶς, i.e., with precision), as those that are said univocally: rather, they are said according to prior and posterior (*secundum prius et posterius*).

### 18.14. A Definition Signifies (Something) One

Not every *ratio* by which a name is expounded (*exponitur*) is the same as a definition; nor is the name expounded by whatever *ratio* always a (name of a thing) defined.<sup>56</sup> Rather, it

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<sup>53</sup> In *Metaph.* 7, l. 4, §1337 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b2–3): “Et sic patet quod non dicitur omnino aequivoce medicinale de his tribus, cum in aequivocis non habeatur respectus ad aliquod unum. Nec iterum univoce dicitur secundum unam rationem. Non enim est eadem ratio secundum quam dicitur medicinale id quo utitur medicina, et quod facit medicinam. Sed dicitur analogice per respectum ad unum, scilicet ad medicinam. Et similiter quod quid est et definitio, non dicitur nec aequivoce nec univoce, de substantia et accidente, sed per respectum ad unum. Dicitur enim de accidente in respectu ad substantiam, ut dictum est.”

<sup>54</sup> In *Metaph.* 7, l. 4, §1337: “Et similiter quod quid est et definitio, non dicitur nec aequivoce nec univoce, de substantia et accidente, sed per respectum ad unum. Dicitur enim de accidente in respectu ad substantiam, ut dictum est.”

<sup>55</sup> In *Metaph.* 7, l. 4, §1351 (cf. ARISTOTLE, *Metaphysica* Z.5, 1031a6–10): “Solvit [Philosophus] praemissam quaestionem; dicens, quod moventem praedictam quaestionem latet, quod rationes, non dicuntur «certe,» idest certitudinaliter, quasi ea quae dicuntur univoce, sed dicuntur secundum prius et posterius, ut supra dictum est. Si autem praedicta accidentia copulata habent terminos, idest rationes aliquas, oportet quod alio modo sint illi termini quam definitiones: aut quod definitio et quod quid erat esse, quod significatur per definitionem, dicatur multipliciter.”

<sup>56</sup> In *Metaph.* 7, l. 4, §1339 (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b7–9): “Et hoc sic patet. Non enim omnis ratio, qua nomen per rationem exponitur, idem est quod definitio; nec nomen expositum per quamcumque rationem, semper est definitum; sed alicui determinatae rationi competit quod sit definitio; illi scilicet quae significat unum. Si enim dicam quod Socrates est albus et musicus et crispus, ista ratio non significat unum, sed multa, nisi forte per accidens, et ideo talis ratio non est definitio.”

befits some determinate *ratio* to be a definition: i.e., that (*ratio*) which signifies (*something*) *one*. Thus, if one says that Socrates is *white*, *musical*, and *curly-headed*, this *ratio* does not signify (*something*) *one*—except perhaps by accident (► 17.9; 38.17)—, but *many*. Hence, such a *ratio* is not a definition.

However, it would not suffice for there to be a definition if that which is signified by the *ratio* is (something) *one* in continuity (*in continuitate* < τῷ συνεχεῖ; ► 38.5, ¶1; 39); for the *Iliad*—i.e., the poem about the Trojan war—would then be a definition (just) because that war was carried out in some continuity of time.<sup>57</sup>

Nor would it suffice (for there to be a definition) if (that which is signified by the *ratio*) is (something) *one* by binding (*per colligationem* < συνδέσμῳ).<sup>58</sup> For example, if we should say, “a house is stones, cement, and wood,” this *ratio* would not be a definition of *house*.

The *ratio* that signifies (something) *one* will be a definition if it signifies something *one* according those modes in which *one* is said by itself (*per se*; ► 17.3; 38.4); for *one* is said in multiple modes (► 38), like *being* (*ens*; ► 30), too: and *this being* signifies *this something* (i.e., substance); another (*being* signifies) *quantity*; another (*being* signifies) *quality*; and so on in the other (categories signified by *being*).<sup>59</sup> Yet, (*being* signifies) substance priorly (*per prius*); and consequently (*consequenter*), the other (categories). Therefore, *one* will simply be priorly in substance; and posteriorly (*per posterius*), in the other (categories).

If it pertains to the *ratio* of *definition* to signify (something) *one*, it follows that the *ratio* of *white man* will be a definition, since *white man* is in some mode (something) *one*.<sup>60</sup> But the *ratio* of *white* will be a definition in a mode other than (that of) the *ratio* of *substance*, since the *ratio* of *substance* will be a definition priorly (*per prius*), while the *ratio* of *white* (will be a definition) posteriorly (*per posterius*), just as *one* is said of them according to prior and posterior (*per prius et posterius*).

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<sup>57</sup> *In Metaph. 7, l. 4, §1340* (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b9): “Non tamen sufficit quod sit unum in continuitate illud quod per rationem significatur, ad hoc quod sit definitio. Sic enim «Ilias,» idest poema de bello Troiano esset definitio, quia illud bellum in quadam continuitate temporis est peractum.”

<sup>58</sup> *In Metaph. 7, l. 4, §1340* (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b9–10): “Aut etiam non sufficit quod sit unum per colligationem; sicut haec ratio non esset definitio domus, si dicerem, quod domus est lapides et cementum et ligna.”

<sup>59</sup> *In Metaph. 7, l. 4, §1340* (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b10–12): “Sed tunc ratio significans unum erit definitio, si significet unum aliquod illorum modorum, quorum quoties unum per se dicitur. Unum enim dicitur multipliciter sicut et ens. Ens autem hoc quidem significat hoc aliquid, aliud quantitatem, aliud qualitatem, et sic de aliis; et tamen per prius substantiam et consequenter alia. Ergo simpliciter unum per prius erit in substantia, et per posterius in aliis.”

<sup>60</sup> *In Metaph. 7, l. 4, §1341* (cf. ARISTOTLE, *Metaphysica* Z.4, 1030b12–13): “Si igitur ad rationem definitionis pertinet quod significet unum, sequitur quod erit ratio albi hominis definitio, quia albus homo est quodammodo unum. Sed alio modo erit definitio ratio albi, et ratio substantiae; quia ratio substantiae erit definitio per prius, ratio albi per posterius, sicut unum per prius et posterius de utroque dicitur.”

### 18.15. Metaphysical Unity of Substance and of Accident

What is caused (*efficitur*) from an accident and a subject is not (something) *one by itself* (*per se*; ►17.3; 38.4), but *one by accident* (*unum per accidens*; ►38; 38.17).<sup>61</sup> Hence, from their conjunction does not result some essence as from the conjunction of (substantial) form and (first) matter (►15.14).

On account of this, an accident neither has a complete *ratio* of essence nor is it a part of a complete essence: rather, just as it is a being according to something (*est ens secundum quid*), so, too, it has an essence according to something (*essentiam secundum quid habet*; ►18.11).<sup>62</sup>

Since essence is that which is signified by the definition, accidents must have an essence in the same mode that they have a definition.<sup>63</sup> And accidents have an incomplete definition because they can only be defined if a subject is posited in their definition.

(Accidents can only be defined if a subject is posited in their definition) because they do not have by themselves an absolute (act of) being from their subject (*non habent per se esse absolutum a subiecto*).<sup>64</sup> Just as a substantial (act of) being (*esse substantiale*) results (*relinquitur*) from (substantial) form and (first) matter when they are composed (►15.14), so from accident and subject results an accidental (act of) being (*esse accidentale*) when an accident happens to (*advenit*) a subject.

Likewise, neither substantial form nor (first) matter have a complete essence; for, even in the definition of a substantial form, that of which the form is (i.e., its proper matter) must be posited.<sup>65</sup> Hence its definition is *by addition to something which is outside its genus* (i.e., insofar as substantial form and matter are causes in diverse genera; ►9.2), as is the definition of an accidental form. Whence, also in the definition of *soul* (i.e., *the first act of*

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<sup>61</sup> *De ente*, c. 6, 42–46: “Vnde ex accidente et subiecto non efficitur unum per se sed unum per accidens. Et ideo ex eorum coniunctione non resultat essentia quedam sicut ex coniunctione forme ad materiam.”

<sup>62</sup> *De ente*, c. 6, 46–49: “propter quod accidens neque rationem complete essentie habet neque pars complete essentie est, sed sicut est ens secundum quid, ita et essentiam secundum quid habet.”

<sup>63</sup> *De ente*, c. 6, 3–8: “quia, ut dictum est, essentia est id quod per diffinitionem significatur, oportet ut eo modo habeant essentiam quo habent diffinitionem. Diffinitionem autem habent incompletam, quia non possunt diffiniri nisi ponatur subiectum in eorum diffinitione.”

<sup>64</sup> *De ente*, c. 6, 8–13: “quia, ut dictum est, essentia est id quod per diffinitionem significatur, oportet ut eo modo habeant essentiam quo habent diffinitionem. Diffinitionem autem habent incompletam, quia non possunt diffiniri nisi ponatur subiectum in eorum diffinitione; et hoc ideo est quia non habent esse per se absolutum a subiecto, sed sicut ex forma et materia relinquitur esse substantiale quando componuntur, ita ex accidente et subiecto relinquitur esse accidentale quando accidens subiecto aduenit.”

<sup>65</sup> *De ente*, c. 6, 13–22: “Et ideo etiam nec forma substantialis completam essentiam habet nec materia, quia etiam in diffinitione forme substantialis oportet quod ponatur illud cuius est forma, et ita diffinitio eius est per additionem alicuius quod est extra genus eius sicut et diffinitio forme accidentalis; unde et in diffinitione anime ponitur corpus a naturali qui considerat animam solum in quantum est forma phisici corporis.”

a physical body that has life in potency),<sup>66</sup> body is posited by the natural (scientist), who considers the soul only insofar as it is the form of a physical body.

### 18.16. Genus in Accidents

*Genus*, *difference*, and *species* are not taken in the same mode in accidents as (they are) in substances.<sup>67</sup> In substances, (something) *one* is caused (*efficitur*) from a substantial form and (its corresponding) matter: one nature (of) some (kind) that results from their conjunction, (and) that is properly placed in the category of substance. Thus, in substances, concrete names that signify the composite are properly said to be in a genus as species or genera: for example, *man* (i.e., a species), and *animal* (i.e., a genus). But in this mode, form—like matter—is in a category only by reduction, as principles are said to be in a genus (► 29.10).

On the other hand, (something) *one* by itself (*unum per se*) does not come to be from an accident and a subject.<sup>68</sup> Whence, from their conjunction does not result some nature to which the intention of *genus* or *species* could be attributed. Wherefrom, accidental names concretely said—e.g., *white*, *musical*—are posited in a category as species or genera only by reduction; but only insofar as they are signified abstractly: e.g., *whiteness*, *music*.

Since accidents are not composed from matter and form, in them a genus cannot be taken from matter, or a difference (taken) from form, as in composite substances.<sup>69</sup> Instead, the first genus must be taken from the mode of being itself, insofar as *being* (*ens*) is diversely said—according to prior and posterior—of the ten genera of categories. For example, quantity is said (to be a *being*) because it is a *measure of substance*; quality (is said to be a *being*) insofar as it is a *disposition of substance*; and so on of the other (categories).

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<sup>66</sup> See ARISTOTLE, *De anima* B.1, 412a27–28: “ἡ ψυχὴ ἐστὶν ἐντελέχεια ἢ πρώτη σώματος φυσικοῦ δυνάμει ζῶντων ἔχοντος.” Cf. *In De anima* 2, c. 1, 314–315: “actus primus corporis phisici potencia uitam habentis.”

<sup>67</sup> *De ente*, c. 6, 109–111: “Sciendum est etiam quod in accidentibus modo alio sumitur genus, differentia et species quam in substantiis. Quia enim in substantiis ex forma substantiali et materia efficitur per se unum, una quadam natura ex earum coniunctione resultante que proprie in predicamento substantie collocatur, ideo in substantiis nomina concreta que compositum significant proprie in genere esse dicuntur, sicut species uel genera, ut homo uel animal. Non autem forma uel materia est hoc modo in predicamento nisi per reductionem, sicut principia in genere esse dicuntur.”

<sup>68</sup> *De ente*, c. 6, 120–128: “Sed ex accidente et subiecto non fit unum per se; unde non resultat ex eorum coniunctione aliqua natura cui intentio generis uel speciei possit attribui. Vnde nomina accidentalium concretie dicta non ponuntur in predicamento sicut species uel genera, ut album uel musicum, nisi per reductionem, sed solum secundum quod in abstracto significantur, ut albedo et musica.”

<sup>69</sup> *De ente*, c. 6, 128–138: “Et quia accidentia non componuntur ex materia et forma, ideo non potest in eis sumi genus a materia et differentia a forma sicut in substantiis compositis; sed oportet ut genus primum sumatur ex ipso modo essendi, secundum quod ens diuersimode secundum prius et posterius dicitur de decem generibus predicamentorum, sicut dicitur quantitas ex eo quod est mensura substantie et qualitas secundum quod est dispositio substantie, et sic de aliis, secundum Philosophum in IX Methaphisice.”

Differences in accidents are taken from the diversity of principles from which they are caused.<sup>70</sup> Proper affections are caused from the proper principles of the subject. Hence, if (accidents) are defined abstractly (► 18.9), a subject is posited in their definition instead of differences insofar as they are in a genus properly. For example, snubness is said to be *a curvedness of the nose*.

It is conversely if their definition is taken insofar as they are said concretely (► 18.9).<sup>71</sup> In this way, a subject would be posited in their definition as the genus; for, then, they would be defined by the mode of composite substances, in which the *ratio* of *genus* is taken from matter, as we say that snub is *a curved nose*.

It is likewise when an accident is a principle of another accident, as the principle of relation is action and affection, and quantity.<sup>72</sup> Hence, ARISTOTLE divides *relation* according to these (► 37.1). But, because the proper principles of accidents are not always manifest, we sometimes take the differences of accidents from their effects, as *congregative* and *segregative* are said to be differences in colors that are caused from abundance or paucity of light, from which the diverse species of colors are caused.

### 18.17. Removal of Differences in Definitions: Substance vs. Accident

(As just discussed), the mode in which accidents are defined is other than the mode in which substances are defined; for substances are not defined through something that should be outside their essence.<sup>73</sup> Whence, that which is posited first in the definition of a substance is a genus, in which is predicated the *what* (*quid*, i.e., the essence) of the (thing) defined. An accident, on the other hand, is defined through something that is outside its essence: i.e., through (its) subject, upon which it depends according to its being

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<sup>70</sup> *De ente*, c. 6, 139–152: “Differentie uero in eis [sc., in accidentibus] sumuntur ex diuersitate principiorum ex quibus causantur. Et quia proprie passiones ex propriis principiis subiecti causantur, ideo subiectum ponitur in diffinitione eorum loco differentie si in abstracto diffiniuntur, secundum quod sunt proprie in genere, sicut dicitur quod simitas est curuitas nasi.”

<sup>71</sup> *De ente*, c. 6, 139–145: “Sed e conuerso esset si eorum diffinitio sumeretur secundum quod concretiue dicuntur; sic enim subiectum in eorum diffinitione poneretur sicut genus, quia tunc diffinirentur per modum substantiarum compositarum in quibus ratio generis sumitur a materia, sicut dicimus quod simum est nasus curuus.”

<sup>72</sup> *De ente*, c. 6, 145–162: “Similiter etiam est si unum accidens alterius accidentis principium sit, sicut principium relationis est actio et passio et quantitas; et ideo secundum hec diuidit Philosophus relationem in V Methaphisice. Sed quia propria principia accidentium non semper sunt manifesta, ideo quandoque sumimus differentias accidentium ex eorum effectibus, sicut congregatiuum et disgregatiuum dicuntur differentie coloris que causantur ex habundantia uel paucitate lucis, ex quo diuerse species coloris causantur.”

<sup>73</sup> *De potentia*, q. 8 a. 4 ad 5: “alius est modus quo definiuntur accidentia, et quo definiuntur substantiae. Substantiae enim non definiuntur per aliquid quod sit extra essentiam eorum: unde id quod primo ponitur in definitione substantiae est genus, quod praedicatur in eo quod quid de definito. Accidens uero definitur per aliquid quod est extra essentiam eius, scilicet per subiectum, a quo secundum suum esse dependet. Unde id quod ponitur in definitione eius, loco generis, est subiectum; sicut cum dicitur: simum est nasus curuus.”

(*secundum suum esse*). Whence, that which is posited in its definition, instead of a genus, is a subject: for example, when we say, “snub is a curved nose” (i.e., where the subject is *nose*, and the difference is *curved*).

Therefore, just as the genus remains in the definitions of substances when differences are removed, so, when the accident—which is posited instead of a difference—is removed from the definition of an accident, the subject remains.<sup>74</sup> But (this happens) diversely:

1. When the difference is removed (in the definition of a substance), the genus remains, but *not the same in number*.<sup>75</sup> For example, when *rational* is removed (from the definition of man, *rational animal*), the *animal* that is a rational animal does not remain the same in number.

2. When that which is posited instead of a difference in the definitions of accidents is removed, the subject remains *the same in number*.<sup>76</sup> For example, when *curved* or *concave* is removed, *nose* remains the same in number.

This is so because the accident does not complete the essence of the subject like the difference completes the essence of the genus.<sup>77</sup>

### 18.18. Definition of Natural and of Mathematical Things Compared

There are some (things) whose (act of) being (*esse*) depends on matter and cannot be defined without matter.<sup>78</sup> And there are some (things) that, even though they can only be in sensible matter, however, sensible matter does not fall in their definition. The former (things) differ from the latter as *snub* (differs from) *curved* or *concave*.

The snub is in sensible matter; and it is necessary for sensible matter to fall in its definition, since snub is *a curved or concave nose*.<sup>79</sup> All natural (things) are such: e.g., man, stone.

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<sup>74</sup> *De potentia*, q. 8 a. 4 ad 5: “Sicut ergo in definitionibus substantiarum, remotis differentiis, remanet genus; ita in definitione accidentium, remoto accidente, quod ponitur loco differentiae, remanet subiectum; aliter tamen et aliter.”

<sup>75</sup> *De potentia*, q. 8 a. 4 ad 5: “Remota enim differentia remanet genus, sed non idem numero: remoto enim rationali, non remanet idem numero animal, quod est animal rationale.”

<sup>76</sup> *De potentia*, q. 8 a. 4 ad 5: “sed remoto eo quod ponitur loco differentiae in definitionibus accidentium, remanet idem subiectum numero: remoto enim curvo vel concavo, remanet idem nasus numero.”

<sup>77</sup> *De potentia*, q. 8 a. 4 ad 5: “Et hoc est, quia accidens non complet essentiam subiecti sicut differentia complet essentiam generis.”

<sup>78</sup> *In Metaph.* 6, l. 1, §1157 (cf. ARISTOTLE, *Metaphysica* E.1, 1025b28–34): “Sciendum est autem, quod eorum quae diffiniuntur, quaedam definiuntur sicut definitur simum, quaedam sicut definitur concavum; et haec duo differunt.” *In Physic.* 1, l. 1, n. 2: “Sciendum est igitur quod quaedam sunt quorum esse dependet a materia, nec sine materia definiri possunt: quaedam vero sunt quae licet esse non possint nisi in materia sensibili, in eorum tamen definitione materia sensibilis non cadit. Et haec differunt ad invicem sicut curvum et simum.”

<sup>79</sup> *In Metaph.* 6, l. 1, §1157: “definitio simi est accepta cum materia sensibili. Simum enim nihil aliud est quam nasus curvus vel concavus.” *In Physic.* 1, l. 1, n. 2: “Nam simum est in materia sensibili, et necesse

On the other hand, the curved or concave, even if it can only be in sensible matter, however, sensible matter does not fall in its definition; for concave is *that whose mean stands out from its extremes (cuius medium exit ab extremis)*.<sup>80</sup> And such are all mathematical (things): e.g., numbers, magnitudes, and figures.

Thus, in mathematical (things), whose *ratio* abstracts from sensible matter, *straight* is related (to its matter) as *snub* (is related to its matter).<sup>81</sup> That is, mathematical (things) have matter as do natural (things); for *straight* is (something) mathematical, while *snub* is (something natural); and the *ratio* of *straight* is with (the matter) *continuum*, just as the *ratio* of *snub* is with (the matter) *nose*. Hence, the continuum is intelligible matter, while the nose is sensible matter (► 13.13). And it is manifest that, in mathematical (things), the thing is other than the essence (of the thing), as *the straight* and *to be straight*.

Indeed, as ARISTOTLE says, in all those things that exist by nature or by art, the form itself considered in itself is diverse, according to our consideration, from the same form insofar as it is taken as it is conjoined with matter.<sup>82</sup>

For example, in mathematical (things), in which this is more manifest because sensible matter is not posited in their *ratio* according to our consideration, the species itself of sphere is other than the form of sphere in sensible matter insofar as it is signified when *golden* or *bronze sphere* is said.<sup>83</sup> Likewise, the form itself of circle is other than what is said (to be a) *golden* or *bronze circle*. ARISTOTLE manifests this because, when we say

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est quod in eius definitione cadat materia sensibilis, est enim simum nasus curvus; et talia sunt omnia naturalia, ut homo, lapis.”

<sup>80</sup> *In Metaph.* 6, l. 1, §1157: “Sed concavitas definitur sine materia sensibili. Non enim ponitur in definitione concavi vel curvi aliquod corpus sensibile, ut ignis aut aqua, aut aliquod corpus huiusmodi. Dicitur enim concavum, cuius medium exit ab extremis.” *In Physic.* 1, l. 1, n. 2: “curvum vero, licet esse non possit nisi in materia sensibili, tamen in eius definitione materia sensibilis non cadit; et talia sunt omnia mathematica, ut numeri, magnitudines et figurae.”

<sup>81</sup> *In De anima* 3, c. 2, 199–204 (cf. ARISTOTLE, *De anima* Γ.4, 429b18–20): “*iterum in hiis que sunt per abstractionem, id est in mathematicis, quorum ratio abstrahit a materia sensibili, rectum se habet sicut simum, hoc est mathematica habent materiam sicut et naturalia (rectum enim mathematicum est, simum autem naturale): ratio enim recti est cum continuo sicut ratio simi cum naso; continuum autem est materia intelligibilis sicut nasus materia sensibilis. Vnde manifestum est quod aliud est in mathematicis res et quod quid erat esse, ut rectum et recto esse.*”

<sup>82</sup> *In De caelo* 1, l. 19 n. 4 (cf. ARISTOTLE, *De caelo* A.9, 277b30–33): “Dicit ergo primo quod in omnibus existentibus et *generatis*, id est factis, vel a natura vel ab arte, alterum est secundum nostram considerationem ipsa forma secundum seipsam considerata; et alterum est ipsa forma *mixta cum materia*, id est secundum quod accipitur prout est coniuncta cum materia.”

<sup>83</sup> *In De caelo* 1, l. 19 n. 4 (cf. ARISTOTLE, *De caelo* A.9, 277b33–278a4): “Et hoc primo manifestat per exemplum in mathematicis, in quibus est magis manifestum, eo quod in ratione eorum non ponitur materia sensibilis. Alterum est enim secundum considerationem nostram ipsa species sphaerae, et alterum forma sphaerae in materia sensibili, prout significatur cum dicitur aurea vel aerea sphaera: et similiter aliud est ipsa forma circuli, et aliud est quod dicitur aereus aut ligneus circulus. Et hoc manifestat quia, cum dicimus *quod quid erat esse*, id est definitivam rationem, sphaerae aut circuli, non ponimus in eius ratione aureum aut aereum; tanquam hoc quod dicimus aureum aut aereum, non sint de eorum substantia, quam scilicet significat definitio.”

the definitive *ratio* of the sphere or the circle, we do not posit *golden* or *bronze* in its *ratio*, so that golden and bronze are not of their essence, which the definition signifies.

### **18.19. Things Defined Without Matter**

There are some (things) that do not depend upon matter, neither according to (their act of) being (*secundum esse*) nor according to (their) *ratio* (*secundum rationem*), either:<sup>84</sup>

1. Because they are never in matter. For example, God and other separate substances.
2. Because they are not universally in matter. For example, substance, potency, act, and being (*ens*) itself.

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<sup>84</sup> *In Physic.* 1, l. 1, n. 2: “Quaedam vero sunt quae non dependent a materia nec secundum esse nec secundum rationem; vel quia nunquam sunt in materia, ut Deus et aliae substantiae separatae; vel quia non universaliter sunt in materia, ut substantia, potentia et actus, et ipsum ens.”



## 19. Universal Predication

*In order to determine the diverse modes in which one is predicated of many (►20.1), we turn our attention first to how any universal is predicated of many—or of one.*

### 19.1. Enunciative Speech or Proposition

Speech is not the instrument of some power (of the mind) that operates naturally (hence, all speech is artificial and conventional, *secundum placitum* = κατὰ συνθήκην).<sup>1</sup> It is nonetheless an instrument of reason. Every instrument (►46.16) must be defined from its end, which is the use of the instrument. And the use of speech—as of every significative voice—is *to signify a conception of the intellect*.

As ARISTOTLE says, the operations of the intellect are two:<sup>2</sup>

1. The **understanding of indivisibles** (*indivisibilium intelligentia* = ἡ τῶν ἀδιαίρετων νόησις), by which the intellect apprehends the essence of any one thing in itself: for example, when it understands *man*, *ox*, or some other uncomplex (essence).<sup>3</sup>

In this operation, truth and falsehood are not found, both because uncomplex (essences) are neither true nor false, and because the intellect is not deceived in (respect of) an essence (*quod quid est*).<sup>4</sup>

2. The operation of the intellect that **composes and divides** the (essences) understood: e.g., as when the intellect composes many priorly-separated, uncomplex (essences), and makes from them one understanding.<sup>5</sup>

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<sup>1</sup> *In Peri.* 1, l. 7, 21–28: “oratio, quamvis non sit instrumentum alicuius uirtutis naturaliter operantis, est tamen instrumentum rationis, ut supra dictum est; omne autem instrumentum oportet definiri ex suo fine, qui est usus instrumenti; usus autem orationis, sicut et omnis uocis significantiue, est significare conceptionem intellectus.” As St. Thomas explains, speech and its parts are not natural things, but some artificial effect; whence, ARISTOTLE says that speech signifies according to the human institution of reason and will, as all artificial things are also caused from human will and reason. See *In Peri.* 1, l. 6, 189–195 (cf. ARISTOTLE, *De interpretatione* 4, 17a1–2): “oratio autem et partes eius non sunt res naturales, sed quidam artificiales effectus. Et ideo subdit [Aristoteles] quod oratio significat secundum placitum, id est secundum institutionem humane rationis et uoluntatis, ut supra dictum est, sicut et omnia artificialia causantur ex humana uoluntate et ratione.”

<sup>2</sup> *In Peri.* 1, l. 7, 28–31: “operationes autem intellectus due sunt, in quarum una non inuenitur ueritas et falsitas, in alia autem inuenitur uerum uel falsum.” Ibid., l. 1, 1–36: “Sicut Philosophus dicit in III De anima, duplex est operatio intellectus: una quidem que dicitur indiuisibilium intelligencia, per quam scilicet intellectus apprehendit essenciam uniuscuiusque rei in seipsa; alia est autem operatio intellectus componentis et diuidentis.”

<sup>3</sup> *In De anima* 3, c. 5, 7–10 (cf. ARISTOTLE, *De anima* Γ.6, 430a26): “Dicit ergo [Philosophus] primo quod una operatio intellectus est secundum quod intelligit indiuisibilia, puta cum intelligit hominem aut bouem aut aliquid aliud incomplexorum.”

<sup>4</sup> *In De anima* 3, c. 5, 10–13 (cf. ARISTOTLE, *De anima* Γ.6, 430a26–27): “et hec intelligencia est in hiis circa que non est falsum, tum quia incomplexa neque sunt uera neque falsa, tum quia intellectus non decipitur in quod quid est.”

<sup>5</sup> *In De anima* 3, c. 5, 13–17 (cf. ARISTOTLE, *De anima* Γ.6, 430a27–28): “set in illis intelligibilibus in quibus falsum et uerum est, est iam quedam compositio intellectuum, id est rerum intellectarum, sicut quando

In this composition, sometimes there is truth, and sometimes falsehood.<sup>6</sup> There is truth when (the intellect) composes those (essences) that are one—or composite—in the thing (*in re*). For example, when (the intellect) composes *incommensurable* and *diameter*; for the diameter of the square is incommensurable with the side.

The composition is false when (the intellect) composes those (essences) that are not composite in the things (*in rebus*): for example, when it composes *commensurable* with *diameter*, saying that the diameter of the square is commensurable with the side.

Hence, the intellect sometimes understands *commensurable* and *diameter* separately, and then there are two understandings.<sup>7</sup> But when it composes (them), there comes to be one understandable (*intelligibile*), and it is simultaneously understood by the intellect.

Whence, ARISTOTLE defines *propositional speech* from the signification of the true and the false:<sup>8</sup> a **proposition** (*enunciatio* = ἀποφαντικὸς [λόγος]) is a *speech* (*oratio* = λόγος) in which is the true or the false (*in qua verum vel falsum est* = ἐν ᾧ τὸ ἀληθεύειν ἢ ψεύδεσθαι ὑπάρχει).

## 19.2. Division of Proposition

ARISTOTLE posits three divisions of proposition, into:<sup>9</sup>

1. **One simply** (*una simpliciter* < εἷς) and **one by conjunction** (*coniunctione una* = συνδέσμῳ εἷς, i.e. one by binding; ► 19.3).

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ex multis fit aliquid *unum*.” Ibid., 38–39 (cf. ARISTOTLE, *De anima* Γ.6, 430a30–31): “intellectus multa incomplexa prius *separata* componit et facit ex eis unum intellectum.”

<sup>6</sup> In *De anima* 3, c. 5, 39–49 (cf. ARISTOTLE, *De anima* Γ.6, 430a31): “in qua compositione quandoque est ueritas quandoque falsitas, ueritas quidem quando componit ea que in re sunt unum uel composita, sicut cum componit *assimetron*, hoc est incommensurable, et dyametron (nam dyameter quadrati est incommensurabilis lateri), falsa autem est compositio quando componit ea que non sunt composita in rebus, sicut cum componit *symetrum* dyametro, dicens quod dyameter quadrati est symeter, id est commensurabilis lateri.”

<sup>7</sup> In *De anima* 3, c. 5, 49–53: “symetrum ergo et dyametrum aliquando separatim et seorsum intelligit intellectus et tunc sunt duo intelligibilia; quando autem componit, fit unum intelligibile et simul intelligitur ab intellectu.”

<sup>8</sup> In *Peri.* 1, l. 7, 31–40 (cf. ARISTOTLE, *De interpretatione* 4, 17a2–3): “et ideo orationem enunciatuam diffinit [Aristotiles] ex significatione ueri et falsi, dicens quod *non omnis oratio est enunciatua, set in qua uerum et falsum est*. Vbi considerandum est quod Aristotiles, mirabili breuitate usus, et diuisionem orationis innuit in hoc quod dicit: «non omnis oratio est enunciatua», et definitionem enunciationis in hoc quod dicit: «set in qua uerum uel falsum est», ut intelligatur hec esse diffinitio enunciationis: «Enunciatio est oratio in qua est uerum uel falsum».”

<sup>9</sup> In *Peri.* 1, l. 8, 6–8 (cf. ARISTOTLE, *De interpretatione* 5, 17a8–9): “Aristotiles sub breuiloquio duas diuisiones enunciationis ponit.” Ibid., l. 10, 178–180: “Prima namque fuit quod enunciationum quedam est una simpliciter, quedam coniunctione una.” Ibid., l. 8, 9–10 (cf. ARISTOTLE, *De interpretatione* 5, 17a8–9): “una [diuisio enunciationis] est quod enunciationum quedam est una simplex, quedam est coniunctione una.” Ibid., 17–18 (cf. ARISTOTLE, *De interpretatione* 5, 17a8–9): “Alia uero subdiuisio enunciationis est quod, si enunciatio sit una, aut est affirmatiua aut negatiua.” Ibid., l. 10, 183–184: “Alia uero fuit diuisio enunciationis in affirmationem et negationem.” Ibid., 177–178 (cf. ARISTOTLE, *De interpretatione* 6, 17b1–3): “Est autem hec tercia diuisio enunciationis quam Philosophus ponit.”

2. **Affirmation** (*affirmatio* = κατάφασις) and **negation** (*negatio* = ἀπόφασις; ► 19.4).

3. **Universal** (*universale* = καθόλου) and **singular** (*singulare* = καθ' ἕκαστον; ► 19.5).

### 19.3. Division of Proposition into One Simply and One by Conjunction

In things that are outside the mind, some things are *one simply*—for example, the indivisible (e.g., the unit or the point), and the continuum (e.g., insofar as it is undivided, a line is something one simply, and not one by composition, as a house; ► 13.11)—, while some things are *one by binding (colligatione)*, *by composition (compositione)* or *by order (ordine)*.<sup>10</sup> Since *being* and *one* are convertible (*ens et unum convertuntur*), it is likewise necessary that every proposition, just like every being, be equally *one*.

Hence, this (division of a proposition into *one simply* and *one by conjunction*) is the division of an analog into those of which it is predicated *according to prior and posterior (secundum prius et posterius)*; for also in this way *one* is divided into *simple* and *composite* (i.e., a simple proposition is prior to a proposition that is composed by conjunction).<sup>11</sup>

### 19.4. Affirmative vs. Negative Proposition

Since a vocal sound (*vox* = φωνή) is a sign of an understanding (*signum intellectus*), and an understanding is a sign of a thing (*signum rei*), the affirmative proposition (which is a significative vocal sound) is prior to the negative (proposition) for three reasons:<sup>12</sup>

1. From the part of *the vocal sound*, because it is simpler, since negation adds over affirmation a negative particle (e.g., *no*, *not*, *non*, etc.).

2. From the part of *the understanding*, because affirmation signifies the composition of the intellect, while negation signifies its division; and division is naturally posterior to composition (► 13.2, ¶2).

3. From the part of *the thing*, affirmation, which signifies *to be (esse)*, is prior to negation, which signifies *not to be (non esse)*, just as habit is naturally prior to privation (► 42.11).

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<sup>10</sup> *In Peri.* 1, l. 8, 11–16: “Sicut etiam in rebus que sunt extra animam aliquid est unum simpliciter, sicut indivisibile uel continuum, aliquid est unum colligatione aut compositione aut ordine: quia enim ens et unum conuertuntur, necesse est sicut omnem rem, ita et omnem enunciationem aliquam esse unam.”

<sup>11</sup> *In Peri.* 1, l. 10, 180–183: “que quidem est diuisio analogi in ea de quibus predicatur secundum prius et posterius: sic enim unum diuiditur in simplex et compositum.”

<sup>12</sup> *In Peri.* 1, l. 8, 19–34: “Enunciatio autem affirmatiua prior est negatiua, triplici ratione, secundum tria que supra posita sunt, ubi dictum est quod <uox> est signum intellectus et intellectus est signum rei; ex parte igitur uocis, affirmatiua enunciatio est prior quia est simplicior: negatiua enim enunciatio addit supra affirmatiuam particulam negatiuam; ex parte intellectus etiam affirmatiua enunciatio, que significat compositionem intellectus, est prior negatiua, que significat diuisionem eiusdem: diuisio enim naturaliter posterior est compositione, nam non est diuisio nisi compositorum, sicut non est corruptio nisi generatorum; ex parte etiam rei, affirmatiua enunciatio, que significat esse, prior est quam negatiua, que significat non esse, sicut habitus naturaliter prior est priuatione.”

However, this is (a division) of a genus into (its) species; for it is taken *according to a difference of the predicate*, in relation to which a negation is said (*ad quod fertur negatio*).<sup>13</sup> Since the predicate is the formal part of the proposition, such a division is said to pertain to the *quality of the proposition*: that is, to an essential quality, insofar as the difference signifies something qualified (*quale quid*; i.e., *affirmative* and *negative divide proposition* in the same way that the quality *rational* and its negation *non-rational* divide *animal*; note that *quality* is from the part of the *predicate*, while *quantity* is from the part of the *subject*).

### 19.5. Universal vs. Singular Proposition

The subject of the proposition is a name, or something taken in the place of a name.<sup>14</sup> A **name** is a *vocal sound that signifies—by convention—a simple understanding* (*vox significativa ad placitum simplicis intellectus*), which is a likeness of a thing (►21.4).

Hence, ARISTOTLE distinguishes the subject by a division of things, saying that, of things (πραγμάτων), some are universals, while others are singulars; and he defines them thus:<sup>15</sup>

**1. Universal** (*universale* = καθόλου) is that which is naturally apt to be predicated of many (*quod natum est de pluribus praedicari* = ὁ ἐπὶ πλειόνων πέφυκε κατηγορεῖσθαι).<sup>16</sup>

**2. Singular** (*singulare* = καθ' ἕκαστον) is that which is not (ὁ μὴ) naturally apt to be predicated of many, but only of one (*sed de uno solo*).<sup>17</sup>

For example, *man* is universal, while *Plato* is singular.<sup>18</sup>

◀ Thus, this division is taken *according to a difference in the subject*, which is predicated of many or of only one.<sup>19</sup> Whence, it is said to pertain to the *quantity* of the proposition; for quantity too follows upon matter.

<sup>13</sup> *In Peri.* 1, l. 10, 184–191: “que quidem est [diuisio] generis in species, quia sumitur secundum differentiam predicati, ad quod fertur negatio, predicatum autem est pars formalis enunciationis; et ideo huiusmodi diuisio dicitur pertinere ad qualitatem enunciationis, qualitatem, inquam, essencialem, secundum quod differentia significat quale quid.”

<sup>14</sup> *In Peri.* 1, l. 10, 18–21: “Subiectum autem enunciationis est nomen uel aliquid sumptum loco nominis; nomen autem est uox significatiua ad placitum simplicis intellectus, quod est similitudo rei.”

<sup>15</sup> *In Peri.* 1, l. 10, 18–26 (cf. ARISTOTLE, *De interpretatione* 7, 17a38–39): “et ideo subiectum enunciationis distinguit [Aristotilis] per diuisionem rerum. Et dicit quod *rerum* quedam *sunt uniuersalia*, quedam *uero singularia*. Manifestat autem membra diuisionis dupliciter: primo quidem per diffinitionem.”

<sup>16</sup> *In Peri.* 1, l. 10, 26–27 (cf. ARISTOTLE, *De interpretatione* 7, 17a39–40): “*uniuersale* est *quod natum est de pluribus predicari*, *singulare uero quod non est aptum natum predicari de pluribus, set de uno solo*.”

<sup>17</sup> *In Peri.* 1, l. 10, 27–28 (cf. ARISTOTLE, *De interpretatione* 7, 17a40): “*singulare uero quod non est aptum natum predicari de pluribus, set de uno solo*.”

<sup>18</sup> *In Peri.* 1, l. 10, 28–30 (cf. ARISTOTLE, *De interpretatione* 7, 17a40–b1): “Manifestat autem [Aristotilis] membra diuisionis [...] secundo per exemplum, cum subdit quod ‘homo’ est *uniuersale*, ‘Plato’ *uero* *singulare*.”

<sup>19</sup> *In Peri.* 1, l. 10, 191–195 (cf. ARISTOTLE, *De interpretatione* 6, 17b1–3): “Tercia autem est hec diuisio, que sumitur secundum differentiam subiecti, quod predicatur de pluribus uel de uno solo; et ideo dicitur pertinere ad quantitatem enunciationis, nam et quantitas consequitur materiam.”

## 19.6. Understanding and Naming Singulars

A difficulty arises concerning this division (of a proposition into universal and singular according to a difference in the subject) because, as ARISTOTLE shows, the universal is not something that exists outside things (*extra res*).<sup>20</sup> What is more, he also says that second substances exist only in first substances, which are singular (► 15.5, ¶2). Hence, the division of things into *universals* and *singulars* is apparently inadequate; for it seems that there are no universal things—and that all existing things are singulars.

However, things are here divided insofar as they are signified by names that underly in propositions; and names signify things only by means of an understanding.<sup>21</sup> Hence, this division of things must be taken insofar as things fall in an understanding; and an understanding can distinguish those (essences) that are conjoined in things when one of them does not fall in the *ratio* of the other (e.g., *body* does not fall in the ratio of *surface*; whence, *surface* can be understood without *body*, even though they always *are* together).

Thus, in any singular thing, one can consider something that is proper to the thing insofar as it is *this thing*: for example, of Sortes—or of Plato—insofar as he is *this man*.<sup>22</sup> And one can consider something in it, in which it agrees with some other things: for example, that Sortes is a man (i.e., of some species), an animal (i.e., of some genus), rational (i.e., having some specific difference), risible (i.e., having some proper, inseparable accident), or white (i.e., having some contingent, separable accident; ► 15.18).

Therefore, when a thing is denominated from that which befits the thing only insofar as it is *this thing*, such a name is said to signify something singular.<sup>23</sup> On the other hand, when the thing is denominated from that which is common to it and to many others, such a name is said to signify a universal; for (such a) name signifies a nature or some disposition that is common to many.

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<sup>20</sup> *In Peri.* 1, l. 10, 31–39: “Accidit autem dubitatio circa hanc diuisionem quia, sicut Philosophus probat in VII Metaphysice, uniuersale non est aliquid extra res existens; et in Predicamentis dicitur quod secunde substancie non sunt nisi in primis, que sunt singulares; non ergo uidetur esse conueniens diuisio rerum per uniuersalia et singularia, quia nulle res uidentur esse uniuersales, set omnes sunt singulares.”

<sup>21</sup> *In Peri.* 1, l. 10, 40–48: “Dicendum est autem quod hic diuiduntur res secundum quod significantur per nomina que subiiciuntur in enunciationibus; dictum est autem supra quod nomina non significant res nisi mediante intellectu, et ideo oportet quod diuisio ista rerum accipiatur secundum quod res cadunt in intellectu. Ea uero que sunt coniuncta in rebus, intellectus potest distinguere, quando unum eorum non cadit in ratione alterius.”

<sup>22</sup> *In Peri.* 1, l. 10, 48–54: “In qualibet autem re singulari est considerare aliquid quod est proprium illi rei in quantum est hec res, sicut Sorti uel Platoni in quantum est hic homo; aliquid autem est considerare in eo, in quo conuenit cum aliis quibusdam rebus, sicut quod Sortes est homo uel animal aut rationalis aut risibilis aut albus.”

<sup>23</sup> *In Peri.* 1, l. 10, 54–62: “Quando igitur res denominatur ab eo quod conuenit illi soli rei in quantum est hec res, huiusmodi nomen dicitur significare aliquid singulare; quando autem denominatur res ab eo quod est commune sibi et multis aliis, nomen huiusmodi dicitur significare uniuersale, quia scilicet nomen significat naturam siue dispositionem aliquam que est communis multis.”

### 19.7. The Universal Exists by an Act of the Intellect

Since ARISTOTLE gives this division (into *universal* and *singular*) concerning things, though not absolutely insofar as they are outside the soul, but insofar as they are referred to an understanding, he does not define the universal and the singular according to something that pertains to the thing.<sup>24</sup>

Thus, (it is not as though) ARISTOTLE would say that the universal (exists) outside singulars, which pertains to platonic opinions, but (that they exist) by an act of the intellectual soul, which (act) is *to be predicated of many or of only one*.<sup>25</sup>

### 19.8. Aptitude of an Essence to Be Predicated of Many

We ought to consider that the intellect apprehends the thing understood according to (its) proper *ratio* or definition.<sup>26</sup> Whence, ARISTOTLE says that the proper object of the intellect is the essence (*quod quid est*).

However, sometimes it happens that the proper *ratio* of some understood-form does not preclude it from being in many.<sup>27</sup> Instead, this is prevented by something else, whether it should be something that happens accidentally—for example, if one man were to remain, all (others) having died—or be due to a condition of matter—for example, that there is one sun (i.e., some individual incorruptible body) does not preclude the *ratio* of *sun* to be in many according to the consideration of the form itself, but because there is no other matter susceptible of such a form. Therefore, ARISTOTLE does not say that **universal** is “that which is predicated of many,” but *that which is naturally apt to be predicated of many*.

Since every form, which is of itself naturally (apt) to be received in matter, is communicable to multiple matters, there are two modes in which that which is signified by a name may not be naturally apt to be predicated of many.<sup>28</sup>

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<sup>24</sup> *In Peri.* 1, l. 10, 62–66: “Quia igitur hanc diuisionem dedit de rebus non absolute secundum quod sunt extra animam, set secundum quod referuntur ad intellectum, non definiuit uniuersale et singulare secundum aliquid quod pertinet ad rem.”

<sup>25</sup> *In Peri.* 1, l. 10, 66–70: “puta si diceret quod uniuersale extra singularia, quod pertinet ad opiniones Platonicas, set per actum anime intellectiue, quod est predicari de multis uel de uno solo.”

<sup>26</sup> *In Peri.* 1, l. 10, 71–85: “Est autem considerandum quod intellectus apprehendit rem intellectam secundum propriam rationem seu diffinitionem: unde et in III De anima dicitur quod obiectum proprium intellectus est quod quid est.”

<sup>27</sup> *In Peri.* 1, l. 10, 71–75: “Contingit autem quandoque quod propria ratio alicuius forme intellecte non repugnat ei quod est esse in pluribus, set hoc impeditur ab aliquo alio, siue sit aliquid accidentaliter adueniens, puta si, omnibus hominibus morientibus, unus solus remaneret, siue sit propter conditionem materie, sicut est unus tantum sol, non quod repugnet rationi solari esse in pluribus secundum considerationem forme ipsius, set quia non est alia materia susceptiua talis forme. Et ideo non dixit quod uniuersale est quod predicatur de pluribus, set quod aptum natum est de pluribus predicari.”

<sup>28</sup> *In Peri.* 1, l. 10, 75–91: “Cum autem omnis forma, que nata est recipi in materia, quantum est de se, communicabilis sit multis materiis, dupliciter potest contingere quod id quod significatur per nomen non sit aptum natum de pluribus predicari.”

1. Because the name signifies a form insofar as it is determined to *this* matter.<sup>29</sup>

For example, the name *Sortes*—or *Plato*—signifies human nature insofar as it is in *this* matter.<sup>30</sup>

2. Insofar as the name signifies a form that is not naturally apt to be received in matter; whence, it must remain singular by itself.<sup>31</sup> This is why ARISTOTLE says that if the species of things were separate, as PLATO posited (them), they would be some (sort of) individuals.

For example, if whiteness should be a form not existing in matter, it would be one—hence, it would be singular.<sup>32</sup>

### 19.9. Things—Not Names—Are Universal

One could object that the name *Sortes*—or *Plato*—is naturally (apt) to be predicated of many, since nothing prevents many to be called by this name.<sup>33</sup> But the response to this is evident if we attend to ARISTOTLE's words; for he does not divide *names* into universal and particular, but *things*.

Therefore, we must understand that (something) is said (to be) universal not when only *the name* can be predicated of many, but (when) *that which is signified by the name* is naturally (apt) to be found in many: and this does not happen in the aforesaid names; for the name of *Sortes*—or of *Plato*—signifies human nature insofar as it is in *this* matter.<sup>34</sup> If this name should be imposed on another man, it would signify human nature in *another*

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<sup>29</sup> *In Peri.* 1, l. 10, 91–93: “uno modo, quia nomen significat formam secundum quod est determinata ad hanc materiam.”

<sup>30</sup> *In Peri.* 1, l. 10, 93–95: “sicut hoc nomen ‘Sortes’ uel ‘Plato’, quod significat naturam humanam prout est in hac materia.”

<sup>31</sup> *In Peri.* 1, l. 10, 95–98; 100–103: “alio modo, secundum quod nomen significat formam que non est nata in materia recipi, unde oportet quod per se remaneat una et singularis [...]; et propter hoc Philosophus dicit in VII Metaphysice quod, si essent species rerum separate sicut Plato posuit, essent indiuidua quedam.” Cf. ARISTOTLE, *Metaphysica* Z.15, 1040a8–9: “οὐδὲ δὴ ἰδέαν οὐδεμίαν ἔστιν ὀρίσασθαι. τῶν γὰρ καθ’ ἕκαστον ἢ ἰδέα, ὡς φασί, καὶ χωριστή.” *In Metaph.* 7, l. 15, §1612: “Si igitur singulare definiri non potest, itaque nec ideam possibile est definire. Ideam enim oportet esse singularem, secundum ea quae ponuntur de idea. Ponunt enim quod idea est quoddam per se existens ab omnibus aliis separatum. Haec autem est ratio singularis.”

<sup>32</sup> *In Peri.* 1, l. 10, 98–100: “alio modo, secundum quod nomen significat formam que non est nata in materia recipi, unde oportet quod per se remaneat una et singularis, sicut albedo, si esset forma non existens in materia, esset una sola, unde esset singularis; et propter hoc Philosophus dicit in VII Metaphysice quod, si essent species rerum separate sicut Plato posuit, essent indiuidua quedam.”

<sup>33</sup> *In Peri.* 1, l. 10, 104–110: “Potest autem obiici quod hoc nomen ‘Sortes’ uel ‘Plato’ est natum de pluribus predicari, quia nihil prohibet esse multos qui uocentur hoc nomine. Set ad hoc patet responsio, si attendantur uerba Aristotilis: ipse enim non diuisit nomina in uniuersale et particulare, set res.” Cf. ARISTOTLE, *De interpretatione* 7, 17a38–b1: “ἔστι τὰ μὲν καθόλου τῶν πραγμάτων τὰ δὲ καθ’ ἕκαστον.”

<sup>34</sup> *In Peri.* 1, l. 10, 110–120: “ideo intelligendum est quod uniuersale dicitur quando non solum nomen potest de pluribus predicari, set id quod significatur per nomen est natum in pluribus inueniri; hoc autem non contingit in predictis nominibus: nam nomen Sortis uel Platonis significat naturam humanam secundum quod est in hac materia; si uero hoc nomen imponatur alteri homini, significabit naturam humanam in alia materia, et sic eius erit alia significatio, unde non erit uniuersale, set equiuocum.”

matter; and, in this way, it will be another signification; whence, it will not be universal, but equivocal (►20.1, ¶2).

### 19.10. The Universal as Nature vs. the Universal as Universal

**Universal** can be taken in two modes:<sup>35</sup>

1. For the *nature* itself, to which the intellect attributes the intention of universality.<sup>36</sup> In this mode, universals, such as genera and species, signify the substances of things as they are predicated in essence (*ut praedicantur in quid*). For example, *animal* (i.e., a genus) signifies the substance of that of which it is predicated (e.g., *animal* signifies the substance or essence of Plato, or of some other subject). And likewise, *man* (e.g., the species *man*, when predicated of Plato, also signifies his substance or essence).

2. Insofar as the aforesaid nature is universal, and insofar as it underlies the intention of universality: that is, insofar as *animal*—or *man*—is considered as *one in many*.<sup>37</sup> It is in this mode that Platonists posited *animal* and *man*, in their universality, to be substances.

### 19.11. The Universal as Universal is Not a Substance

ARISTOTLE proves that *common animal*—or *common man* (i.e., the universal as universal, the Idea or separate genus or species, e.g., of *animal* or of *man*)—is not a substance among the things of nature.<sup>38</sup> Rather, the form of *animal* or of *man* has this community (of universality) insofar as it is in the intellect, which takes a form as common to many insofar as it abstracts it from all individuating (principles; ►49.11). For this purpose, he posits two reasons.

1. Firstly, it seems to be impossible for any of those that are predicated universally to be a substance insofar as it is taken in its universality, because the substance of each thing is proper (*propria* = ἰδιος) to it and is not in another, while the universal is common to many; for *that* is said (to be) **universal** *which is naturally apt to be in many* (*quod natum*

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<sup>35</sup> *In Metaph.* 7, l. 13, §1570 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b1–1039a23): “Sciendum est autem, ad evidentiam huius capituli, quod universale dupliciter potest accipi.”

<sup>36</sup> *In Metaph.* 7, l. 13, §1570: “Uno modo pro ipsa natura, cui intellectus attribuit intentionem universalitatis: et sic universalis, ut genera et species, substantias rerum significant, ut praedicantur in quid. Animal enim significat substantiam eius, de quo praedicatur, et homo similiter.”

<sup>37</sup> *In Metaph.* 7, l. 13, §1570: “Alio modo potest accipi universale inquantum est universale, et secundum quod natura praedicta subest intentioni universalitatis: idest secundum quod consideratur animal vel homo, ut unum in multis. Et sic posuerunt Platonici animal et hominem in sua universalitate esse substantias.”

<sup>38</sup> *In Metaph.* 7, l. 13, §1571 (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b1–1039a23): “Quod [sc., animal et hominem in sua universalitate esse substantias] Aristoteles in hoc capitulo intendit reprobare, ostendens quod animal commune vel homo communis non est aliqua substantia in rerum natura. Sed hanc communitatem habet forma animalis vel hominis secundum quod est in intellectu, qui unam formam accipit ut multis communem, inquantum abstrahit eam ab omnibus individuantibus. Ponit ergo ad propositum duas rationes.”



*est multis inesse* = ὃ πλείοσιν ὑπάρχειν πέφυκεν) and to be predicated of many (*et de multis praedicari*).<sup>39</sup> Therefore, if the universal is a substance, it must be the substance of something. Of what, then, will it be the substance? For it must be either the substance of all those in which it is, or of one:

**(a)** It is not possible, on the one hand, (for the universal) to be the substance of all (the things in which it is) because one cannot be the substance of many; for *many* are *those whose substances are multiple and diverse*.<sup>40</sup>

**(b)** On the other hand, if it should be said that (the universal) is the substance of one of those (things) in which it is, it would follow that all the others in which it is would be that one of which it is posited to be the substance; and, for the same reason, it must also be the substance of them, since it is likewise in them.<sup>41</sup> It remains, therefore, that since (the universal) cannot be the substance of all of those of which it is said, nor of one of them, it is the substance of none.

**2.** According to ARISTOTLE, that is said (to be a) *substance* which is not (said) of a subject (*quae non <est> de subiecto* = τὸ μὴ καθ' ὑποκειμένου [λέγεται]; ► 14.6); but the universal is always said of some subject; therefore, (the universal) is not a substance.<sup>42</sup>

It would seem, however, that this reason is not valid; for in his *Categories*, ARISTOTLE says that *not to be in a subject* belongs to the *ratio* of *substance*—and to predicate of a subject is not against the *ratio* of *substance*.<sup>43</sup> Whence, there (i.e., in the *Categories*) are posited second substances that are predicated of a subject.

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<sup>39</sup> *In Metaph. 7, l. 13, §1572* (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b8–13): “Circa quarum *primam* dicit, quod videtur ex sequentibus rationibus impossibile esse, quodcumque eorum, quae universaliter praedicantur, esse substantiam, secundum scilicet quod in sua universalitate accipitur. Quod primo probatur ex hoc, quod substantia uniuscuiusque, est propria ei, et non inest alii. Sed universale est commune multis, hoc enim dicitur universale, quod natum est multis inesse et de multis praedicari. Si ergo universale est substantia, oportet quod sit alicuius substantia. Cuius ergo substantia erit? Aut enim oportet quod sit substantia omnium, quibus inest, aut unius.”

<sup>40</sup> *In Metaph. 7, l. 13, §1572* (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b13): “Non est autem possibile quod sit substantia omnium: quia unum non potest esse substantia pluribus. Plura enim sunt quorum substantiae sunt plures et diversae.”

<sup>41</sup> *In Metaph. 7, l. 13, §1573* (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b13–15): “Sed si dicatur, quod sit substantia unius eorum quibus inest, sequetur quod omnia alia, quibus inest, sint illud unum, quibus ponitur esse substantia. Oportet enim quod pari ratione, eorum etiam sit substantia, cum et eis similiter insit. Quorum autem substantia est una, et quod quid erat esse unum, oportet et ipsa esse unum. Relinquitur ergo, quod ex quo universale non potest esse substantia omnium, de quibus dicitur, nec unius alicuius, quod nullius sit substantia.”

<sup>42</sup> *In Metaph. 7, l. 13, §1575* (cf. ARISTOTLE, *Metaphysica* Z.13, 1038b15–16): “*Secundam* rationem ponit [Philosophus...] Dicit quod substantia dicitur, quae non est de subiecto: et dicitur universale semper de aliquo subiecto: ergo universale non est substantia.”

<sup>43</sup> *In Metaph. 7, l. 13, §1575*: “Videtur autem ratio haec non valere. Dictum est enim in Praedicamentis, quod de ratione substantiae est, quod non sit in subiecto. Praedicari vero de subiecto non est contra rationem substantiae. Unde ponuntur ibi secundae substantiae quae praedicantur de subiecto.”

However, it ought to be said that ARISTOTLE speaks in his *Categories* according to logical consideration; and the logician considers the things insofar as they are in reason.<sup>44</sup> Hence, (the logician) considers substances insofar as they underlie the intention of universality according to the acceptance of the intellect. Therefore, in respect of predication, which is an act of reason, (the logician) says that (substance) is predicated of a subject—that is, of a substance that exists outside the mind.

The first philosopher (*philosophus primus*, i.e., the metaphysician), on the other hand, considers things insofar as they are beings (*secundum quod sunt entia*).<sup>45</sup> Therefore, in his consideration, *being in a subject* (*esse in subiecto*) and *(being) of a subject* (*de subiecto*) do not differ. Hence, (ARISTOTLE) takes here, said of a subject, that it is something in itself; (that) it is in some subject that exists in act; and it is impossible for this to be a substance; for it would, then, have (its act of) being in a subject, which is also against the *ratio* of *substance* that is had in the *Categories*.

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<sup>44</sup> *In Metaph. 7, l. 13, §1576*: “Sed dicendum quod secundum logicam considerationem loquitur Philosophus in Praedicamentis. Logicus autem considerat res secundum quod sunt in ratione; et ideo considerat substantias prout secundum acceptionem intellectus subsunt intentioni universalitatis. Et ideo quantum ad praedicationem, quae est actus rationis, dicit quod praedicatur de subiecto, idest de substantia subsistente extra animam.”

<sup>45</sup> *In Metaph. 7, l. 13, §1576*: “Sed philosophus primus considerat de rebus secundum quod sunt entia; et ideo apud eius considerationem non differt esse in subiecto et de subiecto. Hic enim accipit dici de subiecto, quod est in se aliqua res et inest alicui subiecto existenti in actu. Et hoc impossibile est esse substantiam. Sic enim haberet esse in subiecto. Quod est contra rationem substantiae: quod etiam in Praedicamentis est habitum.”

## 20. Analogical Predication

*We have determined that essence and definition are predicated analogically of accidents in relation to substance (► 18.12). We must therefore clarify what analogical predication is and how it compares to other modes of predication.*

*Before we begin, however, we remind the reader that the terminology used in Latin to refer to analogy or proportion—and ratio—has not always been consistent (► 5; 6). St. Thomas is not an exception (presumably, because he himself draws from inconsistent sources).<sup>1</sup> Thus, sometimes proportio is equivalent to ἀναλογία, following the Ciceronian tradition.<sup>2</sup> More often, nonetheless, proportio is equivalent to λόγος, while proportionalitas takes the place of ἀναλογία.<sup>3</sup> This corresponds to the Boethian tradition (grounded on NICOMACHUS; ► 6.10), which St. Thomas clearly prefers.*

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<sup>1</sup> The most thorough treatment of the terminology concerning analogy we could find is in RAMÍREZ, *De analogia*, especially 56–65 and footnotes. However, RAMÍREZ does not reach back to ARCHYTAS, our oldest and most reliable source, nor is he able to correctly account for the use of ἀναλογία as it relates to the various means. In the following footnotes we add to his observations on St. Thomas the results of our own research.

<sup>2</sup> This is most evident, for example, in *De prin. nat.* §6, 42–44: “secundum analogiam, id est in proportione uel comparatione uel conuenientia,” where *comparatio* and *proportio* are precisely the two alternatives proposed by CICERO to translate the Greek term ἀναλογία (as already discussed and cited in Chapter 6, “Ἀναλογία, [...], *comparatio, proportio*-ue, dici potest”), while *conuenientia* (which we often render here as *agreement*) typically refers in St. Thomas to a commensurate order, as we will see; cf. *ibid.*, 72–73: “secundum analogiam tantum siue proportionem.” This usage is also evident whenever the Greek term underlies the commented text, as *In Physic.* 1, l. 10, n. 7 (cf. ARISTOTLE, *Physica* A.5, 188b36–189a1): “secundum analogiam, id est proportionem,” for ἀνάλογον; *ibid.*, l. 13, n. 9 (cf. ARISTOTLE, *Physica* A.7, 191a7–12): “secundum analogiam, id est secundum proportionem,” for κατ’ ἀναλογίαν; *ibid.* 4, l. 12, n. 3 (cf. ARISTOTLE, *Physica* Δ.8, 215b3): “secundum aliquam analogiam, id est proportionem,” for κατὰ τὴν ἀναλογίαν; *ibid.* 7, l. 9, n. 2 (cf. ARISTOTLE, *Physica* H.5, 250a8): “eadem analogia, id est eadem proportio,” for ἀνάλογον; *In Meteor.* 1, l. 3, n. 7 (cf. ARISTOTLE, *Meteorologica* A.3, 340a4): “aequalitatem analogiae, id est proportionis,” for τὴν ἰσότητα τῆς κοινῆς ἀναλογίας; *In Metaph.* 3, l. 10, §465: “analogia sive proportione”; *ibid.* 4, l. 1, §535: “analogice praedicari, id est proportionaliter”; *ibid.* 5, l. 8, §879 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b32; 34): “Proportione uero uel analogia,” for κατ’ ἀναλογίαν; *In Metaph.* 12, l. 4, §2470 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b26): “secundum analogiam, id est proportionem,” for κατ’ ἀναλογίαν; *In Post. an.* 2, l. 17, 95–96 (cf. ARISTOTLE, *Analytica Posteriora* B.14, 98a20): “secundum analogiam, id est proportionem,” for κατὰ τὸ ἀνάλογον; *In De caelo* 1, l. 12, n. 11 (cf. ARISTOTLE, *De caelo* A.6, 273b32): “analogia, id est proportio,” for τὴν ἀναλογίαν; *ibid.* 2, l. 11, n. 4 (cf. ARISTOTLE, *De caelo* B.8, 289b16): “analogice, id est proportionaliter,” for ἀνάλογον. The same terminology is used by St. Thomas even when he is not commenting on works directly translated from Greek sources, as *In Sent.* 1, d. 31 q. 2 a. 1 ad 2: “similitudo analogiae uel proportionis”; *ibid.* 3, d. 1 q. 1 a. 1 co.: “unum analogia sive proportione”; *ibid.* 4, d. 1 q. 1 a. 4 qc. 4 co.: “secundum proportionem sive analogiam”; *STh* I, q. 13 a. 5 co.: “secundum analogiam, id est proportionem”; *ibid.*, q. 93 a. 1 ad 3: “secundum analogiam uel proportionem”; *ibid.* I-II, q. 20 a. 3 ad 3: “secundum analogiam uel proportionem”; *Comp. th.* 1, c. 27, 18–19: “secundum analogiam, id est secundum proportionem”; *In De causis*, l. 10: “analogiam, id est secundum proportionem.” In contrast, other places suggest a Boethian usage, as *In Ethic.* 1, l. 7, 98–108 (cf. ARISTOTLE, *Ethica Nicomachea* A.4, 1096a17–19): “secundum analogiam, id est proportionem eandem,” for κατ’ ἀναλογίαν. But such usage is ambiguous even when commenting on BOETHIUS, as *In De Trin.*, q. 4 a. 2 co., 95–96: “per analogiam siue per proportionem.”

<sup>3</sup> It is clear that *proportio* is equivalent to λόγος (*ratio*) mostly—but not exclusively—in quantitative contexts, such as *In De anima* 1, c. 9, 143 (cf. ARISTOTLE, *De anima* A.4, 408a9; 18): “eandem rationem, id est proportionem,” for λόγος, as in other places of the same work; *In Physic.* 7, l. 7, n. 9 (cf. ARISTOTLE, *Physica* H.4, 248b8): “ratio dupli [...], quod est proportio duorum ad unum,” for τὸ γε διπλάσιον ταῦτο (ἄλλο γὰρ πρὸς ἓν); *In Metaph.* 1, l. 16, §242 (cf. ARISTOTLE, *Metaphysica* A.9, 991b17): “quaedam ratio uel proportio in numeris aliquorum,” for λόγος ἐν ἀριθμοῖς; *In Post. an.* 2, l. 1, 228–229 (cf. ARISTOTLE,

## 20.1. Modes of Predicating One of Many

Something can be common to some (things) in three modes: **univocally, equivocally or analogically.**<sup>4</sup> Whence, something is predicated of many (*de pluribus*; also, *de diversis*, i.e., of diverse [subjects]) in three modes:

1. That is predicated **univocally** (*univoce*) which is predicated *according to the same name and according to a ratio—i.e., a definition—that is altogether the same.*<sup>5</sup>

For example, *animal* is (univocally) predicated of man, of horse, of ox, and of ass, because each of them is said (to be an) *animal*, and each is an *animated, sensible substance*, which is the definition of *animal*.<sup>6</sup>

2. That is predicated **equivocally** (*aequivoce*) which is predicated of some (multiple things) *according to the same name but according to altogether diverse ratios.*<sup>7</sup>

For example,<sup>8</sup> *dog* (*canis*) is said of *that which is capable of barking*, and of a constellation (i.e., of *Canis Major*, “Greater Dog,” containing Sirius; or, perhaps, of *Canis Minor*, “Lesser

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*Analytica Posteriora* B.1, 90a19): “*ratio*, idest proportio numerorum,” for λόγος ἀριθμῶν; *In De caelo* 1, l. 26, n. 4 (cf. ARISTOTLE, *De caelo* A.12, 281b6): “sic enim sequetur quod proportio diametri ad latus sit sicut proportio numeralis, quae est ratio commensurabilis,” where St. Thomas is explaining the mode in which it is false to say that the diameter of a square is commensurate (ἡ διάμετρος σύμμετρος) with the side, yet the Greek does not mention any λόγος; *In De div. nom.*, c. 4, l. 19: “*ratio*, idest proportio.” In turn, it is evident that **proportionalitas** takes the place of **ἀναλογία** in certain places, such as *In Sent.* 4, d. 49 q. 2 a. 1 ad 6: “proportionalitas quae est similitudo proportionum”; *De veritate*, q. 2 a. 3 ad 4: “est enim proportionalitas similitudo proportionum”; *In Post. an.* 2, l. 12, 96–97: “proportionalitas uero est collectio duarum proportionum.” This usage patently derives from BOETHIUS, *De institutione arithmetica*, 2.40, 137.8–17: “Est igitur proportionalitas duarum vel trium vel quotlibet proportionum adsumptio ad unum atque collectio. Ut etiam communiter definiamus: proportionalitas est duarum vel plurium proportionum similis habitudo, etiamsi non eisdem quantitibus et differentiis constitutae sint. Differentia uero est inter numeros quantitas. Proportio est duorum terminorum ad se invicem quaedam habitudo et quasi quodammodo continentia, quorum compositio quod efficit, proportionale est. Ex iunctis enim proportionibus proportionalitas fit.” BOETHIUS draws this doctrine almost literally (barring his terminological peculiarities) from NICOMACHUS, *Introductio arithmeticae*, 2.21, 120.2–10: “ἔστιν οὖν ἀναλογία κυρίως δυεῖν ἢ πλειόνων λόγων σύλληψις ἐς τὸ αὐτό, κοινότερον δὲ δυεῖν ἢ πλειόνων σχέσεων, κἂν μὴ λόγῳ τῷ αὐτῷ ὑποτάσσωνται, διαφορὰ δὲ ἢ τινι ἑτέρῳ. λόγος μὲν οὖν ἐστὶ δύο ὄρων πρὸς ἀλλήλους σχέσις, σύνθεσις δὲ τῶν τοιούτων ἢ ἀναλογία, ὥστε ἐν ἐλαχίστοις ὅροις τρισὶν αὕτη συμμέμικται, δύναται γε μὴν καὶ ἐν πλείοσι κατὰ τὸ αὐτὸ διάστημα ἢ κατὰ τὸν αὐτὸν λόγον προχωρεῖν.”

<sup>4</sup> *In Sent.* 1, d. 35 q. 1 a. 4 co.: “tribus modis contingit aliquid aliquibus commune esse; vel univoce, vel aequivoce, vel analogice.” *In Metaph.* 4, l. 1, §535: “aliquid praedicatur de diversis multipliciter.” *De prin. nat.* §6, 20–21: “tripliciter aliquid predicatur de pluribus: uniuoce, equiuoce et analogice.”

<sup>5</sup> *De prin. nat.* §6, 21–23: “Uniuoce predicatur quod predicatur secundum idem nomen et secundum rationem eandem, id est diffinitionem.” *In Metaph.* 4, l. 1, §535: “quandoque quidem [aliquid praedicatur de diversis] secundum rationem omnino eandem, et tunc dicitur de eis univoce praedicari.”

<sup>6</sup> *De prin. nat.* §6, 23–26: “sicut animal predicatur de homine et de asino: utrumque enim dicitur animal, et utrumque est substantia animata sensibilis, quod est diffinitio animalis.” *In Metaph.* 4, l. 1, §535: “sicut animal de equo et bove.”

<sup>7</sup> *De prin. nat.* §6, 27–29: “Equiuoce predicatur quod predicatur de aliquibus secundum idem nomen et secundum diuersam rationem.” *In Metaph.* 4, l. 1, §535: “Quandoque uero [aliquid praedicatur de diversis] secundum rationes omnino diuersas; et tunc dicitur de eis aequivoce praedicari.”

<sup>8</sup> *De prin. nat.* §6, 29–33: “sicut canis dicitur de latrabili et de celesti, quae conueniunt solum in nomine et non in diffinitione siue significatione; id enim quod significatur per nomen est diffinitio, sicut dicitur in IV Methaphisice.” *In Metaph.* 4, l. 1, §535: “sicut canis de sidere et animali.” See ARISTOTLE, *Metaphysica*

Dog,” containing Procyon), which agree only in name, but not in definition or signification; for the definition is what is signified by the name.

Hence, those (things) are (purely) **equivocal** (*aequivoca* = ὁμώνυμα) *which agree only in name—i.e., whose name alone is common—but whose ratio of substance (i.e., the definition of its essence; ► 15.5) is totally diverse.*<sup>9</sup>

**3.** What is predicated **according to analogy** (*secundum analogiam*)—or **analogically** (*analogice*)—is said neither altogether univocally nor purely equivocally, but *according to proportion* (*secundum proportionem*).<sup>10</sup>

Agreement (*convenientia*) according to proportion can be in (one of) two (possible modes, barring imitation, since it is opposed to agreement; ► 20.4); and the community of analogy is considered according to these two (modes): namely, **agreement of proportion** and **agreement of proportionality** (► 20.11).<sup>11</sup>

## 20.2. Proportion

**Proportion** is nothing other than *some habitude* (i.e., *relation*) *to each other of two (things) that agree in something, insofar as they agree or differ* (*quaedam habitudo duorum ad invicem convenientium in aliquo, secundum hoc quod conveniunt aut differunt*).<sup>12</sup>

*Proportion* is said in two (modes), insofar as (the two things) can be understood to agree:<sup>13</sup>

**1.** As a **certitude of mensuration of two quantities** (► 5), insofar as they agree in the same genus of quantity or of quality (► 22.1; 28.6; 37.7).<sup>14</sup> For example, the habitude of a surface to a surface, or of a number to a number, or even of a heat to a heat, *insofar as one exceeds the other or is equal to it.*

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Γ.7, 1012a22–24: “ὀρισμὸς δὲ γίννεται ἐκ τοῦ σημαίνειν τι ἀναγκαῖον εἶναι αὐτοῦς· ὁ γὰρ λόγος οὗ τὸ ὄνομα σημείον ὀρισμὸς ἔσται.”

<sup>9</sup> Cf. *In De anima* 2, c. 2, 92–93: “aequivoca sunt quorum nomen solum commune est et ratio substantie diuersa.” *In Physic.* 5, l. 7, n. 1 (cf. ARISTOTLE, *Physica* E.4, 228a25; *Categoriae* 1, 1a1–4): “aequivoca [ὁμώνυμα], idest non convenientia in nomine et ratione.” *STh* I, q. 13 a. 5 co.: “Neque enim in his quae analogice dicuntur, est una ratio, sicut est in univocis; nec totaliter diversa, sicut in aequivocis.”

<sup>10</sup> *De veritate*, q. 2 a. 11 co.: “dicendum est, quod nec omnino univoce, nec pure aequivoce [...]; sed secundum analogiam, quod nihil est dictu quam secundum proportionem.”

<sup>11</sup> *De veritate*, q. 2 a. 11 co.: “Convenientia autem secundum proportionem potest esse dupliciter: et secundum haec duo attenditur analogiae communitas. [...] Prima ergo convenientia est proportionis, secunda autem proportionalitatis.”

<sup>12</sup> *In De Trin.*, q. 1 a. 2 ad 3, 143–146: “proportio nichil aliud est quam quedam habitudo duorum ad invicem conuenientium in aliquo secundum hoc quod conueniunt aut differunt.”

<sup>13</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “proportio dicitur dupliciter.” *In De Trin.*, q. 1 a. 2 ad 3, 146–147: “Possunt autem intelligi esse conuenientia dupliciter.”

<sup>14</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “Uno modo idem est proportio quod certitudo mensurationis duarum quantitatum.” *In De Trin.*, q. 1 a. 2 ad 3, 147–152: “uno modo ex hoc quod conueniunt in eodem genere quantitatis aut qualitatis, sicut habitudo superficiei ad superficiem aut numeri ad numerum, in quantum unum excedit aliud aut equatur ei; uel etiam caloris ad calorem.”

Such a proportion can only be of two finite (quantities) of which one exceeds (the other) according to something certain and determinate.<sup>15</sup>

**2.** As a **relation of order** (► 8.2; 8.5), insofar as they agree in some order.<sup>16</sup> In this mode is considered the proportion between matter and form, producer and (thing) produced, and other such (► 37.9). And such a proportion is required between the knowing potency and the knowable (object), since the knowable is as the act of the knowing power.

For example, we say that there is a proportion between matter and form because it is had in an order such that matter is perfected by form. This is (moreover) according to some proportionality (► 20.11); for just as form can give (an act of) being (*esse*), so can matter receive the same (act of) being.<sup>17</sup>

Likewise, the mover and the moved must be proportionable.<sup>18</sup> And, also, the agent and the patient: that is, just as the agent can impress some effect, so can the patient receive the same (effect).

### **20.3. Commensuration According to Number and According to Intention**

It is not necessary for the passive power of a recipient to be commensurate to the active potency of the agent either according to number or according to intention.<sup>19</sup> For example:

**1. According to number**, one artificer can, through his art, induce multiple forms in wood: e.g., as the form of a box and the form of a saw; but wood can only receive one of these (i.e., one part of wood can only receive one form; hence, wood is not commensurate to the active potency of the artificer, who can impress multiple forms).<sup>20</sup>

**2. According to intention**, the artificer can produce through his art a beautiful statue that knotty wood cannot receive (i.e., such wood cannot receive the form intended by the

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<sup>15</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “talī proportio non potest esse nisi duorum finitorum, quorum unum excedit secundum aliquid certum et determinatum.”

<sup>16</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “Alio modo dicitur proportio habitudo ordinis.” *In De Trin.*, q. 1 a. 2 ad 3, 154–160: “Alio modo possunt intelligi conuenientia ita quod conueniant in aliquo ordine, et sic attenditur proportio inter materiam et formam, faciens et factum et alia huiusmodi; et talis proportio requiritur inter potentiam cognoscentem et cognoscibile, cum cognoscibile sit quasi actus potentie cognoscentis.”

<sup>17</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “sicut dicimus esse proportionem inter materiam et formam, quia se habet in ordine, ut perficiatur materia per formam, et hoc secundum proportionabilitatem quamdam: quia sicut forma potest dare esse, ita et materia potest recipere idem esse.”

<sup>18</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “et hoc modo etiam movens et motum debent esse proportionabilia, et agens et patiens, ut scilicet sicut agens potest imprimere aliquem effectum, ita patiens possit recipere eundem.”

<sup>19</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “Nec oportet ut commensuretur potentia passiva recipientis ad potentiam activam agentis nec secundum numerum [...] nec etiam secundum intentionem.”

<sup>20</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “nec secundum numerum (sicut unus artifex per artem suam potest in ligno inducere plures formas, ut formam arcae, et formam serrae; sed lignum non potest recipere nisi unam illarum).”

artificer; hence, such wood is not commensurate to the active potency of the artificer, who can impress a more perfect form).<sup>21</sup>

#### 20.4. Agreement vs. Imitation

In those (things) that are produced in imitation of another (e.g., as a statue is produced in imitation of the form intended by the artificer), sometimes that which imitates the other imitates it perfectly (for example, when wood is not knotty, it can commensurably receive the form intended by the artificer).<sup>22</sup> Then, the operative intellect—which preconceives the form of that which is operated—has, as an idea, the form itself of the thing imitated insofar as it is (the form) of that imitated thing.

Sometimes, however, that which is (produced) in imitation of another does not perfectly imitate it.<sup>23</sup> Then, the operative intellect would not take—absolutely—the form of the thing imitated as an idea or exemplar (►9.6) of the thing operated; rather, (the operative intellect would take the form) with some determinate proportion (i.e., quantitative relation), according to which the thing produced in imitation of the exemplar (*exemplatum*) would fall short (*deficeret*) of—or would *imitate*—the principal exemplar.

#### 20.5. Analogy According to Agreement vs. According to Imitation

Thus (from what has just been said), analogy (of proportion) is twofold (in respect of commensuration):<sup>24</sup>

1. According to an **agreement in something one** (*secundum convenientiam in aliquo uno*), which (one-thing) befits (*convenit*) them according to prior and posterior (*per prius et posterius*; e.g., the statue is first in the mind of the artificer and then in wood, but there is a perfect agreement between them).<sup>25</sup>

2. According as **one imitates the other** as much as it can (*secundum quod unum imitatur aliud quantum potest*), not attaining it perfectly.<sup>26</sup>

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<sup>21</sup> *In Sent.* 3, d. 1 q. 1 a. 1 ad 3: “nec etiam secundum intentionem: quia artifex per suam artem potest producere pulchram sculpturam, quam tamen lignum nodosum non potest recipere.”

<sup>22</sup> *De veritate*, q. 3 a. 2 co.: “In his autem quae ad imitationem alterius producuntur, quandoque quidem id quod alterum imitatur, perfecte imitatur ipsum; et tunc intellectus operativus praeconciens formam operati, habet ut ideam ipsam formam rei imitatae, prout est illius rei imitatae.”

<sup>23</sup> *De veritate*, q. 3 a. 2 co.: “quandoque vero quod est ad imitationem alterius, non perfecte imitatur illud; et tunc intellectus operativus non acciperet formam rei imitatae absolute ut ideam vel exemplar rei operandae; sed cum proportione determinata, secundum quam exemplatum a principali exemplari deficeret vel imitaretur.”

<sup>24</sup> *In Sent.* 1, d. 35 q. 1 a. 4 co.: “duplex est analogia.”

<sup>25</sup> *In Sent.* 1, d. 35 q. 1 a. 4 co.: “Quaedam secundum convenientiam in aliquo uno, quod eis per prius et posterius convenit.”

<sup>26</sup> *In Sent.* 1, d. 35 q. 1 a. 4 co.: “Alia analogia est, secundum quod unum imitatur aliud quantum potest, nec perfecte ipsum assequitur.”

## 20.6. Proportional Order to One in Analogical Predication

Something can be predicated analogically—that is, neither univocally nor equivocally—according to an order or respect to something one (*secundum ordinem vel respectum ad aliquid unum*) in two modes:<sup>27</sup> **(1)** according as **one has a proportion to the other**; or **(2)** according as **multiple (things) have a proportion or respect to one** (►20.9).

Whence, in the community of analogy that is taken according to some determinate relation of one (thing) to another (i.e., as opposed to an incommensurate relation; ►20.2), either:<sup>28</sup> **(1)** *one (of them) is posited in the definition of the other* (because one has a proportion to the other), as *substance* is posited in the definition of *accident* (►20.7); or **(2)** *something one (is posited) in the definition of the two*, because both are said due to a (determinate) relation to one, as *substance* is posited in the definition of *quantity* and of *quality* (►20.9).

## 20.7. Agreement of Proportion

Agreement of proportion is of those (things) between which there is a proportion to each other because they have a determinate distance—or another relation—to each other.<sup>29</sup> For example, two (has a relation) with unity because it is its *double*.

According to this mode of agreement, we find something said analogically of two (subjects) of which one has a relation (*habitudinem habet*) to the other.<sup>30</sup> For example, *being* is said of substance (priorly) and of accident (posteriorly) due to the relation that an accident has to substance (►15). Likewise, *healthy* is said of animal (priorly) and of urine (posteriorly) because urine has some relation to the health of the animal.

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<sup>27</sup> ScG 1, 34 n. 1: “Sic igitur ex dictis relinquitur quod ea [...], praedicantur neque univoce neque aequivoce, sed analogice: hoc est, secundum ordinem vel respectum ad aliquid unum. Quod quidem dupliciter contingit: uno modo, secundum quod multa habent respectum ad aliquid unum [...]. Alio modo, secundum quod duorum attenditur ordo vel respectus, non ad aliquid alterum, sed ad unum ipsorum.” *STh* I, q. 13 a. 5 co.: “huiusmodi nomina dicuntur [...] secundum analogiam, idest proportionem. Quod quidem dupliciter contingit in nominibus, vel quia multa habent proportionem ad unum [...]; vel ex eo quod unum habet proportionem ad alterum.”

<sup>28</sup> *De veritate*, q. 2 a. 11 ad 6: “Ad sextum [sc., in omnibus analogiis ita est, quod vel unum ponitur in definitione alterius, sicut ponitur substantia in definitione accidentis, et actus in definitione potentiae; vel aliquid idem ponitur in definitione utriusque, sicut sanitas animalis ponitur in definitione sani, quod dicitur de urina et cibo, quorum alterum est conservativum, alterum significativum sanitatis] dicendum, quod ratio illa procedit de communitate analogiae quae accipitur secundum determinatam habitudinem unius ad alterum: tunc enim oportet quod unum in definitione alterius ponatur, sicut substantia in definitione accidentis; vel aliquid unum in definitione duorum, ex eo quod utraque dicuntur per habitudinem ad unum, sicut substantia in definitione quantitatis et qualitatis.”

<sup>29</sup> *De veritate*, q. 2 a. 11 co.: “Est enim quaedam convenientia inter ipsa quorum est ad invicem proportio, eo quod habent determinatam distantiam vel aliam habitudinem ad invicem, sicut binarius cum unitate, eo quod est eius duplum. [...] in his quae primo modo analogice dicuntur, oportet esse aliquam determinatam habitudinem inter ea quibus est aliquid per analogiam commune.”

<sup>30</sup> *De veritate*, q. 2 a. 11 co.: “secundum modum primae convenientiae invenimus aliquid analogice dictum de duobus quorum unum ad alterum habitudinem habet; sicut ens dicitur de substantia et accidente ex habitudine quam accidens ad substantiam habet; et sanum dicitur de urina et animali, ex eo quod urina habet aliquam habitudinem ad sanitatem animalis.”



That which is predicated of some things according to prior and posterior is certainly not predicated univocally; for the prior is included in the definition of the posterior, as *substance* (is included) in the definition of *accident* insofar as it is a being (*secundum quod est ens*).<sup>31</sup> Hence, if *being* should be said univocally of substance and of accident, substance would have to be posited in the definition of *being* insofar as it is predicated of substance—which is evidently impossible.

### 20.8. Order in a Proportion of One to Another

This mode of proportion occurs insofar as an order or respect of two (things) is considered, not to something else, but *to one of them*.<sup>32</sup>

For example, *being* is said of substance and of accident insofar as accident has a respect to substance—not that substance and accident would be referred to some third thing (e.g., *being*).<sup>33</sup> Likewise, *healthy* is said of (the art of) medicine and of animal insofar as medicine is a cause of the health that is in the animal (i.e., not that medicine and animal would be referred to some third thing).

In an analogical predication of this mode, sometimes the same order is considered according to name and to thing.<sup>34</sup> However, sometimes (it is) not the same (order); for the order of the name follows upon the order of cognition, since it is a sign of intelligible conceptions (► 8.10; 8.11). Thus,

1. When that which is prior according to thing is found (to be) **prior also in cognition** (► 49), the same is found (to be) prior both according to the *ratio* of the name and according to the nature of the thing.<sup>35</sup>

For example, substance is prior to accident both in nature—insofar as the substance is a cause of an accident—and in cognition—insofar as *substance* is posited in the definition

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<sup>31</sup> ScG 1, 32 n. 7: “Quod praedicatur de aliquibus secundum prius et posterius, certum est univoce non praedicari: nam prius in definitione posterioris includitur: sicut substantia in definitione accidentis secundum quod est ens. Si igitur diceretur univoce ens de substantia et accidente, oporteret quod substantia etiam poneretur in definitione entis secundum quod de substantia praedicatur. Quod patet esse impossibile.”

<sup>32</sup> ScG 1, 34 n. 1: “Alio modo, secundum quod duorum attenditur ordo vel respectus, non ad aliquid alterum, sed ad unum ipsorum.” *STh* I, q. 13 a. 5 co.: “vel ex eo quod unum habet proportionem ad alterum.”

<sup>33</sup> ScG 1, 34 n. 1: “sicut ens de substantia et accidente dicitur secundum quod accidens ad substantiam respectum habet, non quod substantia et accidens ad aliquid tertium referantur.” *STh* I, q. 13 a. 5 co.: “sicut sanum dicitur de medicina et animali, inquantum medicina est causa sanitatis quae est in animali.”

<sup>34</sup> ScG 1, 34 n. 2: “In huiusmodi autem analogica praedicatione ordo attenditur idem secundum nomen et secundum rem quandoque, quandoque vero non idem. Nam ordo nominis sequitur ordinem cognitionis: quia est signum intelligibilis conceptionis.”

<sup>35</sup> ScG 1, 34 n. 2: “Quando igitur id quod est prius secundum rem, invenitur etiam cognitione prius, idem invenitur prius et secundum nominis rationem et secundum rei naturam.”

of *accident*.<sup>36</sup> Thus, *being* is said priorly of substance than of accident both according to the nature of the thing and according to the *ratio* of the name.

2. When that which is prior according to nature is **posterior according to cognition** (►49), then, in analogical (things), the order is not the same according to thing and according to the *ratio* of the name.<sup>37</sup>

For example, the virtue (*virtus*) of healing that is in things that cause healing (*in sanativis*) is prior—as cause (is prior) to (its) effect—to the health that is in the animal.<sup>38</sup> However, since we know this power by its effect (►57.5, ¶2), we name it from the effect. Whereby, that which causes healing (*sanativum*) is prior in the order of the thing; and yet, the animal, according to the *ratio* of the name, is priorly said (to be) *healthy* (*sanum*).

### 20.9. Order in a Proportion of Many to One

In this mode, that is said to be predicated analogically—that is, proportionately—which is predicated of many *whose ratios are diverse but are attributed to some one same (thing), to which each is referred according to its (own) relation*.<sup>39</sup>

What is predicated analogically (in this mode) is predicated according to *ratios* that are *in part diverse* and *in part nondiverse*.<sup>40</sup> They are *diverse* insofar as they convey diverse relations (*important diversas habitudines*). They are *one* (i.e., nondiverse) insofar as these diverse relations are referred to something one and the same (*ad unum aliquid et idem*).

For example, in respect to *one health*, *healthy* (*sanativum vel salubre* = ὑγιεινόν) is said of animal, of urine, of food or diet, of (the art of) medicine, and of medication (*de potione*).<sup>41</sup>

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<sup>36</sup> ScG 1, 34 n. 2: “sicut substantia est prior accidente et natura, inquantum substantia est causa accidentis; et cognitione, inquantum substantia in definitione accidentis ponitur. Et ideo ens dicitur prius de substantia quam de accidente et secundum rei naturam et secundum nominis rationem.”

<sup>37</sup> ScG 1, 34 n. 2: “Quando vero id quod est prius secundum naturam, est posterius secundum cognitionem, tunc in analogicis non est idem ordo secundum rem et secundum nominis rationem.”

<sup>38</sup> ScG 1, 34 n. 2: “sicut virtus sanandi quae est in sanativis, prior est naturaliter sanitate quae est in animali, sicut causa effectui; sed quia hanc virtutem per effectum cognoscimus, ideo etiam ex effectu nominamus. Et inde est quod sanativum est prius ordine rei, sed animal dicitur per prius sanum secundum nominis rationem.”

<sup>39</sup> *De prin. nat.* §6, 33–35: “Analogice dicitur predicari quod predicatur de pluribus quorum rationes diuerse sunt, sed attribuuntur uni alicui eidem.” *In Metaph.* 4, l. 1, §535: “et illud dicitur analogice praedicari, idest proportionaliter, prout unumquodque secundum suam habitudinem ad illud unum refertur.”

<sup>40</sup> *In Metaph.* 4, l. 1, §535: “Quandoque vero [aliquid praedicatur de diversis] secundum rationes quae partim sunt diversae et partim non diversae: diversae quidem secundum quod diversas habitudines important, unae autem secundum quod ad unum aliquid et idem istae diversae habitudines referuntur.”

<sup>41</sup> *In Metaph.* 4, l. 1, §537 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003a34–b1): “Ponit enim [Philosophus] primo unum exemplum, quando multa comparantur ad unum sicut ad finem, sicut patet de hoc nomine sanativum vel salubre. Sanativum enim non dicitur univoce de diaeta, medicina, urina et animali. Nam ratio sani secundum quod dicitur de diaeta, consistit in conservando sanitatem. Secundum vero quod dicitur de medicina, in faciendo sanitatem. Prout vero dicitur de urina, est signum sanitatis. Secundum vero quod dicitur de animali, ratio eius est, quoniam est receptivum vel susceptivum sanitatis.” *De prin.*

However, (*healthy*) does not entirely (*ex toto*) signify the same in all, i.e., it is not said univocally; for it is said: of animal, as the *subject (of health)*, i.e., what is receptive or susceptible of health; of urine, as a *sign of health*; of food or diet, as *that which preserves health*; of medicine and of medication, as a *cause of health* (i.e., of medicine, as a virtue that produces health; of medication, as an instrumental agent of health). However, all these *ratios* are attributed *to one end*: namely, *to health* (< τὸ ὑγιεινὸν ἅπαν πρὸς ὑγίειαν).

Thus, the analogical mode of community is a **mean** between pure equivocation and simple univocity; for, in those that are said analogically, there is neither one *ratio*—as in univocal (predications)—, nor is there a totally diverse (*ratio*)—as in equivocal (predications).<sup>42</sup> Instead, the name that is analogically said (to be) in multiple (subjects) signifies diverse proportions to something one.

### 20.10. The One to Which Many Refer

The *one* to which diverse relations are referred in analogical (predications) is one (nature) in number, and not only in *ratio*—unlike that which is designated by a univocal name, which is one in *ratio*.<sup>43</sup>

Those that agree (*conveniunt*) according to analogy—that is, in proportion (*in proportione*), in comparison (*comparatione*) or in agreement (*convenientia*, i.e., to one and the same nature)—can be attributed:<sup>44</sup>

**1. To one end**, as in the example of *health*.<sup>45</sup> Thus, every (thing) is said (to be) *healthy* in respect of one and the same health; for the health of which the animal is susceptible is the same health that urine signifies, that medicine produces, and that diet preserves.

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*nat.* §6, 36–41: “sicut sanum dicitur de corpore animalis et de urina et de potione, sed non ex toto idem significat in omnibus: dicitur enim de urina ut de signo sanitatis, de corpore ut de subiecto, de potione ut de causa. Sed tamen omnes iste rationes attribuuntur uni fini, scilicet sanitati.” ScG 1, 34 n. 1: “sicut secundum respectum ad unam sanitatem animal dicitur sanum ut eius subiectum, medicina ut eius effectivum, cibus ut conservativum, urina ut signum.” *STh* I, q. 13 a. 5 co.: “sicut sanum dicitur de medicina et urina, in quantum utrumque habet ordinem et proportionem ad sanitatem animalis, cuius hoc quidem signum est, illud vero causa.”

<sup>42</sup> *STh* I, q. 13 a. 5 co.: “Et iste modus communitatis [sc., analogiae] medius est inter puram equivocacionem et simplicem univocationem. Neque enim in his quae analogice dicuntur, est una ratio, sicut est in univocis; nec totaliter diversa, sicut in equivocis; sed nomen quod sic multipliciter dicitur, significat diversas proportiones ad aliquid unum.”

<sup>43</sup> *In Metaph.* 4, I. 1, §536: “illud unum ad quod diversae habitudines referuntur in analogicis, est unum numero, et non solum unum ratione, sicut est unum illud quod per nomen univocum designatur.” Cf. ARISTOTLE, *Metaphysica* Γ.2, 1003a33–35: “Τὸ δὲ ὄν λέγεται μὲν πολλαχῶς, ἀλλὰ πρὸς ἓν καὶ μίαν τινὰ φύσιν καὶ οὐχ ὁμωνύμως ἄλλ’ ὥσπερ καὶ τὸ ὑγιεινὸν ἅπαν πρὸς ὑγίειαν.”

<sup>44</sup> *De prin. nat.* §6, 42–44: “Aliquando enim ea quae conveniunt secundum analogiam, id est in proportione uel comparatione uel convenientia, attribuuntur [...]”

<sup>45</sup> *In Metaph.* 4, I. 1, §537 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003a33–b1): “Sic igitur omne sanativum vel sanum dicitur ad sanitatem unam et eandem. Eadem enim est sanitas quam animal suscipit, urina significat, medicina facit, et diaeta conservat.” *De prin. nat.* §6, 44–45: “uni fini, sicut patet in predicto exemplo.”

**2. To one agent.**<sup>46</sup> In this mode, for example, diverse things are said (to be) *medical*: e.g., one who possesses the habit of medicine, as a skilled physician; another, in turn, because he is well apt to having the art of medicine, as are such men who are disposed to easily acquire the art of medicine; whence, it happens that by their own ingenuity they perform some medicinal actions, as a midwife does; another is said (to be) *medicinal* because its action is towards medicine, as the instruments that some physicians use can be said (to be) *medical*, and also medications which physicians use to produce health; and, likewise, other (things) can be taken which are said in multiple (modes), as are these.

**3. To one subject.**<sup>47</sup> For example, *being (ens)* is said of substance, of quality, of quantity, and of the other categories. However, the *ratio* whereby substance is a being and (the *ratio* whereby) quantity is a being is not wholly the same—nor is the *ratio* of the other (categories) the same. Rather, all (these) are said (to be beings) insofar as they are attributed to substance, which is the subject of the others. And so, *being (ens)* is said priorly (*per prius*) of substance, and posteriorly (*per posterius*) of the others. Hence, *being* is not the genus of substance and of quantity because no genus is predicated according to prior and posterior of their species; rather, it is predicated analogically (►27.2, ¶2). Thus, substance and quantity differ in genus, but are the same in analogy.

### 20.11. Agreement of Proportionality

Agreement of *proportionality*, rather than a consideration of the agreement of two things to each other that have a proportion,<sup>48</sup> is an agreement of proportions of two (things) to each other, in which no determinate relation is considered between those of which there is something common by analogy (i.e., instead of comparing one thing to another in proportion, only the relations are compared; and they are not considered insofar as they

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<sup>46</sup> In *Metaph.* 4, l. 1, §538 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b1–5): “Secundo ponit [Philosophus] exemplum quando multa comparantur ad unum sicut ad principium efficiens. Aliquid enim dicitur medicativum, ut qui habet artem medicinae, sicut medicus peritus. Aliquid vero quia est bene aptum ad habendum artem medicinae, sicut homines qui sunt dispositi ut de facili artem medicinae acquirant. Ex quo contingit quod ingenio proprio quaedam medicinalia operantur. Aliquid vero dicitur medicativum vel medicinale, quia eo opus est ad medicinam, sicut instrumenta quibus medici utuntur, medicinalia dici possunt, et etiam medicinae quibus medici utuntur ad sanandum. Et similiter accipi possunt alia quae multipliciter dicuntur, sicut et ista.” *De prin. nat.* §6, 45–49: “aliquando uni agenti, sicut medicus dicitur et de eo qui operatur per artem et de eo qui operatur sine arte, ut uetula, et etiam de instrumentis, sed per attributionem ad unum agens quod est medicina.”

<sup>47</sup> *De prin. nat.* §6, 49–62: “aliquando autem per attributionem ad unum subiectum, sicut ens dicitur de substantia, de qualitate et quantitate et aliis predicamentis: non enim ex toto est eadem ratio qua substantia est ens et quantitas et alia, sed omnia dicuntur ex eo quod attribuuntur substantie, quod est subiectum aliorum. Et ideo ens dicitur per prius de substantia et per posterius de aliis; et ideo ens non est genus substantie et quantitatis, quia nullum genus predicatur per prius et posterius de suis speciebus, sed predicatur analogice. Et hoc est quod diximus, quod substantia et quantitas differunt genere sed sunt idem analogia.”

<sup>48</sup> *De veritate*, q. 2 a. 11 co.: “convenientia etiam quandoque attenditur non duorum ad invicem inter quae sit proportio sed magis duarum ad invicem proportionum [...]. Sed in alio modo analogiae nulla determinata habitudo attenditur inter ea quibus est aliquid per analogiam commune.”

agree in some genus; whence, e.g., a relation between numbers can be compared to a relation between magnitudes).

For example, six agrees with four because, just as six is the double of three, so four (is the double) of two.<sup>49</sup>

We also find something said analogically according to this mode of agreement.<sup>50</sup> For example, the name *sight* (*visus*, i.e., the act of seeing) is said of corporeal sight and of understanding because just as sight is in the eye, so (is) understanding in the mind (i.e., as when we say, “I see it now” for “I understand it now”).

## 20.12. Division of the Equivocal, the Univocal, and the Analogous

The univocal, the equivocal, and the analogous are divided diversely:<sup>51</sup>

### 1. The **univocal** is divided according to *differences* (► 27.2, ¶1).<sup>52</sup>

Thus, any one genus is divided univocally (by its differences; ► 16.4; 16.5; 16.6) into the species contained under the genus; and hence, a proper mode of predicating is not owed to a species.<sup>53</sup>

### 2. The **equivocal** is divided according to *things signified*.<sup>54</sup>

In those (things) that are purely equivocal by chance or fortune, no order or respect of one to the other can be considered.<sup>55</sup> Instead, it is altogether by accident that one name is attributed to diverse things; for the name imposed to one does not signify its having an order to the other (for example, it happened by chance that the same name, *bat*, has been

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<sup>49</sup> *De veritate*, q. 2 a. 11 co.: “sicut senarius convenit cum quaternario ex hoc quod sicut senarius est duplum ternarii, ita quaternarius binarii.”

<sup>50</sup> *De veritate*, q. 2 a. 11 co.: “Quandoque vero dicitur aliquid analogice secundo modo convenientiae; sicut nomen visus dicitur de visu corporali et intellectu, eo quod sicut visus est in oculo, ita intellectus in mente.”

<sup>51</sup> *In Sent.* 1, d. 22 q. 1 a. 3 ad 2: “aliter dividitur aequivocum, analogum et univocum.”

<sup>52</sup> *In Sent.* 1, d. 22 q. 1 a. 3 ad 2: “univocum vero dividitur secundum differentias.”

<sup>53</sup> *In Sent.* 1, d. 22 q. 1 a. 3 ad 2: “Unumquodque autem genus dividitur univoce in species contentas sub genere, et ideo speciebus non debetur proprius modus praedicandi.”

<sup>54</sup> *In Sent.* 1, d. 22 q. 1 a. 3 ad 2: “Aequivocum enim dividitur secundum res significatas.” Consequently, a species can be divided against its genus according to the division of a name that is equivocal in that which is signified (e.g., if we divide the genus *animal* into *animal*, *ox*, and *man*, these three do not signify one ratio). See *In Sent.* 3, d. 33 q. 3 a. 4 qc. 5 ad 1: “Ad primum [sc., *species non debet dividi contra genus*] ergo dicendum, quod species potest dividi contra genus divisione quae est nominis aequivoci in suo significato.”

<sup>55</sup> *ScG* 1, 33 n. 2: “in his quae sunt a casu aequivoca, nullus ordo aut respectus attenditur unius ad alterum, sed omnino per accidens est quod unum nomen diversis rebus attribuitur: non enim nomen impositum uni significat ipsum habere ordinem ad aliud.” *In Sent.* 1, d. 35 q. 1 a. 4 co.: “in his quae sunt pure aequivoca per casum et fortunam, ex uno non cognoscitur alterum, ut quando idem nomen duobus hominibus convenit.”

imposed on a kind of club and on any chiropteran; for the latter is an alteration of the Middle English *bakke*, of Scandinavian origin, while the former comes from the Old English *batt*, and there is no essential order between the two). Whence, one of them is not known from the other, as when two human beings agree in (having) the same name (e.g., from our knowing a kind of club we do not come to know a chiropteran, just like we do not know one Peter just because we know another).

3. The **analogous** is divided according to *diverse modes* (► 27.2, ¶2).<sup>56</sup>

For example, since *being* is predicated analogically of the ten genera, it is divided into them according to diverse modes.<sup>57</sup> Whence, to each one genus is owed its proper mode of predicating (► 33.1).

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<sup>56</sup> *In Sent.* 1, d. 22 q. 1 a. 3 ad 2: “analogum dividitur secundum diversos modos.”

<sup>57</sup> *In Sent.* 1, d. 22 q. 1 a. 3 ad 2: “cum ens praedicetur analogice de decem generibus, dividitur in ea secundum diversos modos. Unde unicuique generi debetur proprius modus praedicandi.”

## 21. Logical Intention and Real Being

*Having determined the modes in which one thing is predicated of many, we turn our attention to the relation between what is predicated and what is.*

### 21.1. Reason

**Reason** (*ratio*) can be taken in two (modes):<sup>1</sup>

1. Sometimes, that which is in the reasoning (subject) is said (to be a) *reason*: namely, **(a) the act** itself of reason (i.e., the act of reasoning); or **(b) the power** that reason is (i.e., the faculty of reason, a power of the human mind).<sup>2</sup>
2. Sometimes, *reason* is the name of an **intention**, whether **(a)** insofar as it signifies the **definition** of a thing, according as a reason (i.e., what we have been calling *ratio*; ► 8.1) is a definition; or **(b)** insofar as an **argumentation** is said (to be a) *reason*.<sup>3</sup>

### 21.2. The Intention in the Mind Responds to a Nature in the Thing

In all intentions (i.e., both *ratios* or definitions, and argumentations) this is true in common: that the intentions themselves are not in things, but only in the soul.<sup>4</sup> However, (intentions, when they are truly attributed to things) have something that responds (to them) in the thing: a nature, to which the intellect attributes such intentions.

For example, the intention of *genus* is not in the ass, but (what is in the ass is) the nature of *animal*, to which the intellect attributes this intention (i.e., the intention of *genus*).<sup>5</sup> And there is in the thing something that responds to it, in which it is founded: *the truth of that thing to which such an intention is attributed*.

### 21.3. How a *Ratio* is Said to Be in a Thing-Outside-The-Mind

A *ratio* is said to be in a thing outside the mind (*in re extra animam*)<sup>6</sup> insofar as that which is signified by the name—i.e., that to which it befalls to be a *ratio*—is in the thing.<sup>7</sup>

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<sup>1</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 3: “Sciendum est autem, quod ratio sumitur dupliciter.”

<sup>2</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 3: “quandoque enim ratio dicitur id quod est in ratiocinante, scilicet ipse actus rationis, vel potentia quae est ratio.”

<sup>3</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 3: “quandoque autem ratio est nomen intentionis, sive secundum quod significat definitionem rei, prout ratio est definitio, sive prout ratio dicitur argumentatio.”

<sup>4</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 3: “In omnibus autem intentionibus hoc communiter verum est, quod intentiones ipsae non sunt in rebus sed in anima tantum, sed habent aliquid in re respondens, scilicet naturam, cui intellectus hujusmodi intentiones attribuit.”

<sup>5</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 3: “sicut intentio generis non est in asino, sed natura animalis, cui per intellectum haec intentio attribuitur: [...] est in re aliquid respondens ei in quo fundatur, scilicet veritas illius rei cui talis intentio attribuitur.”

<sup>6</sup> The human mind is a *rational soul*. See, e.g., *Super Cor.* 2, c. 5 l. 1: “mens seu anima rationalis.”

<sup>7</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “ratio dicitur esse in re, in quantum significatum nominis, cui accidit esse rationem, est in re: et hoc contingit proprie, quando conceptio intellectus est similitudo rei.”

Hence, a *ratio* is not said to be in a thing as though the intention that the name of the *ratio* signifies were in it; nor as though the conception that belongs to that intention were outside the mind, since that conception is in the mind (*in anima*) as in a subject (*sicut in subjecto*).<sup>8</sup>

Instead, a *ratio* is said to be in a thing insofar as there is something in the thing outside the mind that responds to the conception of the mind *as that which is signified (responds) to the sign*.<sup>9</sup> And this properly happens when the conception of the intellect is a likeness (*similitudo*) of the thing outside the mind.

However, a *ratio* is not always *properly* said to be in a real thing; for the conception of the intellect can be related to the thing outside the mind in one of three ways:<sup>10</sup> **(1)** properly, again, as a likeness of the real thing outside the mind (► 21.4); **(2)** as something that follows upon our way of understanding the real thing (► 21.5); or **(3)** as neither (► 21.13).

#### 21.4. The Likeness of the Thing-Outside-The-Mind

Whenever the intellect apprehends something that is in the thing according to (the same mode in) which it is apprehended, what the intellect conceives is *a likeness of the thing that exists outside the mind*.<sup>11</sup> Such a conception of the intellect has its foundation immediately in the thing, insofar as the thing itself, due to its conformity with the intellect, causes the intellect to be true and causes the name—that signifies the understanding—to be properly said (i.e., truly predicated) of the thing.<sup>12</sup>

Thus, of those (natures) that are signified by names, there are some that, according to being (*secundum esse*), are a complete whole outside the soul.<sup>13</sup> And of such a mode are

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<sup>8</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “Et ex hoc patet [...] qualiter ratio dicatur esse in re. Non enim hoc dicitur, quasi ipsa intentio quam significat nomen rationis, sit in re; aut etiam ipsa conceptio, cui convenit talis intentio, sit in re extra animam, cum sit in anima sicut in subjecto.”

<sup>9</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “Et ex hoc patet [...] qualiter ratio dicatur esse in re. [...] dicitur esse in re, in quantum in re extra animam est aliquid quod respondet conceptioni animae, sicut significatum signo.”

<sup>10</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “sciendum, quod ipsa conceptio intellectus tripliciter se habet ad rem quae est extra animam.” *In Sent.* 1, d. 30 q. 1 a. 3 co.: “Sciendum tamen est, quod ratio in intellectu rerum tripliciter se habet. Quandoque enim apprehendit aliquid quod est in re secundum quod apprehenditur [...]. Quandoque vero apprehendit aliquid quod nullo modo in re est [...]. Aliquando autem apprehendit aliquid cui subest in re natura quaedam, non tamen secundum rationem qua apprehenditur.” *In Sent.* 1, d. 19 q. 5 a. 1 co.: “eorum quae significantur nominibus, invenitur triplex diversitas. Quaedam enim sunt quae secundum esse totum completum sunt extra animam [...]. Quaedam autem sunt quae nihil habent extra animam [...]. Quaedam autem sunt quae habent fundamentum in re extra animam, sed complementum rationis eorum quantum ad id quod est formale, est per operationem animae.”

<sup>11</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “Aliquando enim hoc quod intellectus concipit, est similitudo rei existentis extra animam.” *In Sent.* 1, d. 30 q. 1 a. 3 co.: “Quandoque enim [intellectus] apprehendit aliquid quod est in re secundum quod apprehenditur.”

<sup>12</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “talis conceptio intellectus habet fundamentum in re immediate, in quantum res ipsa, ex sua conformitate ad intellectum, facit quod intellectus sit verus, et quod nomen significans illum intellectum, proprie de re dicatur.”

<sup>13</sup> *In Sent.* 1, d. 19 q. 5 a. 1 co.: “eorum quae significantur nominibus, invenitur triplex diversitas. Quaedam enim [eorum quae significantur nominibus] sunt quae secundum esse totum completum sunt extra animam; et huiusmodi sunt entia completa, sicut homo et lapis.” *In Sent.* 1, d. 2 q. 1 a. 3 co.:



complete beings, such as a man or a stone. Whence, when the form (of man) is apprehended, that which is conceived from the name *man* (*homo*, i.e., human being) is a likeness of the human being that exists outside the mind.

### 21.5. Intentions Founded in a Thing-Outside-The-Mind

Sometimes, the conception that the name signifies is not a likeness of a thing that exists outside the mind, but *something that follows upon the mode of understanding the thing that is outside the mind*.<sup>14</sup> Such are the intentions that our intellect discovers (*adinvenit*; i.e., *finds out*; *devises*).<sup>15</sup>

For example, what is signified by the name *genus* is not a likeness of something existing outside the mind: rather, the intellect attributes (e.g.) to *animal*, the intention of *genus* because it understands *animal* as existing in multiple species.<sup>16</sup>

Although the proximate foundation of such intentions is not in the thing, but in the intellect, nevertheless, the remote foundation is the thing itself.<sup>17</sup> Hence, the intellect that discovers them is not false. And it is likewise of all other (intentions) that follow upon the mode of understanding, as the abstractions of mathematicians (►49.10).

(According to this mode), the intellect apprehends something that some nature in the thing underlies, but not according to the *ratio* whereby it is apprehended (►21.6).<sup>18</sup> This is evident when it apprehends the intention of the genus of *substance* (as) non-determined—according to itself—to *this* or *that* species, which in the thing is some (determinate) nature; and it attributes the *ratio* of *genus*—which *ratio* is not in the thing—to *this* nature apprehended according to the mode by which it is in the apprehending intellect, which takes some common one essence (*unum quid*) in which that nature is found.

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“Aliquando enim hoc quod intellectus concipit, est similitudo rei existentis extra animam, sicut hoc quod concipitur de hoc nomine homo.” *In Sent.* 1, d. 30 q. 1 a. 3 co.: “ut quando apprehenditur forma lapidis.”

<sup>14</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “Aliquando autem hoc quod significat nomen non est similitudo rei existentis extra animam, sed est aliquid quod consequitur ex modo intelligendi rem quae est extra animam: et hujusmodi sunt intentiones quas intellectus noster adinvenit.”

<sup>15</sup> See LEWIS and SHORT, *A Latin Dictionary*, entry for *ādivněňo*.

<sup>16</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “sicut significatum hujus nominis genus non est similitudo alicujus rei extra animam existentis; sed ex hoc quod intellectus intelligit animal ut in pluribus speciebus, attribuit ei intentionem generis.”

<sup>17</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “hujusmodi intentionis licet proximum fundamentum non sit in re sed in intellectu, tamen remotum fundamentum est res ipsa. Unde intellectus non est falsus, qui has intentiones adinvenit. Et simile est de omnibus aliis qui consequuntur ex modo intelligendi, sicut est abstractio mathematicorum et hujusmodi.”

<sup>18</sup> *In Sent.* 1, d. 30 q. 1 a. 3 co.: “Aliquando autem apprehendit aliquid cui subest in re natura quaedam, non tamen secundum rationem qua apprehenditur; sicut patet quando apprehendit intentionem generis substantiae, quae in re est natura quaedam non determinata secundum se ad hanc vel ad illam speciem; et huic naturae apprehensae, secundum modum quo est in intellectu apprehendente, qui ex omnibus accipit unum quid commune in quibus invenitur natura illa, attribuit rationem generis, quae quidem ratio non est in re.”

Those (intentions) that have a foundation in the thing outside the soul have a complement of *ratio*—in respect to that which is formal—through the operation of the soul, as is evident in (the case of) the universal (►19.7).<sup>19</sup>

For example, humanity is something in the thing, but it does not have there (i.e., in the thing outside the mind) the *ratio* of universal; for outside the soul there is no humanity (that is) common to many; rather, insofar as it is received in the intellect, an intention is added to it through an operation of the intellect, according to which it is said (to be a) *species*.<sup>20</sup>

Likewise, time (which is defined as *the number of motion according to prior and posterior*) has a foundation in motion: namely, the prior and the posterior in motion itself.<sup>21</sup> However, in respect of that which is formal in time—namely, numeration—it is completed through the operation of the numbering intellect (►62.6; 34.4).

## 21.6. Reception in the Intellect of the Likeness of a Thing

The likeness of a thing is received in the intellect according to the mode of the intellect, and not according to the mode of the thing (►26.3).<sup>22</sup> Whence, something responds (in the thing) to the composition and the division of the intellect (i.e., to a true proposition; ►19.1); but (the composition itself) is not had in the intellect as (it is had) in the thing.

The proper object of the human intellect is the quiddity of the material thing that falls under sense and imagination; but there is a twofold composition in the material thing (►15.14):<sup>23</sup>

**1. Composition of form to matter** (*compositio formae ad materiam*).<sup>24</sup> To this responds the composition of the intellect by which the universal whole is predicated of its part; for the genus is taken from common matter, while the completive difference (is taken) from the form (►13.16); and the particular (is taken) from individual matter (►13.12).

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<sup>19</sup> *In Sent.* 1, d. 19 q. 5 a. 1 co.: “Quaedam autem sunt quae habent fundamentum in re extra animam, sed complementum rationis eorum quantum ad id quod est formale, est per operationem animae, ut patet in universali.”

<sup>20</sup> *In Sent.* 1, d. 19 q. 5 a. 1 co.: “Humanitas enim est aliquid in re, non tamen ibi habet rationem universalis, cum non sit extra animam aliqua humanitas multis communis; sed secundum quod accipitur in intellectu, adiungitur ei per operationem intellectus intentio, secundum quam dicitur species.”

<sup>21</sup> *In Sent.* 1, d. 19 q. 5 a. 1 co.: “et similiter est de tempore, quod habet fundamentum in motu, scilicet prius et posterius ipsius motus; sed quantum ad id quod est formale in tempore, scilicet numeratio, completur per operationem intellectus numerantis.”

<sup>22</sup> *STh* I, q. 85 a. 5 ad 3: “similitudo rei recipitur in intellectu secundum modum intellectus, et non secundum modum rei. Unde compositioni et divisioni intellectus respondet quidem aliquid ex parte rei; tamen non eodem modo se habet in re, sicut in intellectu.”

<sup>23</sup> *STh* I, q. 85 a. 5 ad 3: “Intellectus enim humani proprium obiectum est quidditas rei materialis, quae sub sensu et imaginatione cadit. Invenitur autem duplex compositio in re materiali.”

<sup>24</sup> *STh* I, q. 85 a. 5 ad 3: “Prima quidem [compositio in re materiali], formae ad materiam, et huic respondet compositio intellectus qua totum universale de sua parte praedicatur; nam genus sumitur a materia communi, differentia vero completiva speciei a forma, particulare vero a materia individuali.”

For example, *animal* signifies *that which has a sensitive nature*; *rational* (signifies) *that which has an intellective nature*; *man* (signifies) *that which has one and the other*; and *Socrates* (signifies) *that which has all these with individual matter*.<sup>25</sup>

And according to this identity of *ratio* (i.e., univocally; ► 20.1), our intellect composes one (proposition) predicating (a universal whole, i.e., a genus, a species, or a difference) of another (i.e., of a subjective part, as a species or an individual).<sup>26</sup>

**2. Composition of accident to subject** (*compositio accidentis ad subiectum*).<sup>27</sup> To this real composition responds the composition of the intellect according to which an accident is predicated of a subject, as when we say, “a man is white.”

Here, the composition of the intellect differs from the composition of the thing.<sup>28</sup> Those that are composed in the thing are diverse (i.e., they are not one in genus), while the composition of the intellect (i.e., the proposition; ► 19.1) is a sign of the identity of those that are composed; for the intellect does not compose in such a way that it would say that a man is whiteness; rather, it says that a man is white—i.e., having whiteness—, while *the subject* that is a man *is the same* than *that which has whiteness*.

### 21.7. Relations of *Ratio*

Just as a real relation (*realis relatio*) consists in an order of a thing to a thing, a relation of *ratio* (*relatio rationis*) consists in an order of understandings.<sup>29</sup>

A relation of *ratio* can happen in two modes:<sup>30</sup>

**1.** Insofar as this order is discovered (*adinventus*) by the intellect and attributed to that which is said relatively.<sup>31</sup>

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<sup>25</sup> *STh* I, q. 85 a. 5 ad 3: “Et simile est de compositione formae et materiae, nam animal significat id quod habet naturam sensitivam, rationale vero quod habet naturam intellectivam, homo vero quod habet utrumque, Socrates vero quod habet omnia haec cum materia individuali.”

<sup>26</sup> *STh* I, q. 85 a. 5 ad 3: “et secundum hanc identitatis rationem, intellectus noster unum componit alteri praedicando.”

<sup>27</sup> *STh* I, q. 85 a. 5 ad 3: “Secunda vero compositio est accidentis ad subiectum, et huic reali compositioni respondet compositio intellectus secundum quam praedicatur accidens de subiecto, ut cum dicitur, homo est albus.”

<sup>28</sup> *STh* I, q. 85 a. 5 ad 3: “Tamen differt compositio intellectus [secundum quam praedicatur accidens de subiecto] a compositione rei, nam ea quae componuntur in re, sunt diversa; compositio autem intellectus est signum identitatis eorum quae componuntur. Non enim intellectus sic componit, ut dicat quod homo est albedo; sed dicit quod homo est albus, idest habens albedinem, idem autem est subiecto quod est homo, et quod est habens albedinem.”

<sup>29</sup> *De potentia*, q. 7 a. 11 co.: “sicut realis relatio consistit in ordine rei ad rem, ita relatio rationis consistit in ordine intellectuum.”

<sup>30</sup> *De potentia*, q. 7 a. 11 co.: “relatio rationis [...] dupliciter potest contingere.”

<sup>31</sup> *De potentia*, q. 7 a. 11 co.: “uno modo secundum quod iste ordo est adinventus per intellectum, et attributus ei quod relative dicitur.”

Reason discovers these relations by considering the order of that which is in the intellect to the things that are outside; or, also, the order of understandings to one another.<sup>32</sup>

Of such mode are the relations that are attributed by the intellect to the things understood insofar as they are understood (*prout sunt intellectae*), such as a relation of genus and species.<sup>33</sup>

2. Insofar as such relations (of *ratio*) follow upon the mode of understanding: i.e., that the intellect understands something in an order to another, even if the intellect does not discover (that order; ►21.8); instead, (such an order) follows, of some necessity, upon the mode of understanding; and the intellect does not attribute such relations to that which is in the intellect, but to that which is in the thing (*in re*).<sup>34</sup>

### 21.8. Non-Discovered Relations of *Ratio*

(That an order follows, of some necessity, upon the mode of understanding) happens insofar as some (things) that do not have an order according to themselves (*secundum se*) are understood ordinately, even though the intellect does not understand that they have an order; for in such a way (the understanding) would be false.<sup>35</sup>

For some (things) to have an order, each must be a being, and each must be distinct; for there is no order of the same to the same, and each must be orderable to the other (►8.5).<sup>36</sup> However, sometimes the intellect:

1. Takes some two (understandings) as beings, of which only one or neither (of them) is a being.<sup>37</sup> For example, when it takes two future (things), or one present and another future, and understands one with an order to the other, saying that one is prior to the other; whence, these relations are only of *ratio*, insofar as they follow upon the mode of understanding.

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<sup>32</sup> *De potentia*, q. 7 a. 11 co.: “has enim relationes ratio adinvenit considerando ordinem eius quod est in intellectu ad res quae sunt extra, vel etiam ordinem intellectuum ad invicem.”

<sup>33</sup> *De potentia*, q. 7 a. 11 co.: “huiusmodi sunt relationes quae attribuuntur ab intellectu rebus intellectis, prout sunt intellectae, sicut relatio generis et speciei.”

<sup>34</sup> *De potentia*, q. 7 a. 11 co.: “Alio modo secundum quod huiusmodi relationes consequuntur modum intelligendi, videlicet quod intellectus intelligit aliquid in ordine ad aliud; licet illum ordinem intellectus non adinveniat, sed magis ex quadam necessitate consequatur modum intelligendi. Et huiusmodi relationes intellectus non attribuit ei quod est in intellectu, sed ei quod est in re.”

<sup>35</sup> *De potentia*, q. 7 a. 11 co.: “Et hoc quidem contingit secundum quod aliqua non habentia secundum se ordinem, ordinate intelliguntur; licet intellectus non intelligat ea habere ordinem, quia sic esset falsus.”

<sup>36</sup> *De potentia*, q. 7 a. 11 co.: “Ad hoc autem quod aliqua habeant ordinem, oportet quod utrumque sit ens, et utrumque distinctum (quia eiusdem ad seipsum non est ordo) et utrumque ordinabile ad aliud.”

<sup>37</sup> *De potentia*, q. 7 a. 11 co.: “Quandoque autem intellectus accipit aliqua duo ut entia, quorum alterum tantum vel neutrum est ens: sicut cum accipit duo futura, vel unum praesens et aliud futurum, et intelligit unum cum ordine ad aliud, dicens alterum esse prius altero; unde istae relationes sunt rationis tantum, utpote modum intelligendi consequentes.”

2. Takes one (thing) as two (things) and understands them with some order. For example, when we say that something is the same as itself; and in this way, the relation is of *ratio* only.<sup>38</sup>

3. Takes two (things) as orderable to one another, between which there is no mean order; instead, one of them is essentially an order.<sup>39</sup> For example, when it says that a relation happens to a subject; whence, such a relation of a relation—to whatever other (thing)—is only of *ratio*.

4. Takes something with an order to another insofar as it is the terminus of an order of another to it, even if it is not ordered to the other (► 37.21, ¶2).<sup>40</sup> For example, taking that which is knowable as a terminus of the order of knowledge to it; and in this way, with some order to knowledge, the name *knowable* signifies relatively; and it is a relation of *ratio* only.

### 21.9. Comparability

Diversities of relations—even of those that are of diverse genera—can be referred to one another; for those that are of diverse genera are diverse to each other.<sup>41</sup> Moreover, there can be some relation (between them), as between those-that-are-from-a-principle and the principle (*inter principiata et principium*). However, not all (things) that are related can be compared: only those that have a relation according to one quantity or one quality, such that—from this—one can be said to be greater, better, whiter, or something of this sort.

Thus, those that are of one order seem to be comparable to each other—and being *prior* or *posterior* conveys a comparison.<sup>42</sup> However, there are three requirements for things to be **comparable** (*comparabilia* = συμβλητά):<sup>43</sup>

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<sup>38</sup> *De potentia*, q. 7 a. 11 co.: “Quandoque vero accipit unum ut duo, et intelligit ea cum quodam ordine: sicut cum dicitur aliquid esse idem sibi; et sic talis relatio est rationis tantum.”

<sup>39</sup> *De potentia*, q. 7 a. 11 co.: “Quandoque vero accipit aliqua duo ut ordinabilia ad invicem, inter quae non est ordo medius, immo alterum ipsorum essentialiter est ordo: sicut cum dicit relationem accidere subiecto; unde talis relatio relationis ad quodcumque aliud rationis est tantum.”

<sup>40</sup> *De potentia*, q. 7 a. 11 co.: “Quandoque vero accipit aliquid cum ordine ad aliud, in quantum est terminus ordinis alterius ad ipsum, licet ipsum non ordinetur ad aliud: sicut accipiendo scibile ut terminum ordinis scientiae ad ipsum; et sic cum quodam ordine ad scientiam, nomen scibilis relative significat; et est relatio rationis tantum.”

<sup>41</sup> *De potentia*, q. 7 a. 8 ad 2: “non omnium est comparatio quorum est relatio ad invicem, sed solum illorum quorum est relatio secundum unam quantitatem vel qualitatem, ut ex hoc possit unum altero dici maius aut melius, vel albius vel aliquid huiusmodi. Relationum autem diversitates possunt ad invicem referri etiam quae diversorum generum sunt: ea enim quae diversorum generum sunt, sunt ad invicem diversa. [...] potest esse aliqua relatio [...] sicut inter principiata et principium.”

<sup>42</sup> *In Physic.* 7, l. 1, n. 1: “ea quae sunt unius ordinis, habent aliquam comparisonem ad invicem.” *Ibid.*, l. 7, n. 1: “ea quae sunt unius ordinis videntur comparabilia esse, et hoc ipsum quod est prius et posterius comparisonem importat.”

<sup>43</sup> *In Physic.* 7, l. 7, n. 12: “oportet ea quae sunt comparabilia, non solum non esse aequivoca, quod erat primum; sed etiam non habere differentiam, neque ex parte subiecti primi in quo aliquid recipitur, quod erat secundum; neque ex parte eius quod recipitur, quod est forma vel natura; et hoc est tertium.”

1. Those that are comparable must not be (purely) equivocal.

For example, *acute* (*acutum* = ὀξύ) is taken equivocally:<sup>44</sup> **(a)** in one mode, it is said in magnitudes, according to which an angle is said (to be) *acute*, and a stylus is said (to be) *acute* (i.e., sharp; in both cases, some magnitudes make an angle that is less than a right angle); **(b)** in another mode, *acute* is said in savors, as wine is said (to be) *acute* (i.e., acid, pungent); **(c)** in another mode, it is said in voices, according to which the highest voice in melodies, or in the strings of a lyre, is said (to be) *acute*. Therefore, it would be impossible to compare a stylus, a wine and a high voice in order to tell which one is acuter; for *acute* is predicated equivocally of them. On the other hand, a high voice can be compared in acuteness to that which is on a par with it (*iuxta ipsam*) in the order of melodies, because *acute* is not predicated equivocally of one and of the other, but according to the same *ratio*.

Those things that are the same in definition are the same simply.<sup>45</sup> Hence, it is the proper definition of a thing by which we can discern whether things are the same or other: for example, white or sweet. But *other* can be taken in two modes, as also *prior* (can be taken in two modes): **(a)** as white is said (to be) *other than* sweet because in the white is found (some) other subjected nature than in the sweet; **(b)** because they differ not only according to a subjected nature, but they are altogether not the same; for it is manifest that the *ratio* of *identity* and of *diversity* is the same both in species and in definition (►41).

Hence, we must consider that many things that are not equivocal according to the abstract consideration of the logician or of the mathematician, are nonetheless said equivocally in some mode according to the concrete *ratio* of the natural (philosopher) because they are not received in whatever matter according to the same *ratio* (►21.11).<sup>46</sup> For example,

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<sup>44</sup> *In Physic. 7, l. 7, n. 8* (cf. ARISTOTLE, *Physica* H.4, 248b7–10): “Sicut *acutum* aequivoce sumitur: uno enim modo dicitur in magnitudinibus, secundum quem modum angulus dicitur acutus, et stylus acutus; alio modo dicitur in saporibus, secundum quem modum vinum dicitur acutum; tertio modo dicitur in vocibus, secundum quem modum vox *ultima*, idest suprema, in melodiis, vel chorda in cythara dicitur acuta. Ideo ergo non potest fieri comparatio ut dicatur quid sit acutius, utrum stylus aut vinum aut vox ultima, quia acutum de eis aequivoce praedicatur: sed vox ultima potest comparari secundum acuitatem, ei quae est iuxta ipsam in ordine melodiae, propter hoc quod acutum non aequivoce, sed secundum eandem rationem praedicatur de utraque.”

<sup>45</sup> *In Physic. 7, l. 8, n. 9* (cf. ARISTOTLE, *Physica* H.4, 249a25–29): “quia ea quae sunt idem definitione, sunt idem simpliciter, ideo [...] illud est propria definitio rei, quo possumus discernere utrum sit idem aut aliud, puta album vel dulce. Et hoc quod dico *aliud*, potest duobus modis accipi, sicut et prius: uno scilicet modo ut album dicatur aliud a dulci, quia in albo invenitur alia natura subiecta quam in dulci; alio modo, quia non solum secundum naturam subiectam differunt, sed omnino non sunt idem. [...] Manifestum est enim quod eadem est ratio identitatis et diversitatis, et in specie et in definitione.”

<sup>46</sup> *In Physic. 7, l. 7, n. 9*: “Est autem considerandum, quod multa quidem secundum abstractam considerationem vel logici vel mathematici non sunt aequivoca, quae tamen secundum concretam rationem naturalis ad materiam applicantis, aequivoce quodammodo dicuntur, quia non secundum eandem rationem in qualibet materia recipiuntur.”

even if the *ratio* of *double* consists in being of the ratio (*proportio*) *two-to-one* (2 : 1), this *ratio* contains an equivocation; for it could perhaps be said that *one* itself is equivocal (► 38.1); and if *one* is said equivocally, it follows that *two* is also said equivocally; for *two* is nothing other than *twice one*.<sup>47</sup> Thus, we cannot say that water is the double of air—or conversely—because air and water are not comparable (i.e., insofar as *double* is not received in air and in water according to the same *ratio*; on the other hand, they would be comparable according to the abstract consideration of the mathematician, who abstracts from sensible matter).<sup>48</sup> Likewise, *equal*—i.e., *that which is of one quantity*—is equivocal because the *ratio* of *one quantity* is not the same in all (subjects).<sup>49</sup>

2. Hence, there must be no difference on the part of the first subject in which something is received.<sup>50</sup> If one nature is received in diverse things *according to one, first subject* (*secundum unum primum subiectum* < ἐν ᾧ πρῶτον, τὸ αὐτό), these are comparable.

For example, horse and dog can be compared according to whiteness in order to tell which one is whiter because not only is the nature of whiteness the same in one and in the other, but there is also one, first subject in which whiteness is received: *surface*.<sup>51</sup> Likewise, magnitude is comparable in one and in the other in order to tell which one is greater because the subject of magnitude is the same in one and in the other: namely, the *substance of a compound body* (*substantia corporis mixti*).

On the other hand,<sup>52</sup> water and voice are not comparable according to magnitude in order to tell whether voice is greater than water—or conversely—because, although magnitude

<sup>47</sup> *In Physic. 7, l. 7, n. 9* (cf. ARISTOTLE, *Physica* H.4, 248b12–15): “Quamvis enim ratio dupli sit, quod est proportio duorum ad unum, tamen ista etiam ratio continet aequivocationem: quia forte potest dici quod ipsum unum est aequivocum; et si unum aequivoce dicitur, sequitur quod duo, quia duo nihil aliud est quam bis unum.”

<sup>48</sup> *In Physic. 7, l. 7, n. 8* (cf. ARISTOTLE, *Physica* H.4, 248b13–15): “Inveniuntur enim aliqua non aequivoca, quae tamen non sunt comparabilia; sicut hoc ipsum quod est *multum*, secundum eandem rationem dicitur de aqua et de aere, et tamen non sunt comparabilia aer et aqua secundum multitudinem. Si autem non velit aliquis hoc concedere quod multum idem significet propter eius communitatem, saltem concedet quod *duplum*, quod est species multiplicis, idem significat in aere et aqua: utrobique enim significat proportionem duorum ad unum. Et tamen non sunt comparabilia aer et aqua secundum duplum et dimidium, ut dicatur quod aqua est duplum aeris, aut e converso.”

<sup>49</sup> *In Physic. 7, l. 7, n. 9* (cf. ARISTOTLE, *Physica* H.4, 248b17–19): “*aequale* [...] aequivocum est; quia aequale est quod habet unam quantitatem, non est autem eadem ratio unius quantitatis in omnibus.”

<sup>50</sup> *In Physic. 7, l. 7, n. 10* (cf. ARISTOTLE, *Physica* H.4, 248b21–22): “si una natura recipiatur in diversis secundum unum primum subiectum, erunt illa ad invicem comparabilia.”

<sup>51</sup> *In Physic. 7, l. 7, n. 10* (cf. ARISTOTLE, *Physica* H.4, 248b22–24): “sicut equus et canis comparari possunt secundum albedinem, ut dicatur quod eorum sit albius, quia non solum est eadem natura albedinis in utroque, sed etiam est unum primum subiectum in quo recipitur albedo, scilicet superficies. Et similiter magnitudo est comparabilis in utroque, ut dicatur quod eorum sit maius; quia idem est subiectum magnitudinis in utroque, scilicet substantia corporis mixti.”

<sup>52</sup> *In Physic. 7, l. 7, n. 10* (cf. ARISTOTLE, *Physica* H.4, 248b24–25): “Sed aqua et vox non sunt comparabilia secundum magnitudinem, ut dicatur quod vox est maior quam aqua, aut e converso; quia licet magnitudo secundum se sit eadem, non tamen est idem receptivum: quia secundum quod dicitur

is the same according to itself (*secundum se*), what is receptive (of the *ratio* of *magnitude*) is not the same: insofar as (magnitude) is said of water, its subject is *substance*; but insofar as it is said of voice, its subject is *sound*, which is a *quality*.

3. There must be no difference on the part of that which is received in the first subject.<sup>53</sup> For example, color is divided into diverse species of color. Whence, it is not comparable insofar as it (i.e., color commonly taken) is predicated of them (i.e., of diverse species). Even though it is not said equivocally, and although it has one first subject, which is *surface*, which is the first subject of the genus, (it is) not, however, (the first subject) of some species of color. Hence, we cannot say which is more colored, whether white or black; for this comparison is not according to some determinate species of color, but according to common color itself. Instead, according to white, which is not divided into diverse species, a comparison can be made of all white things in order to tell which one is whiter.

Those that are of one genus (e.g., *magnitude*) are not comparable because a genus is not something simply one, while a species (e.g., *line*) is something simply one (► 16.6).<sup>54</sup> On the other hand, those that are of one species (e.g., white or black, which are species of color) are comparable, since those that are of the same nature are comparable. Whence, it is evident that the genus is not one nature, while the species is one nature.

The species is one nature because it is taken from the last form (► 16.6), which is simply one in the nature of things.<sup>55</sup> On the other hand, the genus is not one nature because it is

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de aqua, subiectum eius est substantia; secundum autem quod dicitur de voce, subiectum eius est sonus, qui est qualitas.”

<sup>53</sup> *In Physic. 7*, l. 7, n. 12 (cf. ARISTOTLE, *Physica* H.4, 249a3–8): “requiritur tertium ad hoc quod aliqua sint comparabilia. Et dicit quod oportet ea quae sunt comparabilia, non solum non esse aequivoca, quod erat primum; sed etiam non habere differentiam, neque ex parte subiecti primi in quo aliquid recipitur, quod erat secundum; neque ex parte eius quod recipitur, quod est forma vel natura; et hoc est tertium. Et exemplificat de hoc tertio. Quia color dividitur in diversas species coloris: unde non est comparabile secundum quod de eis praedicatur; licet non dicatur aequivoce, et licet etiam habeat unum primum subiectum, quod est superficies, quod est primum subiectum generis, non autem alicuius speciei coloris. Non enim possumus dicere quid sit magis coloratum, utrum album vel nigrum: haec enim comparatio non esset secundum aliquam determinatam speciem coloris, sed secundum ipsum colorem communem. Secundum vero album, quod non dividitur in diversas species, potest fieri comparatio omnium alborum, ut dicatur quid sit albius.”

<sup>54</sup> *In Physic. 7*, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a21–25): “genus non est aliquid unum simpliciter, species autem est aliquid unum simpliciter. [...] ea quae sunt unius generis, non sunt comparabilia; quae vero sunt unius speciei, comparabilia sunt; cum [...] eadem natura comparabilium est: ex quo videtur quod genus non sit una natura, sed species sit una natura.”

<sup>55</sup> *In Physic. 7*, l. 8, n. 8: “[...] videtur quod genus non sit una natura, sed species sit una natura. Et huius ratio est, quia species sumitur a forma ultima, quae simpliciter una est in rerum natura: genus autem non sumitur a forma aliqua quae sit una in rerum natura, sed secundum rationem tantum; non est enim aliqua forma ex qua homo sit animal, praeter illam ex qua homo est homo. Omnes igitur homines, qui sunt unius speciei, conveniunt in forma quae constituit speciem, quia quilibet habet animam rationalem: sed non est in homine, equo aut asino aliqua anima communis, quae constituat animal, praeter illam animam quae constituit hominem vel equum aut asinum (quod si esset, tunc genus esset unum et comparabile, sicut



not taken from some form that is one in the nature of things, but (is one) only according to *ratio*. Thus, there is no form from which a man is an animal other than that (form) from which a man is a man (►15.13). Therefore, all men, who are of one species, agree (*conveniunt*) in the form that constitutes the species, because any (of them) has a rational soul. On the other hand, there is no common soul in man, horse or ass, which would constitute an animal, other than that soul which constitutes a man, a horse, or an ass; otherwise, the genus would be comparable, as is the species. Rather, the form of a genus is taken in consideration alone by abstraction of the intellect from the differences.

Therefore, the species is something one from one form existing in the nature of things; the genus, on the other hand, is not one because diverse species of a genus receive predication according to the diverse forms existing in the nature of things.<sup>56</sup> And thus, a (predicable) genus is one logically—but not physically. (Note that the same happens with the genus of body and of substance; ►21.10; 21.11).

#### **21.10. Equivocation Due to Likeness or to Proximity to a Genus**

As ARISTOTLE says, since the (predicable) genus is one in some mode, but not (one) simply, close to the genus there are many latent: that is, due to proximity and likeness to the unity of a genus, the equivocation of many is latent.<sup>57</sup>

There are some very distant equivocal (things) in which only the community of the name is considered: for example, if *dog (canis)* is said of a celestial constellation (i.e., *Canis*) and of an animal capable of barking.<sup>58</sup>

There are others that have some likeness: for example, if the name *man* is said of a true man and of a depicted man insofar as it has some likeness to a true man.<sup>59</sup>

Other equivocations are proximate (to a predicable genus) either:<sup>60</sup>

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et species); sed in sola consideratione accipitur forma generis, per abstractionem intellectus a differentiis.”

<sup>56</sup> *In Physic.* 7, l. 8, n. 8: “Sic igitur species est unum quid a forma una in rerum natura existente: genus autem non est unum; quia secundum diversas formas in rerum natura existentes, diversae species generis praedicationem suscipiunt. Et sic genus est unum logice, sed non physice.”

<sup>57</sup> *In Physic.* 7, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a21–23): “Quia ergo genus quodammodo est unum, et non simpliciter, iuxta genera latent multa: idest, per similitudinem et propinquitatem ad unitatem generis, multorum aequivocatio latet.”

<sup>58</sup> *In Physic.* 7, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a23–24): “Sunt autem quaedam aequivocationum multum distantes, in quibus sola communitas nominum attenditur; sicut si canis dicatur caeleste sidus, et animal latrabile.”

<sup>59</sup> *In Physic.* 7, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a24): “Quaedam vero sunt quae habent quandam similitudinem; sicut si hoc nomen homo dicatur de vero homine et de homine picto, in quantum habet similitudinem quandam veri hominis.”

<sup>60</sup> *In Physic.* 7, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a24): “Quaedam vero aequivocationes sunt proximae.”

1. Because they agree in (a predicable) genus.<sup>61</sup>

For example, when *body* is said of a celestial body (e.g., the sun or the moon, considered to be incorruptible by ancient scientists)<sup>62</sup> and of a corruptible body, it is said equivocally, speaking naturally, because they do not have one matter.<sup>63</sup>

Indeed, as ARISTOTLE proves, the corruptible and the incorruptible (body) are diverse in genus (►41.11).<sup>64</sup> And this is so because, just as form and act pertain to the species, so matter and potency pertain to the genus. Whence, just as the contrariety that is according to forms and acts produces a difference according to species, so the contrariety that is according to potency produces diversity of genus.

Nevertheless, (the corruptible and the incorruptible) agree in the logical genus (of *body*).<sup>65</sup> And because of this agreement of genus, they seem to be altogether non-equivocal.

2. Because they are proximate according to some likeness (< ἀναλογία).<sup>66</sup>

For example, one who teaches in a school, and likewise one who precedes in a house, is equivocally said (to be a) *master* (*magister*). Nonetheless, (each is said to be a master) in

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<sup>61</sup> *In Physic.* 7, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a24): “aut propter convenientiam in genere.”

<sup>62</sup> As St. Thomas explains, there are some universals that contain under themselves only one singular, as *sun* and *moon* (i.e., according to ancient science). Whence, ARISTOTLE says that universal is *that which is naturally apt to be in many*, and not “what is in many.” However, it is not as though the nature itself of the species, of itself (*quantum est de se*), would not be naturally apt to be in many; rather, there is something else that prevents (it from being in many): for example, that the whole matter of the species is comprehended in one individual, and that it is not necessary for a species that can be perpetual in one individual to be multiplied according to number. See *In Metaph.* 7, l. 13, §1574: “Sciendum autem quod ideo dicitur quod universale est quod natum est pluribus inesse, non autem quod pluribus inest; quia quaedam universalia sunt quae non continent sub se nisi unum singulare, sicut sol et luna. Sed hoc non est quin ipsa natura speciei quantum est de se sit nata esse in pluribus; sed est aliquid aliud prohibens, sicut quod tota materia speciei comprehendatur in uno individuo, et quod non est necessarium multiplicari secundum numerum speciem, quae in uno individuo potest esse perpetua.”

<sup>63</sup> *In Physic.* 7, l. 8, n. 8: “sicut si corpus dicatur de corpore caelesti et de corpore corruptibili, aequivoce dicitur, naturaliter loquendo, quia eorum non est materia una.”

<sup>64</sup> *In Metaph.* 10, l. 12, §2137 (cf. ARISTOTLE, *Metaphysica* I.10, 1058b26–29): “corruptibile et incorruptibile sunt contraria. Quod [Philosophus] probat ex hoc, quod impotentia opposita determinatae potentiae est quaedam privatio, ut in nono habitum est. Privatio autem est principium contrarietatis. Unde sequitur, quod impotentia sit contrarium potentiae. Corruptibile autem et incorruptibile opponuntur secundum potentiam et impotentiam. Sed diversimode. Nam si accipiatur potentia communiter, secundum quod se habet ad posse agere vel pati quodcumque, sic corruptibile secundum potentiam dicitur, incorruptibile secundum impotentiam. Si autem dicatur potentia secundum quod non est posse aliquid deterius, sic e converso, incorruptibile dicitur secundum potentiam, corruptibile vero secundum impotentiam. Cum autem ex his videretur concludendum quod corruptibile et incorruptibile differunt specie, concludit quod sunt diversa genere. Et hoc ideo, quia sicut forma et actus pertinent ad speciem, ita materia et potentia pertinent ad genus. Unde sicut contrarietas quae est secundum formas et actus, facit differentiam secundum speciem, ita contrarietas quae est secundum potentiam, facit generis diversitatem.” Cf. AVERROES, *tafsir ma ba’d at-tabī’at*, Comm. 26 on Book X, Tome VII, 1386.3–1387.8.

<sup>65</sup> *In Physic.* 7, l. 8, n. 8: “Conveniunt tamen [corpus caeleste et corpus corruptibile] in genere logico: et propter hanc generis convenientiam videntur omnino non aequivoca esse.”

<sup>66</sup> *In Physic.* 7, l. 8, n. 8 (cf. ARISTOTLE, *Physica* H.4, 249a24–25): “aut etiam sunt propinquae secundum aliquam similitudinem.”

proximate equivocation due to a likeness (i.e., an analogy of proportionality); for each is a leader (*rector*): the former, of a school; the latter, of a house.<sup>67</sup>

◀ Whence, due to this proximity either of genus (§1) or of likeness (§2), there seem to be no equivocations—when nonetheless there are.<sup>68</sup>

### 21.11. Logical vs. Philosophical Genus

Since the material whence the genus is taken has in itself (both) matter and form, the logician considers the genus only from its formal part; whence, also, his definitions are said (to be) *formal*.<sup>69</sup> The natural (scientist), on the other hand, considers the genus from the part of one and of the other (i.e., from the formal and the material part; ▶13.10). Hence, sometimes it happens that something communicates in a genus according to the logician which does not communicate according to the natural (scientist).

Thus, sometimes it happens that a thing attains some likeness (▶21.10, §2) of the first act in such matter; another attains (it) without matter; and another (attains it) in another, altogether diverse matter.<sup>70</sup> For example, a stone (attains some likeness of the first act) in a matter that is according to a potency towards being (*secundum potentiam ad esse*), to which pertains this: that it subsists; which also pertains to the sun (i.e., an incorruptible body) according to a matter (that is in potency) towards place (*ad ubi*), and not towards being; and an angel (attains some likeness of the first act) lacking all matter.

Whence, the logician, finding in all these (things) the matter from which he would have taken the genus, posits all (of them) in one genus of *substance*.<sup>71</sup> On the other hand, the natural (scientist) and the metaphysician, who consider all the principles of a thing, not

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<sup>67</sup> *In Physic.* 7, l. 8, n. 8: “sicut ille qui docet in scholis dicitur magister, et similiter ille qui praeest domui dicitur magister domus, aequivoce, et tamen propinqua aequivocatione propter similitudinem; uterque enim est rector, hic quidem scholarum, ille vero domus.”

<sup>68</sup> *In Physic.* 7, l. 8, n. 8: “Unde propter hanc propinquitatem vel generis vel similitudinis, non videntur esse aequivocationes, cum tamen sint.”

<sup>69</sup> *In De Trin.*, q. 4 a. 2 co., 159–167: “Sciendum tamen quod cum illud materiale unde sumitur genus habeat in se materiam et formam, logicus considerat genus solum ex parte eius quod formale est, unde et eius diffinitiones dicuntur formales; set naturalis considerat genus ex parte utriusque. Et ideo contingit quandoque quod aliquid communicat in genere secundum logicum, quod non communicat secundum naturalem.”

<sup>70</sup> *In De Trin.*, q. 4 a. 2 co., 167–175: “contingit enim quandoque quod illud de similitudine primi actus <quod> consequitur res aliqua in materia tali, aliud consequatur sine materia, et aliud in alia materia omnino diuersa; sicut patet quod lapis in materia que est secundum potentiam ad esse pertingit ad hoc quod subsistat, ad quod idem pertingit sol secundum materiam ad ubi et non ad esse, et angelus omni materia carens.”

<sup>71</sup> *In De Trin.*, q. 4 a. 2 co., 175–183: “Vnde logicus, inueniens in omnibus his illud materie ex quo genus sumebat, ponit omnia in uno genere substantie; naturalis uero et metaphisicus, qui considerant omnia principia rei, non inuenientes conuenientiam in materia, dicunt genere differre, secundum hoc quod dicitur in X Metaphisice, quod corruptibile et incorruptibile differunt genere, et quod illa conueniunt genere quorum materia est una et generatio ad inuicem.”

finding agreement in matter, say that (a corruptible body, an incorruptible body, and a simple, immaterial substance) differ in genus, according to what ARISTOTLE says, that the corruptible and the incorruptible differ in genus, and that those agree in genus of which the matter is one, and (there is) generation towards each other.

### 21.12. Logical vs. Philosophical Analogy

Something is said according to analogy in three (modes):<sup>72</sup>

1. *According to intention only, but not according to being (secundum intentionem tantum, et non secundum esse).*<sup>73</sup> This occurs when one intention, which has (its act of) being (*esse*) in one (thing), is referred to multiple (things) according to prior and posterior (*per prius et posterius*).

For example, the intention of *health* is referred to animal, urine, and diet, according to prior and posterior (*secundum prius et posterius*) diversely, but not according to a diverse (act of) being (*esse*), since the (act of) being of health is only in the animal.<sup>74</sup>

2. *According to being, but not according to intention (secundum esse et non secundum intentionem).*<sup>75</sup> This happens when multiple (things) are equated (*parificantur*) in the intention of something common, but that common (something) does not have (an act of) being (*esse*) of one *ratio* in all (of them).

For example, all bodies are equated in the intention of *corporeity* (►46.10).<sup>76</sup> Whence, the logician, who considers only intentions, says that the name *body* is predicated univocally of all bodies. However, the (act of) being (*esse*) of its nature is not of the same *ratio* in *corruptible* and *incorruptible bodies*. Whence, according to the metaphysician and the natural (scientist), who considers the thing according to its (act of) being, neither the name *body* nor any other (name) is said univocally of *corruptible* and *incorruptible (bodies)*.

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<sup>72</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: "aliquid dicitur secundum analogiam tripliciter."

<sup>73</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: "vel secundum intentionem tantum, et non secundum esse; et hoc est quando una intentio refertur ad plura per prius et posterius, quae tamen non habet esse nisi in uno."

<sup>74</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: "sicut intentio sanitatis refertur ad animal, urinam et dietam diversimode, secundum prius et posterius; non tamen secundum diversum esse, quia esse sanitatis non est nisi in animali."

<sup>75</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: "Vel secundum esse et non secundum intentionem; et hoc contingit quando plura parificantur in intentione alicujus communis, sed illud commune non habet esse unius rationis in omnibus."

<sup>76</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: "sicut omnia corpora parificantur in intentione corporeitatis. Unde logicus, qui considerat intentiones tantum, dicit, hoc nomen corpus de omnibus corporibus univoce praedicari: sed esse hujus naturae non est ejusdem rationis in corporibus corruptibilibus et incorruptibilibus. Unde quantum ad metaphysicum et naturalem, qui considerant res secundum suum esse, nec hoc nomen corpus, nec aliquid aliud dicitur univoce de corruptibilibus et incorruptibilibus, ut patet 10 Metaphys. ex Philosopho et Commentatore."

Likewise, quantity, and the unity that is the principle of number, cannot be found according to the same *ratio* in *corruptible* and *incorruptible bodies*.<sup>77</sup>

**3. According to intention and according to being (*secundum intentionem et secundum esse*).**<sup>78</sup> This happens when (multiple things) are equated neither in a common intention nor in being. And concerning such (things), the common nature must have some (act of) being in each of those of which (the name) is said; but it differs according the *ratio* of *greater or lesser perfection*.

For example, *being* (*ens*) is said of substance and of accident (but the act of being differs in them according to perfection; for substance exists in itself, while accident exists in dependence of substance; and therefore, *substance* is posited in the *ratio* of *accident*).<sup>79</sup>

### **21.13. Intentions Not Founded in a Thing-Outside-The-Mind**

Sometimes, that which is signified by a name does not have a foundation—whether proximate or remote—in the thing outside the mind.<sup>80</sup>

For example, the conception of *chimera* (fire-breathing monster with a lion's head, a goat's body, and a serpent's tail) does not have a foundation in a thing outside the mind because it is not the likeness of something that exists outside the mind (►21.5).<sup>81</sup> Nor does it follow upon our mode of understanding something found in nature (►21.8). Whence, this conception is false (i.e., it is not naturally apt to be truly predicated). And something similar can be said of dreams and of imagination.

### **21.14. Priority vs. Causality in Genera, Species, and Individuals**

That which is prior need not be a cause of all those that agree (*conveniunt*) in the nature of a genus or of a species.<sup>82</sup> Indeed, in the order of nature, one (individual) cannot be prior

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<sup>77</sup> *In Physic.* 7, l. 7, n. 9: “quantitatem et unitatem, quae est principium numeri, non secundum eandem rationem contingit invenire in corporibus caelestibus et in igne et in aere et aqua.”

<sup>78</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: “Vel secundum intentionem et secundum esse; et hoc est quando neque parificatur in intentione communi, neque in esse. [...] et de talibus oportet quod natura communis habeat aliquod esse in unoquoque eorum de quibus dicitur, sed differens secundum rationem majoris vel minoris perfectionis.”

<sup>79</sup> *In Sent.* 1, d. 19 q. 5 a. 2 ad 1: “sicut ens dicitur de substantia et accidente.”

<sup>80</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “Aliquando vero id quod significatur per nomen, non habet fundamentum in re, neque proximum neque remotum.”

<sup>81</sup> *In Sent.* 1, d. 2 q. 1 a. 3 co.: “sicut conceptio Chimerae: quia neque est similitudo alicujus rei extra animam, neque consequitur ex modo intelligendi rem aliquam naturae: et ideo ista conceptio est falsa.” *In Sent.* 1, d. 30 q. 1 a. 3 co.: “Quandoque vero [intellectus] apprehendit aliquid quod nullo modo in re est, ut quando quis imaginatur Chimaeram, vel aliquid hujusmodi.” *In Sent.* 1, d. 19 q. 5 a. 1 co.: “Quaedam autem [eorum quae significantur nominibus] sunt quae nihil habent extra animam, sicut somnia et imaginatio Chimerae.”

<sup>82</sup> *Quodlibet* 3, q. 3 a. 1 ad arg.: “Non autem oportet quod omnium quae conveniunt in natura generis vel speciei, id quod est prius, sit causa omnium aliorum. Et quidem in eadem specie non potest unum esse prius altero, proprie loquendo, ordine naturae: quia species praedicatur aequaliter de omnibus individuis,

to another in the same species, properly speaking; for a species is **equally predicated** of all individuals. But in genera this is not so; for among the species of one genus, one is naturally prior and **more perfect** than the other.

Among individuals of one species, however, one is prior to another in (the order of) time.<sup>83</sup> And although some individual that is prior in time is the cause of some other that is posterior, as the father is the cause of the son, however, this is not universally true, for not all the more ancient are the cause of all the younger.

Among the species of the same genus, that which is prior can be a principle and cause of the others (► 11.3; 27.4; 47.2).<sup>84</sup> For example, local motion (is a principle and cause) of the other motions (i.e., local motion is a cause of alteration, which is motion in the genus of quality; and alteration is a cause of increase or decrease, which is motion in the genus of quantity; ► 48.24); (the number) two (is the principle and cause) of the other numbers; and the triangle (is the principle and cause) of the other rectilinear figures (► 36.8). However, this is not universally true, for man, which is the **most perfect** species of animal, is not the active cause of the other species.

### 21.15. Equality and Priority According to Thing vs. According to *Ratio* in Opposites

Among those that are divided from an opposite (► 42), some can be found to be:<sup>85</sup>

1. Naturally **simultaneous both according to thing** (*secundum rem*) and **according to ratio** (*secundum rationem*), as two species of animals or two species of colors.<sup>86</sup>

When a univocal genus is divided into its species (► 27.2), the parts of the division are **had equally** (*ex aequo se habent*; ► 6.11, ¶6) according to the ratio of the genus, although according to the nature of the thing, one species is **more principal** and **more perfect** than the other, as man (is more principal and more perfect) than the other animals.<sup>87</sup>

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ut dicitur in III Metaphysicorum. In generibus autem non est sic. Nam inter species unius generis una est naturaliter prior et perfectior altera.”

<sup>83</sup> *Quodlibet* 3, q. 3 a. 1 ad arg.: “Est autem in individuis unius speciei unum altero tempore prius; et quamvis aliquod individuum, quod est prius tempore, sit causa cuidam alii quod est posterius, ut pater est causa filii, sicut in obiciendo tangebatur; non tamen hoc est universaliter verum; non enim omnes antiquiores sunt causa omnium iuniorum.”

<sup>84</sup> *Quodlibet* 3, q. 3 a. 1 ad arg.: “Similiter etiam contingit id quod est prius inter species eiusdem generis, esse aliorum principium et causam, sicut motus localis aliorum motuum, et binarius aliorum numerorum, et triangulus aliarum figurarum rectilinearum; non tamen hoc est universaliter verum. Non enim homo, qui est perfectissima species animalis, est causa activa aliarum specierum.”

<sup>85</sup> *STh* I-II, q. 29 a. 2 ad 1: “in his quae ex opposito dividuntur, quaedam inveniuntur quae sunt [...]”

<sup>86</sup> *STh* I-II, q. 29 a. 2 ad 1: “quaedam inveniuntur quae sunt naturaliter simul et secundum rem, et secundum rationem, sicut duae species animalis, vel duae species coloris.”

<sup>87</sup> *STh* I-II, q. 61 a. 1 ad 1: “quando genus univocum dividitur in suas species, tunc partes divisionis ex aequo se habent secundum rationem generis; licet secundum naturam rei, una species sit principalior et perfectior alia, sicut homo aliis animalibus.”

2. **Simultaneous according to *ratio***, but one is really (*realiter*, i.e., as to the thing) prior to the other and is its cause, as is evident in the species of numbers, figures, and motions.<sup>88</sup>

The species that divide a genus **equally** (*ex aequo*) are simultaneous in nature.<sup>89</sup> Hence, according to the division of a genus into (its) species, the (species) co-divided from each other are simultaneous in nature.<sup>90</sup> But among the principles and parts that are required for the completion (*ad completionem*; i.e., for the perfection) of a composite thing, there can be something (that is) prior (and something that is posterior).

Those that divide something common univocal are simultaneous in respect of the intention of the genus (*quantum ad intentionem generis*; ►27.2, ¶1), even if one could be a cause of another in respect of being (*quantum ad esse*), as local motion is a cause of the other motions against which it is divided (►48.24).<sup>91</sup>

In all univocal (predications), the *ratio* of the name is common to any of those (subjects) of which the name is univocally predicated.<sup>92</sup> Hence, they are **equal** in something with respect to the univocal *ratio* of the name, even though one can be prior or posterior according to being (*secundum esse*).

Thus, the species of some genera—such as numbers and figures—are related according to prior and posterior in respect of being (*quantum ad esse*), even if they are said to be simultaneous insofar as they receive the predication of a common genus.<sup>93</sup> For example, all numbers are **equal** in the *ratio* of *number* (i.e., any number is *as much* a number as any other), even though one (number) is prior to another according to the nature of the

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<sup>88</sup> *STh* I-II, q. 29 a. 2 ad 1: “Quaedam vero sunt simul secundum rationem, sed unum realiter est prius altero et causa eius, sicut patet in speciebus numerorum, figurarum et motuum.”

<sup>89</sup> *In Peri.* 1, l. 1, n. 10: “quia sunt species ex aequo dividentes genus, sunt simul natura.” Here, St. Thomas is referring to affirmation and negation, which are species of the genus of enunciation.

<sup>90</sup> *STh* I-II, q. 113 a. 6 ad 3: “Ad tertium [sc., *ea quae connumerantur quasi ad invicem condivisa, sunt simul natura*] dicendum quod ista [sc., numeratio eorum quae requiruntur ad iustificationem impii] non est connumeratio secundum divisionem generis in species, in qua oportet quod connumerata sint simul, sed secundum differentiam eorum quae requiruntur ad completionem alicuius. In qua quidem enumeratione aliquid potest esse prius, et aliquid posterius, quia principiorum et partium rei compositae potest esse aliquid alio prius.”

<sup>91</sup> *In Sent.* 3, d. 33 q. 2 a. 1 qc. 1 ad 2: “ea quae dividunt aliquod commune univocum, sunt simul quantum ad intentionem generis, quamvis unum possit esse causa alterius quantum ad esse, sicut motus localis est causa aliorum motuum contra quos dividitur.”

<sup>92</sup> *De veritate*, q. 2 a. 11 co.: “In omnibus enim univocis communis est ratio nominis utriusque eorum de quibus nomen univoce praedicatur; et sic quantum ad illius nominis rationem univoca in aliquo aequalia sunt, quamvis secundum esse unum altero possit esse prius vel posterius.”

<sup>93</sup> *STh* I, q. 77 a. 4 ad 1: “Ad primum [sc., *in his quae cadunt sub una divisione, non est prius et posterius, sed sunt naturaliter simul*] ergo dicendum quod alicuius generis species se habent secundum prius et posterius, sicut numeri et figurae, quantum ad esse; licet simul esse dicantur in quantum suscipiunt communis generis praedicationem.”

thing (*secundum naturam rei*; i.e., according to thing, two is naturally prior to three because there cannot be three without there being two; ►47.2).<sup>94</sup>

**3. Not simultaneous**, both according to thing and according to *ratio*, as substance and accident; for substance is really a cause of accident (i.e., substance is prior to accident *secundum esse*); and *being (ens)*, according to *ratio*, is attributed to substance prior than to accident, for (*being*) is only attributed to accident insofar as it is *in a substance*.<sup>95</sup>

When there is a division of some analog that is said of many according to prior and posterior (*secundum prius et posterius*; ►27.2, ¶2), then nothing prevents one from being **more principal** than another even according to the common *ratio*—i.e., (one can) be related according to prior and posterior also in respect of the intention of the common (analog) that is divided—as substance is more principally said (to be a) *being* than accident.<sup>96</sup>

In those (predicates) that are said of many according to prior and posterior (*per prius et per posterius*), it is not the prior that must receive the predication of the common (nature), which is as the cause of the others; rather, (what must receive the predication of the common predicate is) that in which the complete *ratio* of the common (nature) is (found) first.<sup>97</sup> For example, *healthy* is said priorly of animal, in which the perfect *ratio* of *health* is found, even though (the art of) medicine is said to be *healthy* as effecting health.

### 21.16. Equal and Unequal

*Equal* and *unequal* are said according to quantity (►22.1); for (whatever is) *one in quantity* is said (to be) **equal**, as (whatever is *one*) *in quality* (is said to be) **alike**, and (whatever is *one*) *in substance* (is said to be the) **same**.<sup>98</sup>

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<sup>94</sup> *De veritate*, q. 2 a. 11 co.: “sicut in ratione numeri omnes numeri sunt aequales, quamvis secundum naturam rei unus altero naturaliter prior sit.”

<sup>95</sup> *STh* I-II, q. 29 a. 2 ad 1: “Quaedam vero non sunt simul nec secundum rem, nec secundum rationem, sicut substantia et accidens, nam substantia realiter est causa accidentis; et ens secundum rationem prius attribuitur substantiae quam accidenti, quia accidenti non attribuitur nisi in quantum est in substantia.”

<sup>96</sup> *STh* I-II, q. 61 a. 1 ad 1: “quando est divisio alicuius analogi, quod dicitur de pluribus secundum prius et posterius; tunc nihil prohibet unum esse principalius altero, etiam secundum communem rationem; sicut substantia principalius dicitur ens quam accidens.” *In Sent.* 3, d. 33 q. 2 a. 1 qc. 1 ad 2: “ea quae dividunt aliquod commune analogum se habent secundum prius et posterius etiam quantum ad intentionem communis quod dividitur, sicut patet de substantia et accidente.”

<sup>97</sup> *De veritate*, q. 1 a. 2 co.: “non oportet in illis quae dicuntur per prius et per posterius de multis, quod illud prius recipiat praedicationem communis, quod est ut causa aliorum, sed illud in quo est primo ratio illius communis completa; sicut sanum per prius dicitur de animali, in quo primo perfecta ratio sanitatis invenitur, quamvis medicina dicatur sana ut effectiva sanitatis.”

<sup>98</sup> *De virtutibus*, q. 5 a. 3 co.: “aequale et inaequale dicuntur secundum quantitatem; unum enim in quantitate aequale dicitur, sicut in qualitate simile, et in substantia idem, ut patet in V Metaph.”



## 22. Virtual Quantity

*We have determined that things can be of unequal perfection, and that inequality pertains to quantity. We seek to clarify here what this quantity of perfection is.*

### 22.1. Dimensive vs. Virtual Quantity

Quantity is twofold, each (mode) of which is diversified by many (*per multa diversificatur*):<sup>1</sup>

**1. Dimensive quantity** (*quantitas dimensiva*) or quantity **of bulk** (*quantitas molis*; ► 35), which is considered **according to extension**, and exists only in corporeal things.<sup>2</sup>

Dimensive quantity is diversified by many because *longitude*, *latitude*, and *profundity*—and, in potency, *number*—are contained under it (► 34).<sup>3</sup>

**2. Virtual quantity** (*quantitas virtualis*) or quantity **of virtue** (*quantitas virtutis*), which is considered **according to intension**: that is, **according to the perfection of some form or nature**; for the virtue of a thing is its perfection (► 22.2; 23); and, therefore, the virtual quantity of any one form is considered according to the mode of its perfection (► 22.3).<sup>4</sup> This quantity is designated (e.g.) when something is said to be *more*—or *less*—hot insofar as it is *more*—or *less*—perfect in heat.

Virtual quantity (is also diversified by many because it) is distinguished in as many natures or forms as there are, of which the mode of perfection produces a whole measure of quantity (*quarum perfectionis modus totam mensuram quantitatis facit*).<sup>5</sup>

A quantity of virtue is considered in two modes:<sup>6</sup> **(a)** in respect of the **number of objects**, which is by the mode of discrete quantity; or **(b)** in respect of the **intension of the act over the same object**, and this is like continuous quantity (i.e., magnitude).

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<sup>1</sup> *STh I*, q. 42 a. 1 ad 1: “duplex est quantitas.” *De veritate*, q. 29 a. 3 co., 140: “Est autem duplex quantitas.” *Ibid.*, 148–149: “Utraque autem quantitas per multa diversificatur.”

<sup>2</sup> *STh I*, q. 42 a. 1 ad 1: “Una scilicet quae dicitur quantitas *molis*, vel quantitas dimensiva, quae in solis rebus corporalibus est.” *De veritate*, q. 29 a. 3 co., 140–141: “scilicet dimensiva, quae secundum extensionem consideratur.”

<sup>3</sup> *De veritate*, q. 29 a. 3 co., 148–151: “Utraque autem quantitas per multa diversificatur; nam sub quantitate dimensiva continetur longitudo, latitudo et profundum, et numerus in potentia.”

<sup>4</sup> *STh I*, q. 42 a. 1 ad 1: “alia est quantitas *virtutis*, quae attenditur secundum perfectionem alicuius naturae vel formae, quae quidem quantitas designatur secundum quod dicitur aliquid magis vel minus calidum, in quantum est perfectius vel minus perfectum in caliditate.” *De veritate*, q. 29 a. 3 co., 141–148: “et virtualis, quae attenditur secundum intensionem; virtus enim rei est ipsius perfectio secundum illud Philosophi in VII Physicorum «Unumquodque perfectum est quando attingit propriae virtuti»; et sic quantitas virtualis uniuscuiusque formae attenditur secundum modum suae perfectionis.”

<sup>5</sup> *De veritate*, q. 29 a. 3 co., 151–154: “quantitas autem virtualis in tot distinguitur quot sunt naturae vel formae, quarum perfectionis modus totam mensuram quantitatis facit.”

<sup>6</sup> *In Sent.* 1, d. 17 q. 2 a. 1 ad 2: “quantitas virtutis attenditur dupliciter: vel quantum ad numerum objectorum, et hoc est per modum quantitatis discretarum; vel quantum ad intensionem actus super idem objectum; et hoc est sicut quantitas continua.” *STh II-II*, q. 24 a. 4 ad 1: “quantitas virtualis [...] non solum

## 22.2. Virtue as *Maximum Potency*

We call **potency** (*potentia* = δύναμις, i.e., power) *the intrinsic principle by which an agent acts or a patient is affected (principium intrinsecum quo agens agit vel patiens patitur).*<sup>7</sup>

Thus, a potency (►31.3) is nothing other than the principle of operation of something, whether (such an operation) is an action or an affection (►33.5).<sup>8</sup> However, this principle is not the subject that acts or that is affected (*subiectum agens aut patiens*), but that whereby the agent acts or the patient is affected (i.e., acted upon).<sup>9</sup>

For example, the art of building (*ars aedificativa*) is a potency in the builder, who builds through it (*per eam aedificat*). Likewise, heat (is a potency) in fire, which heats by heat (*calore calefacit*).<sup>10</sup> And dry(ness) is a (passive) potency in wood, because (wood) is combustible in respect of it.

However, *potency* does not signify the relation itself of principle—otherwise it would be in the genus of *relation*.<sup>11</sup> Instead, it signifies *that which is the principle*.

A potency receives the name and the *ratio* of **virtue** (*virtus* = ἀρετή, i.e., excellence), as ARISTOTLE says, *insofar as it is referred—i.e., by comparison, in order—to the last in that of which something is capable (secundum quod refertur ad ultimum in quod aliquid potest, per comparisonem ad ultimum in quod potentia potest < πρὸς τὸ πλεῖστον; in ordine ad hoc in quod ultimo potest, per respectum ad plurimum in quod potest).*<sup>12</sup>

(In other words, an active—or passive—potency or power is called *virtue* insofar as it is referred to the maximum it can act—or be acted upon.)

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attenditur secundum numerum obiectorum, ut scilicet plura vel pauciora diligantur, sed etiam secundum intensionem actus, ut magis vel minus aliquid diligatur.”

<sup>7</sup> *De op. occ.*, 104–105: “hoc enim dicimus potentiam principium intrinsecum quo agens agit uel patiens patitur.”

<sup>8</sup> *Q. d. de anima*, a. 12 co.: “potentia nihil aliud est quam principium operationis alicuius, sive sit actio sive passio.”

<sup>9</sup> *Q. d. de anima*, a. 12 co.: “Non quidem principium quod est subiectum agens aut patiens, sed id quo agens agit aut patiens patitur.” *STh* I, q. 41 a. 5 ad 1: “potentia [...] significat id quod est principium; non quidem sicut agens dicitur principium, sed sicut id quo agens agit.”

<sup>10</sup> *Q. d. de anima*, a. 12 co.: “sicut ars aedificativa est potentia in aedificatore qui per eam aedificat, et calor in igne qui calore calefacit, et siccum est potentia in lignis, quia secundum hoc sunt combustibilia.”

<sup>11</sup> *STh* I, q. 41 a. 5 ad 1: “potentia non significat ipsam relationem principii, alioquin esset in genere relationis, sed significat id quod est principium.”

<sup>12</sup> *De op. occ.*, 105–108: “Hec quidem potentia, secundum quod refertur ad ultimum in quod aliquid potest, accipit nomen et rationem uirtutis.” *STh* II-II, q. 134 a. 1 co.: “sicut dicitur in I *de Caelo*, *virtus dicitur per comparisonem ad ultimum in quod potentia potest.*” *Quodlibet* 4, q. 2 a. 1 ad arg.: “Et hoc modo Philosophus definit uirtutem, cum dicit, quod uirtus est ultimum potentiae: quia scilicet uirtus rei attenditur in ordine ad hoc in quod ultimo potest.” *In Post. an.* 1, l. 37, 51–56: “dicitur enim uirtus uniuscuiusque in quod ultimum potest [...], ut dicitur in I *De celo.*” *In Ethic.* 2, l. 6, 23–27: “uirtus alicuius rei attenditur secundum ultimum id quod potest [...], ut dicitur in I *De caelo.*” Cf. ARISTOTLE, *De caelo* A.1, 281a7–15.

For example, the virtue of one who can carry 100 pounds would not consist in that he can carry ten, but in that he can carry the last in that which he is ultimately capable of—namely, (in that he can carry) 100 (pounds).<sup>13</sup>

Evidently, one who can excel in some things (*qui potest in ea quae excellunt*), necessarily can also (attain) those that are inferior (*possit etiam in ea quae sunt infra*).<sup>14</sup>

However, the virtue of a thing is only attributed to the excellent.<sup>15</sup> That is, the virtue of a thing is considered (*attenditur; pensatur*, i.e., is pondered) in respect of that which is the most excellent—i.e., the whole—of all those in which it can: not indeed (by comparison to) the last *from the part of defect* but *from the part of excess*, whose *ratio* consists in a magnitude; for the magnitude of whatever thing, too, is denominated by that which is the maximum, as when notifying a quantity of three-cubits we do not say that it is two-cubits.

*Virtue* thus taken—i.e., in common, as that which can be a principle of some operation or motion—is not a habit (i.e., a perfection added to a potency).<sup>16</sup>

Nonetheless, this, too, has a place in the (scientific, moral, and artistic) virtues of the soul (e.g., the intellectual virtues, including the mathematical sciences; ► 51);<sup>17</sup> for (that) is said (to be a) human virtue whereby man is capable (of doing) in that which is most excellent

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<sup>13</sup> *In De caelo* 1, l. 25, n. 4: “dicit [Philosophus] quod, si contingat aliquam rem posse in aliquid magnum, puta quod aliquis homo ambulet per centum stadia, aut possit levare aliquod magnum pondus, semper determinamus sive denominamus eius potentiam per respectum ad plurimum in quod potest.” *Quodlibet* 4, q. 2 a. 1 ad arg.: “sicut virtus eius qui potest ferre centum libras, ut ipse ibidem dicit, non consistit in hoc ut ferat decem, sed in hoc quod ferat illud ultimum in quod ultimo potest, scilicet centum.” *In Post. an.* 1, l. 37, 51–56: “dicitur enim uirtus uniuscuiusque in quod ultimum potest, sicut hominis qui potest ferre centum libras, uirtus non est quod ferat decem, sed quod ferat centum, quod est ultimum sue potencie, ut dicitur in *I De celo*.” *In Ethic.* 2, l. 6, 24–27: “puta in eo quod potest ferre centum libras, virtus eius determinatur non ex hoc quod fert quinquaginta, sed ex hoc quod fert centum.”

<sup>14</sup> *In De caelo* 1, l. 25, n. 4: “Sic igitur patet quod ille qui potest in ea quae excellunt, necesse est quod possit etiam in ea quae sunt infra; puta si aliquis potest portare centum talenta, poterit etiam portare duo, et si potest ire per centum stadia, potest ire per duo.”

<sup>15</sup> *In De caelo* 1, l. 25, n. 4: “sed tamen virtus rei non attribuitur nisi excellentiae, idest, secundum id attenditur virtus rei, quod est excellentissimum omnium eorum in quae potest. — Et hoc est quod dicitur in alia translatione, *virtus est ultimum potentiae*, quia scilicet virtus rei determinatur secundum ultimum in quod potest.” *De veritate*, q. 10 a. 7 ad 4: “quamvis potentiae se extendant ad omnia sua obiecta, tamen earum virtus pensatur ex ultimo in quod possunt, ut patet in *I Caeli et mundi*.” *STh* II-II, q. 134 a. 1 co.: “non quidem ad ultimum ex parte defectus; sed ex parte excessus, cuius ratio consistit in magnitudine.” *Quodlibet* 4, q. 2 a. 1 ad arg.: “Sic ergo virtus cuiuslibet rei non attenditur in uno eorum quae potest, sed respectu totius quod potest.” *In De caelo* 1, l. 25, n. 4 (cf. ARISTOTLE, *De caelo* A.1, 281a9–10): “Nec tamen denominatur ab illis partibus, puta quod determinetur eius potentia quia potest ferre quinquaginta talenta, aut ire quinquaginta stadia; sed per id quod est maximum: ita scilicet ut potentia uniuscuiusque denominetur per respectum *ad finem*, idest per ultimum et per maximum ad quod potest, et per virtutem suae excellentiae; sicut etiam et magnitudo cuiuslibet rei determinatur per id quod est maximum, sicut quantitatem tricubiti notificantes, non dicimus quod sit bicubitum.”

<sup>16</sup> *In Sent.* 3, d. 27 q. 1 a. 1 ad 1: “virtus hic non sumitur pro habitu, sicut in 2 *Ethic.* sed communiter pro omni eo quod potest esse principium alicujus operationis vel motus.”

<sup>17</sup> *In De caelo* 1, l. 25, n. 4: “Et hoc etiam habet locum in virtutibus animae: dicitur enim virtus humana, per quam homo potest in id quod est excellentissimum in operibus humanis, scilicet in opere quod est secundum rationem.”

in human deeds: that is, in a deed that is according to reason. Thus, to execute a *great* work—from which (sc., *magnum*) the name *magnificence* is taken—properly pertains to the *ratio* of *virtue*.<sup>18</sup> Whence, ARISTOTLE calls *magnificence* a *virtue*.

Likewise, (in the logical order) we assign the *ratio* of *man* by *rational*, and not by *sensible*, because—always—that which is last and maximum is completive (i.e., perfective), and gives species to the thing (thus, the rational order follows upon the real order).<sup>19</sup>

Also, ARISTOTLE proves that (in the order of natural philosophy) the demonstration by which we maximally know is more powerful (*potior*), because the virtue of a demonstration is to (scientifically) know (►53.2); and this is the maximum that a demonstration can do: to make (us) know (scientifically).<sup>20</sup> Whence, this is the virtue of demonstration; for it is evident that a demonstration is more powerful the more it makes (us) know (scientifically).

This is true not only in natural but also in mathematical things, since their form is taken for their nature.<sup>21</sup> Thus, as ARISTOTLE says, a circle *maximally* is a—perfect—circle when it maximally is according to (its) nature—that is, when it has the perfection of its form.

### 22.3. Consideration of Virtual Quantity

Virtual quantity (*quantitas virtualis*) is considered:<sup>22</sup>

#### 1. First, in (its) root: that is, in the perfection itself of the form or nature.<sup>23</sup>

In this mode, (a virtual quantity) is said (to be a) *spiritual magnitude*: e.g., heat is said (to be) *great* because of its intensity and perfection.<sup>24</sup> Whence, AUGUSTINE says that, *in those things which are not great in bulk, to be greater is to be better*; for that which is more perfect is said (to be) *better*.

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<sup>18</sup> *STh* II-II, q. 134 a. 1 co.: “operari aliquid magnum, ex quo sumitur nomen *magnificentiae*, proprie pertinet ad rationem virtutis. Unde magnificentia nominat virtutem.”

<sup>19</sup> *In De caelo* 1, l. 25, n. 4: “Et similiter rationem hominis assignamus per *rationale*, et non per *sensibile*: quia semper id quod est ultimum et maximum, est completivum et dans speciem rei.”

<sup>20</sup> *In Post. an.* 1, l. 37, 49–51; 56–58; 61–62 (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85a21–22): “Illa demonstratio est *potior* per quam maxime scimus (et hoc sic probat [Philosophus], quia *virtus demonstrationis* est scire [...]; hoc autem est maximum quod potest facere demonstratio, quod faciat scire, unde hec est *virtus demonstrationis*; [...]; unde manifeste patet hec propositio, quod tanto est demonstratio *potior*, quanto magis facit scire).”

<sup>21</sup> *In Physic.* 7, l. 6, n. 2: “Quod non solum in rebus naturalibus verum est, sed etiam in mathematicis, ut eorum forma accipiatur pro eorum natura: tunc enim *maxime circulus est*, idest perfectus circulus, *quando maxime est secundum naturam*, idest quando habet perfectionem suae formae.” Cf. ARISTOTLE, *Physica* H.3, 246b29–30: “καθάπερ ὁ κύκλος τότε μάλιστα κατὰ φύσιν ἐστίν, ὅταν μάλιστα κύκλος ᾖ.”

<sup>22</sup> *STh* I, q. 42 a. 1 ad 1: “Huiusmodi autem *quantitas virtualis* attenditur [...].”

<sup>23</sup> *STh* I, q. 42 a. 1 ad 1: “Huiusmodi autem *quantitas virtualis* attenditur primo quidem in radice, idest in ipsa perfectione formae vel naturae.”

<sup>24</sup> *STh* I, q. 42 a. 1 ad 1: “sic dicitur *magnitudo spiritualis*, sicut dicitur *magnus calor* propter suam intensionem et perfectionem. Et ideo dicit Augustinus, VI *de Trin.*, quod *in his quae non mole magna sunt, hoc est maius esse, quod est melius esse*: nam melius dicitur quod perfectius est.”

2. Secondly, **in the effects of the form.**<sup>25</sup> Wherefrom, virtual quantity is considered both:

**(a) According to being** (*secundum esse*); for the first effect of a form is the (act of) being; and everything has (its act of) being according to its form (*secundum suam formam*).<sup>26</sup>

Virtual quantity is considered according to the (act of) being (e.g.) insofar as those (things) that are more perfect in nature are of greater duration.<sup>27</sup>

**(b) According to operation** (*secundum operationem*); for the second effect (of a form) is (its) operation, since every agent operates through its form (*omne agens agit per suam formam*).<sup>28</sup>

Virtual quantity is considered according to operation (e.g.) insofar as those (things) that are more perfect in nature are greater in potency (i.e., more powerful) to act (*sunt magis potentia ad agendum*).<sup>29</sup>

#### 22.4. The Form and the Subject of Virtue

Those that are one in subject but not (one) in *ratio* do not have the same potency or virtue, as is evident in the white and in the musical.<sup>30</sup>

A virtue that is a principle of action or affection is manifestly shown to be derived from the specific form of a thing; for every accident that is proper to some species is derived from the essential principles of that species (► 15.16; 15.17; 15.19).<sup>31</sup>

This is why, in order to demonstrate the proper affections of their subjects, we take as a cause the definition that designates the essential principles of a thing (► 55.12); and the principle of an essence and quiddity is a form that exists *in a determinate matter* (► 56).<sup>32</sup>

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<sup>25</sup> *STh I*, q. 42 a. 1 ad 1: "Secundo autem attenditur quantitas virtualis in effectibus formae. [...] Attenditur igitur quantitas virtualis et secundum esse, et secundum operationem."

<sup>26</sup> *STh I*, q. 42 a. 1 ad 1: "Primus autem effectus formae est esse, nam omnis res habet esse secundum suam formam."

<sup>27</sup> *STh I*, q. 42 a. 1 ad 1: "Attenditur igitur quantitas virtualis [...] secundum esse quidem, in quantum ea quae sunt perfectioris naturae, sunt maioris durationis."

<sup>28</sup> *STh I*, q. 42 a. 1 ad 1: "Secundus autem effectus est operatio, nam omne agens agit per suam formam."

<sup>29</sup> *STh I*, q. 42 a. 1 ad 1: "Attenditur igitur quantitas virtualis [...] secundum operationem vero, in quantum ea quae sunt perfectioris naturae, sunt magis potentia ad agendum."

<sup>30</sup> *In Physic.* 1, l. 15, n. 2: "ea vero quae sunt subiecto unum sed non ratione, non habent eandem potentiam seu virtutem, ut patet in albo et musico."

<sup>31</sup> *De op. occ.*, 108–113: "Huiusmodi autem uirtus que est talium actionum uel passionum principium, manifeste ostenditur ex forma rei specifica deriuari; omne enim accidens quod est proprium alicuius speciei deriuatur ex principiis essentialibus illius speciei."

<sup>32</sup> *De op. occ.*, 113–120: "et inde est quod ad demonstrandum proprias passiones de suis subiectis, accipimus pro causa diffinitionem designantem essentialia principia rei. Est autem essentie et quidditatis principium forma in determinata materia existens; oportet igitur huiusmodi uirtutes procedere a formis talium rerum secundum quod in propriis materiis existunt."

Therefore, virtues of this mode must proceed from the forms of such things according as they exist in (their) proper matters.

### 22.5. Magnitude of a Form: by Itself vs. by Accident

Every active potency is according to some form.<sup>33</sup> Hence, *magnitude*—and consequently, *finite* and *infinite*—befits (*convenit*) a potency as it befits (its) form. Yet, *magnitude* belongs to a form both *by itself* and *by accident*.

1. **By itself**, according to the perfection of the form itself.<sup>34</sup> For example, *great whiteness* is said, according to the perfection of its proper *ratio*, even of little snow.

This (intensive) magnitude maximally belongs to a potency that is not in an (extensive) magnitude, because immaterial potencies are more perfect and universal the less they are contracted by application to matter.<sup>35</sup>

2. **By accident**, (e.g.) according as some form has extension in a subject.<sup>36</sup> For example, *great whiteness* is said because of the magnitude of a surface.

This (intensive) magnitude cannot belong to a potency that is not in an (extensive) magnitude.<sup>37</sup>

### 22.6. Equality and Inequality in Non-Subsistent Forms

Since the (act of) being of whatever non-subsistent form consists in being in a subject or in matter, its quantity or perfection can be considered in two modes:<sup>38</sup>

(a) According to the ratio of the proper species (*secundum rationem propriae speciei*).<sup>39</sup>

(b) According to the (act of) being that (the form) has in a subject or in matter (*secundum esse quod habet in materia seu subiecto*; ► 22.8).<sup>40</sup>

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<sup>33</sup> *In Physic.* 8, l. 21, n. 9: “cum omnis potentia activa sit secundum aliquam formam, eo modo convenit magnitudo potentiae, et per consequens finitum et infinitum, sicut convenit formae. Formae autem convenit magnitudo et per se, et per accidens.”

<sup>34</sup> *In Physic.* 8, l. 21, n. 9: “per se quidem, secundum perfectionem ipsius formae, sicut dicitur magna albedo etiam parvae nivis, secundum perfectionem propriae rationis.”

<sup>35</sup> *In Physic.* 8, l. 21, n. 9: “prima magnitudo [sc., secundum perfectionem ipsius formae] maxime ei [sc., potentiae quae non est in magnitudine] competit, quia potentiae immateriales, quanto sunt minus contractae per applicationem ad materiam, tanto sunt perfectiores et universaliares.”

<sup>36</sup> *In Physic.* 8, l. 21, n. 9: “per accidens autem secundum quod aliqua forma habet extensionem in subiecto, sicut dicitur magna albedo propter magnitudinem superficiei.”

<sup>37</sup> *In Physic.* 8, l. 21, n. 9: “Haec autem secunda magnitudo non potest competere potentiae quae non est in magnitudine.”

<sup>38</sup> *De virtutibus*, q. 5 a. 3 co.: “Cum autem cuiuslibet formae non subsistentis esse consistat in eo quod subiecto vel materiae inest, dupliciter potest eius quantitas seu perfectio considerari.”

<sup>39</sup> *De virtutibus*, q. 5 a. 3 co.: “uno modo, secundum rationem propriae speciei.”

<sup>40</sup> *De virtutibus*, q. 5 a. 3 co.: “alio modo, secundum esse quod habet in materia seu subiecto.”

Whence, it is evident that something can be related to diverse forms concerning equality and inequality in (the same) two modes:<sup>41</sup>

1. Some forms **do not receive inequality**: neither **(a)** according to themselves, such that one of them would be greater than another of the same species; nor **(b)** according to (their act of) being, such that they would be more (perfect) in a subject.<sup>42</sup>

Of this mode are all substantial forms.<sup>43</sup>

2. Some forms **do not receive inequality (a) according to themselves, but (b)** insofar as they are **in a subject**, such as whiteness and blackness.<sup>44</sup>

Thus, a whiteness (that is received in a subject) is said (to be) *greater* in two modes:<sup>45</sup> from the intention of its own quantity, and from the quantity of the surface (in which it is received). Whence, although a greater potency can be in a lesser magnitude, any such greater potency can be still greater if the magnitude is greater.

3. Some forms **receive inequality (a) according to themselves, but not (b)** insofar as they are **in a subject**, as a triangle is said (to be) *greater than* (another) triangle because the lines of one triangle are greater than those of the other, even if they are ordered to something one that specifies (them); for *one surface is not more triangular than another*.<sup>46</sup>

4. There are some forms that **receive inequality both (a) according to themselves and (b)** insofar as they are **in a subject**: for example, health, science, and motion.<sup>47</sup>

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<sup>41</sup> *De virtutibus*, q. 5 a. 3 co.: “Ex his igitur patet, quod dupliciter potest aliquid se ad diversas formas habere circa aequalitatem et inaequalitatem.”

<sup>42</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam enim formae sunt quae in eadem specie inaequalitatem non recipiunt neque secundum se, ut una earum sit maior quam alia eiusdem speciei, neque secundum esse, ut scilicet magis insit subiecto; et huiusmodi sunt omnes formae substantiales.”

<sup>43</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam enim formae sunt quae in eadem specie inaequalitatem non recipiunt neque secundum se, ut una earum sit maior quam alia eiusdem speciei, neque secundum esse, ut scilicet magis insit subiecto; et huiusmodi sunt omnes formae substantiales.”

<sup>44</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam vero inaequalitatem non recipiunt secundum se, sed solum secundum quod insunt subiecto, sicut albedo et nigredo.”

<sup>45</sup> *In Sent.* 4, d. 40 q. 1 a. 2 ad 5: “albedo dicitur maior dupliciter, uno modo ex intensione ipsius qualitatis, alio modo ex quantitate superficiei.” *In Physic.* 8, l. 21, n. 17 (cf. ARISTOTLE, *Physica* Θ.10, 266b7–8): “videmus enim quod aliqua minor magnitudo habet maiorem virtutem quam maior magnitudo, sicut parvus ignis habet maiorem virtutem activam quam multus aer. Sed per hoc non potest haberi quod quantum infinitum habeat potentiam finitam: quia si accipiatur aliqua adhuc magis excedens magnitudo, habebit maiorem virtutem; sicut si aer maior secundum aliquam quantitatem habet minus de virtute quam parvus ignis, si multum augeatur aeris quantitas, habebit maiorem virtutem quam parvus ignis.”

<sup>46</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam vero inaequalitatem recipiunt secundum se, non tamen secundum quod insunt subiecto, sicut triangulus dicitur maior triangulo, eo quod lineae unius trianguli sunt maiores quam alterius, quamvis ordinentur ad aliquid unum specificans; non tamen una superficies est magis triangula quam alia.”

<sup>47</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam vero sunt quae recipiunt inaequalitatem et secundum se, et secundum quod insunt subiecto; sicut sanitas, et scientia, et motus.”

Thus, health can be unequal either because of the degree of commensuration in one is closer to the due and perfect equality than (it is) in another; or because, regarding the same degree of commensuration, one has (health) more firmly and better than another.<sup>48</sup>

Likewise, the science of one (scientist) is greater than that of another either because he knows more conclusions or because he scientifically knows the same things better.<sup>49</sup>

Likewise, a motion is unequal either because it transits a greater space or because the mobile is moved with greater velocity.<sup>50</sup>

### 22.7. Inequality According to the *Ratio* of the Proper Species

The forms of things are ordered; and one adds above another in perfection.<sup>51</sup> This is evident from what ARISTOTLE says in his *Metaphysics*, that the definition and species of things are like numbers, in which the species are multiplied by the addition of a unit (► 16.7); and it is evident also by induction; for the species of things are multiplied according to the perfect and the imperfect (e.g., a stone has fewer perfections than a dog).

That which constitutes the species is a difference (► 41.28; 16.6).<sup>52</sup> Each thing is constituted in a species insofar as it is determined into some special degree (of perfection) in (i.e., among) beings, because—again—the species of things are like numbers, which differ by addition and subtraction of a unit.

The forms of diverse things (e.g., the forms of essentially composite things that are not the same in species) are unequal according to the *ratio* of (their) proper species.<sup>53</sup> But (of) the forms of one species, some can be equal, while others cannot; for the specific principle must be taken in something indivisible; and the difference of such a principle varies the

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<sup>48</sup> *De virtutibus*, q. 5 a. 3 co.: “potest esse sanitas inaequaliter, vel quia gradus commensurationis in uno est propinquior debitae et perfectae aequalitati quam in alio, vel quia circa eundem gradum commensurationis unus firmius se habet quam alius, et melius.”

<sup>49</sup> *De virtutibus*, q. 5 a. 3 co.: “scientia est maior unius quam alterius, vel quia conclusiones plures novit, vel quia easdem res melius scit.”

<sup>50</sup> *De virtutibus*, q. 5 a. 3 co.: “Est enim motus inaequalis, vel quia maius spatium pertransit, vel quia mobile velocius movetur.”

<sup>51</sup> *De spirit. creat.*, a. 1 ad 9: “formae rerum sunt ordinatae, et una addit super alteram in perfectione. Et hoc patet per Philosophum in VIII Metaph., qui dicit quod definitiones et species rerum sunt sicut numeri, in quibus species multiplicantur per additionem unitatis; tum etiam hoc per inductionem apparet gradatim species rerum multiplicari secundum perfectum et imperfectum.”

<sup>52</sup> *Sth* I, q. 13 a. 5 co.: “differentia est quae constituit speciem. Unumquodque autem constituitur in specie, secundum quod determinatur ad aliquem specialem gradum in entibus, quia species rerum sunt sicut numeri, qui differunt per additionem et subtractionem unitatis, ut dicitur in VIII Metaphys.”

<sup>53</sup> *De virtutibus*, q. 5 a. 3 co.: “Secundum quidem rationem propriae speciei, formae diversarum specierum sunt inaequales; sed formae unius speciei quaedam quidem possunt esse aequales, quaedam autem non. Oportet enim principium specificum accipi in aliquo indivisibili. Differentia enim huiusmodi principii speciem variat, et ideo, si hoc principio esset additio vel subtractio, ex necessitate species variaretur. Unde et Philosophus dicit in VIII Metaph., quod species rerum sunt sicut numeri, in quibus unitas addita vel subtracta variat speciem.”



species. Hence, if in this principle there should be addition or subtraction, the species would necessarily vary; whence, again, ARISTOTLE says that the species of things are like numbers, in which a unit added or subtracted varies the species (►16.7).

1. There are some forms that receive (*sortiuntur*) the species by something of their essence, as all absolute forms, whether they are substantial or accidental.<sup>54</sup> And in such (forms) it is impossible that, in the same species according to this mode, there were found one form greater than another. Thus, no one whiteness—considered according to itself (i.e., not considered insofar as it is in a subject)—is more whiteness than another (►21.9).

2. There are, however, some forms that receive the species from something extrinsic to which they are ordered.<sup>55</sup> For example, motion receives (its) species from (its) terminus (►14.9; 48.21). Whence, one motion is greater than another according to proximity or distance to a terminus (►48.22, ¶2).

3. There are some qualities that are dispositions in an order to something, as health is some commensuration in an order to the nature of the animal that is said to be healthy.<sup>56</sup> Hence, some degree of commensuration is health in a lion but illness in a man. Therefore, since health does not receive the species according to the degree of commensuration but according to the nature of the animal to which it is ordered, one health can be greater than another in the same animal, as ARISTOTLE says: namely, insofar as there can be diverse degrees of commensuration in which agreement with human nature is preserved.

And this is had in the same mode in science, which receives (its) unity from the unity of the subject (►58.6). Whence, geometry can be in one (geometer) greater than in another insofar as (the former) knows more conclusions (i.e., a greater *number of objects*) ordered to the cognition of the subject of geometry, which is magnitude (►60.1).<sup>57</sup>

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<sup>54</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam vero formae sunt quae sortiuntur speciem per aliquid suae essentiae, sicut omnes formae absolutae, sive sint substantiales sive accidentales; et in talibus impossibile est quod in eadem specie secundum hunc modum una forma maior alia inveniatur, non enim est una albedo secundum se considerata, magis albedo quam alia.”

<sup>55</sup> *De virtutibus*, q. 5 a. 3 co.: “Quaedam vero formae sunt quae sortiuntur speciem ex aliquo extrinseco ad quod ordinantur, sicut motus sortitur speciem ex termino. Unde unus motus est maior alio, secundum propinquitatem vel distantiam a termino.”

<sup>56</sup> *De virtutibus*, q. 5 a. 3 co.: “Et similiter inveniuntur quaedam qualitates quae sunt dispositiones in ordine ad aliquid; sicut sanitas est quaedam commensuratio humorum in ordine ad naturam animalis, quod dicitur sanum: et ideo aliquis gradus commensurationis humorum in leone est sanitas, qui in homine esset infirmitas. Quia ergo secundum gradum commensurationis sanitas non recipit speciem, sed secundum naturam animalis ad quam ordinatur, contingit etiam quod in eodem animali una sanitas est maior quam alia, ut dicitur X Ethicorum: in quantum, scilicet, diversi gradus commensurationis humorum possunt esse, in quibus salvatur convenientia humanae naturae.”

<sup>57</sup> *De virtutibus*, q. 5 a. 3 co.: “Et eodem modo se habet in scientia, quae recipit unitatem ex unitate subiecti; unde in uno potest esse geometria maior quam in alio, in quantum novit plures conclusiones ordinatas ad cognitionem subiecti geometriae, quod est magnitudo.”

## 22.8. Inequality According to the Act of Being in a Subject or in Matter

1. Some forms of one species can be unequal insofar as they are more or less (perfectly) in (a subject or matter).<sup>58</sup> However, some (forms) cannot be more or less (perfectly) in (a subject or matter); for not any form that gives species to a subject in which it is can be in (it) more or less (perfectly) because the specific principle must consist in (something) indivisible—wherefrom, no substantial form (of one species) receives (in individual matter) more or less (perfection; e.g., no human being is more human than another).

2. Likewise, also, if a form should receive (its) species according to something that is indivisible according to its *ratio*, it would not be said according to more or less.<sup>59</sup> Whence, *two*—and whatever other species of number, which is specified according to an added unit—does not receive more or less. The same reason is (considered): in figures that are specified according to number, as *triangle* and *square* (i.e., if the number of a figure's boundaries changes, its species changes; ► 4.4); in determinate quantities, as *two-cubits* and *three-cubits*; and in numerical relations, as *double* and *triple*.

3. On the other hand, forms that neither give species to the subject nor receive the species from something that is indivisible according to its *ratio* can be in (a subject) according to more or less: e.g., whiteness and blackness, and other such.<sup>60</sup>

That which befits accidents from the part of the subject but not from the *ratio* itself of *accident*, is not attributed to an accident in abstract, but in concrete.<sup>61</sup> And such is intension and remission in some accidents: whence, not *whiteness*, but *the white* is said (to be) *more* or *less*. And the same can be said of habits and other qualities, except that some habits increase or diminish through some addition.

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<sup>58</sup> *De virtutibus*, q. 5 a. 3 co.: “Similiter etiam secundum quantitatem perfectionis quam habent huiusmodi formae secundum quod insunt materiae vel subiecto, quaedam formae unius speciei inaequales esse possunt, in quantum insunt secundum magis et minus; quaedam vero magis et minus inesse non possunt. Non enim quaecumque forma dat speciem subiecto cui inest, potest inesse magis et minus: quia [...] principium specificum oportet in indivisibili consistere; quod inde est, quia nulla forma substantialis recipit magis et minus.”

<sup>59</sup> *De virtutibus*, q. 5 a. 3 co.: “Similiter etiam si qua forma speciem sortiatur secundum aliquid quod secundum suam rationem est indivisibile, non dicitur secundum magis et minus. Et inde est quod binarius, et quaelibet alia species numeri quae specificatur secundum unitatem additam, non recipit magis et minus; et eadem ratio est in figuris quae secundum numerum specificantur, ut triangulus et quadratum; et in quantitibus determinatis, ut bicubitum et tricubitum; et in relationibus numeralibus, sicut duplum et triplum.”

<sup>60</sup> *De virtutibus*, q. 5 a. 3 co.: “Formae vero quae neque dant speciem subiecto, neque sortiuntur speciem ex aliquo quod secundum rationem suam sit indivisibile, possunt inesse secundum magis et minus, ut albedo et nigredo, et alia huiusmodi.”

<sup>61</sup> *STh I-II*, q. 53 a. 2 ad 3: “id quod convenit accidentibus ex parte subiecti, non autem ex ipsa ratione accidentis, non attribuitur accidenti in abstracto, sed in concreto. Et huiusmodi est intensio et remissio in quibusdam accidentibus, unde albedo non dicitur magis et minus, sed album. Et eadem ratio est in habitibus et aliis qualitibus, nisi quod quidam habitus augentur vel diminuuntur per quandam additionem.”

## 22.9. Virtue as That Which Makes—a Subject and its Operation—Good

The last to which the potency of something extends is a good work (*bonum opus*).<sup>62</sup> Hence, it pertains to the virtue of any one thing to render a good work; and, since a perfect operation (*perfecta operatio*) proceeds only from a perfect agent, it follows that any one thing should be good and should operate well according to its proper virtue.

If this is true in all other (things), as is evident from the (above) examples, it follows that man's virtue will be some habit from which man comes to be good formally speaking—just as whiteness makes something white—, and by which someone operates well.

Thus, as ARISTOTLE says, every virtue makes the subject of which it is (properly a virtue) to be good and renders its work good (*omnis virtus subiectum cuius est facit bene se habere et opus eius reddit bene se habens* < οὐ ἄν ἡ ἀρετή, αὐτό τε εὖ ἔχον ἀποτελεῖ καὶ τὸ ἔργον αὐτοῦ εὖ ἀποδίδωσιν).<sup>63</sup>

For example, the virtue of the eye is both (that) whereby the eye is good, and (that) whereby we see well, which (i.e., the act of seeing) is the proper act of the eye.<sup>64</sup>

Likewise, the virtue of a horse is that which makes the horse good, and (that) whereby the horse operates its work well, which is to run swiftly, to agreeably carry the rider, and to courageously drive away the warring (enemies in battle).<sup>65</sup>

*Virtue conveys (importat) the perfection of a potency. Whence, the virtue of whatever thing is determined (in relation) to the last in that which the thing can, as ARISTOTLE says.<sup>66</sup> And the last in which any one potency is capable of must be good; for every bad conveys a defect. Whence, (Pseudo-)DIONYSIUS says that every bad (thing) is weak (infirmitas).*

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<sup>62</sup> *In Ethic.* 2, l. 6, 27–38: “ultimum autem ad quod potentia alicuius rei se extendit est bonum opus, et ideo ad virtutem cuiuslibet rei pertinet quod reddat bonum opus; et quia perfecta operatio non procedit nisi a perfecto agente, consequens est quod secundum virtutem propriam unaquaeque res et bona sit et bene operetur. Et si hoc est verum in omnibus aliis, ut per exempla iam patuit, sequitur quod virtus hominis erit habitus quidam, ut supra habitum est, ex quo homo fit bonus formaliter loquendo sicut albedine fit aliquid album, et per quem aliquis bene operatur.”

<sup>63</sup> *In Ethic.* 2, l. 6, 14–22 (cf. ARISTOTLE, *Ethica Nicomachea* B.5, 1106a15–17): “Dicit ergo [Philosophus] primo quod omnis virtus subiectum cuius est facit bene se habere et opus eius reddit bene se habens.”

<sup>64</sup> *In Ethic.* 2, l. 6, 14–22 (cf. ARISTOTLE, *Ethica Nicomachea* B.5, 1106a17–19): “sicut virtus oculi est per quam et oculus est bonus et per quam bene videmus, quod est proprium opus oculi.”

<sup>65</sup> *In Ethic.* 2, l. 6, 14–22 (cf. ARISTOTLE, *Ethica Nicomachea* B.5, 1106a19–21): “similiter etiam virtus equi est quae facit equum bonum et per quam equus bene operatur opus suum, quod est velociter currere et suaviter ferre ascensorem et audacter expectare bellatores.”

<sup>66</sup> *STh* I-II, q. 55 a. 3 co.: “virtus importat perfectionem potentiae, unde virtus cuiuslibet rei determinatur ad ultimum in quod res potest, ut dicitur in I *de Caelo*. Ultimum autem in quod unaquaeque potentia potest, oportet quod sit bonum, nam omne malum defectum quendam importat; unde Dionysius dicit, in IV cap. *de Div. Nom.*, quod omne malum est *infirmitas*. Et propter hoc oportet quod virtus cuiuslibet rei dicatur in ordine ad bonum. Unde virtus humana, quae est habitus operativus, est bonus habitus, et boni operativus.”

Wherefrom, the virtue of whatever thing must be said in order to (something) good. Whence, human virtue, which is an operative power, is a good habit, and operative of good (i.e., able to produce that which is good).

Likewise, AUGUSTIN says that virtues are the greatest goods—not simply (of course), but in a genus.<sup>67</sup>

In every composite, the good is not of *this* or *that* part, but of the whole.<sup>68</sup> And we say *good* according to the goodness that is proper of the whole and its perfection; for parts are imperfect in respect of the whole: just as the parts of a man are not a man, also the parts of the number six do not have the perfection of six; and, likewise, the parts of a line do not attain the perfection of measure (i.e., of magnitude) that is found in the whole line.

### 22.10. Order of Potencies and Virtues to Their Acts

A virtue is said (to be) *the last of a potency* in the same genus (as the potency), which is the genus of the principle in respect of that of which it is said (to be a) *potency* or *virtue*.<sup>69</sup> On the other hand, the act (of a virtue) is a last, but outside of that genus. Hence, an act cannot be a virtue.

Again, *virtue*, properly speaking, includes a respect to something of which it would be a principle, such as *running* or *being*.<sup>70</sup> And, since the act as such is a last—i.e., it is not ordered to something as an effect—, hence, the act cannot be said (to be a) *virtue*—except in that mode of speaking whereby a habit is denominated by (its) act as a cause (is denominated) by (its) effect.

However, a potency, according to what it is, involves some relation to an act; for (a potency) is a principle of acting or of being acted upon.<sup>71</sup> Whence, an act must be posited

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<sup>67</sup> *De virtutibus*, q. 1 a. 1 ad 3: “Augustinus dicit, virtutes esse maxima bona, non simpliciter, sed in genere; sicut et ignis dicitur subtilissimum corporum. Unde non sequitur quod nihil sit in nobis ipsis virtutibus melius; sed quod sint de numero eorum quae sunt maxima bona secundum genus suum.”

<sup>68</sup> ScG 1, 18 n. 6: “In omni composito bonum non est huius vel illius partis, sed totius, - et dico bonum secundum illam bonitatem quae est propria totius et perfectio eius: nam partes sunt imperfectae respectu totius: sicut partes hominis non sunt homo, partes etiam numeri senarii non habent perfectionem senarii, et similiter partes lineae non perveniunt ad perfectionem mensurae quae in tota linea invenitur.”

<sup>69</sup> *In Sent.* 3, d. 23 q. 1 a. 3 qc. 3 ad 2: “virtus dicitur ultimum potentiae in eodem genere, quod est genus principii respectu ejus cujus dicitur potentia vel virtus; sed actus est ultimum extra genus illud: et ideo non oportet quod actus sit virtus.”

<sup>70</sup> *In Sent.* 3, d. 23 q. 1 a. 3 qc. 3 co.: “virtus proprie loquendo includit respectum ad aliquid cujus principium sit, sicut currendi, vel essendi. Et quia actus, in quantum hujusmodi, cum sit ultimum, non ordinatur ad aliquid sicut effectus; ideo actus virtus dici non potest, nisi eo modo loquendi, quo habitus per actus nominantur, sicut causae per effectus.”

<sup>71</sup> *In De anima* 2, c. 6, 124–130 (cf. ARISTOTLE, *De anima* B.4, 415a18–21): “Potencia enim secundum hoc ipsum quod est importat habitudinem quandam ad actum: est enim principium agendi uel paciendi; unde oportet quod actus ponantur in diffinitionibus potenciarum. Et, si ita se habet circa ordinem actus et potencie, et actibus adhuc sunt priora opposita, id est obiecta.”

in the definition of potencies. And if acts and potencies are so related in respect of order (i.e., if acts are prior to potencies), so are objects prior to acts.

### 22.11. Specification of Operations of Active vs. Passive Potencies

The species of acts and operations are taken according to an order to objects (► 14.9); for every operation is an act either of an active or of a passive potency:<sup>72</sup>

**1. The objects of passive potencies** are compared to (their) operations as **active** because they reduce the potencies into act, as the visible (object reduces the potency of sight (i.e., activates it), and (as) every sensible (object reduces) sense (into act).<sup>73</sup>

**2. The objects of active potencies** are compared to their operations as **ends**; for the objects of active potencies are the (things) operated by them (*sunt operata ipsarum*).<sup>74</sup> It is manifest that in any (of them), there are—other than the operations—(the things) operated, which are the ends of the operations, as the house that is constructed is the end of (the act of) constructing.

It is evident, therefore, that every object is compared to an operation either as active (*ut activum*, i.e., as that which activates the potency to operate) or as an end (*ut finis*, i.e., as that towards which the potency is inclined to operate); and (that) the operation is specified by one or the other.<sup>75</sup>

Indeed, it is evident that active (objects that are) diverse in species have operations (that are) different in species, as heating (i.e., an operation) is from heat (i.e., an object that activates a passive potency) and cooling (i.e., an operation different to heating in species) is from cold (i.e., an object that is diverse from heat in species).<sup>76</sup>

Likewise, an operation is also specified from the terminus and end, as (the operations of) healing and sickening differ in species according to the difference of health and illness.<sup>77</sup>

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<sup>72</sup> *In De anima* 2, c. 6, 131–134: “Species enim actuum et operationum sumuntur secundum ordinem ad obiecta. Omnis enim [...] operatio uel est actus potencie actiue uel passiuæ.”

<sup>73</sup> *In De anima* 2, c. 6, 134–137: “Obiecta quidem potenciarum passiuarum comparantur ad operationes earum ut actiua, quia reducunt potencias in actum, sicut uisibile uisum et omne sensibile sensum.”

<sup>74</sup> *In De anima* 2, c. 6, 137–144: “Obiecta uero potenciarum actiuarum comparantur ad operationes ipsarum ut fines; obiecta enim potenciarum actiuarum sunt operata ipsarum, manifestum est autem quod, in quibuscunque preter operationes sunt aliqua operata, quod operata sunt fines operationum, ut dicitur in I Ethicorum, sicut domus que edificatur est finis edificationis.”

<sup>75</sup> *In De anima* 2, c. 6, 144–147: “Manifestum est igitur quod omne obiectum comparatur ad operationem [...] uel ut actiuum uel ut finis. Ex utroque autem specificatur operatio.”

<sup>76</sup> *In De anima* 2, c. 6, 147–151: “manifestum est enim quod diuersa actiua secundum speciem habent operationes specie differentes, sicut calefactio est a calore et infrigidatio a frigore.”

<sup>77</sup> *In De anima* 2, c. 6, 151–154: “similiter etiam ex termino et fine specificatur operatio, sicut sanatio et egrotatio differunt specie secundum differentiam sanitatis et egritudinis.”

Therefore, objects are prior to operations in the way of definition.<sup>78</sup> And potencies are distinguished according to the *ratio* of (their) objects.<sup>79</sup>

### 22.12. The Proper Principles of Operations

Wherever there are proper operations, there must be proper principles of those operations.<sup>80</sup> Hence, not whatever diversity of acts indicates a diversity of potencies.<sup>81</sup> Sometimes, it indicates only a diversity of habits, as to geometrize and to syllogize (i.e., these two operations do not indicate that man has one potency for exerting the science of geometry and another, diverse potency for exerting the art of logic; rather, this diversity of acts indicates a diversity of habits that perfect a single intellectual potency, making it capable of exerting diverse acts). Sometimes, (a diversity of acts indicates) neither (a diversity of potencies nor a diversity of habits).

This is evident because the substance (i.e., essence) of any which potency is according as it is naturally apt to operate about (its) proper object (*secundum quod est nata operari circa proprium objectum*).<sup>82</sup> Hence, actions that differ according to diverse objects indicate a diversity of potencies, but in such a way that *difference of objects* is taken according to *that which pertains to the proper ratio of the object*.

For example, man and stone differ in genus, but agree in color insofar as they are the object of sight; hence, seeing man or stone pertains to one potency.<sup>83</sup> Yet, to sense sound and colors pertains to diverse potencies, since sound and color—according to the proper *ratios* whereby they are distinguished—are (diverse) proper objects of sense.

Sometimes, however, the diversity of acts is caused from a diversity of media or of principles from which one reaches the same genus of object.<sup>84</sup> And such a diversity (of

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<sup>78</sup> *In De anima* 2, c. 6, 154–155: “Sic igitur obiecta sunt priora operationibus [...] in uia diffiniendi.”

<sup>79</sup> *In De anima* 3, c. 8, 124–125: “potencie distinguuntur secundum rationes obiectorum.”

<sup>80</sup> *In Sent.* 4, d. 4 q. 1 a. 1 co.: “Ubi quomodo sunt operationes propriae, oportet quod sint principia propria illarum operationum.”

<sup>81</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “non quaelibet diversitas actus ostendit diversitatem potentiae; sed quandoque etiam ostendit tantum diversitatem habitus, sicut geometrizare, et syllogizare; quandoque autem neutrum.”

<sup>82</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “Ista autem sic patet: quia enim substantia uniuscujusque potentiae est, secundum quod est nata operari circa proprium objectum, ut de sensu dicit Philosophus in 2 De anima, ideo actiones quae differunt secundum diversa objecta, ostendunt diversitatem potentiarum: ut tamen accipiatur differentia obiectorum secundum id quod ad propriam rationem objecti pertinet.”

<sup>83</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “homo enim et lapis differunt genere, sed conveniunt secundum quod sunt objectum visus in colore: et ideo visio hominis et lapidis pertinent ad unam potentiam; sed sentire sonum et colores pertinent ad diversas potentias: quia sonus et color, secundum proprias rationes, quibus ad invicem distinguuntur, sunt propria objecta sensus.”

<sup>84</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “Quandoque autem diversitas actuum causatur ex diversitate medii, vel principii, ex quo pervenitur ad idem genus objecti: et talis diversitas actuum ostendit diversitatem habituum: diversae enim scientiae ex diversis principiis procedunt, etiam si easdem condiciones demonstrant.” *In Sent.* 4, d. 14 q. 1 a. 3 qc. 2 co.: “habitus medius est inter potentiam et actum.”

acts) indicates a diversity of habits; for a habit is a mean between the potency and the act. Thus, diverse sciences proceed from diverse principles (and use diverse definitions, which are means to the end of demonstration), even if they demonstrate the same conditions.

For example, the astronomer and the natural (scientist) demonstrate the roundness of the Earth through diverse means.<sup>85</sup> Likewise, moral virtues are distinguished from diverse ends, which (ends) are in operable (objects) as principles (are) in speculative (objects).

Sometimes, on the other hand, the diversity of acts is caused from that which is an accident of the action; and such a diversity of actions requires neither diverse potencies nor diverse habits; for that which is by accident does not cause a difference in species.<sup>86</sup>

### **22.13. Accidental Diversity of Acts**

(A diversity of acts is caused by an accident in the action):

#### **1. From the part of the agent, according as it is more powerful or weaker in acting.<sup>87</sup>**

Indeed, something acts only insofar as it is in act.<sup>88</sup> And since an active potency follows upon (its) act, the quantity of potency follows upon the quantity of the act; for the more any one thing is in act the more it abounds in (its) virtue of acting (*abundat in virtute agendi*).

For example, bluntness or subtlety of disposition, which differ according to the swiftness and tardiness to learn, (are accidents in the agent).<sup>89</sup>

#### **2. From the part of the mean.<sup>90</sup>**

For example, to believe and to opine, which differ according to the efficacy or weakness of the mean, (are accidents in a cognitive habit).<sup>91</sup>

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<sup>85</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “sicut astrologus et naturalis diversis mediis rotunditatem terrae ostendit, ut dicitur in 2 Phys. Similiter etiam virtutes morales distinguuntur ex diversis finibus, qui sunt in operativis sicut principia in speculativis.”

<sup>86</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “Quandoque vero diversitas actuum causatur ex eo quod est accidens actionis [...]: et talis diversitas actionum neque potentiam diversam neque diversum habitum requirit: quia illud quod est per accidens, non causat differentiam in specie.”

<sup>87</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “vel ex parte agentis, secundum quod est potentius vel infirmius in agendo.”

<sup>88</sup> *In De anima* 3, c. 1, 296–297: “nichil agit nisi secundum quod est actu.” *De potentia*, q. 1 a. 2 co.: “cum potentia activa sequatur actum, quantitas potentiae sequitur quantitatem actus; unumquodque enim tantum abundat in virtute agendi quantum est in actu.”

<sup>89</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “sicut hebetudo vel subtilitas ingenii, quae differunt secundum velocitatem et tarditatem addiscendi.”

<sup>90</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “vel ex parte medii.”

<sup>91</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “ut credere et opinari, quae differunt secundum efficaciam et debilitatem medii.”

### 3. From the part of the object.<sup>92</sup>

For example, to see a man or a stone (is an accident in the object of sight); for to be man or stone happens (*accidit*) to the colored thing.<sup>93</sup> Thus, for example, a twofold quantity can be considered about the act and the intention of an end (in the potency of will):<sup>94</sup> from the part of the object, because one wants or does a greater good; and from the intension of the act, because one intensely wants or does, which is greater from the part of the agent.

#### 22.14. Subjective vs. Objective Quantity

The aforesaid *ratio* of *magnitude*—i.e., the perfection of those (that are) in a subject—is common to all qualities and to all forms.<sup>95</sup> However, some qualities have—apart from this magnitude or quantity that pertains to them by themselves—another magnitude or quantity that pertains to them by accident. And this (can happen) in two modes:

##### 1. By reason of the subject.<sup>96</sup>

For example, whiteness is said (to be a) *quantum* by accident because its subject is a quantum.<sup>97</sup> Whence, if the subject is increased, the whiteness is increased by accident. However, something is not said (to be) *whiter* (*magis album*) according to this increase: rather, (we say there is a) *greater whiteness* (*maior albedo*), as also something is said (to be a) *whiter* (*maius album*) because those that pertain to this increase are not predicated in another way of whiteness and of the subject by reason of which whiteness is said to increase by accident.

This mode of quantity and of increase does not pertain (e.g.) to the qualities of the soul—i.e., to the sciences and to the (moral) virtues.<sup>98</sup>

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<sup>92</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “vel ex parte objecti.”

<sup>93</sup> *In Sent.* 2, d. 24 q. 2 a. 2 ad 5: “sicut videre hominem et lapidem; accidit enim colorato esse hominem aut lapidem.”

<sup>94</sup> *STh* I-II, q. 19 a. 8 co.: “circa actum et intentionem finis, duplex quantitas potest considerari, una ex parte obiecti, quia vult maius bonum, vel agit; alia ex intensione actus, quia intense vult vel agit, quod est maius ex parte agentis.”

<sup>95</sup> *De virtutibus*, q. 1 a. 11 ad 10: “omnibus qualitibus et formis est communis ratio magnitudinis quae dicta est, scilicet perfectio earum in subiecto. Aliquae tamen qualitates, praeter istam magnitudinem seu quantitatem quae competit eis per se, habent aliam magnitudinem vel quantitatem quae competit eis per accidens; et hoc dupliciter.”

<sup>96</sup> *De virtutibus*, q. 1 a. 11 ad 10: “Uno modo ratione subiecti.”

<sup>97</sup> *De virtutibus*, q. 1 a. 11 ad 10: “sicut albedo dicitur quanta per accidens, quia subiectum eius est quantum; unde augmentato subiecto, augmentatur albedo per accidens. Sed secundum hoc augmentum, non dicitur aliquid magis album, sed maior albedo, sicut et dicitur aliquid maius album: non enim aliter praedicantur ea quae pertinent ad hoc augmentum, de albedine, et de subiecto ratione cuius albedo per accidens augeri dicitur.”

<sup>98</sup> *De virtutibus*, q. 1 a. 11 ad 10: “Sed hic modus quantitatis et augmenti non competit qualitibus animae, scilicet scientiis et virtutibus.”



**2. From the part of the object, in that which acts,** quantity and increase can be attributed to some quality by accident; and this is said (to be a) *quantity of virtue*, which is said (to be) *more* on account of the quantity or containment (*continentia*) of the object (► 14.9).<sup>99</sup>

For example, one is said (to be) *of great virtue* who can carry a great weight, or can do whatever great thing, whether in dimensive magnitude, in magnitude of perfection, or according to discrete quantity—as one is said (to be) *of great virtue* who can produce many (things).<sup>100</sup>

In this mode, quantity can be attributed by accident (e.g.) to the qualities of the soul—namely to the sciences and to the (moral) virtues.<sup>101</sup>

However, there is this (difference) between science and (moral) virtue:<sup>102</sup> that it does not belong to the *ratio* of *science* to extend in act in respect of all objects; for it is not necessary for the scientist to know all that can be known (scientifically); on the other hand, it belongs to the *ratio* of (*moral*) *virtue* to act virtuously in all deeds. Whence, science can increase either according to the number of objects or according to its intension in the subject, while virtue (can increase) only in one mode (i.e., in intensity).

### **22.15. Virtue as Perfection**

As ARISTOTLE says, virtue is some perfection (*perfectio quaedam* = τελείωσις τις).<sup>103</sup> Which he proves thus: each thing is perfect (► 23) when it can attain its proper virtue.<sup>104</sup> For example, a natural body is perfect when it can produce something like itself, which is the virtue of nature. Which he also proves, thus: something is maximally in accordance to

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<sup>99</sup> *De virtutibus*, q. 1 a. 11 ad 10: “Alio modo quantitas et augmentum attribuitur alicui qualitati per accidens, ex parte obiecti in quod agit: et haec dicitur quantitas virtutis; quae magis dicitur propter quantitatem obiecti vel continentiam.”

<sup>100</sup> *De virtutibus*, q. 1 a. 11 ad 10: “sicut dicitur magnae virtutis qui magnum pondus potest ferre, vel qualitercumque potest magnam rem facere, sive magnitudine dimensiva, sive magnitudine perfectionis, vel secundum quantitatem discretam; sicut dicitur aliquis magnae virtutis qui potest multa facere.”

<sup>101</sup> *De virtutibus*, q. 1 a. 11 ad 10: “Et hoc modo quantitas per accidens potest attribui qualitibus animae, scilicet scientiis et virtutibus.”

<sup>102</sup> *De virtutibus*, q. 1 a. 11 ad 10: “Sed tamen hoc interest inter scientiam et virtutem: quia de ratione scientiae non est quod se extendat in actum respectu omnium obiectorum: non enim est necesse quod sciens omnia scibilia cognoscat. Sed de ratione virtutis est quod in omnibus virtuose se agat. Unde scientia potest augeri vel secundum numerum obiectorum, vel secundum intensionem eius in subiecto; virtus autem uno modo tantum.”

<sup>103</sup> *In Physic.* 7, l. 6, n. 2 (cf. ARISTOTLE, *Physica* H.3, 246b27–28): “assumit [Philosophus] quandam propositionem, scilicet quod virtus sit perfectio quaedam.”

<sup>104</sup> *In Physic.* 7, l. 6, n. 2 (cf. ARISTOTLE, *Physica* H.3, 246b28–29): “Quod quidem sic probat: quia unumquodque tunc est perfectum, quando pertingere potest ad propriam virtutem; sicut naturale corpus tunc perfectum est, quando potest aliud sibi simile facere, quod est virtus naturae. Quod etiam probat per hoc, quia tunc est aliquid maxime secundum naturam, quando naturae virtutem habet; virtus enim naturae est signum completionis naturae: cum autem aliquid habet complete suam naturam, tunc dicitur esse perfectum.”

(its) nature when it has the virtue of (its) nature; for the virtue of a nature is a sign of the completion (i.e., perfection) of a nature; and when something completely has its nature, then is it said to be perfect (e.g., as when a horse can beget a horse).

Therefore, it is evident that, since the virtue of each thing follows upon the perfection of its form, something is perfect when it has its virtue.<sup>105</sup> And thus, it follows that virtue is some perfection.

A magnitude of perfection can be said (to be a) *magnitude of virtue* because some quality should be capable in something great—and it itself would be great for the same reason.<sup>106</sup> The more each thing is closer to its perfection, the more virtuous and the more intense it is.<sup>107</sup> Any one (thing) is more perfect the more it attains its proper virtue.<sup>108</sup> The order of things is such that, the more something is superior, the more it has a united virtue; and (the more) it extends itself to many (things).<sup>109</sup>

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<sup>105</sup> *In Physic.* 7, l. 6, n. 2: “Sic ergo patet, quod cum ad perfectionem formae cuiuslibet rei consequatur virtus eius, quod tunc unumquodque perfectum est, quando habet suam virtutem. Et ita sequitur quod virtus sit perfectio quaedam.”

<sup>106</sup> *De virtutibus*, q. 1 a. 11 ad 10: “Sed considerandum est, quod eiusdem rationis est quod aliqua qualitas in aliquid magnum possit, et quod ipsa sit magna, sicut ex supradictis patet; unde etiam magnitudo perfectionis potest dici magnitudo virtutis.”

<sup>107</sup> *In Physic.* 5, l. 10, n. 7: “unumquodque autem quanto est propinquius suae perfectioni, tanto est virtuosius et intensius.”

<sup>108</sup> *In Post. an.* 1, l. 37, 58–60: “unumquodque autem tanto perfectius est quanto magis attingit ad propriam uirtutem, ut patet in VII Phisicorum.”

<sup>109</sup> *STh* I, q. 57 a. 2 co.: “Hoc enim rerum ordo habet, quod quanto aliquid est superius, tanto habeat virtutem magis unitam et ad plura se extendentem.” This is immediately applied to common (as opposed to proper) sense in man, but St. Thomas adds, “Et simile etiam est in aliis considerare.”

## 23. Perfection

*Since virtue is a perfection, and quantity of virtue (virtual quantity) is quantity of perfection, we need to determine what it is for something to be perfect.*

### 23.1. Perfect as *That of Which Nothing is Outside*

*Perfect*—together with *whole*, *false*, *accident* (and others)—is one of the names that signifies something that is related to being (*ens*) according to the mode of an affection (*per modum passionis*; i.e., just like *odd* and *even* signify proper qualitative properties of number insofar as it is number, *perfect* signifies a property of being as such).<sup>1</sup>

As ARISTOTLE says, *perfect* and *whole* either are the same or signify almost the same (< ὅλον δὲ καὶ τέλειον ἢ τὸ αὐτὸ πᾶμπαν ἢ σύνεγγυς τὴν φύσιν); for the definition of **whole** and of **perfect** (*perfectum* = τέλειον) is *that of which nothing is outside* (*id cuius nihil est extra est definitio perfecti et totius* < οὐ δὲ μηδὲν ἔξω, τοῦτ' ἔστι τέλειον καὶ ὅλον).<sup>2</sup>

(Moreover), *all* (*omne*, or *every* < τὰ πάντα), *the whole* (*totum* < τὸ πᾶν), and *perfect* (*perfectum* < τὸ τέλειον) do not differ one from the other according to (their) formal *ratio* (*secundum speciem* = κατὰ τὴν ἰδέαν, *idest secundum formalem rationem*), because all (of them) convey some integrity (*important integritatem quandam*).<sup>3</sup> (Therefore), if they differ in something, they (must) differ in matter (*in materia* = ἐν τῇ ὕλῃ) or in subject (*subiecto*), insofar as they are said of diverse (*inquantum de diversis dicuntur* < ἐφ' ὧν λέγονται).

Thus, we use **all** in discrete (things), as (when) we say, “all men” (*omnem hominem*, or *every man*).<sup>4</sup> We use it also in continua that are proximate to division (i.e., continua that

<sup>1</sup> *In Metaph.* 5, l. 18, §1033: “Postquam Philosophus distinxit nomina, quae significant causas, et subiectum, et partes subiectorum huius scientiae; hic incipit distinguere nomina quae significant ea quae se habent per modum passionis; et dividitur in duas partes. In prima distinguit nomina ea quae pertinent ad perfectionem entis. In secunda distinguit nomina quae pertinent ad entis defectum [...]. Circa primum duo facit. Primo distinguit nomina significantia ea quae pertinent ad perfectionem entis. Secundo pertinentia ad totalitatem.” *In Metaph.* 5, l. 22, §1128: “distinguit [Philosophus] nomina, quae significant defectum entis, vel ens incompletum. Et primo hoc nomen falsum. Secundo hoc nomen accidens.”

<sup>2</sup> *In Metaph.* 5, l. 18, §1033: “Perfectum enim et totum, aut sunt idem, aut fere idem significant, ut dicitur in tertio Physicorum.” *In Physic.* 3, l. 11, n. 4: “*Id cuius nihil est extra est definitio perfecti et totius.* [...] Sic igitur manifestum est quod haec est definitio totius: *totum est cuius nihil est extra.*” Cf. ARISTOTLE, *Physica* Γ.6, 207a8–10: “οὐ δὲ μηδὲν ἔξω, τοῦτ' ἔστι τέλειον καὶ ὅλον· οὕτω γὰρ ὀριζόμεθα τὸ ὅλον, οὐ μηδὲν ἄπεισιν”; 13–15: “ὅλον δὲ καὶ τέλειον ἢ τὸ αὐτὸ πᾶμπαν ἢ σύνεγγυς τὴν φύσιν. τέλειον δ' οὐδὲν μὴ ἔχον τέλος· τὸ δὲ τέλος πέρας.” Cf. *De caelo* B.4, 286b18–19. Cf. *Quodlibet* 3, q. 6 a. 3 co.: “totum et perfectum est idem, ut dicitur in III Physic.” *De perf.*, c. 5, 17–18: “Cum enim totum et perfectum sit cui nihil deest [...].” *In Sent.* 1, d. 8 q. 5 a. 3 ad 1: “totum enim et perfectum est idem, ut dicit Philosophus.”

<sup>3</sup> *In De caelo* 1, l. 2 n. 8 (cf. ARISTOTLE, *De caelo* A.1, 268a20–22): “dicit [Philosophus] quod haec tria, *omne* et *totum* et *perfectum*, non differunt ab invicem *secundum speciem*, idest secundum formalem rationem, quia omnia important integritatem quandam: sed si in aliquo differant, differunt in materia et subiecto, inquantum de diversis dicuntur.”

<sup>4</sup> *In De caelo* 1, l. 2 n. 8: “Nam hoc quod dicitur *omne*, utimur in discretis, sicut dicimus *omnem hominem*: utimur etiam eo in continuis quae sunt propinqua divisioni, sicut dicimus *omnem aquam* et *omnem aerem.*”

are easily divided), as (when) we say, “all [the] water” (*omnem aquam*, or *every water*), and “all [the] air” (*omnem aerem*, or *every air*).

In turn, **whole** is said in all of the above, and in continua; for we say, “[the] whole people” (*totum populum*, i.e., in discrete things) or “[the] whole wood” (i.e., in continua).<sup>5</sup>

However, *whole* is not found among simple (things), which do not have parts, and for which we use the name *perfect*.<sup>6</sup>

Thus, we say **perfect** in all of the above, and in forms (in themselves, simple); for we say, “perfect whiteness” (*perfectam albedinem*), and “perfect virtue” (*perfectam virtutem*).<sup>7</sup>

### 23.2. Perfect as Terminated

**Perfect** is *that of which nothing is outside* (as just defined); but nothing that lacks (its) end is perfect (*nullum carens fine est perfectum* = τέλειον οὐδὲν μὴ ἔχον τέλος); for the end is the perfection of each thing; and the **end** is *the terminus of that of which the end is* (< τὸ τέλος πέρας).<sup>8</sup>

Whence, the (thing’s) terminus (► 8.8) is one of the conditions of the perfect; for the perfect is terminated and absolute; does not depend on another, i.e., is by itself (► 17.6); and possesses—i.e., is not deprived of (► 42.7)—those that befit it according to its genus.<sup>9</sup>

Therefore, nothing (that is materially) infinite and indeterminate (*interminatum*) is perfect—and the definition of *perfect*—i.e., *that of which nothing is outside*—does not befit the (material) infinite (► 24.8, ¶1).<sup>10</sup>

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<sup>5</sup> *In De caelo* 1, l. 2 n. 8: “*Totum* autem dicitur et in his et in continuis: dicimus enim *totum* populum et *totum* lignum.”

<sup>6</sup> *In Physic.* 3, l. 11, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 207a8–15): “Sed *totum* et *perfectum* vel sunt penitus idem, vel sunt propinqua secundum naturam. Et hoc ideo dicit, quia *totum* non invenitur in simplicibus, quae non habent partes: in quibus tamen utimur nomine *perfecti*.”

<sup>7</sup> *In De caelo* 1, l. 2 n. 8: “*Perfectum* autem dicimus et in his et in formis: dicimus enim *perfectam albedinem* et *perfectam virtutem*.”

<sup>8</sup> *In Physic.* 3, l. 11, n. 4: “Per hoc igitur manifestum est quod *perfectum est cuius nihil est extra ipsum*. Sed nullum carens fine est perfectum; quia finis est perfectio uniuscuiusque. Finis autem est terminus eius cuius est finis: nullum igitur infinitum et interminatum est perfectum. Non ergo competit infinito definitio perfecti, cuius scilicet nihil est extra.”

<sup>9</sup> *In Metaph.* 5, l. 19, §1044 (cf. ARISTOTLE, *Metaphysica* Δ.17, 1022a4–14): “Hic prosequitur *de nominibus, quae significant conditiones perfecti*. Perfectum autem, ut ex praemissis patet, est terminatum et absolutum, non dependens ab alio, et non privatum, sed habens ea, quae sibi secundum suum genus competunt. Et ideo primo ponit hoc nomen *Terminus*. Secundo hoc quod dicitur per se [...]. Tertio hoc nomen *Habitus*.” *In Metaph.* 5, l. 18, §1033: “distinguit [Philosophus] quaedam nomina, quae significant quasdam perfectiones perfecti, ibi, «Terminus dicitur».”

<sup>10</sup> *In Physic.* 3, l. 11, n. 4: “Per hoc igitur manifestum est quod *perfectum est cuius nihil est extra ipsum*. Sed nullum carens fine est perfectum; quia finis est perfectio uniuscuiusque. Finis autem est terminus eius cuius est finis: nullum igitur infinitum et interminatum est perfectum. Non ergo competit infinito definitio perfecti, cuius scilicet nihil est extra.”

### 23.3. Perfect as *Totally Terminated*

Everything that comes to be (*omne quod fit*) is drawn from potency into act (*de potentia in actum deductum est*) and from non-being into being (*de non esse in esse*) when it is produced (*quando factum est*).<sup>11</sup>

Whence, according to the origin of the name, something is rightly said to be **perfect** as *totally produced* (*quasi totaliter factum*) when potency is totally reduced to act, such that it retains nothing of non-being, but has a complete being (*esse completum*; ►46.29, ¶1).<sup>12</sup>

### 23.4. Perfect as *in Act*

By some extension of the name, not only that which—in coming about (*fiendo*)—attains a complete act is said (to be) **perfect**, but also *that which is in complete act* without any production (*id quod est in actu completo absque omni factione*; ►24.8, ¶2).<sup>13</sup>

Whence, that is said to be **perfect** which *does not lack* (*its act of*) *being in act* (*non deest esse in actu*), whether it has this through the mode of production (*per modum factionis* or not (►46.29).<sup>14</sup> And since (that) is said (to be) *perfect* which lacks nothing according to the mode of its perfection, something is said to be **perfect** *insofar as it is in act*.

### 23.5. Modes in Which *Perfect* is Said by Itself

ARISTOTLE posits three modes in which something is said (to be) **perfect** by itself, of which the first two modes of perfection are considered according to interior (perfection; ►23.6), while the third one is considered in respect to external (perfection; ►23.8).<sup>15</sup>

### 23.6. Intrinsic Modes in Which *Perfect* is Said by Itself

Something is said (to be) **perfect** by itself, considered according to interior (perfection), in two modes:<sup>16</sup>

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<sup>11</sup> ScG 1, 28 n. 9: “omne quod fit, de potentia in actum deductum est et de non esse in esse quando factum est.”

<sup>12</sup> ScG 1, 28 n. 9: “si nominis significatio quantum ad sui originem attendatur [...], tunc recte perfectum esse dicitur, quasi totaliter factum, quando potentia totaliter est ad actum reducta, ut nihil de non esse retineat, sed habeat esse completum.”

<sup>13</sup> ScG 1, 28 n. 9: “Per quamdam igitur nominis extensionem perfectum dicitur non solum quod fiendo pervenit ad actum completum, sed id etiam quod est in actu completo absque omni factione.”

<sup>14</sup> *STh* I, q. 4 a. 1 ad 1: “quia in his quae fiunt, tunc dicitur esse aliquid perfectum, cum de potentia educitur in actum; transumitur hoc nomen perfectum ad significandum omne illud cui non deest esse in actu, sive hoc habeat per modum factionis, sive non.” *STh* I, q. 4 a. 1 co.: “Secundum hoc enim dicitur aliquid esse perfectum, secundum quod est actu, nam perfectum dicitur, cui nihil deest secundum modum suae perfectionis.”

<sup>15</sup> *In Metaph.* 5, l. 18, §1033: “ponit [Philosophus] tres modos quibus aliquid secundum se dicitur perfectum.” *Ibid.*, §1038: “Uterque autem [sc., primus et secundus] modus perfectionis attenditur interiorem.” *Ibid.*, §1039: “Tertium modum ponit per respectum ad exterius.”

<sup>16</sup> *In Metaph.* 5, l. 18, §1038 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b12–1022a1): “Uterque autem [sc., primus et secundus] modus perfectionis attenditur interiorem.”

1. Insofar as nothing is lacking in the naturally determined **dimensional quantity** of a thing: *that outside of which no part of it can be taken (extra quod non est accipere aliquam eius particulam < οὐ μὴ ἔστιν ἔξω τι λαβεῖν μηδὲ ἐν μόριον).*<sup>17</sup>

For example, a man is said (to be) *perfect* when he lacks none of its parts.<sup>18</sup> Likewise, time is said (to be) *perfect* when it is impossible to take something outside that is the time's part: for example, a day (is said to be) perfect when no part of the day is lacking.

2. Insofar as nothing lacks in the **virtual quantity** owed to a thing according to nature: *that which has neither excess (superexcellētia vel superabundantia = ὑπερβολή)<sup>19</sup> nor defect (defectum < ἐλλείπωσις) according to (its) virtue (secundum virtutem = κατ' ἀρετήν)* so that it produces (something) well according to its genus (< πρὸς τὸ γένος); for we say that something is well had which has neither more nor less of that which it must have.

For example, a physician or a piper is said (to be) *perfect* when he does not lack something that pertains to the species of (his) proper virtue, according to which the former is a good physician, and the latter, a good piper; for the virtue of anything is what makes the possessor (of the virtue) good and renders its work good (► 22.9).<sup>20</sup>

According to this second mode, we also use—by transfer—the name *perfect* for bad (things).<sup>21</sup> For example, we say (that someone is) a *perfect slanderer*, or a *perfect robber*, when he lacks nothing of that which befits them insofar as they are such.

It is not astonishing that we should use the name *perfection* in these (bad things), which rather sound of defect; for even when they are bad, we use for them—because of some

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<sup>17</sup> In *Metaph.* 5, l. 18, §1034 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b12–13): “Dicit ergo [Philosophus] primo, quod perfectum *uno modo* dicitur, extra quod non est accipere aliquam eius particulam.” Ibid.: “sicut homo dicitur perfectus, quando nulla deest ei pars.” Ibid., §1038: “primus modus perfecti accipiebatur ex hoc quod nihil rei deerat de quantitate dimensioniva sibi naturaliter determinata.”

<sup>18</sup> In *Metaph.* 5, l. 18, §1034: “sicut homo dicitur perfectus, quando nulla deest ei pars.” Ibid. (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b13–14): “Et dicitur tempus perfectum, quando non est accipere extra aliquid quod sit temporis pars.” Ibid.: “sicut dicitur dies perfectus, quando nulla pars diei deest.”

<sup>19</sup> In *Metaph.* 5, l. 18, §1035 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b14–15): “*Alio modo* dicitur aliquid perfectum secundum virtutem; et sic dicitur aliquid perfectum, quod non habet «hyperbolem,» idest superexcellētia vel superabundantiam ad hoc quod aliquid bene fiat secundum genus illud, et similiter nec defectum. Hoc enim dicimus bene se habere, ut dicitur in secundo Ethicorum, quod nihil habet nec plus nec minus quam debet habere.” Ibid., §1038: “hic secundus modus accipitur ex hoc quod nihil deest alicui de quantitate virtutis sibi debitae secundum naturam.”

<sup>20</sup> In *Metaph.* 5, l. 18, §1035 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b16–17): “Et sic dicitur perfectus medicus et perfectus fistulator, quando non deficit ei aliquid, quod pertineat ad speciem propriae virtutis, secundum quam dicitur, quod hic est bonus medicus, et ille bonus fistulator. Virtus enim cuiuslibet est quae bonum facit habentem, et opus eius bonum reddit.”

<sup>21</sup> In *Metaph.* 5, l. 18, §1036 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b17–18): “Secundum autem hunc modum utimur translative nomine perfecti etiam in malis.” Ibid. (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b18–19): “Dicimus enim perfectum «sycophantam,» idest calumniatorem, et perfectum latronem, quando in nullo deficit ab eo quod competit eis in quantum sunt tales.”

likeness—the name *goodness*.<sup>22</sup> Thus, we say (that someone is) a *good slanderer*, or a *good robber*, because they are had in their operations—even if (they *are*) bad—as the good (agents) are (had) in (their) good (operations).

### 23.7. Virtual and Dimensive Quantities Analogically Compared

That something should be said (to be) *perfect* by comparison to (its) proper virtue, comes from virtue being some perfection of the thing (►22.3); for each one (thing) is perfect when no part of its natural magnitude—which befits it according to the species of (its) proper virtue—is lacking in it.<sup>23</sup> And just as any natural thing has a determinate natural measure of magnitude according to continuous quantity, so too any (one) thing has the determinate quantity of its natural virtue.

For example, a horse has a determinate dimensive quantity according to nature—with some latitude; for there is some quantity beyond which no horse extends in magnitude.<sup>24</sup> And, likewise, there is some (dimensive) quantity that it does not surpass in smallness.

So, too, the virtual quantity of the horse is determined from one and from the other part of some termini; for there is some virtue of the horse that is not found greater in any horse.<sup>25</sup> And, likewise, there is some (virtual quantity) so small, that none is lesser.

### 23.8. Extrinsic Mode in Which *Perfect* is Said by Itself

The third mode (in which something is said—by itself—to be perfect) that ARISTOTLE posits (is) in respect of (something) external (*per respectum ad exterius*): *those are said (to be) perfect which have already attained their end (quibus inest finis = οἷς ὑπάρχει τὸ τέλος, idest quae iam consecuta sunt suum finem)*, if the end is good (*studiosus = σπουδαῖον, idest bonus*).<sup>26</sup>

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<sup>22</sup> *In Metaph.* 5, l. 18, §1036 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b19–20): “Nec est mirum si in istis quae magis sonant defectum, utimur nomine perfectionis; quia etiam cum sint mala, utimur in eis nomine bonitatis per quamdam similitudinem. Dicimus enim bonum furem et bonum calumniatorem, quia sic se habent in suis operationibus, licet malis, sicut boni in bonis.”

<sup>23</sup> *In Metaph.* 5, l. 18, §1037 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b20–23): “Et quod aliquid dicatur perfectum per comparationem ad virtutem propriam, provenit quia virtus est quaedam perfectio rei. Unumquodque enim tunc est perfectum quando nulla pars magnitudinis naturalis, quae competit ei secundum speciem propriae virtutis, deficit ei. Sicut autem quaelibet res naturalis, habet determinatam mensuram naturalis magnitudinis secundum quantitatem continuam, ut dicitur in secundo de Anima, ita etiam quaelibet res habet determinatam quantitatem suae virtutis naturalis.”

<sup>24</sup> *In Metaph.* 5, l. 18, §1037: “Equus enim habet quantitatem dimensivam determinatam secundum naturam cum aliqua latitudine. Est enim aliqua quantitas, ultra quam nullus equus protenditur in magnitudine. Et similiter est aliqua quantitas, quam non transcendit in parvitate.”

<sup>25</sup> *In Metaph.* 5, l. 18, §1037: “Ita etiam ex utraque parte determinatur aliquibus terminis quantitas virtutis equi. Nam aliqua est virtus equi, qua maior in nullo equo invenitur: et similiter est aliqua tam parva, qua nulla est minor.”

<sup>26</sup> *In Metaph.* 5, l. 18, §1039 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b23–25): “*Tertium modum* ponit [Philosophus] per respectum ad exterius; dicens, quod illa dicuntur tertio modo perfecta «quibus inest finis,» idest quae iam consecuta sunt suum finem; si tamen ille finis fuerit «studiosus,» idest bonus.”

For example, man (is perfect) when it has already attained happiness.<sup>27</sup> On the other hand, one who attains its end in bad (things), is said (to be) *deficient* rather than *perfect*; for **bad** (*malum*) is *the privation of a due perfection (privatio perfectionis debitae)*. Whence, it is evident that the bad are not happier when they attain their will, but more miserable.

Since every end is some last (thing), we transfer the name *perfect* to those that reach the end, even if it is bad.<sup>28</sup> For example, something is said to be perfectly lost, or perfectly corrupted, when nothing of the corruption or loss is lacking. And from this metaphor, death is said (to be) an end, because it is last. However, the end not only has its being last, but also that it should be the cause for the sake of which something is done (*cuius causa fit aliquid* = τὸ οὐ ἔνεκα ἔσχατον; ►9.8), which does not happen in death or in corruption.

### 23.9. Perfect Simply vs. Perfect According to Something

*Perfect* (in respect of an end) is said in multiple modes:<sup>29</sup>

1. **Perfect simply** (*simpliciter*) is that which attains the end that befits it according to its proper *ratio*.<sup>30</sup> For example, an animal is said to be simply perfect when it is brought through to an end such that nothing is lacking in it of those (things) that constitute the integrity of the animal's life: e.g., when nothing is lacking in it from the number and disposition of the limbs, the owed quantity of body, and the virtues by whose operations the lives of animals are perfected.

2. That can be said (to be) **perfect according to something** (*secundum quid*) which attains the end of any of the concomitants of the proper *ratio*.<sup>31</sup> For example, an animal can be said (to be) *perfect* according to something if it is perfect in a concomitant: e.g., if it is perfect in whiteness, in smell, or in something of this mode.

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<sup>27</sup> *In Metaph.* 5, l. 18, §1039: "sicut homo, quando iam consequitur beatitudinem. Qui autem consequitur finem suum in malis, magis dicitur deficiens quam perfectus; quia malum est privatio perfectionis debitae. In quo patet, quod mali, quando suam perficiunt voluntatem, non sunt feliciores, sed miserores."

<sup>28</sup> *In Metaph.* 5, l. 18, §1039 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b25–30): "Quia vero omnis finis est quoddam ultimum, ideo per quamdam similitudinem transferimus nomen perfectum ad ea, quae perveniunt ad ultimum, licet illud sit malum. Sicut dicitur aliquid perfecte perdi, vel corrumpi, quando nihil deest de corruptione vel perditione rei. Et per hanc metaphoram, mors dicitur finis, quia est ultimum. Sed finis non solum habet quod sit ultimum, sed etiam quod sit cuius causa fit aliquid. Quod non contingit morti vel corruptioni."

<sup>29</sup> *De perf.*, c. 1, 4–21: "perfectum multipliciter dicitur."

<sup>30</sup> *De perf.*, c. 1, 4–5; 6–8: "Est enim aliquid simpliciter perfectum. [...] Simpliciter quidem perfectum est quod attingit ad finem eius quod ei competit secundum propriam rationem." Ibid., 11–18: "sicut animal simpliciter dicitur esse perfectum, quando ad hunc finem perducitur ut nihil ei desit ex his quae integritatem animalis vitae constituunt: puta cum nihil ei deficit ex numero et dispositione membrorum, et debita corporis quantitate, et virtutibus quibus operationes animalis vitae perficiuntur."

<sup>31</sup> *De perf.*, c. 1, 5–6; 8–11: "aliquid vero dicitur perfectum secundum quid. [...] secundum quid autem perfectum dici potest quod attingit ad finem alicuius eorum quae concomitantur propriam rationem." Ibid., 18–21: "secundum quid autem perfectum animal potest dici si sit perfectum in aliquo concomitanti, puta si sit perfectum in albedine, aut in odore, aut in aliquo huiusmodi."



### 23.10. Universally Perfect vs. Perfect in a Genus

ARISTOTLE shows how, in relation to the (above three) modes of perfection (► 23.5), some things are said (to be) *perfect* by themselves in two modes:<sup>32</sup>

**1. Universally perfect;** for they lack absolutely nothing at all; nor do they have any excess; for they are not exceeded inwardly in goodness by anything; nor do they receive something external; for they are not wanting in external goodness.<sup>33</sup>

**2. Perfect in some genus;** for they have neither excess nor defect in respect of that which pertains to that genus and is owed to it; nor is there something pertaining to that genus outside of them, as lacking in them.<sup>34</sup>

For example, man is said to be perfect when he has already obtained happiness.<sup>35</sup>

And just as this distinction is made in reference to the second mode of perfection posited above (i.e., virtual; ► 23.6), so can it be made in respect of the first (i.e., dimensive).<sup>36</sup>

For example, the world is said (to be) perfect *universally* because there is nothing at all outside of it, while any particular body is a perfect quantity *in its genus* because it has three dimensions, of which there are no more.<sup>37</sup>

### 23.11. Perfect in Respect of Another

ARISTOTLE posits the following modes in which things are said (to be) **perfect** in respect of others *by comparison to those that are perfect according to themselves*:<sup>38</sup>

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<sup>32</sup> *In Metaph.* 5, l. 18, §1033 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b30–1022a1): “ostendit [Philosophus] quomodo secundum hos modos aliqua diversimode perfecta dicuntur.” Ibid., §1040: “Ostendit [Philosophus] quomodo aliqua diversimode se habeant ad praedictos modos perfectionis; et dicit, quod quaedam dicuntur secundum se perfecta: et hoc dupliciter.”

<sup>33</sup> *In Metaph.* 5, l. 18, §1040 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b31–32): “Alia quidem universaliter perfecta, quia nihil omnino deficit eis absolute, nec aliquam habent «hyperbolem,» idest excedentiam, quia a nullo videlicet penitus in bonitate exceduntur, nec aliquid extra accipiunt, quia nec indigent exteriori bonitate.” As St. Thomas immediately explains, this is the condition of the first principle (simply): namely, God, in which there is perfect goodness, which lacks nothing of all the perfections found in each of the genera: “Et haec est conditio primi principii, scilicet Dei, in quo est perfectissima bonitas, cui nihil deest de omnibus perfectionibus in singulis generibus inventis.”

<sup>34</sup> *In Metaph.* 5, l. 18, §1041 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1021b32–1022a1): “Alia dicuntur perfecta in aliquo genere, ex eo quod quantum ad illud genus pertinet, nec «habent hyperbolem,» idest excedentiam, quasi aliquid eis deficiat eorum, quae illi generi debentur; nec aliquid eorum, quae ad perfectionem illius generis pertinent, est extra ea, quasi eo careant.”

<sup>35</sup> *In Metaph.* 5, l. 18, §1041: “sicut homo dicitur perfectus, quando iam adeptus est beatitudinem.”

<sup>36</sup> *In Metaph.* 5, l. 18, §1042: “Et sicut fit haec distinctio quantum ad secundum modum perfectionis supra positum, ita potest fieri quantum ad primum, ut tangitur in principio Caeli et mundi.”

<sup>37</sup> *In Metaph.* 5, l. 18, §1042: “Nam quodlibet corpus particulare est quantitas perfecta secundum suum genus, quia habet tres dimensiones, quibus non sunt plures. Sed mundus dicitur perfectus universaliter, quia omnino nihil extra ipsum est.”

<sup>38</sup> *In Metaph.* 5, l. 18, §1033 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1022a1–3): “[ponit Philosophus] modos, quibus aliqua dicuntur perfecta per respectum ad alia.” Ibid., §1043: “Ponit [Philosophus] *modum*,

1. Because they produce (*faciunt* = ποιεῖν) something perfect in some of the above (three) modes.<sup>39</sup> For example, an (art of) medicine that produces perfect health is perfect.
2. Because they have (*habent* = ἔχειν; ► 42.13) something perfect.<sup>40</sup> For example, a man that has a perfect science is said (to be) *perfect*.
3. By representing (*repraesentando* < *congruendo* = ἀρμόττειν, i.e., to adapt, to fit well) such a perfect (thing).<sup>41</sup> For example, an image (► 9.6) that perfectly represents a man is said (to be) *perfect*.
4. By referring in any other mode to those that are said to be perfect by themselves in the first modes.<sup>42</sup>

### 23.12. Virtual Existence of an Effect in its Effective Cause

Whatever perfections are in an effect must be found in the effective cause, whether according to the same *ratio*—if the agent is univocal, as man begets man—or in a more eminent mode—if it is an equivocal agent, as there is in the sun a likeness of those that are generated by the virtue of the sun (► 46.19). For it is manifest that the effect preexists virtually (*virtute*) in the agent cause; and to preexist in the virtue of the agent cause is not to preexist in a more imperfect mode, but in a more perfect (mode).<sup>43</sup> Although to preexist in the potency of a material cause is to preexist in a more imperfect mode—because matter as such (*huiusmodi*) is imperfect—, the agent, on the other hand, is—as such—perfect.

Therefore, actions are comprehended under habits as that-which-is-from-a-principle (*principiatum*) is contained in its principle.<sup>44</sup>

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*secundum quem aliqua dicuntur perfecta per respectum ad aliud: et dicit, quod alia dicuntur perfecta «secundum ipsa,» idest per comparisonem ad perfecta, quae sunt secundum se perfecta.»*

<sup>39</sup> *In Metaph.* 5, l. 18, §1043 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1022a1–2): “Vel ex eo, quod faciunt aliquid perfectum aliquo priorum modorum; sicut medicina est perfecta, quia facit sanitatem perfectam.”

<sup>40</sup> *In Metaph.* 5, l. 18, §1043 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1022a2): “Aut ex eo, quod habent aliquid perfectum; sicut homo dicitur perfectus, qui habet perfectam scientiam.”

<sup>41</sup> *In Metaph.* 5, l. 18, §1043 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1022a2): “Aut repraesentando tale perfectum; sicut illa, quae habent similitudinem ad perfecta; ut imago dicitur perfecta, quae repraesentat hominem perfecte.”

<sup>42</sup> *In Metaph.* 5, l. 18, §1043 (cf. ARISTOTLE, *Metaphysica* Δ.16, 1022a2–3): “Aut qualitercumque aliter referantur ad ea, quae dicuntur per se perfecta primis modis.”

<sup>43</sup> *STh* I, q. 4 a. 2 co.: “per hoc quod quidquid perfectionis est in effectu, oportet inveniri in causa effectiva, vel secundum eandem rationem, si sit agens univocum, ut homo generat hominem; vel eminentiori modo, si sit, agens aequivocum, sicut in sole est similitudo eorum quae generantur per virtutem solis. Manifestum est enim quod effectus praeexistit virtute in causa agente, praeexistere autem in virtute causae agentis, non est praeexistere imperfectiori modo, sed perfectiori; licet praeexistere in potentia causae materialis, sit praeexistere imperfectiori modo, eo quod materia, in quantum huiusmodi, est imperfecta; agens vero, in quantum huiusmodi, est perfectum.”

<sup>44</sup> *De veritate*, q. 22 a. 13 ad 13: “actiones comprehenduntur sub habitibus, sicut principiatum continetur in suo principio.”

### 23.13. Perfection in Substantial Forms

Some (thinkers) would posit that, according to the order of genera, of which one is ordered under another, there is an order of diverse forms in matter: i.e., as if we were to say that matter would have its being-a-substance-in-act according to one form; and, according to another (form, it would have its) being-a-body; and again, according to another (form, it would have its) being-an-animated-body, and so on.<sup>45</sup>

However, if this position were to be taken, only the first form, which would make a substance in act, would be substantial, while all the others (would be) accidental, since the substantial form is what causes *this something* (*facit hoc aliquid*; ► 15.13).<sup>46</sup>

Hence, we ought to say that it is the same form in number whereby a thing has its being a substance; its being in the last, most special species (*in ultima specie specialissima*); and (its being) in all the intermediate genera (► 15.13).<sup>47</sup>

Therefore, since the forms of natural things are like numbers (► 16.7), in which there is a diversity of species if a unit is added or subtracted, as ARISTOTLE says, we ought to understand the diversity of natural forms, according to which matter is constituted in diverse species, from this: that *one adds a perfection above the other*, such that, for example, one form constitutes in corporeal being only—which must be the lowest degree of animal forms, since matter is in potency only to corporeal forms (► 46.11); for those (beings) that are incorporeal are immaterial—, while another, more perfect form constitutes matter in corporeal being; an ulterior (form) gives to it a vital (act of) being; and an ultimate (form) gives to it corporeal being and vital being, and adds to it, over the latter, a sensitive being; and so on in other (corporeal substances, until we reach the form of man, which adds rational being).<sup>48</sup>

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<sup>45</sup> Q. d. de anima, a. 9 co.: “inter formam substantialem et materiam non potest cadere aliqua forma substantialis media, sicut quidam voluerunt, ponentes quod secundum ordinem generum, quorum unum sub altero ordinatur, est ordo diversarum formarum in materia; utpote si dicamus, quod materia secundum unam formam habet quod sit substantia in actu, et secundum aliam quod sit corpus, et iterum secundum aliam quod sit animatum corpus, et sic deinceps.”

<sup>46</sup> Q. d. de anima, a. 9 co.: “Sed hac positione facta, sola prima forma, quae faceret esse substantiam actu, esset substantialis, aliae vero omnes accidentales; quia forma substantialis est quae facit hoc aliquid.”

<sup>47</sup> Q. d. de anima, a. 9 co.: “Oportet igitur dicere, quod eadem numero forma sit per quam res habet quod sit substantia, et quod sit in ultima specie specialissima, et in omnibus intermediis generibus.”

<sup>48</sup> Q. d. de anima, a. 9 co.: “Relinquitur ergo dicendum quod cum formae rerum naturalium sint sicut numeri, in quibus est diversitas speciei addita vel subtracta unitate, ut dicitur in VIII Metaphys.; oportet intelligere diversitatem formarum naturalium, secundum quas constituitur materia in diversis speciebus, ex hoc quod una addit perfectionem super aliam, ut puta quod una forma constituit in esse corporali tantum (hunc enim oportet esse infimum gradum formarum animalium, eo quod materia non est in potentia nisi ad formas corporales. Quae enim incorporea sunt, immaterialia sunt, ut in praecedentibus ostensum est). Alia autem perfectior forma constituit materiam in esse corporali, et ulterius dat ei esse vitale. Et ulterius alia forma dat ei et esse corporale et esse vitale, et super hoc addit ei esse sensitivum; et sic est in aliis.”

Therefore, we ought to understand that a form that is more perfect insofar as—together with matter—it constitutes a composite in the perfection of a lower degree, is understood as material in respect of an ulterior perfection; and so on, proceeding (with) ulterior (forms).<sup>49</sup>

For example, first matter—insofar as it is already constituted in corporeal being—is matter in respect of an ulterior perfection, which is life.<sup>50</sup> Wherefrom, *body (corpus)* is the genus of *living body (corporis viventis)*; and *animated or living (animatum, sive vivens)* is the difference; for the genus is taken from matter (with an indeterminate form; ► 14.12), while the difference (is taken determinately) from the form.

### 23.14. Perfection in Proper Accidental Forms

In some mode, one and the same form, insofar as it constitutes a matter in an act of an inferior degree, is a mean between (that) matter and itself insofar as it constitutes it in an act of a higher degree.<sup>51</sup> And matter, insofar as it is understood (to be) constituted in a substantial being according to a perfection of a lower degree, can be consequently understood as subjected to accidents; for, according to that lower degree of perfection, it is necessary for substance to have some proper accidents that must be in it of necessity.

For example, since matter is constituted in corporeal being by forms, it immediately follows that there are in it dimensions whereby matter is understood (to be) divisible by diverse parts, so that, in this way, according to its diverse parts, it can be susceptible of diverse forms (► 35.19).<sup>52</sup> And ultimately, since matter is understood (to be) constituted into some substantial being, it can be understood as (being) susceptible of accidents whereby it is disposed to an ulterior perfection, according to which matter comes to be (the) proper (matter in relation) to the reception of an ulterior perfection.

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<sup>49</sup> *Q. d. de anima*, a. 9 co.: “Oportet ergo intelligere quod forma perfectior secundum quod simul cum materia compositum constituit in perfectione inferioris gradus, intelligatur ut materiale respectu ulterioris perfectionis, et sic ulterius procedendo.”

<sup>50</sup> *Q. d. de anima*, a. 9 co.: “Utpote materia prima, secundum quod iam constituta est in esse corporeo, est materia respectu ulterioris perfectionis, quae est vita; et exinde est quod corpus est genus corporis viventis; et animatum, sive vivens, est differentia. Nam genus sumitur a materia et differentia a forma.”

<sup>51</sup> *Q. d. de anima*, a. 9 co.: “et sic quodammodo una et eadem forma, secundum quod constituit materiam in actu inferioris gradus, est media inter materiam et seipsam, secundum quod constituit eam in actu superioris gradus. Materia autem prout intelligitur constituta in esse substantiali secundum perfectionem inferioris gradus, per consequens intelligi potest ut accidentibus subiecta. Nam substantia secundum illum inferiorem gradum perfectionis necesse est quod habeat quaedam accidentia propria quae necesse est ei inesse.”

<sup>52</sup> *Q. d. de anima*, a. 9 co.: “Sicut ex hoc quod materia constituitur in esse corporeo per formas, statim consequitur ut sint in ea dimensiones, per quas intelligitur materia divisibilis per diversas partes, ut sic secundum diversas sui partes possit esse susceptiva diversarum formarum. Et ulterius ex quo materia intelligitur constituta in esse quodam substantiali, intelligi potest ut susceptiva accidentium quibus disponitur ad ulteriorem perfectionem, secundum quam materia fit propria ad ulteriorem perfectionem suscipiendam.”

Such dispositions are understood before form as induced by an agent into matter, even if they are some (sort of) accidents improper to the form that are caused in matter only from the form itself (► 15.16).<sup>53</sup> Whence, forms are not understood (to be) in matter before as dispositions: rather, the form is understood before them as a cause (is prior) to (its) effects.

For example, since the soul is a substantial form—for it constitutes a man in a determinate species of substance—, there is no other mean substantial form whatever between the soul and first (i.e., prime) matter.<sup>54</sup> Rather, man is perfected by the rational soul itself according to diverse degrees of perfection: i.e., such that it is a body, an animated body, and a rational animal.

On the other hand, matter, insofar as it is understood as receiving from the rational soul itself the perfections of a lower degree—for example, that it is a body, an animated body, and an animal—must be understood, together with (its) befitting dispositions, to be the proper matter (in relation) to a rational soul insofar as (the rational soul) gives (to it) the last perfection (i.e., being rational).<sup>55</sup> Therefore, the soul, insofar as it is a form that gives being, does not have some other mean between itself and first (i.e., prime) matter.

### 23.15. Perfection in Operations

Since any one (thing) acts insofar as it is in act (*unumquodque agit secundum quod est actu*), it is necessary for any form to be also the principle of operations.<sup>56</sup> Hence, the same form that gives (the act of) being to matter is also the principle of operation (which is the second effect of form, after giving the act of being to matter; ► 22.3, ¶2b).

However, we ought to consider that, according to the degree of forms in the perfection of being, there is also a degree of them in the virtue of operating, since operation is proper to that which exists in act.<sup>57</sup> Hence, the more a form is of greater perfection in giving being,

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<sup>53</sup> Q. d. de anima, a. 9 co.: “Huiusmodi autem dispositiones praeintelliguntur formae ut inductae ab agente in materiam, licet sint quaedam accidentia impropria formae, quae non nisi ex ipsa forma causentur in materia. Unde non praeintelliguntur in materia formae quasi dispositiones, sed magis forma praeintelligitur eis, sicut causa effectibus.”

<sup>54</sup> Q. d. de anima, a. 9 co.: “Sic igitur cum anima sit forma substantialis, quia constituit hominem in determinata specie substantiae, non est aliqua alia forma substantialis media inter animam et materiam primam; sed homo ab ipsa anima rationali perficitur secundum diversos gradus perfectionum, ut sit scilicet corpus, et animatum corpus, et animal rationale.”

<sup>55</sup> Q. d. de anima, a. 9 co.: “Sed oportet quod materia secundum quod intelligitur ut recipiens ab ipsa anima rationali perfectiones inferioris gradus, puta quod sit corpus et animatum corpus et animal, intelligatur, simul cum dispositionibus convenientibus, quod sit materia propria ad animam rationalem, secundum quod dat ultimam perfectionem. Sic igitur anima, secundum quod est forma dans esse, non habet aliquid aliud medium inter se et materiam primam.”

<sup>56</sup> Q. d. de anima, a. 9 co.: “Sed quia eadem forma quae dat esse materiae est etiam operationis principium, eo quod unumquodque agit secundum quod est actu; necesse est quod anima, sicut et quaelibet alia forma, sit etiam operationis principium.”

<sup>57</sup> Q. d. de anima, a. 9 co.: “Sed considerandum est quod secundum gradum formarum in perfectione essendi est etiam gradus earum in virtute operandi, cum operatio sit existentis in actu. Et ideo quanto

the greater it is in virtue in operating. Whence, more perfect forms have multiple and more diverse operations than less perfect forms.

Wherefrom, a diversity of accidents suffices for the diversity of operations in less perfect things, while an ulterior diversity of parts is required in more perfect things—and the more a form is perfect, the more (a diversity of parts is required).<sup>58</sup>

For example, we see that diverse operations befit (*conveniunt*) fire according to diverse operations: e.g., to bear up according to (its) lightness; to heat, according to heat; and so on.<sup>59</sup> However, any one of these operations befits fire according to any of its parts. On the other hand, in animated bodies that have nobler forms, diverse operations are ascribed (*deputantur*) to diverse parts. For example, in plants, the operation of the root is other than (the operation) of the branch or (the operation) of the trunk.

The more the animated bodies are perfect, the more it is necessary to find greater diversity in parts on account of greater perfection.<sup>60</sup> Whence, since the rational soul is the most perfect natural form, the greatest distinction of parts is found in man on account of diverse operations. And the soul of each of them (i.e., the soul of each of the most perfect animated bodies) gives a substantial (act of) being (►22.3, ¶2a) according to the mode that befits their operations (►22.3, ¶2b). A sign of this is that, if the soul is removed, neither flesh nor eye remains—except equivocally.

### 23.16. A Perfect Whole Requires Unequal Parts

Whoever intends to constitute a whole, considers for this purpose that the whole should be perfect.<sup>61</sup> And according to this, he brings together diverse and unequal parts into its composition; for, if all (parts) were equal, the whole would not be perfect.

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aliqua forma est maioris perfectionis in dando esse, tanto etiam est maioris virtutis in operando. Unde formae perfectiores habent plures operationes et magis diversas quam formae minus perfectae.”

<sup>58</sup> Q. d. *de anima*, a. 9 co.: “Et inde est quod ad diversitatem operationum in rebus minus perfectis sufficit diversitas accidentium. In rebus autem magis perfectis requiritur ulterius diversitas partium; et tanto magis, quanto forma fuerit perfectior.”

<sup>59</sup> Q. d. *de anima*, a. 9 co.: “Videmus enim quod igni conveniunt diversae operationes secundum diversa accidentia; sicut ferri sursum secundum levitatem, calefacere secundum calorem, et sic de aliis. Sed tamen quaelibet harum operationum competit igni secundum quamlibet partem eius. In corporibus vero animatis quae habent nobiliores formas, diversis operationibus deputantur diversae partes; sicut in plantis alia est operatio radices, alia rami et stipitis.”

<sup>60</sup> Q. d. *de anima*, a. 9 co.: “Et quanto corpora animata fuerint perfectiora, tanto propter maiorem perfectionem necesse est inveniri maiorem diversitatem in partibus. Unde cum anima rationalis sit perfectissima formarum naturalium, in homine invenitur maxima distinctio partium propter diversas operationes; et anima singulis earum dat esse substantiale, secundum illum modum qui competit operationi ipsorum. Cuius signum est, quod remota anima, non remanet neque caro neque oculus nisi aequivoce.”

<sup>61</sup> *De sub. sep.*, c. 12, 135–139: “Qui enim aliquod totum constituere intendit, ad hoc respicit quod totum perfectum sit et secundum hoc diversas partes et inaequales ad eius compositionem conducit. Si enim omnes essent aequales, iam non esset totum perfectum.”

This is as evident in a natural whole as in a civic whole; for the body of a human would not be perfect if it did not have diverse limbs of unequal dignity; nor would a body politic be perfect unless there existed unequal conditions and diverse offices in it.<sup>62</sup>

Indeed, nature proceeds in its operation from the simple to the composite, such that, among those (things) that come to be through an operation of nature, that which is maximally composite is a whole and (is) the end of the others, as is apparent in all wholes in respect of their parts.<sup>63</sup> Whence, also the operative human reason proceeds from the simple towards the composite as from the imperfect towards the perfect.

Thus, those (parts) from which some perfect one thing must come to be differ in species.<sup>64</sup> Whence, every perfect whole in natural things is found to be constituted from parts (that are) diverse according to species, as man (is constituted) from flesh, bones, and nerves.

On the other hand, a whole that is composed from parts of the same species is imperfect in the genus of nature, as the elements, and other inanimate bodies.<sup>65</sup> Whence, it is manifest that, since the body politic is some perfect whole, it must consist from unlike parts according to species.

### **23.17. Priority of the Perfect vs. the Imperfect**

The perfect is prior to the imperfect in (the order of) nature (► 46.29); but in (the order of) time, the imperfect is prior to the perfect in one and the same (thing).<sup>66</sup>

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<sup>62</sup> *De sub. sep.*, c. 12, 140–144: “quod patet tam in toto naturali, quam in toto civili. Non enim esset corpus hominis perfectum nisi membra diversa et inaequalis dignitatis haberet; neque esset civitas perfecta nisi inaequales conditiones et officia diversa in civitate existerent.”

<sup>63</sup> *In Polit.*, pr.: “Procedit autem natura in sua operatione ex simplicibus ad composita; ita quod in eis quae per operationem naturae fiunt, quod est maxime compositum est perfectum et totum et finis aliorum, sicut apparet in omnibus totis respectu suarum partium. Unde et ratio hominis operativa ex simplicibus ad composita procedit tamquam ex imperfectis ad perfecta.”

<sup>64</sup> *In Polit.* 2, l. 1 n. 12: “ea ex quibus oportet unum aliquid perfectum fieri, differunt specie: unde omne totum perfectum in rebus naturalibus invenitur esse constitutum ex partibus diversis secundum speciem; ut homo ex carnibus, ossibus et nervis.”

<sup>65</sup> *In Polit.* 2, l. 1 n. 12: “Totum vero quod componitur ex partibus eiusdem speciei est imperfectum in genere naturae, sicut aer et aqua et alia inanimata corpora. Unde manifestum est quod, cum civitas sit quoddam totum perfectum, oportet quod consistat ex partibus dissimilibus secundum speciem.”

<sup>66</sup> *STh* III, q. 1 a. 5 ad 3: “perfectum est prius imperfecto, in diversis quidem, tempore et natura, oportet enim quod perfectum sit quod alia ad perfectionem adducit, sed in uno et eodem imperfectum est prius tempore, etsi sit posterius natura.”





## 24. The Infinite

*Having distinguished between dimensive and virtual quantity, we seek now to clarify what is meant by infinite quantity; whether such a quantity exists or can be known—and how. The next chapter provides more detail on the infinite in dimensive quantity in particular.*

### 24.1. Infinite

As ARISTOTLE says, **infinite** (*infinitum* = τὸ ἄπειρον) must be defined as *that of which there is always something outside* (*cuius est semper aliquid extra* = οὗ ἄεί τι ἔξω ἐστί), contrary to how some others before him defined it as *that of which there is nothing outside*.<sup>1</sup>

(The predecessors of ARISTOTLE posited the latter definition because) they reckoned that *infinite* is conjoined to *whole*.<sup>2</sup> Thus, about the infinite, they took it as a thing knowable by itself that it would contain all, and that it would have all in itself, because it has some likeness with a whole, just as that which is in potency has a likeness with (that which is) in act; for the infinite, insofar as it is in potency, is as matter in respect of the perfection of a magnitude; and it is as a whole in potency (► 24.5), but not in act (► 24.3).

This is evident because *infinite* is said according as it is possible for something to be divided into a lesser and insofar as addition can come to be from the opposite of division (i.e., the parts that are infinitely subtracted from one magnitude through division can be added infinitely to any magnitude).<sup>3</sup> Therefore, the infinite, according to its proper *ratio*, is a whole in potency; and it is imperfect, just as matter does not have perfection.

However, (the infinite) is not whole and finite according to the proper *ratio* whereby it is infinite, but according to the end and to the whole in respect of which it is in potency; for division, which is possible (to proceed) infinitely (*in infinitum*), is said to be perfect insofar as it terminates at something; but insofar as it goes towards the infinite, it is imperfect.<sup>4</sup>

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<sup>1</sup> *In Physic.* 3, l. 11, n. 2 (cf. ARISTOTLE, *Physica* Γ.6, 206b33–207a2): “Dicit ergo [Philosophus] primo quod contrario modo definiendum est infinitum quam sicut quidam definirunt. Dixerunt enim quidam quod infinitum est *extra quod nihil est*: sed e contra dicendum est quod infinitum est *cuius est semper aliquid extra*.”

<sup>2</sup> *In Physic.* 3, l. 11, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 207a18–22): “excludit [Philosophus] quandam falsam opinionem ex praedicta definitione falsa exortam. Et primo communiter quantum ad omnes. [...] Dicit ergo primo quod quia aestimaverunt infinitum coniungi toti, hinc acceperunt quasi *dignitatem*, idest rem per se notam, de infinito, quod omnia contineret et omnia in se haberet; propter hoc quod habet quandam similitudinem cum toto, sicut id quod est in potentia habet similitudinem cum actu. Infinitum enim in quantum est in potentia, est sicut materia respectu perfectionis magnitudinis: et est sicut totum in potentia, non autem in actu.”

<sup>3</sup> *In Physic.* 3, l. 11, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 207a22–23): “Quod patet ex hoc, quod infinitum dicitur secundum quod possibile est aliquid dividi in minus, et secundum quod ex opposito divisioni potest fieri appositio, ut supra dictum est. Sic igitur infinitum secundum se, idest secundum propriam rationem, est in potentia totum: et est imperfectum, sicut materia non habens perfectionem.”

<sup>4</sup> *In Physic.* 3, l. 11, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 207a23–24): “Non autem est totum et finitum secundum se, idest secundum propriam rationem qua est infinitum; sed secundum aliud, idest secundum

Moreover, it is manifest that, since it is proper of a whole to contain and of matter to be contained, the infinite as such (*infinitem in quantum huiusmodi < ἢ ἄπειρον*) does not contain, but is contained (*non continet, sed continetur* = οὐ περιέχει ἀλλὰ περιέχεται): i.e., insofar as that which is in act of the infinite is always contained by something greater according as it is possible to take something outside.<sup>5</sup>

Whence, speaking of the infinite according to the whole that is in potency in it, to which addition cannot be made—as opposed to the infinite according to that which is in act of it, to which addition can always be made—, ARISTOTLE (elsewhere) defines **infinite** (in some way, ὠριστάί πως ὁ ἄπειρος), as *that of which there is not more* (*cuius non est plus < οὐ οὐκ ἔστι πλείων*): that is, *than which a greater cannot be taken* (*quo non potest maius accipi*), which is (equivalent to) the definition of the perfect and whole.<sup>6</sup>

## 24.2. Division of the Infinite

ARISTOTLE posits two divisions of the infinite:<sup>7</sup>

### 1. The infinite in act (► 24.3).

This division is insofar as *infinite* is the same as *non-traversable* (*infinitem idem est quod intransibile*); for something is said (to be) *infinite* because it does not have an end (*non est finitem*).<sup>8</sup> However, this division is common to the infinite and to everything that is said privatively. Thus, (for example), *invisible* is said in three (modes):

**(a)** *What is not naturally apt to be seen*, as a voice, which is not of the genus of *visible*.

**(b)** *What is badly seen*, as that which is seen in darkness or remotely.

**(c)** *What is naturally apt to be seen and is not seen*, as that which is totally in darkness.

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finem et totum, ad quod est in potentia. Divisio enim quae est possibilis in infinitum, secundum quod ad aliquid terminatur, dicitur esse perfecta: et secundum quod vadit in infinitum, est imperfecta.”

<sup>5</sup> *In Physic.* 3, l. 11, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 207a24–25): “Et manifestum est quod, cum totius sit continere, materiae autem contineri, quod infinitum in quantum huiusmodi non continet, sed continetur: in quantum scilicet id quod de infinito est in actu, semper continetur ab aliquo maiori, secundum quod possibile est aliquid extra accipere.”

<sup>6</sup> *In De caelo* 1, l. 29, n. 3 (cf. ARISTOTLE, *De caelo* A.12, 283a9–10): “infinitem est *cuius non est plus*, id est quo non potest maius accipi. Nec obstat quod Aristoteles in III *Physic.* improbat hanc definitionem infiniti, dicens eam magis esse definitionem perfecti et totius, cum tamen infinitum sit imperfectum et in modum partis se habens: quia Philosophus ibi loquitur de infinito secundum id quod de eo est in actu, cui semper potest additio fieri; hic autem loquitur de infinito secundum totum quod est de eo in potentia, cui non potest additio fieri.”

<sup>7</sup> *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a2–7): “ponit [Philosophus] duas divisiones infiniti.”

<sup>8</sup> *In Physic.* 3, l. 7, n. 9: “Quarum prima est communis infinito et omnibus privative dictis. Nam invisibile dicitur tripliciter, vel quod non est aptum natum videri, ut vox, quae non est de genere visibilium; vel quod male videtur, sicut quod videtur in obscuro aut a remotis; vel quod natum est videri et non videtur, sicut quod est omnino in tenebris. Sic igitur et [...] dicitur infinitum, [...] (nam infinitum idem est quod intransibile).” *STh* I, q. 7 a. 1 co.: “infinitem dicitur aliquid ex eo quod non est finitem.”

## 2. The infinite in potency (► 24.5).

This division is proper of the infinite, and is insofar as *infinite* is said:<sup>9</sup> **(a)** according to **addition** (*per appositionem, secundum appositionem* = κατὰ πρόσθεσιν), as in numbers; **(b)** according to **division** (*secundum divisionem* = κατὰ διαίρεσιν), as in magnitudes; or **(c)** according to **both**, as in time.

### 24.3. Infinite in Act

Every finite is traversable by division.<sup>10</sup> Whence, **infinite** is properly *that which cannot be traversed in measuring* (*quod mensurando pertransiri non potest*). Thus, *infinite* is said in as many modes as *non-traversable* (*intransibile*) is said.

ARISTOTLE distinguishes four modes in which *infinite* is said in act:<sup>11</sup>

1. That which cannot be traversed (*quod non potest transiri* = τὸ ἀδύνατον διελθεῖν) in measuring (*mensurando*) insofar as it is not naturally apt (*eo quod non est natum* = τῷ μὴ πεφυκέναι), according to its genus (*secundum suum genus*), to be traversed (*pertransiri* = διιέναι).<sup>12</sup>

For example, an indivisible, such as a point and a form (is infinite; for it is not in the genus of *traversable*).<sup>13</sup> Thus, we say that the point, the unit, or anything that is not a quantum and measurable, is infinite or non-traversable. Likewise, in this (negative) mode a voice (*vox* = φωνή) is also said (to be) *invisible* (*invisibilis* = ἀόρατος) because it is not of the genus of *visible*.

2. That which, considered in itself (*quantum est de se*), can be traversed (*transiri potest* < τὸ διεξοδόν), but is not yet traversed, even if it has begun to be traversed (*nondum est*

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<sup>9</sup> *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a6–7): “Aliam divisionem propriam infiniti ponit [Philosophus...] dicens quod infinitum dicitur vel per appositionem, sicut in numeris; aut secundum divisionem, sicut in magnitudinibus; aut utroque modo, sicut in tempore.”

<sup>10</sup> *In Metaph.* 11, l. 10, §2314: “Circa primum [sc., *quot modis dicitur infinitum in actu*] considerandum est, quod omne finitum dividendo pertransitur. Unde infinitum proprie est, quod mensurando pertransiri non potest. Tot ergo modis dicitur infinitum, quot modis dicitur intransibile.”

<sup>11</sup> *In Metaph.* 11, l. 10, §2314 (cf. ARISTOTLE, *Metaphysica* K.10, 1066a35–b1): “ostendit [Philosophus] *quot modis dicitur infinitum in actu*.” Ibid., §2315: “Utrumque autem [sc., infinitum et intransibile] dicitur [in actu] quatuor modis.” Note that, in a parallel place in his *Physics*, St. Thomas counts only three modes, the second of which (*quod est esse male transibile*) he subdivides into two.

<sup>12</sup> *In Metaph.* 11, l. 10, §2315 (cf. ARISTOTLE, *Metaphysica* K.10, 1066a35–36): “quorum primus est secundum quod infinitum sive intransibile dicitur quod non potest transiri mensurando, eo quod non est natum secundum suum genus pertransiri.” *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a3–4): “Sic igitur et uno modo dicitur infinitum, quod non est natum transiri (nam infinitum idem est quod intransibile): et hoc est quia est de genere intransibilium.”

<sup>13</sup> *In Metaph.* 11, l. 10, §2315 (cf. ARISTOTLE, *Metaphysica* K.10, 1066a36): “sicut dicimus punctum, aut unitatem, aut aliquid quod non est quantum et mensurabile, esse infinitum seu intransibile; per quem modum vox dicitur invisibilis, quia non est de genere visibilium.” *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a4): “sicut indivisibilia ut punctus et forma; per quem etiam modum dicitur vox invisibilis.”

*pertransitum, licet inceptum sit pertransiri*), since its traversal cannot be completed by us (*eius transitus non potest perfici a nobis*), for, as ARISTOTLE says, it has imperfect traversal (*habens transitionem imperfectam* < ἔχον ἀτελεύτητον, i.e., is impracticable).<sup>14</sup>

For example, if we were to say that the depth of the sea, the height of the sky, or some long, immeasurable or non-traversable road (is) *infinite* because it exceeds the virtue of the measurer (*excedit vires mensurantis*), although it would be traversable in itself.<sup>15</sup>

3. That which, of itself, can be traversed; for (the traversal) can be completed (*potest perfici*), but with difficulty (*cum difficultate*); for it is scarcely (*vix* = μόλις) traversable.<sup>16</sup>

For example, a journey to India can be said to be infinite.<sup>17</sup>

This mode (§3) and the preceding one (§2) pertain to *that which is badly traversable (quod est esse male transibile; ► 24.2, §1b)*.<sup>18</sup>

4. That which is naturally apt of being traversed or terminated according to its genus, but is not (*quod natum est habere transitionem aut terminum <secundum suum genus, sed> non habet* = ὁ πεφυκὸς ἔχει μὴ ἔχει διέξοδον ἢ πέρασ): i.e., as existing in the genus of the traversable (*quasi de genere transibiliū existens*), which, however, is not traversable to an end (*non habet transitum ad finem*).<sup>19</sup> And **this is truly and properly the infinite**.<sup>20</sup>

For example, if there should be some line or any other quantity that does not have a terminus.<sup>21</sup>

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<sup>14</sup> *In Metaph.* 11, l. 10, §2316 (cf. ARISTOTLE, *Metaphysica* K.10, 1066a36–37): “Secundo modo dicitur infinitum vel intransibile quod nondum est pertransitum, licet inceptum sit pertransiri: hoc enim est quod dicit «habens transitionem imperfectam.»” *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a4–5): “Alio modo dicitur infinitum, quod quantum est de se, transiri potest, sed eius transitus non potest perfici a nobis.”

<sup>15</sup> *In Metaph.* 11, l. 10, §2317: “Ut si dicamus profunditatem maris infinitam, vel altitudinem caeli, vel aliquam viam longam immensurabilem seu intransibilem seu infinitam: quia excedit vires mensurantis, licet in se sit transibilis.” *In Physic.* 3, l. 7, n. 9: “sicut si dicatur profunditas maris esse infinita.”

<sup>16</sup> *In Metaph.* 11, l. 10, §2317 (cf. ARISTOTLE, *Metaphysica* K.10, 1066a37): “Tertius modus est secundum quod dicitur infinitum vel intransibile quod vix transitur.” *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a5): “Alio modo dicitur infinitum, quod quantum est de se, transiri potest, sed eius transitus [...] potest perfici, tamen vix et cum difficultate, sicut si dicamus quod iter usque in Indiam est infinitum. Et utrumque istorum pertinet ad hoc quod est esse male transibile.”

<sup>17</sup> *In Physic.* 3, l. 7, n. 9: “sicut si dicamus quod iter usque in Indiam est infinitum.”

<sup>18</sup> *In Physic.* 3, l. 7, n. 9: “Et utrumque istorum pertinet ad hoc quod est esse male transibile.”

<sup>19</sup> *In Metaph.* 11, l. 10, §2318 (cf. ARISTOTLE, *Metaphysica* K.10, 1066a37–b1): “Quartus modus est secundum quod dicitur infinitum illud quod natum est habere transitionem aut terminum secundum suum genus, sed non habet.” *In Physic.* 3, l. 7, n. 9 (cf. ARISTOTLE, *Physica* Γ.4, 204a5–6): “Tertio modo dicitur infinitum, quod est natum transiri quasi de genere transibiliū existens, quod tamen non habet transitum ad finem.”

<sup>20</sup> *In Metaph.* 11, l. 10, §2318: “Et hoc est vere et proprie infinitum.” *In Physic.* 3, l. 7, n. 9: “et sic proprie dicitur infinitum.”

<sup>21</sup> *In Metaph.* 11, l. 10, §2318: “Putat si sit linea aliqua interminata.” *In Physic.* 3, l. 7, n. 9: “ut si esset aliqua linea non habens terminum, vel quaecumque alia quantitas.”

#### 24.4. The Infinite is Found Only in Quantities

(From the above division), *infinite* is said in two modes:<sup>22</sup>

1. **Negatively** (► 42.2, ¶1): *that which does not have an end (quod non habet finem*; this corresponds to the first mode, since it is a negation outside of a genus).
2. **Privatively** (► 42.2, ¶2; 42.8): *that which is naturally apt to have an end and does not have it (quod natum est habere finem et non habet)*; and this infinite **is found only in quantities**.

(As discussed above; ► 8.8) *end* or *terminus* is said of the terminus of a quantity, as the point (is said to be the end or terminus) of the line.<sup>23</sup> In this mode, *finite* and *infinite* are said from position (*a positione*) and from privation (*a privatione*) of such an end, insofar as it is an affection (*passio*) of quantity, which is found only in corporeal things.

*Privation* belongs to the *ratio* of *infinite* because *being in potency (ens in potentia)* has the *ratio* of *infinite* only insofar as it is under the *ratio* of *privation* (► 42.7).<sup>24</sup> (Indeed, *that which is badly traversable—infinite in act* of modes 2 and 3, above—is intrinsically finite; it is infinite only in respect of something extrinsic.)

Speaking by itself, *infinite*—as well as *finite*—is only in quantity, as ARISTOTLE says.<sup>25</sup>

The infinite is a universal affection (*passio... universalis*) of any quantum, including motion (i.e., including quanta *secundum posterius*, such as motion).<sup>26</sup>

#### 24.5. Infinite in Potency

ARISTOTLE distinguishes (three) modes in which *infinite* is said in potency:<sup>27</sup>

1. **By addition** (*appositione* = προσθέσει).<sup>28</sup>

<sup>22</sup> *De potentia*, q. 1 a. 2 co.: “infinitem dicitur dupliciter. Uno modo privative; et sic dicitur infinitum quod natum est habere finem et non habet: tale autem infinitum non invenitur nisi in quantitativibus. Alio modo dicitur infinitum negative, id est quod non habet finem.”

<sup>23</sup> *In Sent.* 1, d. 43 q. 1 a. 1 co.: “Uno modo [finis vel terminus dicitur] terminus quantitatis, sicut punctus lineae; et hoc modo dicitur a positione et a privatione talis finis, finitum et infinitum, secundum quod est passio quantitatis; et sic non sunt in incorporeis.”

<sup>24</sup> *In Metaph.* 2, l. 4, §329: “privatio est de ratione infiniti. Non enim ens in potentia habet rationem infiniti, nisi secundum quod est sub ratione privationis.”

<sup>25</sup> *In Physic.* 1, l. 4, n. 3: “infinitem per se loquendo non est nisi in quantitate.” Cf. ARISTOTLE, *Physica* A.2, 185b2–3: “ὁ γὰρ τοῦ ἀπείρου λόγος τῷ ποσῷ προσχρῆται.” *De veritate*, q. 29 a. 3 co., 137–139: “finitum et infinitum circa quantitatem intelliguntur, ut patet per Philosophum in I Physicorum.”

<sup>26</sup> *In Metaph.* 11, l. 10, §2314: “Philosophus [...] determinat *de infinito*, quod est passio motus et cuiuslibet quanti universalis.”

<sup>27</sup> *In Metaph.* 11, l. 10, §2314 (cf. ARISTOTLE, *Metaphysica* K.10, 1066b1): “ostendit [Philosophus...] quot modus dicitur infinitum in potentia.” Ibid., §2319: “Ostendit *quot modis dicitur infinitum in potentia*.”

<sup>28</sup> *In Metaph.* 11, l. 10, §2319 (cf. ARISTOTLE, *Metaphysica* K.10, 1066b1): “dicit [Philosophus] quod dicitur infinitum uno modo appositione.”

For example, number (is said to be infinite) because a unit can always be added to any given number; and in this way, number is infinitely increasable (*augmentabilis in infinitum*).<sup>29</sup>

**2. By removal** (*ablatione* = ἀφαίρεσις) and **division** (*divisione*).<sup>30</sup>

In this mode, magnitude is said (to be) *infinitely divisible* (*divisibilis in infinitum*).<sup>31</sup>

**3. By one and the other** (*utrinque* = ἄμφω: i.e., by addition and removal/division).<sup>32</sup>

For example, time is said (to be) *infinite* both by division, because it is a continuum, and by addition, because it is a number (i.e., the number of a motion according to prior and posterior).<sup>33</sup> Likewise, motion is infinite in this mode.

#### 24.6. Is There Something Infinite?

As ARISTOTLE says, it is manifest that, if there simply (*simpliciter* = ἀπλῶς) is no infinite, many impossible (consequences would) happen:<sup>34</sup>

1. Against those who posit the eternity of the world, time would have principle and end.<sup>35</sup>
2. It would follow that a magnitude is not always divisible into magnitudes—but every magnitude *is* divisible.<sup>36</sup> Therefore, through the division of magnitude, sometimes we would arrive at some (parts) that are not magnitudes.
3. It would also follow that a number cannot be increased infinitely.<sup>37</sup>

Therefore, it is necessary to say in what mode there is or there is not (an infinite).<sup>38</sup>

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<sup>29</sup> *In Metaph.* 11, l. 10, §2319: “sicut numerus. Semper enim cuilibet numero dato est apponere unitatem, et sic numerus est augmentabilis in infinitum.”

<sup>30</sup> *In Metaph.* 11, l. 10, §2320 (cf. ARISTOTLE, *Metaphysica* K.10, 1066b1): “Alius modus secundum quod infinitum dicitur ablatione et divisione.”

<sup>31</sup> *In Metaph.* 11, l. 10, §2320: “secundum quod magnitudo dicitur divisibilis in infinitum.”

<sup>32</sup> *In Metaph.* 11, l. 10, §2321 (cf. ARISTOTLE, *Metaphysica* K.10, 1066b1): “Tertius modus contingit utrinque.”

<sup>33</sup> *In Metaph.* 11, l. 10, §2321: “sicut tempus dicitur infinitum et divisione, quia continuum est, et appositione, quia numerus est. Et similiter etiam in motu infinitum est.”

<sup>34</sup> *In Physic.* 3, l. 10, n. 2 (cf. ARISTOTLE, *Physica* Γ.6, 206a9–10): “manifestum est quod si infinitum simpliciter non sit, quod multa impossibilia accidunt.”

<sup>35</sup> *In Physic.* 3, l. 10, n. 2 (cf. ARISTOTLE, *Physica* Γ.6, 206a10–11): “Quorum unum est quod tempus habebit principium et finem: quod reputatur inconueniens secundum ponentes aeternitatem mundi.”

<sup>36</sup> *In Physic.* 3, l. 10, n. 2 (cf. ARISTOTLE, *Physica* Γ.6, 206a11): “sequetur quod magnitudo non semper sit divisibilis in magnitudines, sed quandoque deveniatur per divisionem magnitudinum ad quaedam quae non sunt magnitudines: sed omnis magnitudo est divisibilis.”

<sup>37</sup> *In Physic.* 3, l. 10, n. 2 (cf. ARISTOTLE, *Physica* Γ.6, 206a1–12): “Item sequetur quod numerus non augeatur in infinitum.”

<sup>38</sup> *In Physic.* 3, l. 10, n. 2 (cf. ARISTOTLE, *Physica* Γ.6, 206a12–14): “igitur [...] necesse est dicere quod quodammodo est, quodammodo non est.”

## 24.7. Infinite Simply vs. Infinite According to Something

That which is infinite in all modes can only be one.<sup>39</sup> Whence, ARISTOTLE says that, since a body has dimensions towards every part (*est ad omnem partem dimensionatum*), it is impossible for there to be multiple infinite bodies.

Indeed, when something is said to be infinite, *infinite* must be taken according to its (own, proper) *ratio*.<sup>40</sup> Thus, if we say that a line is infinite, we understand it to be infinite according to longitude; and if we say that a surface is infinite, we understand that it is infinite according to longitude and latitude.

A body, in turn, extends towards all parts because it has all dimensions.<sup>41</sup> And in this mode, if a body should be said to be infinite, it would have to be infinite towards every part. Hence, from no part will there be something outside of it. Therefore, it is not possible that there should be more than one infinite body.

However, if something were infinite in one mode only, nothing would prevent there being multiple such infinite (things): for example, if we were to understand multiple lines infinite according to longitude drawn in some surface finite according to latitude.<sup>42</sup>

Therefore, since the infinite is not some substance but happens to (i.e., is a proper affection of) things that are said (to be) *infinite*, just as the infinite is multiplied according to diverse subjects, so is it necessary that a property of the infinite be multiplied in such a way that it would befit (*conveniat*) any one of them according to that subject.<sup>43</sup>

Now, there is some property of the infinite: that there is not something greater than the infinite.<sup>44</sup> Hence, if we take one infinite line, there is nothing in it greater than the infinite.

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<sup>39</sup> *STh* III, q. 10 a. 3 ad 3: “id quod est infinitum omnibus modis, non potest esse nisi unum, unde et Philosophus dicit, in I *de Caelo et Mundo*, quod quia corpus est ad omnem partem dimensionatum, impossibile est plura esse corpora infinita.” Cf. ARISTOTLE, *De caelo* A.7, 274b19–22.

<sup>40</sup> *In De caelo* 1, l. 13, n. 11: “Cum enim aliquid dicitur esse infinitum, oportet quod infinitum accipiatur secundum propriam eius rationem: puta, si dicamus lineam esse infinitam, intelligimus eam esse infinitam secundum longitudinem; si vero dicamus superficiem esse infinitam, intelligimus quod sit infinita secundum longitudinem et latitudinem.”

<sup>41</sup> *In De caelo* 1, l. 13, n. 11 (cf. ARISTOTLE, *De caelo* A.7, 274b19–22): “Corpus autem distenditur ad omnem partem, quia habet omnes dimensiones, ut supra dictum est: et sic, si corpus dicatur infinitum, oportet quod sit infinitum ad omnem partem; et ita ex nulla parte erit aliquid extra ipsum. Non ergo est possibile quod in corpore infinito sint plura dissimilia, quorum unumquodque sit infinitum: quia non est possibile esse plura infinita, secundum praedicta.”

<sup>42</sup> *STh* III, q. 10 a. 3 ad 3: “Si tamen aliquid esset infinitum uno modo tantum, nihil prohiberet esse plura talia infinita, sicut si intelligeremus plures lineas infinitas secundum longitudinem protractas in aliqua superficie finita secundum latitudinem.”

<sup>43</sup> *STh* III, q. 10 a. 3 ad 3: “Quia igitur infinitum non est substantia quaedam, sed accidit rebus quae dicuntur infinitae [...]; sicut infinitum multiplicatur secundum diversa subiecta, ita necesse est quod proprietas infiniti multiplicetur, ita quod conveniat unicuique eorum secundum illud subiectum.”

<sup>44</sup> *STh* III, q. 10 a. 3 ad 3: “Est autem quaedam proprietas infiniti quod infinito non sit aliquid maius. Sic igitur, si accipiamus unam lineam infinitam, in illa non est aliquid maius infinito. Et similiter, si accipiamus

Likewise, if we take any of other infinite lines, it is manifest that any one of them has infinite parts. Therefore, there must not be in *this* line something greater than all these infinite (parts), although in *another* line—and in a *third* one—there will be multiple—also infinite—parts other than these.

We see that this happens also in numbers; for the species of even numbers are infinite; and likewise, the species of odd numbers.<sup>45</sup> However, there are more even and odd numbers than even (i.e., according to determination, not according to one-to-one relation).

Therefore, nothing is greater than that which is simply infinite in respect of all (*simpliciter quoad omnia*).<sup>46</sup> On the other hand, there is nothing greater than that which is infinite according to something (*secundum aliquid*) in that order—but something greater can be taken outside of that order.

#### 24.8. *Infinite* Attributed to Matter vs. to Form

(As already discussed, matter is ended by form and form is ended by matter; ► 10.7.)

**1. Matter is perfected by the form** by which it is ended.<sup>47</sup> Hence, *infinite*, insofar as it is attributed to matter, has the *ratio of imperfect*; for it is as matter not having a form.

Thus, the infinite that befits (dimensional) quantity is the infinite that is had from the part of matter; for the terminus of (such) quantity is as its form.<sup>48</sup> A sign of this is that *figure*, which consists in the termination of (continuous) quantity (► 4), is some *form around quantity*.

If we speak of *infinite* insofar as it pertains to matter, it is evident that every existent in act has some form; and, in this way, its matter is terminated by a form.<sup>49</sup> Matter, insofar as it

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quamcumque aliarum linearum infinitarum, manifestum est quod uniuscuiusque earum partes sunt infinitae. Oportet igitur quod omnibus illis infinitis non sit aliquid maius in illa linea, tamen in alia linea et in tertia erunt plures partes, etiam infinitae, praeter istas.”

<sup>45</sup> *STh* III, q. 10 a. 3 ad 3: “Et hoc etiam videmus in numeris accidere, nam species numerorum parium sunt infinitae, et similiter species numerorum imparium; et tamen numeri et pares et impares sunt plures quam pares.”

<sup>46</sup> *STh* III, q. 10 a. 3 ad 3: “Sic igitur dicendum quod infinito simpliciter quoad omnia, nihil est maius, infinito autem secundum aliquid determinatum, non est aliquid maius in illo ordine, potest tamen accipi aliquid maius extra illum ordinem.”

<sup>47</sup> *STh* I, q. 7 a. 1 co.: “Materia autem perficitur per formam per quam finitur, et ideo infinitum secundum quod attribuitur materiae, habet rationem imperfecti; est enim quasi materia non habens formam.”

<sup>48</sup> *STh* I, q. 7 a. 1 ad 2: “terminus quantitatis est sicut forma ipsius, cuius signum est, quod figura, quae consistit in terminatione quantitatis, est quaedam forma circa quantitatem. Unde infinitum quod competit quantitanti, est infinitum quod se tenet ex parte materiae.”

<sup>49</sup> *STh* I, q. 7 a. 2 co.: “Si enim loquamur de infinito secundum quod competit materiae, manifestum est quod omne existens in actu, habet aliquam formam, et sic materia eius est terminata per formam. Sed quia materia, secundum quod est sub una forma substantiali, remanet in potentia ad multas formas accidentales; quod est finitum simpliciter, potest esse infinitum secundum quid, utpote lignum est finitum secundum suam formam, sed tamen est infinitum secundum quid, in quantum est in potentia ad figuras infinitas.” Cf. *Quodlibet* 3, q. 2 a. 1 co.; *In Sent.* 4, d. 49 q. 2 a. 1 ad 12.



is under one substantial form, remains in potency to many accidental forms. Therefore, what is simply (*simpliciter*) finite—e.g., wood is finite according to its form—can be infinite according to something (*secundum quid*) insofar as it is in potency to infinite figures.

Thus, first (i.e., prime) matter, even in respect of potency, is not simply (*simpliciter*) infinite, but (infinite) according to something (*secundum quid*), because its potency extends only to natural forms.<sup>50</sup>

**2. Form is not perfected by matter;** instead, its amplitude (*amplitudo*) is contracted (*contrahitur*) by it.<sup>51</sup> Whence, *infinite* has the *ratio* of *perfect* insofar as it is had from the part of a form not determined by matter.

If we speak of *infinite* insofar as it pertains to form, it is manifest that in this mode, those (things) whose forms are in matter are simply finite, and in no mode (are they) infinite.<sup>52</sup> Indeed, material creatures have (imperfect) infinity from the part of matter, but finitude from the part of the form, which is limited by the matter in which it is received; for a form is only limited because it is received in another—to which matter it is commensurate.

For example, if whiteness existed separated—i.e., subsistent, not in a subject—, it would be infinite in respect of the *ratio* of *whiteness*, since it would not be contracted into some subject.<sup>53</sup> Such whiteness would differ from any whiteness existing in a subject: it would be distinguished from them because it would not be *in another*; nor would it be *limited*.

## 24.9. Infinite According to Virtual Quantity

What is finite according to one quantity may be infinite according to another.<sup>54</sup> This is evident (as just discussed; ► 24.7) if each quantity taken is dimensive; for some surface can be understood (to be) finite according to latitude, and infinite according to longitude.

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<sup>50</sup> *STh* I, q. 7 a. 2 ad 3: “materia prima, etiam secundum potentiam, non est infinita simpliciter, sed secundum quid, quia eius potentia non se extendit nisi ad formas naturales.”

<sup>51</sup> *STh* I, q. 7 a. 1 co.: “Forma autem non perficitur per materiam, sed magis per eam eius amplitudo contrahitur, unde infinitum secundum quod se tenet ex parte formae non determinatae per materiam, habet rationem perfecti.”

<sup>52</sup> *STh* I, q. 7 a. 2 co.: “Si autem loquamur de infinito secundum quod convenit formae, sic manifestum est quod illa quorum formae sunt in materia, sunt simpliciter finita, et nullo modo infinita.” *Quodlibet* 7, q. 1 a. 1 ad 1: “forma non limitatur nisi ex hoc quod in alio recipitur, cui materia commensuratur.” *STh* I, q. 50 a. 2 ad 4: “Creaturae autem materiales habent infinitatem ex parte materiae, sed finitatem ex parte formae, quae limitatur per materiam in qua recipitur.”

<sup>53</sup> *STh* I, q. 50 a. 2 ad 4: “Sicut si diceremus albedinem separatam existentem esse infinitam quantum ad rationem albedinis, quia non contrahitur ad aliquod subiectum.” *Quodlibet* 7, q. 1 a. 1 ad 1: “si esset aliqua albedo existens non in subiecto, ex hoc ipso distingueretur a qualibet albedine in subiecto existente; [...] in ratione albedinis non esset recepta, et sic nec limitata.” *STh* I, q. 7 a. 1 ad 3: “si esset albedo subsistens, ex hoc ipso quod non esset in alio, differret ab omni albedine existente in subiecto.”

<sup>54</sup> *De veritate*, q. 29 a. 3 co., 155–160: “Contingit autem id quod est secundum unam quantitatem finitum, esse secundum aliam infinitum. Et hoc patet, si utraque quantitas accipiatur dimensiva; potest enim intelligi aliqua superficies finita secundum latitudinem et infinita secundum longitudinem.”

It is also evident if we take one dimensive quantity and the other virtual; for if an infinite white body were understood, whiteness would not be intensely infinite on account of this, but only extensively, by accident; for it would be possible to find something whiter.<sup>55</sup>

The same is evident notwithstanding if one and the other quantity should be virtual; for, in one and the same (subject), a diverse virtual quantity can be considered according to the diverse *ratios* of those that are predicated of the same (subject).<sup>56</sup>

For example, insofar as (the subject) is said (to be) *sensible* (*sensibilis*), (a virtual quantity can be considered in it) from the perfection of sensing (*ex perfectione sentiendi*).<sup>57</sup> And likewise of other (*ratios*).

Therefrom, insofar as (a subject) is said (to be a) *being* (*ens*), a virtual quantity can be considered in it in respect of the perfection of (the act of) being (*quantum ad perfectionem essendi*).<sup>58</sup>

#### 24.10. Limitation in Quantity of Being

Nothing prevents some creature from being infinite according to something (*secundum quid*; ►24.7).<sup>59</sup> However, every creature is simply finite (*finita simpliciter*) insofar as its (act of) being (*esse*) is not an absolute subsistent, but is limited to some nature that befalls it (*cui advenit*).

Thus, if whiteness should exist separated—i.e., subsistent, not in a subject—, it would be infinite in respect of the *ratio* of *whiteness*, since it would not be contracted into some subject (as just discussed; ►24.8).<sup>60</sup> However, its (act of) being (*esse*) would be finite, since it would be determined to some special nature (i.e., limited to the special nature of whiteness, which is a color, which is a quality; none of which is separated being).

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<sup>55</sup> *De veritate*, q. 29 a. 3 co., 160–165: “Patet etiam si accipiatur una quantitas dimensiva et alia virtualis; si enim intelligatur corpus album infinitum, non propter hoc albedo intensive infinita erit, sed solum extensive per accidens, poterit enim aliquid albius inveniri.”

<sup>56</sup> *De veritate*, q. 29 a. 3 co., 165–169: “Patet nihilominus idem si utraque quantitas sit virtualis, nam in uno et eodem diversa quantitas virtualis attendi potest secundum diversas rationes eorum quae de ipso praedicantur.”

<sup>57</sup> *De veritate*, q. 29 a. 3 co., 169; 171–173: “sicut [...] ex hoc quod dicitur sensibilis [consideratur in eo quantitas virtualis] ex perfectione sentiendi, et sic de aliis.”

<sup>58</sup> *De veritate*, q. 29 a. 3 co., 169–171: “sicut ex hoc quod dicitur ens, consideratur in eo quantitas virtualis quantum ad perfectionem essendi.”

<sup>59</sup> *STh I*, q. 50 a. 2 ad 4: “omnis creatura est finita simpliciter, inquantum esse eius non est absolutum subsistens, sed limitatur ad naturam aliquam cui advenit. Sed nihil prohibet aliquam creaturam esse secundum quid infinitam.”

<sup>60</sup> *STh I*, q. 50 a. 2 ad 4: “Sicut si diceremus albedinem separatam existentem esse infinitam quantum ad rationem albedinis, quia non contrahitur ad aliquod subiectum; esse tamen eius esset finitum, quia determinatur ad aliquam naturam specialem.” *Quodlibet 7*, q. 1 a. 1 ad 1: “si esset aliqua albedo existens non in subiecto [...]” *STh I*, q. 7 a. 1 ad 3: “si esset albedo subsistens [...]”

Likewise, if there should be some created forms non-received in matter, but subsistent by themselves, as some have opined concerning angels, they will indeed be infinite according to something: insofar as such forms are neither terminated nor contracted by some matter.<sup>61</sup> However, since a created form subsisting in this way has (an act of) being (*esse*) and (the form itself) is not its (own act of) being, it is necessary for its being to be received and contracted to a determinate nature. Whence, it cannot be simply infinite.

Thus, immaterial substances (i.e., subsistent forms) are finite according to their (act of) being (*secundum suum esse*), but infinite insofar as their forms are not received in another.<sup>62</sup> Whence, it is said in the *Book of Causes*<sup>63</sup> that (an immaterial substance) is “finite (from) above” (*superius*): i.e., insofar as it receives (its act of) being from its superior; but “infinite (from) below” (*inferius*), insofar as it is not received in some matter.

#### 24.11. Formal vs. Quantitative Division

Division causes multitude (►40.2).<sup>64</sup> However, division is twofold (►40.4):

**1. Formal division**, which is *by opposites*. This division causes a multitude that is of transcendentals, according to which *being* is divided by *one* and *many*.<sup>65</sup> The multitude that follows upon the formal division of things cannot be infinitely multiplied; for there are determinate species of things, as (there is) also a determinate quantity of universe.

**2. Division according to quantity**. The division of continuous quantity causes number, which is a species of quantity insofar as it has the *ratio* of *measure*.<sup>66</sup> And this number is infinitely multipliable, just as magnitude is infinitely divisible. Whence, ARISTOTLE says that this number that is infinitely multiplied is not separated from the division of the continuum.

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<sup>61</sup> *STh* I, q. 7 a. 2 co.: “Si autem sint aliquae formae creatae non receptae in materia, sed per se subsistentes, ut quidam de Angelis opinantur, erunt quidem infinitae secundum quid, in quantum huiusmodi formae non terminantur neque contrahuntur per aliquam materiam, sed quia forma creata sic subsistens habet esse, et non est suum esse, necesse est quod ipsum eius esse sit receptum et contractum ad determinatam naturam. Unde non potest esse infinitum simpliciter.”

<sup>62</sup> *STh* I, q. 50 a. 2 ad 4: “Substantiae autem immateriales creatae sunt finitae secundum suum esse, sed infinitae secundum quod eorum formae non sunt receptae in alio. [...] Et propter hoc dicitur in libro *de Causis*, quod intelligentia est *finita superius*, in quantum scilicet recipit esse a suo superiori; sed est *infinita inferius*, in quantum non recipitur in aliqua materia.”

<sup>63</sup> A work once attributed to ARISTOTLE, but which St. Thomas rightly identified as having been taken mostly from the *Elements of Theology*, by PROCLUS.

<sup>64</sup> *In Physic.* 3, l. 12, n. 5: “divisio [...] multitudinem causat. Est autem duplex divisio: una formalis, quae est per opposita; et alia secundum quantitatem.”

<sup>65</sup> *In Physic.* 3, l. 12, n. 5: “Prima autem divisio causat multitudinem, quae est de transcendentibus, secundum quod ens dividitur per unum et multa [...]: sed multitudo quae sequitur divisionem formalem rerum, non multiplicatur in infinitum; sunt enim determinatae species rerum, sicut et determinata quantitas universi.”

<sup>66</sup> *In Physic.* 3, l. 12, n. 5: “divisio continuae quantitatis causat numerum, qui est species quantitatis, in quantum habet rationem mensurae. Et hic numerus multiplicabilis est in infinitum, sicut et magnitudo divisibilis est in infinitum.” Ibid. (cf. ARISTOTLE, *Physica* Γ.7, 207b13–14): “Et ideo dicit [Philosophus] quod hic numerus, qui multiplicatur in infinitum, non separatur a divisione continui.”

Nor is this number infinite in such a way that (it would be) something permanent, but as something that always exists in coming-to-be, insofar as (something) is successively added over whatever given number; as is (the case) also of time, and of the number of time; for the number of time grows successively by addition of day to day, but not (in such a way) that all days should be simultaneous.<sup>67</sup>

#### 24.12. The Infinite Virtue of Reason

Our intellect receives cognition of things through abstract species, which are likenesses (►21.4) of forms and not of matters or of the material dispositions that are the principles of individuation.<sup>68</sup> Whence, our intellect can only know universals, and not singulars.

Therefore, our intellect cannot consider many (things) simultaneously in act.<sup>69</sup> And thus, if it should know infinite things (by) considering them, it would have to enumerate infinite (things) one after one, which is against the *ratio* of *infinite* (*in act*). However, our intellect can know infinite (things) virtually and in potency—for example, all the species of numbers or of proportions—insofar as it has a sufficient principle to know all (things). Hence, our intellect knows *in potency and in virtue* the infinite (things) *of which it has the principle of cognition*.<sup>70</sup>

Reason is in some mode of infinite virtue insofar as it can consider something infinitely, as is apparent in the addition of numbers and of lines.<sup>71</sup> Whence, the infinite—taken in some mode—is proportionate to reason; for also the universal that reason apprehends is in some mode infinite, insofar as it contains infinite singulars in potency.

It is impossible for there to be an infinite virtue in a body.<sup>72</sup> However, the possible intellect is of infinite virtue in some mode; for through it we judge infinite things according to number

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<sup>67</sup> *In Physic.* 3, l. 12, n. 5 (cf. ARISTOTLE, *Physica* Γ.7, 207b14–15): “Neque tamen hic numerus sic est infinitus, sicut aliquid permanens, sed sicut semper in fieri existens, in quantum successive additur supra quemlibet numerum datum; sicuti etiam est de tempore et de numero temporis. Numerus enim temporis crescit successive per additionem diei ad diem, non quod omnes dies sint simul.”

<sup>68</sup> *Comp. th.* 1, c. 133, 12–18: “intellectus noster cognitionem de rebus accipit per species abstractas, que sunt similitudines formarum et non materie, nec materialium dispositionum que sunt individuationis principia: unde intellectus noster singularia cognoscere non potest, sed solum uniuersalia.”

<sup>69</sup> *Comp. th.* 1, c. 133, 25–33: “Intellectus enim noster non potest simul actu plura considerare, et sic si infinita cognosceret considerando ea, oporteret quod numeraret infinita unum post unum, quod est contra rationem infiniti; sed uirtute et in potentia intellectus noster infinita cognoscere potest, utpote omnes species numerorum uel proportionum, in quantum habet sufficiens principium ad omnia cognoscenda.”

<sup>70</sup> *Comp. th.* 1, c. 133, 38–40: “intellectus noster potentia et uirtute cognoscit infinita quorum cognitionis principium habet.”

<sup>71</sup> *STh* I-II, q. 30 a. 4 ad 2: “ratio quodammodo est virtutis infinitae in quantum potest in infinitum aliquid considerare, ut apparet in additione numerorum et linearum. Unde infinitum aliquo modo sumptum, est proportionatum rationi. Nam et uniuersale, quod ratio apprehendit, est quodammodo infinitum, in quantum in potentia continet infinita singularia.”

<sup>72</sup> *ScG* 2, 59 n. 6: “Impossibile est in corpore esse virtutem infinitam: ut probatur ab Aristotele in VIII Physicor. Intellectus autem possibilis est quodammodo virtutis infinitae: iudicamus enim per ipsum res

insofar as by it we know universals, under which are comprehended infinite particulars in potency. Therefore, the possible intellect is not a virtue in a body.

### 24.13. Cognition of the Infinite

Cognition extends to many or few according to the virtue of the mean of knowing.<sup>73</sup> For example, the likeness that is received in sight is determined according to the particular conditions of the thing; whence, it is conducive to the cognition of only one thing.

On the other hand, the likeness of the thing received in the intellect is detached (*absoluta*) from particular conditions.<sup>74</sup> Whence, since it is thus loftier (*elevation*), it is conducive into many. And since one universal form is naturally apt to be participated by infinite singulars, it is therefrom that the intellect knows infinite (things) in some mode.

However, since the likeness that is in the intellect does not lead to the cognition of the singular in respect of those (conditions) whereby singulars are distinguished one from another, but only in respect of (their) common nature, it is therefrom that our intellect, through the species that it has in itself, is cognitive of infinite (things) only in potency.<sup>75</sup>

(Again), nothing prevents one thing from being infinite in one mode and finite in another mode: for example, (again) if a body should be infinite in longitude but finite in latitude.<sup>76</sup> And (this) can (happen) likewise in forms: for example, if we posit some infinite body to be white, the extensive quantity of whiteness—according to which (whiteness) is said to be a quantum by accident—will be infinite, while its quantity by itself—that is, (its) intensive (quantity)—would nonetheless be finite. And the same is (true) of any other form of an infinite body, since every form received in some matter is ended (*finitur*) according to the mode of the recipient and does not have—in this mode—an infinite intension.

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infinitas secundum numerum, in quantum per ipsum cognoscimus universalia, sub quibus comprehenduntur particularia infinita in potentia. Non est igitur intellectus possibilis virtus in corpore.”

<sup>73</sup> *De veritate*, q. 2 a. 9 co.: “secundum virtutem medii cognoscendi, cognitio ad multa vel ad pauca se extendit; sicut similitudo quae recipitur in visu, est determinata secundum particulares condiciones rei, unde non est ductiva in cognitionem nisi unius rei.”

<sup>74</sup> *De veritate*, q. 2 a. 9 co.: “sed similitudo rei recepta in intellectu, est absoluta a particularibus conditionibus, unde cum sic elevatior, est ductiva in plura. Et quia una forma universalis nata est ab infinitis singularibus participari, inde est quod intellectus quodammodo infinita cognoscit.”

<sup>75</sup> *De veritate*, q. 2 a. 9 co.: “Sed quia illa similitudo quae est in intellectu, non ducit in cognitionem singularis quantum ad ea quibus singularia ad invicem distinguuntur, sed solum quantum ad naturam communem; inde est quod intellectus noster per speciem quam habet apud se non est cognoscitivus infinitorum nisi in potentia.”

<sup>76</sup> *De veritate*, q. 2 a. 9 co.: “Nihil prohibet aliquid esse infinitum uno modo, et alio modo finitum: ut si aliquod corpus esset quidem longitudine infinitum, sed latitudine finitum; et similiter potest esse in formis: ut si aliquod corpus infinitum ponamus esse album, quantitas albedinis extensiva, secundum quam dicitur quanta per accidens, erit infinita; quantitas autem eius per se, scilicet intensiva, nihilominus esset finita; et similiter est de quacumque alia forma corporis infiniti: quia omnis forma recepta in aliqua materia finitur ad modum recipientis, et ita non habet intensionem infinitam.”

Now the infinite, just as it is incompatible with (*repugnat*) cognition, so too is it incompatible with traversal; for the infinite can neither be known nor can it be traversed.<sup>77</sup> Nonetheless, if something were to be set in motion over an infinite (magnitude), but not through the way of its infinity, it could be traversed. For example, what is infinite in longitude and finite in latitude can be traversed through (its) latitude, but not (through its) longitude.

In the same mode, too, if some infinite were to be known through the way in which it is infinite, it would in no mode be perfectly knowable.<sup>78</sup> On the other hand, if it were known not by the infinite way, it could be perfectly known in this way; for the *ratio* of *infinite* befits (*congruit*) quantity; and every quantity has, from its *ratio*, an *order of parts*. It follows that the infinite is known through the way of the infinite when it is apprehended *part after part*.

Whence, if our intellect had to know an infinite white body, it could in no mode know it perfectly—nor (could it perfectly know) its whiteness.<sup>79</sup> However, if it were to know the nature itself of whiteness or of corporeity that is found in an infinite body, it would in this way know an infinite perfectly in respect of all its parts, but not through the way of the infinite.

In this mode (i.e., through the way of the species, which is a likeness of the thing; ►24.12, 21.4), it is possible for our intellect to perfectly know—in some mode—an infinite continuum.<sup>80</sup> However, in no mode (can our intellect know) infinite (things) discretely (i.e., singularly), because it cannot know many (things singularly) through one species. Wherefrom, if (our intellect) is to consider many (things), it must know one after another; and in this way, it knows a discrete quantity through the way of the infinite. Whence, if it were to know an infinite multitude in act, it would follow that it would know an infinite through the way of the infinite, which is impossible.

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<sup>77</sup> *De veritate*, q. 2 a. 9 co.: “Infinitem autem, sicut repugnat cognitioni, ita et repugnat transitioni: infinitum enim nec cognosci nec transiri potest: nihilominus tamen, si aliquid moveatur super infinitum non per viam infinitatis suae, transiri poterit; sicut quod est infinitum longitudine, et latitudine finitum, potest pertransiri latitudine, sed non longitudine.”

<sup>78</sup> *De veritate*, q. 2 a. 9 co.: “ita etiam si aliquod infinitum cognoscatur per viam per quam est infinitum, nullo modo perfecte cognosci potest; si autem cognoscatur non per viam infiniti, sic perfecte cognosci poterit: quia enim infiniti ratio congruit quantitati, secundum Philosophum in I Phys., omnis autem quantitas de sui ratione habet ordinem partium; sequitur quod tunc infinitum per viam infiniti cognoscatur, quando apprehenditur pars post partem.”

<sup>79</sup> *De veritate*, q. 2 a. 9 co.: “Unde si sic debeat intellectus noster cognoscere corpus album infinitum, nullo modo cognoscere poterit perfecte ipsum, neque albedinem eius; si autem cognoscat ipsam naturam albedinis vel corporeitatis, quae invenitur in corpore infinito, sic cognoscat infinitum perfecte quantum ad omnes partes eius, non tamen per viam infiniti.”

<sup>80</sup> *De veritate*, q. 2 a. 9 co.: “et sic possibile est ut intellectus noster quodammodo infinitum continuum perfecte cognoscat; sed infinita discrete nullo modo, eo quod non potest per unam speciem multa cognoscere; et inde est quod si multa debet considerare, oportet quod unum post alterum cognoscat, et ita quantitatem discretam per viam infiniti cognoscit. Unde si cognosceret infinitam multitudinem in actu, sequeretur quod cognosceret infinitum per viam infiniti; quod est impossibile.”

## 25. The Infinite in Dimensive Quantity

*In this chapter we provide greater detail about the way in which there is—and the way in which there is not—an infinite in dimensive quantity and in mathematics.*

### 25.1. No Actual Infinite in Magnitude

To be infinite according to one's essence and according to magnitude is not the same.<sup>1</sup> Given that there should be some infinite body according to magnitude—for example, some element—, it would not however be infinite according to essence, because its essence would be terminated at some species by a form; and at some individual, by matter.

Since no creature is infinite according to essence (► 24.10), it remains to inquire whether some creature is infinite *according to magnitude*.<sup>2</sup>

**Body**, which is a complete (i.e., perfect) magnitude, is taken in two (modes; ► 46.10):<sup>3</sup>

1. **Naturally**, insofar as matter and form is considered in it (i.e., in the body).

Concerning the natural body, it is manifest that it cannot be infinite; for every natural body has some determinate substantial form.<sup>4</sup> Hence, since accidents follow upon a substantial

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<sup>1</sup> *STh I*, q. 7 a. 3 co.: “aliud est esse infinitum secundum suam essentiam, et secundum magnitudinem. Dato enim quod esset aliquod corpus infinitum secundum magnitudinem, utpote ignis vel aer, non tamen esset infinitum secundum essentiam, quia essentia sua esset terminata ad aliquam speciem per formam, et ad aliquod individuum per materiam.”

<sup>2</sup> *STh I*, q. 7 a. 3 co.: “Et ideo, habito ex praemissis quod nulla creatura est infinita secundum essentiam, adhuc restat inquirere utrum aliquid creatum sit infinitum secundum magnitudinem.”

<sup>3</sup> *STh I*, q. 7 a. 3 co.: “Sciendum est igitur quod corpus, quod est magnitudo completa, dupliciter sumitur, scilicet mathematice, secundum quod consideratur in eo sola quantitas; et naturaliter, secundum quod consideratur in eo materia et forma.”

<sup>4</sup> *STh I*, q. 7 a. 3 co.: “Et de corpore quidem naturali, quod non possit esse infinitum in actu, manifestum est. Nam omne corpus naturale aliquam formam substantialem habet determinatam, cum igitur ad formam substantialem consequantur accidentia, necesse est quod ad determinatam formam consequantur determinata accidentia; inter quae est quantitas. Unde omne corpus naturale habet determinatam quantitatem et in maius et in minus. Unde impossibile est aliquod corpus naturale infinitum esse.” St. Thomas adds other, physical arguments through which the same conclusion is reached, saying that this is evident also from motion, for every natural body has some natural motion, and an infinite body could not have some natural motion: neither straight, because something is moved naturally in straight motion only when it is outside of its place, which cannot happen to an infinite body, for it would occupy all places and, in this way, any place would be its place indifferently; nor, likewise, according to circular motion, for in circular motion one part of the body must be transferred to the place in which another part was; which in a circular body, if it is posited (to be) infinite, cannot be, for two lines drawn from the center, the longer they are protracted from the center, the more they will be distant from each other; therefore, if the body is infinite, the lines would be infinitely distant from each other, and in this mode one could never arrive to the place of another. *STh I*, q. 7 a. 3 co.: “Hoc etiam ex motu patet. Quia omne corpus naturale habet aliquem motum naturalem. Corpus autem infinitum non posset habere aliquem motum naturalem, nec rectum, quia nihil movetur naturaliter motu recto, nisi cum est extra suum locum, quod corpori infinito accidere non posset; occuparet enim omnia loca, et sic indifferenter quilibet locus esset locus eius. Et similiter etiam neque secundum motum circularem. Quia in motu circulari oportet quod una pars corporis transferatur ad locum in quo fuit alia pars; quod in corpore circulari, si ponatur infinitum, esse non posset, quia duae lineae protractae a centro, quanto longius protrahuntur a centro, tanto longius distant ab invicem; si ergo corpus esset infinitum, in infinitum lineae distarent ab invicem, et sic una nunquam posset pervenire ad locum alterius.” These and other reasons (physical and logical) are in ARISTOTLE'S

form, it is necessary that determinate accidents follow upon a determinate form—among which (accidents) is quantity. Whence, a natural body has a determinate quantity, both in the greater and in the lesser. Therefore, it is impossible for some natural body to be infinite.

**2. Mathematically**, insofar as only quantity is considered in it (i.e., in the body).

The same reason is (true) also concerning a mathematical body; for if we were to imagine a mathematical body existing in act, we would have to imagine it under some form, since something is in act only through its form.<sup>5</sup> Whence, since **figure** is *the form of the quantum as such*, it would have to have some figure. And in this way, it will be finite; for it is a figure, which is comprehended within a terminus or within termini (► 4.3; 36.5).

Although the infinite is not against the *ratio of magnitude* in common, it is however against the *ratio* of whichever of its species: e.g., against the *ratio* of *a magnitude of two cubits* or *of three cubits*—whether circular, triangular, or something like this.<sup>6</sup> And it is impossible for that which is not in a species to be in a genus. Whence, it is not possible for there to be some infinite magnitude, since no species of magnitude is infinite.

The infinite that befits quantity is had from the part of matter (► 24.8).<sup>7</sup> And matter is reached by the division of the whole; for parts are related in the *ratio* of *matter* (► 13.1); on the other hand, the whole, which is had in the *ratio* of *form*, is reached by addition. Hence, no infinite is found in the addition of magnitude: rather, only in division (is found).

Motion and time are not in act according to the whole, but successively; whence, they have potency mixed with act; but magnitude is whole in act.<sup>8</sup> Hence, the infinite that befits quantity and is had from the part of matter is incompatible with (*repugnat*) the totality of magnitude, but not with the totality of time or of motion; for being in potency befits matter.

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works. See *Metaphysica* K.10, 1066a35–1067a37; *Physica* Γ.4–8, 202b30–208a23; *De caelo* A.5–7, 271b1–276a17; and the corresponding commentaries by St. Thomas.

<sup>5</sup> *STh* I, q. 7 a. 3 co.: “De corpore etiam mathematico eadem ratio est. Quia si imaginemur corpus mathematicum existens actu, oportet quod imaginemur ipsum sub aliqua forma, quia nihil est actu nisi per suam formam. Unde, cum forma quanti, in quantum huiusmodi, sit figura, oportebit quod habeat aliquam figuram. Et sic erit finitum, est enim figura, quae termino vel terminis comprehenditur.”

<sup>6</sup> *STh* I, q. 7 a. 3 ad 2: “licet infinitum non sit contra rationem magnitudinis in communi, est tamen contra rationem cuiuslibet speciei eius, scilicet contra rationem magnitudinis bicubitae vel tricubitae, sive circularis vel triangularis, et similibus. Non autem est possibile in genere esse quod in nulla specie est. Unde non est possibile esse aliquam magnitudinem infinitam, cum nulla species magnitudinis sit infinita.”

<sup>7</sup> *STh* I, q. 7 a. 3 ad 3: “infinitum quod convenit quantitati, ut dictum est, se tenet ex parte materiae. Per divisionem autem totius acceditur ad materiam, nam partes se habent in ratione materiae, per additionem autem acceditur ad totum, quod se habet in ratione formae. Et ideo non invenitur infinitum in additione magnitudinis, sed in divisione tantum.”

<sup>8</sup> *STh* I, q. 7 a. 3 ad 4: “motus et tempus non sunt secundum totum in actu, sed successive, unde habent potentiam permixtam actui. Sed magnitudo est tota in actu. Et ideo infinitum quod convenit quantitati, et se tenet ex parte materiae, repugnat totalitati magnitudinis, non autem totalitati temporis vel motus, esse enim in potentia convenit materiae.”



## 25.2. Infinite Multitude: By Itself vs. by Accident

A multitude is said (to be) *infinite*:<sup>9</sup>

1. **By itself**, when it is required for something that the multitude be infinite (*quando requiritur ad aliquid ut multitudo infinita sit*).<sup>10</sup>

It is impossible for this to be, because something would then have to depend on infinities; whence, its generation would never be completed, since infinities cannot be traversed.<sup>11</sup>

2. **By accident**, when it is not required for something that the multitude be infinite, but it happens to be so (*sed accidit ita esse*).<sup>12</sup>

This (mode) can be manifested in the operation of an artificer, for which some multitude is required by itself: to wit, that there be an art in the soul, a hand that moves, and a hammer.<sup>13</sup> And if this multitude were to be infinitely multiplied, the artwork would never be completed, because it would depend on infinite causes.

On the other hand, a multitude of hammers that occurs because one breaks and another is taken, is a multitude by accident; for it happens that (the artwork) would be operated by multiple hammers; and it makes no difference whether it would be operated by one, two, many, or infinite (hammers), if it would be operated in infinite time.<sup>14</sup>

## 25.3. No Actual Infinite in Multitude

Some, like AVICENNA and ALGAZEL, have said that it is impossible for there to be an infinite multitude in act by itself, but that it is not impossible for an infinite multitude to be in act by accident in the mode just described.<sup>15</sup> However, this is impossible because every multitude has to be in some species of multitude, and the species of multitude are

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<sup>9</sup> *STh I*, q. 7 a. 4 co.: “Dicitur enim multitudo esse infinita per se [...]. Per accidens autem dicitur multitudo infinita [...].”

<sup>10</sup> *STh I*, q. 7 a. 4 co.: “Dicitur enim multitudo esse infinita per se, quando requiritur ad aliquid ut multitudo infinita sit.”

<sup>11</sup> *STh I*, q. 7 a. 4 co.: “Et hoc est impossibile esse, quia sic oporteret quod aliquid dependeret ex infinitis; unde eius generatio nunquam completeretur, cum non sit infinita pertransire.”

<sup>12</sup> *STh I*, q. 7 a. 4 co.: “Per accidens autem dicitur multitudo infinita, quando non requiritur ad aliquid infinitas multitudinis, sed accidit ita esse.”

<sup>13</sup> *STh I*, q. 7 a. 4 co.: “Et hoc sic manifestari potest in operatione fabri, ad quam quaedam multitudo requiritur per se, scilicet quod sit ars in anima, et manus movens, et martellus. Et si haec in infinitum multiplicarentur, nunquam opus fabrile completeretur, quia dependeret ex infinitis causis.”

<sup>14</sup> *STh I*, q. 7 a. 4 co.: “Sed multitudo martellorum quae accidit ex hoc quod unum frangitur et accipitur aliud, est multitudo per accidens, accidit enim quod multis martellis operetur; et nihil differt utrum uno vel duobus vel pluribus operetur, vel infinitis, si infinito tempore operaretur.”

<sup>15</sup> *STh I*, q. 7 a. 4 co.: “Quidam enim, sicut Avicenna et Algazel, dixerunt quod impossibile est esse multitudinem actu infinitam per se, sed infinitam per accidens multitudinem esse, non est impossibile. Et hoc sic manifestari potest in operatione fabri [...]. Per hunc igitur modum, posuerunt quod possibile est esse actu multitudinem infinitam per accidens.”

according to the species of numbers; but no species of number is infinite, since any number is a multitude *measured* by one (►2.1).<sup>16</sup> Whence, it is impossible for there to be an infinite multitude in act, whether by itself or by accident.

(In other words, the argument used to prove that there are no infinite magnitudes is true also for multitudes. Since any number is *a whole composed from units*, the multitude of unit-parts is as its matter; and since it is *a whole measured by one*, the measure itself is as its form-whole; ►13.1. Now if this form should be infinite, it would be indeterminate; and an indeterminate form constitutes a genus; ►14.12. But there is no genus without species; ►14.14. Therefore, an infinite multitude is opposed to whatever species of multitude in the same way that a genus is opposed to its species: to wit, according to the opposition of the unsigned to the signed; for the designation of the species in respect of the genus is by a constitutive difference, which is taken from the form of the thing; ►14.15. Thus, a multitude cannot be simultaneously differentiated and undetermined).<sup>17</sup>

On the other hand, an infinite multitude in potency is possible because the increase of multitude follows upon the division of magnitude: the more something is divided, the greater the resultant plurality is according to number.<sup>18</sup> Whence, just as an infinite is found in potency in the division of a continuum, since (division) proceeds towards matter, for the same reason also an infinite is found in potency in the addition of multitude.

#### 25.4. How the Infinite is in Potency

ARISTOTLE shows how the infinite would be in potency; for something is found (to be) in potency in two modes:<sup>19</sup>

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<sup>16</sup> *STh* I, q. 7 a. 4 co.: “Sed hoc est impossibile. Quia omnem multitudinem oportet esse in aliqua specie multitudinis. Species autem multitudinis sunt secundum species numerorum. Nulla autem species numeri est infinita, quia quilibet numerus est multitudo mensurata per unum. Unde impossibile est esse multitudinem infinitam actu, sive per se, sive per accidens.” St. Thomas adds another argument from creation, in *ibid.*: “Item, multitudo in rerum natura existens est creata, et omne creatum sub aliqua certa intentione creantis comprehenditur, non enim in vanum agens aliquod operatur. Unde necesse est quod sub certo numero omnia creata comprehendantur. Impossibile est ergo esse multitudinem infinitam in actu, etiam per accidens.”

<sup>17</sup> Cf. *STh* I, q. 7 a. 4 ad 3: “Ad tertium [sc., *ea quae non opponuntur ad invicem, non impediunt se invicem. Sed, posita aliqua multitudine rerum, adhuc possunt fieri alia multa quae eis non opponuntur, ergo non est impossibile aliqua iterum simul esse cum eis, et sic in infinitum. Ergo possibile est esse infinita in actu*] dicendum quod, licet, quibusdam positis, alia poni non sit eis oppositum; tamen infinita poni opponitur cuilibet speciei multitudinis. Unde non est possibile esse aliquam multitudinem actu infinitam.”

<sup>18</sup> *STh* I, q. 7 a. 4 co.: “Sed esse multitudinem infinitam in potentia, possibile est. Quia augmentum multitudinis consequitur divisionem magnitudinis, quanto enim aliquid plus dividitur, tanto plura secundum numerum resultant. Unde, sicut infinitum invenitur in potentia in divisione continui, quia proceditur ad materiam, ut supra ostensum est; eadem ratione etiam infinitum invenitur in potentia in additione multitudinis.”

<sup>19</sup> *In Physic.* 3, l. 10, n. 4: “ostendit [Philosophus] quomodo infinitum sit in potentia. Dupliciter enim invenitur aliquid in potentia.”

1. Such that the whole can be reduced into act.<sup>20</sup>

For example, it is possible for this bronze to be a statue, which will at some time will be a statue.<sup>21</sup> However, the infinite is not said to be in potency in this mode, such that it would thereafter be in act.<sup>22</sup>

2. Such that **it comes to be** a being in act not simultaneously but **successively**.<sup>23</sup>

In this mode, the infinite is said to be simultaneously in potency and in act; for all are thus simultaneously in potency in respect of one part; and in act, in respect of another.<sup>24</sup>

Indeed, something is said *to be* (*esse*) in multiple (modes):<sup>25</sup> either because the whole is simultaneous, as a man or a house; or because one part of it always comes to be after another—by which mode are said to be a day and a (recurrent) game (lit., *ludus agonalis*).

Thus, since one (thing) whatsoever that is in potency is reduced into act according to the mode of its being (*secundum modum sui esse*), a day is not reduced into act as though it were a whole simultaneously, but successively.<sup>26</sup> For example, the Olympic Games are said to be and to last for as long as there can come to be contests and (for as long as they) come to be in act, for—as long as this festivity lasted—some part of the games was coming to be, and some (part) was to come to be in the future.

Likewise, a multitude is not reduced into act as if it were a whole simultaneously, but successively; for after any multitude whatever, another multitude can be taken infinitely.<sup>27</sup>

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<sup>20</sup> *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a18–19): “Uno modo sic quod totum potest reduci in actum.”

<sup>21</sup> *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a19–20): “sicut possibile est hoc aes esse statuam, quod aliquando erit statua.”

<sup>22</sup> *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a20–21): “non autem sic dicitur esse infinitum in potentia, quod postea totum sit in actu.”

<sup>23</sup> *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a22): “Alio modo aliquid dicitur in potentia esse, quod postea fit actu ens, non quidem totum simul, sed successive.”

<sup>24</sup> *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a23–24): “Et hoc modo dicitur infinitum esse simul et in potentia et in actu: omnia enim huiusmodi simul sunt in potentia quantum ad unam partem, et in actu quantum ad aliam.”

<sup>25</sup> *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a21–22): “Multipliciter enim dicitur aliquid esse: vel quia totum est simul, ut homo et domus; vel quia semper una pars eius fit post aliam, per quem modum dicitur esse dies et ludus agonalis.”

<sup>26</sup> *STh* I, q. 7 a. 4 ad 1: “unumquodque quod est in potentia, reducitur in actum secundum modum sui esse, dies enim non reducitur in actum ut sit tota simul, sed successive. Et similiter infinitum multitudinis non reducitur in actum ut sit totum simul, sed successive, quia post quamlibet multitudinem, potest sumi alia multitudo in infinitum.” *In Physic.* 3, l. 10, n. 4 (cf. ARISTOTLE, *Physica* Γ.6, 206a24–25): “Olympia enim, idest festa agonalia quae celebrabantur in monte Olympo, dicuntur esse et durare secundum agones posse fieri et fieri in actu: quia quamdiu durabant ista festa, aliqua pars illorum ludorum erat in fieri, et aliqua erat ut in futurum fienda.”

<sup>27</sup> *STh* I, q. 7 a. 4 ad 1: “Et similiter infinitum multitudinis non reducitur in actum ut sit totum simul, sed successive, quia post quamlibet multitudinem, potest sumi alia multitudo in infinitum.”

Thereafter, the species of figures have infinity from the infinity of number; for three-sided (*trilaterum*), four-sided (*quadrilaterum*), and so on, are species of figures (►4.4).<sup>28</sup> Whence, just as an infinite numerable multitude is not reduced into act (such) that it would be simultaneously whole, likewise, nor (is) a multitude of figures (reduced simultaneously into act, but successively).

### 25.5. Succession Is Found in All Infinities in Potency

ARISTOTLE shows what is common to all infinities.<sup>29</sup> He says that this is found altogether and universally in all (material) infinities: that the infinite is (i.e., consists in) *always taking another and another (part of a whole) according to some succession*, but in such a way that *whatever of the infinite is taken in act, the whole is finite*.

Whence, the infinite cannot be taken to be some whole existing in act as *this designated something*, as we take a (singular) man, or a house, but as are successive (things), such as days and (recurrent) games, whose being is not such that something of them would be like some perfect substance existing whole in act.<sup>30</sup>

On the other hand, in generation and corruption, even if it were to proceed infinitely, that which is taken in act is always finite; for in the whole course of (human) generation, even if it were to proceed infinitely, both: (a) all the men that are taken in act are finite according to number; and (b) such a finite (number) must be taken another and another (*alterum et alterum* = ἕτερον καὶ ἕτερον), according as some men succeed some (other).<sup>31</sup>

### 25.6. Assimilation of the Infinite to Matter

For something to be infinite, it is required that there always be some part outside of any other taken part, such that the same part that was priorly taken is never taken again.<sup>32</sup>

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<sup>28</sup> *STh* I, q. 7 a. 4 ad 2: “species figurarum habent infinitatem ex infinitate numeri, sunt enim species figurarum, trilaterum, quadrilaterum, et sic inde. Unde, sicut multitudo infinita numerabilis non reducitur in actum quod sit tota simul, ita nec multitudo figurarum.”

<sup>29</sup> *In Physic.* 3, l. 10, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 206a27–29): “ostendit [Philosophus] quid sit commune omnibus infinitis. Et dicit quod hoc omnino et universaliter in omnibus infinitis invenitur, quod infinitum est in semper aliud et aliud accipiendo secundum quandam successionem, ita tamen quod quidquid accipitur in actu de infinito, totum sit finitum.”

<sup>30</sup> *In Physic.* 3, l. 10, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 206a29–32): “Unde non oportet accipere quod infinitum sit aliquid totum simul existens, sicut *hoc aliquid* demonstratum, sicut accipimus hominem vel domum; sed sicut sunt successiva, ut dies et ludus agonalis, quorum esse non est hoc modo quod aliquid eorum sit sicut quaedam substantia perfecta tota actu existens.”

<sup>31</sup> *In Physic.* 3, l. 10, n. 6 (cf. ARISTOTLE, *Physica* Γ.6, 206a32–33): “In generatione autem et corruptione, etsi in infinitum procedatur, semper illud quod accipitur in actu, est finitum. In toto enim decursu generationis, etiam si procedatur in infinitum, et omnes homines qui simul actu accipiuntur, sunt finiti secundum numerum, et huiusmodi finitum oportet accipere alterum et alterum, secundum quod quidam homines succedunt quibusdam.”

<sup>32</sup> *In Physic.* 3, l. 11, n. 3 (cf. ARISTOTLE, *Physica* Γ.6, 207a4–6): “ad hoc quod aliquid sit infinitum, requiritur *hoc*, scilicet quod extra quamlibet partem acceptam sit quaedam alia; ita tamen quod nunquam resumatur illa quae prius fuit accepta.”

Thus, an infinite quantity cannot be comprehended; and if one should want to take it, he would take it—*part after part*—infinitely (*in infinitum*).<sup>33</sup>

Since *infinite* in addition or division is said insofar as something *can be* added to or divided, the infinite is as a being in potency; for *to be* (*esse* = τὸ εἶναι) is said of that which is in act (*in actu* = ἐντελεχεία, ἐνεργεία, κατ' ἐνέργειαν) and of that which is in potency (*in potentia* = δυνάμει).<sup>34</sup>

Since the infinite is always in potency, it is assimilated to matter (►9.3), which is always in potency; and does not exist by itself whole in act, as the finite is in act.<sup>35</sup> And just as the *infinite according to division* is simultaneously in potency with act, likewise, we ought to say of the *infinite according to addition* that it is in some mode the same with the *infinite according to division*. Whence, it is manifest that the infinite by addition is in potency, since something else can always be taken by adding.

Thus, as ARISTOTLE says, the infinite according to addition is in some mode the same as the infinite according to division, since the infinite according to addition comes to be conversely with the infinite according to division.<sup>36</sup> For according as something is divided infinitely, according to this it can seemingly be added to some determinate quantity.

### 25.7. Infinite as a Principle

ARISTOTLE shows in what mode the infinite is a principle.<sup>37</sup> He says that, since there are four genera of causes, it is evident from the aforesaid that the infinite is a cause as matter (*sicut materia* = ὡς ὕλη); for the infinite has an (act of) being in potency, which is proper

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<sup>33</sup> *In Physic.* 3, l. 11, n. 3: “Non enim potest comprehendi quantitas infiniti; sed si quis velit eam accipere, accipiet partem post partem in infinitum.”

<sup>34</sup> *In Physic.* 3, l. 10, n. 3 (cf. ARISTOTLE, *Physica* Γ.6, 206a14–16): “ostendit [Philosophus] quod infinitum est sicut potentia ens. Et dicit quod aliquid dicitur esse in actu, et aliquid dicitur esse in potentia. Infinitum autem dicitur esse per appositionem, sicut in numeris, vel per ablationem, sicut in magnitudinibus.”

<sup>35</sup> *In Physic.* 3, l. 10, n. 9 (cf. ARISTOTLE, *Physica* Γ.6, 206b12–18): “cum infinitum sit semper in potentia, assimilatur materiae, quae est semper in potentia; et non est per se existens in actu totum, sicut finitum est in actu. Et sicut infinitum secundum divisionem est in potentia cum actu simul, similiter dicendum est de infinito secundum appositionem, quod quodammodo est idem cum infinito secundum divisionem, ut dictum est. Inde autem manifestum est quod infinitum per appositionem est in potentia, quia semper contingit aliquid aliud accipere apponendo.”

<sup>36</sup> *In Physic.* 3, l. 10, n. 8 (cf. ARISTOTLE, *Physica* Γ.6, 206b3–6): “Dicit ergo primo [Philosophus] quod quodammodo infinitum secundum appositionem est idem cum infinito secundum divisionem; quia infinitum secundum appositionem fit e converso cum infinito secundum divisionem. Secundum enim quod aliquid dividitur in infinitum, secundum hoc in infinitum videtur posse apponi ad aliquam determinatam quantitatem.”

<sup>37</sup> *In Physic.* 3, l. 12, n. 10 (cf. ARISTOTLE, *Physica* Γ.7, 207b34–208a1): “ostendit [Philosophus] quomodo infinitum sit principium. Et dicit quod cum sint quatuor genera causarum, ut supra dictum est, patet ex praemissis quod infinitum est causa sicut materia: infinitum enim habet esse in potentia, quod est proprium materiae. Sed materia quidem quandoque est sub forma, quandoque autem sub privatione. Infinito autem non competit ratio materiae secundum quod est sub forma, sed secundum quod est sub privatione: quia scilicet infinitum dicitur per remotionem perfectionis et termini. Et propter hoc subiungit quod ipsi infinito esse est privatio, idest ratio infiniti in privatione consistit.”

of matter. However, matter is sometimes under a form and sometimes under privation, and the *ratio* of *matter* does not befit the infinite insofar as it is under a form but insofar as it is under privation—namely, because *infinite* is said by removal of a perfection and of a terminus. For this (reason), he adds that the *ratio* of *infinite* consists in privation (*ipsi infinito esse est privatio* < τὸ... εἶναι αὐτῷ [sc., τῷ ἀπείρῳ] στέρησις, *idest ratio infiniti in privatione consistit*).

### 25.8. Infinite Division in Magnitude

ARISTOTLE shows how there would be an infinite in the division of magnitude.<sup>38</sup> He says that if someone, having taken some determinate part of a finite magnitude by division, should then continue to take other parts by division, always maintaining the same *ratio*, i.e., proportion (*eandem rationem* < τῷ αὐτῷ λόγῳ, *idest proportionem*), but not according to the same quantity (*non secundum eandem quantitatem* < μὴ τὸ αὐτό τι τοῦ ὅλου μέγεθος), he will not traverse the finite by dividing in the same proportion.

For example, if from a line of one cubit he would take a half, and again (he would take) from the remainder a half, he could proceed in this way infinitely; for he would preserve the same proportion in subtracting, but not the same quantity of that which is subtracted, since, according to quantity, a half of a half (of any given whole) is less than a half of the whole.<sup>39</sup>

On the other hand, should he always take the same quantity, the proportion would always be increased more and more necessarily.<sup>40</sup>

For example, if one cubit is subtracted from a quantity of ten cubits, what is subtracted is related to the whole in a ratio of 1 : 10 (*in subdecupla proportione*).<sup>41</sup> And, should one cubit be subtracted again from the remainder, that which is subtracted would be related (to the remaining nine cubits) in a greater proportion (i.e., 1 : 9 > 1 : 10); for one cubit is exceeded by nine (cubits) less than (it is exceeded) by ten (i.e., 9 – 1 < 10 – 1).

<sup>38</sup> *In Physic.* 3, l. 10, n. 9 (cf. ARISTOTLE, *Physica* Γ.6, 206b7–9): “Manifestat igitur [Philosophus] quomodo sit infinitum divisione in magnitudine. Et dicit quod si aliquis in aliqua magnitudine finita, accepta aliqua parte determinata per divisionem, semper accipiat dividendo alias partes secundum eandem *rationem*, idest proportionem, sed non secundum eandem quantitatem in eadem proportione, non pertransibit dividendo illud finitum.”

<sup>39</sup> *In Physic.* 3, l. 10, n. 9: “puta si a linea cubitali accipiat medietatem, et iterum a residuo medietatem; et sic in infinitum procedere potest. Servabitur enim in subtrahendo eadem proportio, sed non eadem quantitas subtracti; minus est enim secundum quantitatem dimidium dimidii quam dimidium totius.”

<sup>40</sup> *In Physic.* 3, l. 10, n. 9 (cf. ARISTOTLE, *Physica* Γ.6, 206b9–11): “Sed si semper sumeret eandem quantitatem, oporteret quod semper magis ac magis augetur proportio.”

<sup>41</sup> *In Physic.* 3, l. 10, n. 9: “Put a si a quantitate decem cubitorum subtrahatur unus cubitus, subtractum se habet ad totum in subdecupla proportione: si autem iterum a residuo subtrahatur unus cubitus, subtractum se habebit in maiori proportione; minus enim unus cubitus exceditur a novem quam a decem.”

Thus, just as the quantity is decreased whenever the same proportion is preserved, so the proportion is increased whenever the same quantity is taken.<sup>42</sup>

Therefore, if someone—thus subtracting from some finite magnitude—should always increase the proportion by taking the same quantity, he would traverse the finite magnitude by dividing:<sup>43</sup> for example, if he should always subtract one cubit from a line of one hundred cubits. And this is so because every finite (quantity) is consumed if whatsoever finite (quantity) is always taken.

It is not unfitting if in some infinite (quantity) there are infinite unequal (parts) if the *ratio* of *quantity* is considered (*si attendatur ratio quantitatis*).<sup>44</sup> For if a continuum is divided according the same proportion, it will be (possible) to proceed infinitely: for example, if we were to take one third of the whole, and one third of the third, and so on. But the parts taken will not be equal according to quantity. On the other hand, if the division is made according to unequal parts, it will not be (possible) to proceed indefinitely even if the *ratio* of *quantity* were to be considered only in a mathematical body.

It has been shown that magnitude is not infinite in act.<sup>45</sup> Thus, the infinite is not found in magnitudes by addition but by division. Hence, it is not difficult to destroy the opinion of those who posit that there are indivisible lines—and to show that such lines are divisible. However, *infinite* is said, in addition or in division, insofar as it can be added or divided. It remains, therefore, that the infinite is as a being in potency.

### 25.9. Infinite Addition vs. Division in Magnitude

ARISTOTLE shows the difference between the infinite according to addition and the infinite according to division.<sup>46</sup> He says that the infinite by addition does not exceed in the greater

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<sup>42</sup> *In Physic.* 3, l. 10, n. 9: “Sicut igitur servando eandem proportionem diminuitur quantitas, ita sumendo eandem quantitatem augetur proportio.”

<sup>43</sup> *In Physic.* 3, l. 10, n. 9 (cf. ARISTOTLE, *Physica* Γ.6, 206b9–11): “Si ergo aliquis sic subtrahendo ab aliqua magnitudine finita, semper augeat proportionem sumendo eandem quantitatem, transibit dividendo magnitudinem finitam.” Ibid.: “puta si a linea centum cubitorum semper subtrahat unum cubitum.” Ibid. (cf. ARISTOTLE, *Physica* Γ.6, 206b11–12): “Et hoc ideo est, quia omne finitum consumitur quocumque finito semper accepto.”

<sup>44</sup> *In Physic.* 1, l. 9, n. 12: “Non enim est inconveniens quod in aliquo finito sint infinita inaequalia, si attendatur ratio quantitatis: quia si dividatur continuum secundum eandem proportionem, erit procedere in infinitum, ut puta si accipiatur tertium totius et tertium tertii et sic deinceps; sed tamen partes acceptae non erunt aequales secundum quantitatem. Sed si fiat divisio per partes aequales, non erit procedere in infinitum, etiam si sola ratio quantitatis in corpore mathematico consideretur.”

<sup>45</sup> *In Physic.* 3, l. 10, n. 3 (cf. ARISTOTLE, *Physica* Γ.6, 206a16–18): “Ostensum est enim quod magnitudo non est actu infinita; et sic in magnitudinibus per appositionem infinitum non invenitur, sed per divisionem in eis invenitur infinitum. Non enim est difficile destruere opinionem ponentium indivisibiles esse lineas. Vel, secundum aliam litteram: non est difficile *partiri atomos lineas*, idest ostendere lineas, quas quidam ponunt indivisibiles, esse partibiles. Dicitur autem infinitum in appositione vel divisione, secundum quod potest apponi vel dividi. Relinquitur igitur quod infinitum sit tanquam in potentia ens.”

<sup>46</sup> *In Physic.* 3, l. 10, n. 10 (cf. ARISTOTLE, *Physica* Γ.6, 206b18–20): “ostendit [Philosophus] differentiam inter infinitum secundum appositionem et infinitum secundum divisionem. Et dicit quod infinitum per

every given finite magnitude (*non excedit in maius omnem magnitudinem finitam datam < οὐ ὑπερβαλεῖ παντὸς μεγέθους*), while the infinite according to division exceeds every determinate smallness in the lesser (*excedit omnem determinatam parvitatem in minus < ὑπερβάλλει παντὸς ὠρισμένου καὶ ἀεὶ ἔσται ἔλαττον*).

For example, let us take some determinate smallness—say, one inch.<sup>47</sup> If a line of 100 cubits should be divided infinitely, taking always a half, we would arrive at something less than one inch. But by adding infinitely, from the contrary of division, there will be some given finite quantity that will never be passed through. Thus, let two magnitudes be given, each of ten cubits, and a third one that is of 20. Now if that which is subtracted infinitely, taking always a half from one magnitude of ten cubits, were to be added to the other that is also of ten cubits, one would never arrive, by infinitely adding, at the measure of quantity that is twenty cubits; for however much there remains in the magnitude from which is being subtracted, that much would be lacking from the given measure in the quantity to which is being added.

#### **25.10. Infinite Division Transcends Infinite Addition in Magnitude**

As ARISTOTLE says, infinite addition does not bring about the transcendence of every determinate quantity.<sup>48</sup> Wherefrom, it is not possible—not even in potency—for every determinate quantity to be exceeded through addition.

If there existed in nature the potency towards an addition that transcends every quantity, it would follow that there would be an infinite in act, such that the infinite would be an accident of some nature.<sup>49</sup> Hence, if it is not possible for there to be a sensible body infinite in act, it follows that there is no potency in nature towards an addition that transcends every quantity, but only towards an infinite addition through the contrary of division.

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appositionem non excedit in maius omnem magnitudinem finitam datam; sed infinitum secundum divisionem excedit omnem determinatam parvitatem in minus.” Cf. *In De caelo* 2, l. 9, n. 7.

<sup>47</sup> *In Physic.* 3, l. 10, n. 10: “Accipiamus enim aliquam determinatam parvitatem, puta unius digiti: si lineam centum cubitorum dividam in infinitum, accipiendo semper dimidium, venietur ad aliquid minus uno digito. Sed apponendo in infinitum, e contrario divisioni, erit dare aliquam quantitatem finitam quae nunquam pertransibitur. Dentur enim duae magnitudines, quarum utraque sit decem cubitorum, et tertia quae sit viginti. Si igitur id quod subtrahitur in infinitum, accipiendo semper dimidium ab una magnitudine decem cubitorum, addatur alteri quae etiam est decem cubitorum, nunquam pervenietur in infinitum apponendo ad mensuram quantitatis quae est viginti cubitorum: quia quantum remanebit in magnitudine cui subtrahitur, tantum deficiet a data mensura in quantitate cui addetur.”

<sup>48</sup> *In Physic.* 3, l. 10, n. 11 (cf. ARISTOTLE, *Physica* Γ.6, 206b20–22): “Dicit ergo [Philosophus] primo quod ex quo appositio in infinitum non facit transcendere omnem determinatam quantitatem, non est possibile esse, nec etiam in potentia, quod excellatur omnis determinata quantitas per appositionem.”

<sup>49</sup> *In Physic.* 3, l. 10, n. 11 (cf. ARISTOTLE, *Physica* Γ.6, 206b23–27): “Quia si esset in natura potentia ad appositionem transcendentem omnem quantitatem, sequeretur quod esset actu infinitum; sic quod infinitum esset accidens alicui naturae [...]. Si ergo non est possibile esse corpus sensibile actu infinitum [...], sequitur quod non sit potentia in natura ad appositionem transcendentem omnem magnitudinem; sed solum ad appositionem infinitam per contrarium divisioni.”



ARISTOTLE makes this manifest through the dictum of PLATO.<sup>50</sup> Since the infinite in the addition of magnitudes is through the opposite of division, PLATO posits two infinities:

1. *The great*, which pertains to addition.
2. *The small*, which pertains to division.

This is so because, to wit, the infinite seems to exceed both through addition into increase; and through division into decrease, or by *tending into nothing* (*tendendo in nihil*).<sup>51</sup>

However, even though PLATO posits two infinities, he does not use them.<sup>52</sup> Indeed, he posits number to be the substance of all things, and in numbers the infinite through division is not found, since in them there is a minimum unit. Nor (is the infinite found) by addition, also according to him, since he says that the species of numbers vary only up to ten, and after (ten) there is a return to the unit, reckoning *eleven*, *twelve*, etc. (i.e., 10 + 1, etc.).

### 25.11. Why Division Transcends Addition in Magnitude

As shown above, infinite addition (*appositio in infinitum*) is found in magnitudes in such a way that any determinate magnitude is not exceeded by this (addition).<sup>53</sup> On the other hand, infinite division (*divisio in infinitum*) is found in magnitudes such that, in dividing, any quantity whatever is traversable in the less (*transitur quaecumque quantitas in minus*).

ARISTOTLE says that this happens according to *ratio* (*secundum rationem* = κατὰ λόγον) because, since *infinite* has the *ratio* of *matter*, it is contained within as matter (*cum infinitum habeat rationem materiae, continetur intus sicut materia* < περιέχεται ἡ ὕλη ἐντὸς καὶ τὸ ἄπειρον); for that which contains is a species and a form (*quod continet, est species et forma* < περιέχει τὸ εἶδος); and it is manifest from what has been said (► 13.1; 13.11) that *whole* has the *ratio* of *form*, while *parts* (have) the *ratio* of *matter*.<sup>54</sup>

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<sup>50</sup> *In Physic.* 3, l. 10, n. 12 (cf. ARISTOTLE, *Physica* Γ.6, 206b27–28): “manifestat [Philosophus...] quod dixerat per dictum Platonis. Et dicit quod quia infinitum in appositione magnitudinum est per oppositum divisioni, propter hoc Plato duo fecit infinita, scilicet magnum, quod pertinet ad additionem, et parvum quod pertinet ad divisionem.”

<sup>51</sup> *In Physic.* 3, l. 10, n. 12 (cf. ARISTOTLE, *Physica* Γ.6, 206b28–29): “quia scilicet infinitum videtur excellere et per additionem in augmentum, et per divisionem in decrementum, vel tendendo in nihil.”

<sup>52</sup> *In Physic.* 3, l. 10, n. 12 (cf. ARISTOTLE, *Physica* Γ.6, 206b30–33): “Sed cum ipse Plato faciat duo infinita, non tamen utitur eis: quia cum numerum poneret substantiam esse omnium rerum, in numeris non invenitur infinitum per divisionem, quia in eis est minimum unitas; neque etiam per additionem secundum ipsum, quia dicebat quod species numerorum non variantur nisi usque ad decem, et postea reditur ad unitatem, computando undecim et duodecim et cetera.”

<sup>53</sup> *In Physic.* 3, l. 12, n. 2 (cf. ARISTOTLE, *Physica* Γ.7, 207a33–35): “Dictum est autem supra quod appositio in infinitum sic invenitur in magnitudinibus, quod tamen non exceditur per hoc quaecumque determinata magnitudo. Sed divisio in infinitum sic invenitur in magnitudinibus, quod dividendo transitur quaecumque quantitas in minus, ut supra expositum est.”

<sup>54</sup> *In Physic.* 3, l. 12, n. 2 (cf. ARISTOTLE, *Physica* Γ.7, 207a33; 35–b1): “Hoc autem secundum rationem dicit [Philosophus] accidere: quia cum infinitum habeat rationem materiae, continetur intus sicut materia:

Therefore, since in magnitudes one goes from whole to parts by division, it is reasonable that no terminus should be found there that is not transcended by infinite division.<sup>55</sup> On the other hand, in addition one goes from parts to whole, which has the *ratio* of *containing* and *terminating form*. Whence, it is reasonable (εὐλόγως) that there should be some determinate quantity that infinite addition does not transcend.

### 25.12. Finite Division vs. Infinite Addition in Number

In (the genus of) number: (1) there is found some terminus in the lesser that cannot be transcended by division, but (2) some terminus is not found in the greater; for (given) any number, another greater can be found by addition; while (3) the opposite occurs in magnitudes, as has been said.<sup>56</sup> ARISTOTLE assigns the reason for this:

1. *Why in numbers there is found some terminus in the lesser that is not transcended by dividing.*<sup>57</sup> The reason for this is that every one as such (*omne unum, in quantum unum*), is indivisible, as an indivisible man is one man, and not many. And any number must be resolved into one, which is evident from the ratio itself of number; for number signifies this: that some [things] should be more than one (*plura uno* = ἕνα πλείω); for any multitudes that exceed—more or less—one, are determinate species of numbers. Whence, since one belongs to the ratio of number, and indivisibility belongs to the ratio of one, it follows that the division of number rests at an indivisible term.

ARISTOTLE manifests that it belongs to the *ratio* of *number* that it should be *more than one* by (its) species, since *two*, *three*, and whatever other number is denominated from *one*.<sup>58</sup> Whence, he says that the substance (i.e., essence) of *six* is in this: that it should be *one*

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illud autem quod continet, est species et forma. Manifestum est autem ex iis quae dicta sunt in secundo, quod totum habet rationem formae, partes autem rationem materiae.”

<sup>55</sup> *In Physic.* 3, l. 12, n. 2: “Cum ergo in magnitudinibus a toto itur ad partes per divisionem, rationabile est quod ibi nullus terminus inveniatur, qui non transcendatur per infinitam divisionem. Sed in additione itur a partibus ad totum, quod habet rationem formae continentis et terminantis: unde rationabile est quod sit aliqua determinata quantitas, quam infinita appositio non transcendat.”

<sup>56</sup> *In Physic.* 3, l. 12, n. 3 (cf. ARISTOTLE, *Physica* Γ.7, 207b1–5): “in numero invenitur aliquis terminus in minus, quem non est dividendo transcendere: sed non invenitur aliquis terminus in plus; quia quolibet numero est invenire alium maiorem per additionem. In magnitudinibus autem est e converso, ut dictum est. Et huius rationem assignat [Philosophus]”

<sup>57</sup> *In Physic.* 3, l. 12, n. 3 (cf. ARISTOTLE, *Physica* Γ.7, 207b5–8): “et primo quidem quare in numeris aliquis terminus invenitur, qui in minus non transcenditur dividendo. Huius autem ratio est, quia omne unum, in quantum unum, est indivisibile, sicut homo indivisibilis est unus homo et non multi. Quemlibet autem numerum oportet resolvere in unum: quod patet ex ipsa ratione numeri. Numerus enim hoc significat, quod sint aliqua plura uno: quaelibet autem plura excedentia unum plus vel minus, sunt determinatae species numerorum. Unde cum unum sit de ratione numeri, et de ratione unius sit indivisibilitas, sequitur quod divisio numeri stet in termino indivisibili.”

<sup>58</sup> *In Physic.* 3, l. 12, n. 3 (cf. ARISTOTLE, *Physica* Γ.7, 207b8–10): “Quod autem dixerat, quod de ratione numeri sit quod sint plura uno, manifestat per species; quia duo et tria et quilibet alius numerus denominatur ab uno. Unde dicitur in V Metaphys. quod substantia senarii est in hoc quod sit sexies unum, non autem in hoc quod sit bis tria vel ter duo: quia sequeretur quod unius rei essent plures definitiones et plures substantiae; quia ex diversis partibus diversimode consurgit unus numerus.”

*six-times*; and not in this: that it should be *twice three* or *thrice two*; for it would then follow that there would be multiple definitions of one thing, and multiple substances (i.e., essences), since one number emerges diversely from diverse parts.

**2. Why addition in numbers exceeds every determinate multitude.**<sup>59</sup> As ARISTOTLE says, given any number, we can always understand another, greater (number) because magnitude is infinitely divisible; for it is manifest that division causes multitude. Whence, the more a magnitude is divided, the greater a multitude arises. Hence, the infinite addition of numbers follows upon the infinite division of magnitudes.

Thus, just as the infinite division of magnitude is not in act but in potency and exceeds every determinate (magnitude) in the lesser, as has been said, so the infinite addition of numbers is not in act but in potency and exceeds every determinate multitude.<sup>60</sup> However, this number that is thus infinitely multiplied is not a number separated from the diminishing of magnitude.

**3. Why the opposite occurs in magnitudes.** ARISTOTLE shows that in magnitudes (this occurs) contrarily because the continuum is infinitely divisible, as has been said.<sup>61</sup> But (this division) does not proceed infinitely into the greater, even according to potency, because the more some one thing is in potency, the more it can be in act.

Therefore, if there existed in the potency of nature that some magnitude would grow infinitely, it would follow that there would be some infinite sensible magnitude, which is false.<sup>62</sup> It remains, therefore, that there is no addition of magnitudes infinite in potency such that every determinate quantity would be exceeded; for it would follow that there would be a greater universe.

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<sup>59</sup> *In Physic.* 3, l. 12, n. 4 (cf. ARISTOTLE, *Physica* Γ.7, 207b10–11): “assignat [Philosophus] causam quare in numeris additio excedit omnem determinatam multitudinem. Et dicit quod possumus semper intelligere quolibet numero dato alium maiorem, per hoc quod magnitudo dividitur in infinitum. Manifestum est enim quod divisio causat multitudinem: unde quanto plus dividitur magnitudo, tanto maior multitudo consurgit; et ideo ad infinitam divisionem magnitudinum sequitur infinita additio numerorum.”

<sup>60</sup> *In Physic.* 3, l. 12, n. 4 (cf. ARISTOTLE, *Physica* Γ.7, 207b11–14): “Et ideo sicut infinita divisio magnitudinis non est in actu sed in potentia, et excedit omne determinatum in minus, ut dictum est; ita additio numerorum infinita non est in actu sed in potentia, et excedit omnem determinatam multitudinem. Sed hic numerus, qui sic in infinitum multiplicatur, non est numerus *separatus a decisione* magnitudinum.”

<sup>61</sup> *In Physic.* 3, l. 12, n. 6 (cf. ARISTOTLE, *Physica* Γ.7, 207b15–18): “ostendit [Philosophus] quod e contrario est in magnitudinibus. Dividitur enim continuum in infinitum, ut dictum est. Sed in maius non procedit in infinitum etiam secundum potentiam, quia quantum unumquodque est in potentia, tantum potest esse in actu.”

<sup>62</sup> *In Physic.* 3, l. 12, n. 6 (cf. ARISTOTLE, *Physica* Γ.7, 207b19–21): “Si igitur esset in potentia naturae quod cresceret aliqua magnitudo in infinitum, sequeretur quod esset aliqua magnitudo sensibilis infinita; quod est falsum, ut supra dictum est. Relinquitur igitur quod non est in potentia additio magnitudinum in infinitum sic quod excedatur omnis determinata quantitas: quia sequeretur quod esset aliquid maius caelo.”

From this, it is evidently false what some say, that in first matter there is potency to all quantity; for in first matter there is potency only to a determinate quantity.<sup>63</sup>

Also, it is evident from the preceding reason why it is not necessary for a number to be in act as much as it is in potency, as here is said of magnitude, because the addition of a number follows upon the division of a continuum, whereby one goes from the whole to that which is in potency (in relation) to number.<sup>64</sup> Whence, it is not necessary to arrive at some act that ends the potency. On the other hand, the addition of magnitude leads into act, as has been said.

### 25.13. The Infinite in Mathematics

As ARISTOTLE shows, even if there is no infinite magnitude in act, this does not take away the consideration of mathematicians, who use the infinite: for example, when a geometrician says, “let there be such an infinite line.”<sup>65</sup>

Thus, (geometricians) do not need for their demonstration an infinite (line) in act, nor do they use it: rather, they only need for there to be some finite line, as much (i.e., as long) as they need it, such that they can subtract from it what they want. And for this it suffices that there be some greatest magnitude, since it befits (*competit*) some greatest magnitude to be divisible according to whatever proportion in respect of another given magnitude—and this line, they call *infinite*.<sup>66</sup>

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<sup>63</sup> *In Physic.* 3, l. 12, n. 7: “Ex quo patet falsum esse, quod quidam dicunt, quod in materia prima est potentia ad omnem quantitatem: non enim est in materia prima potentia nisi ad determinatam quantitatem.”

<sup>64</sup> *In Physic.* 3, l. 12, n. 7: “Patet etiam ex praemissis ratio quare non oportet numerum tantum esse in actu, quantum est in potentia, sicuti hic dicitur de magnitudine: quia additio numeri sequitur divisionem continui, per quam a toto itur ad id quod est in potentia ad numerum. Unde non oportet devenire ad aliquem actum finientem potentiam. Sed additio magnitudinis ducit in actum, ut dictum est.” As St. Thomas explains, AVERROES, however, assigns another reason: because the potency to the addition of magnitude is one and the same in magnitude; but the potency to the addition of number is in diverse numbers, insofar as something can be added to any number. But this reason is not enough, because just as by addition there is another and another species of number, so (is there) another and another species of measure, insofar as two-cubits and three-cubits are said (to be) species of quantity. Moreover, whatever is added to a greater number can be added to a lower (number); and according to this, in one and the same number—namely, two or three—there is potency to infinite addition. *Ibid.*: “Commentator autem assignat aliam rationem: quia potentia ad additionem magnitudinis est in una et eadem magnitudine; sed potentia ad additionem numerorum est in diversis numeris, in quantum cuilibet numero potest aliquid addi. Sed haec ratio parum valet, quia sicut per additionem est alia et alia species numeri, ita alia et alia species mensurae, secundum quod bicubitum et tricubitum dicuntur species quantitatis. Et etiam quidquid additur superiori numero, additur inferiori; et secundum hoc in uno et eodem numero, scilicet binario vel ternario, est potentia ad infinitam additionem.”

<sup>65</sup> *In Physic.* 3, l. 12, n. 9 (cf. ARISTOTLE, *Physica* Γ.7, 207b27–28): “ostendit [Philosophus] quomodo mathematici utuntur infinito. Et dicit quod ratio praedicta, qua ponimus non esse magnitudinem infinitam in actu, non removet considerationem mathematicorum, qui utuntur infinito; puta cum geometra dicit, *sit talis linea infinita*.”

<sup>66</sup> *In Physic.* 3, l. 12, n. 9 (cf. ARISTOTLE, *Physica* Γ.7, 207b28–32): “Non enim indigent ad suam demonstrationem infinito in actu, neque eo utuntur: sed solum indigent quod sit aliqua linea finita tanta quanta est eis necessaria, ut ex ea possint subtrahere quod volunt. Et ad hoc sufficit quod aliqua maxima

Whence, in order to demonstrate, it makes no difference whether there is an infinite (quantity) or a greatest, finite quantity.<sup>67</sup> But it very much makes a difference in respect of the being of the thing (*quantum ad esse rei*) whether there is or there is not (an infinite).

#### 25.14. The *Ratio of Infinite* is in Things According to Prior and Posterior

ARISTOTLE shows in what mode the infinite in potency is found diversely in diverse (things).<sup>68</sup> He says that the infinite is not in motion, in magnitude, and in time, according to the same *ratio*, as though it were one nature univocally predicated of them, but according to prior and posterior (*per prius et posterius*). And always that which is in them posterior is said (to be) *infinite* insofar as that which is prior is infinite (< τὸ ὕστερον λέγεται κατὰ τὸ πρότερον). Thus, it is said of the posterior of them according to the prior, as of motion (2nd) on account of the magnitude (1st) in which (there) is motion, whether local, increase, or alteration; and of time (3rd), (*infinite* is said) on account of motion (2nd).

This is (so) because the infinite pertains to (*competit*) quantity (1st), while motion (2nd) is a quantum according to magnitude (1st); and time (3rd), on account of motion (2nd).<sup>69</sup>

Thus, motion (is said to be infinite) according to the magnitude in which something (a) is moved locally; (b) is altered; or (c) is increased.<sup>70</sup> For *infinite* is attributed by division to the continuum, which (i.e., *continuum*) is first attributed to magnitude (1st), from which motion (2nd) has continuity.<sup>71</sup> This is evident in local motion (a), since the parts in local motion are taken according to the parts of a magnitude.<sup>72</sup>

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magnitudo sit; quia alicui maximae magnitudini competit, quod possit dividi secundum quantamcumque proportionem respectu alterius magnitudinis datae.” *STh* I, q. 7 a. 3 ad 1: “geometer non indiget sumere aliquam lineam esse infinitam actu, sed indiget accipere aliquam lineam finitam actu, a qua possit subtrahi quantum necesse est, et hanc nominat lineam infinitam.”

<sup>67</sup> *In Physic.* 3, l. 12, n. 9 (cf. ARISTOTLE, *Physica* Γ.7, 207b33–34): “Unde ad demonstrandum non differt utrum sit hoc modo vel illo, scilicet vel infinita vel finita maxima quantitas. Sed quantum ad esse rei multum differt, utrum sit vel non sit.”

<sup>68</sup> *In Physic.* 3, l. 12, n. 8 (cf. ARISTOTLE, *Physica* Γ.7, 207b21–25): “ostendit [Philosophus] quomodo infinitum inveniatur diversimode in diversis. Et dicit quod infinitum non est secundum eandem rationem in motu et in magnitudine et tempore, ac si esset una natura univoce praedicata de eis: sed dicitur de posteriori eorum secundum prius, sicut de motu propter magnitudinem, in qua est motus, vel localis vel alterationis vel augmenti; de tempore autem propter motum.” *In Metaph.* 11, l. 10, §2354 (cf. ARISTOTLE, *Metaphysica* K.10, 1067a33–35): “Ostendit [Philosophus] quomodo infinitum in potentia in diversis inveniatur; et dicit quod invenitur in magnitudine et motu et tempore; et non univoce praedicatur de eis, sed per prius et posterius. Et semper quod est in eis posterius, dicitur infinitum, secundum quod id quod est prius est infinitum.”

<sup>69</sup> *In Physic.* 3, l. 12, n. 8: “Et hoc ideo quia infinitum competit quantitati, motus autem est quantus secundum magnitudinem, et tempus propter motum.”

<sup>70</sup> *In Metaph.* 11, l. 10, §2354 (cf. ARISTOTLE, *Metaphysica* K.10, 1067a35–36): “motus [dicitur infinitum] secundum magnitudinem, in quam aliquid movetur localiter, aut augetur, aut alteratur.”

<sup>71</sup> *In Metaph.* 11, l. 10, §2354: “quod sic intelligendum est. Infinitum enim divisione, attribuitur continuo, quod primo attribuitur magnitudini, ex qua motus habet continuitatem.”

<sup>72</sup> *In Metaph.* 11, l. 10, §2354: “Quod manifestum est in motu locali; quia partes in motu locali accipiuntur secundum partes magnitudinis.”

Likewise, this is evident in the motion of increase (c), since increase is considered (attenditur) according to the addition of magnitude.<sup>73</sup>

In alteration (b), on the other hand, it is not so manifest.<sup>74</sup> However, also there it is somehow true, since the quality whereby alteration comes to be is divisible by accident (following) upon the division of magnitude. Moreover, the intension and remission of quality is considered insofar as the subject that exists in a magnitude participates (in) the quality in some—either more (perfect) or less perfect—mode.

Likewise, time (3rd) is said to be infinite according to motion (2nd).<sup>75</sup>

Time is continuous (following) upon the continuity of motion; for time, according to itself, since it is a number, does not have continuity: rather, (it has continuity) in the subject, just as ten measures of cloth are continuous because the cloth is some continuum.<sup>76</sup>

Therefore, *infinite* must be said of these three in the same order as *continuous* (is said of them: i.e., 1st of magnitude; 2nd of motion; and 3rd of time).<sup>77</sup>

### 25.15. The First Subject by Itself of the Infinite

Lest someone should understand that the infinite is matter as first matter, ARISTOTLE adds that the subject by itself (< τὸ καθ' αὐτὸ ὑποκείμενον) of the privation in which the *ratio* of *infinite* consists is the sensible continuum (< τὸ συνεχὲς καὶ αἰσθητόν).<sup>78</sup>

This is apparent because the infinite that is in numbers is caused from an infinite division of magnitude.<sup>79</sup> Likewise, the infinite in time and motion is caused from magnitude (i.e., motion follows upon magnitude, and time follows upon motion). And what is first in any

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<sup>73</sup> *In Metaph.* 11, l. 10, §2354: “Et similiter manifestum est in motu augmenti; quia secundum additionem magnitudinis, augmentum attenditur.”

<sup>74</sup> *In Metaph.* 11, l. 10, §2354: “Sed in alteratione non est ita manifestum. Sed tamen etiam ibi aliquantulum verum est; quia qualitas secundum quam fit alteratio, per accidens dividitur ad divisionem magnitudinis. Et iterum intensio et remissio qualitatis attenditur secundum quod subiectum in magnitudine existens, aliquo modo vel perfectiori vel minus perfecto participat qualitatem.”

<sup>75</sup> *In Metaph.* 11, l. 10, §2354 (cf. ARISTOTLE, *Metaphysica* K.10, 1067a36–37): “Et tempus dicitur infinitum secundum motum.”

<sup>76</sup> *In Metaph.* 11, l. 10, §2354: “Ad continuitatem autem motus, est et tempus continuum. Nam tempus secundum se, cum sit numerus, non habet continuitatem, sed solum in subiecto. Sicut decem mensurae panni continuae sunt, eo quod pannus quoddam continuum est.”

<sup>77</sup> *In Metaph.* 11, l. 10, §2354: “Eodem igitur ordine oportet quod infinitum de istis tribus dicatur sicut et continuum.”

<sup>78</sup> *In Physic.* 3, l. 12, n. 10 (cf. ARISTOTLE, *Physica* Γ.7, 208a1–2): “Et ne aliquis intelligat quod infinitum est materia sicut materia prima, subiungit [Philosophus] quod per se subiectum privationis, quae constituit rationem infiniti, est continuum sensibile”

<sup>79</sup> *In Physic.* 3, l. 12, n. 10: “Et hoc apparet, quia infinitum quod est in numeris causatur ex infinita divisione magnitudinis; et similiter infinitum in tempore et motu causatur ex magnitudine: unde relinquatur quod primum subiectum infiniti sit continuum.”

genus is the cause of all others in the same genus (►27); therefore, every infinite follows upon magnitude). Whence, it remains that the first subject of the infinite is the continuum.

And since magnitude, according to being (*secundum esse*, i.e., as opposed to *secundum rationem*), is not separated from sensible (things), it follows that the (first) subject of the infinite is sensible.<sup>80</sup>

All the ancients that use the infinite as a material principle agree in this.<sup>81</sup> Whence, it was unfitting that they should attribute to the infinite (the property of) containing, since it does not belong to matter to contain (*continere* < περιέχον) but to be contained (*contineri* < περιεχόμενον).

### 25.16. Infinite: Unknown and Part

Because the infinite is as a being in potency, it follows not only that it is contained and that it does not contain, but also two other conclusions.<sup>82</sup>

1. The infinite as such is unknown (*ignotum* = ἄγνωστον) because it is as matter not having a form (<est sicut> *materia non habens speciem* < εἶδος οὐκ ἔχει ἢ ὕλη, *idest formam*), and matter is known only through form.<sup>83</sup>

2. The infinite has the *ratio* of *part* rather than (the *ratio*) of *whole* (*magis habet rationem partis quam totius* = μᾶλλον ἐν μορίου λόγῳ τὸ ἄπειρον ἢ ἐν ὅλου), because matter is compared to the whole as a part.<sup>84</sup> And the infinite is rightly related as a part insofar as it belongs to it to take only some part in act.

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<sup>80</sup> *In Physic.* 3, l. 12, n. 10: “Et quia magnitudo secundum esse non est separata a sensibilibus, sequitur quod subiectum infiniti sit sensibile.”

<sup>81</sup> *In Physic.* 3, l. 12, n. 10 (cf. ARISTOTLE, *Physica* Γ.7, 208a2–4): “Et in hoc etiam concordant omnes antiqui, qui utuntur infinito sicut principio materiali. Unde inconueniens fuit quod attribuerunt infinito continere, cum materiae non sit continere, sed magis contineri.”

<sup>82</sup> *In Physic.* 3, l. 11, n. 7 (cf. ARISTOTLE, *Physica* Γ.6, 207a25–28): “Ex hoc autem quod est sicut ens in potentia, non solum hoc sequitur, quod infinitum contineatur et non contineat: sed etiam sequuntur duae aliae conclusiones.”

<sup>83</sup> *In Physic.* 3, l. 11, n. 7 (cf. ARISTOTLE, *Physica* Γ.6, 207a25–26): “Quarum una est, quod infinitum in quantum huiusmodi est ignotum, quia est sicut materia non habens speciem, idest formam, ut dictum est; materia autem non cognoscitur nisi per formam.”

<sup>84</sup> *In Physic.* 3, l. 11, n. 7 (cf. ARISTOTLE, *Physica* Γ.6, 207a26–28): “Alia conclusio est, quae ex eodem sequitur, quod infinitum magis habet rationem partis quam totius, quia materia comparatur ad totum ut pars. Et recte infinitum se habet ut pars, in quantum non est de ipso accipere nisi aliquam partem in actu.”





## 26. Participation

We have determined that infinite has the ratio of perfect only insofar as it is had from the part of a form that is not determined by matter (► 24.8); and the reason for this is that form is not perfected by matter: rather, the amplitude of the perfection of a form is contracted by the matter in which it is received. In this chapter we seek to clarify the way in which any received perfection is contracted by that in which it is received.

### 26.1. Participation

**To participate** (*participare*) is—as it were—to receive (lit., *to take, to acquire*) a part (*quasi partem capere*).<sup>1</sup> Therefrom, when something receives particularly (*particulariter recipit*) that which universally pertains to another, it is said *to participate (in) it*.

### 26.2. Modes of Participation

#### 1. **Species** participate (in a) **genus**.<sup>2</sup>

For example, (the species) *man* is said to participate (in the genus) *animal* because (*man*) does not have the *ratio* of *animal* according to its whole community.<sup>3</sup>

#### 2. **Individuals** participate (in a) **species**.<sup>4</sup>

Sortes (i.e., some individual man) participates (in the species of) *man* for the same reason (i.e., because he does not have the *ratio* of *man* according to its whole community).<sup>5</sup>

#### 3. **Matter** participates (in a) **form**.

A subject participates (in) an accident, and matter (participates in) a form; for a substantial or accidental form, which is common in its *ratio*, is determined to *this* or *that* subject.<sup>6</sup>

Thus, it is evident that if something hot does not have the whole perfection of the hot, this is because heat is not participated according to (its) perfect *ratio*.<sup>7</sup> On the other hand, if heat should be subsistent by itself, it could not lack something of the virtue of heat.

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<sup>1</sup> *In De ebdo.*, l. 2, 70–73: “Est autem participare quasi partem capere. Et ideo quando aliquid particulariter recipit id quod ad alterum pertinet uniuersaliter, dicitur participare illud.”

<sup>2</sup> *ScG* 1, 32 n. 6: “species participare dicitur genus.”

<sup>3</sup> *In De ebdo.*, l. 2, 71–76: “homo dicitur participare animal quia non habet rationem animalis secundum totam communitatem.”

<sup>4</sup> *ScG* 1, 32 n. 6: “participare dicitur [...] individuum speciem.”

<sup>5</sup> *In De ebdo.*, l. 2, 76–77: “et eadem ratione Sortes participat hominem.”

<sup>6</sup> *In De ebdo.*, l. 2, 77–80: “Similiter etiam subiectum participat accidens et materia formam, quia forma substantialis uel accidentalis, que de sui ratione communis est, determinatur ad hoc uel illud subiectum.”

<sup>7</sup> *STh* I, q. 4 a. 2 co.: “Manifestum est enim quod, si aliquod calidum non habeat totam perfectionem calidi, hoc ideo est, quia calor non participatur secundum perfectam rationem, sed si calor esset per se subsistens, non posset ei aliquid deesse de virtute caloris.”

#### 4. Effects participate (in their) cause.

An effect is said to participate (in) its cause (► 11.3; 11.5), above all, when it does not attain the virtue of its cause by equaling it (*non adequat*).<sup>8</sup> For example, when we say that air participates (in) the light of the sun because it does not receive it in the (whole) brightness that (light) is in the sun.

#### 26.3. Reception is According to the Mode of the Receiver

Every recipient receives something according to its own mode.<sup>9</sup> Hence, each (perfection) is received in something according to the mode of the recipient, such that what is received is limited according to the receiver. And everything that is in potency to something, and apt to receive it, is devoid of that to which it is in potency and of which it is receptive.

Every form (that is) received in something is limited and is terminated, ended according to the mode and capacity of the recipient.<sup>10</sup> Whence, it does not have infinite intension. For example, *this white body* does not have *the whole whiteness* according to *the whole possible whiteness*. On the other hand, if whiteness should be separate, it would lack nothing of that which pertains to the virtue of whiteness.

Everything that is imperfect is derived from something perfect; for perfect (things) are naturally prior to the imperfect, as act (is prior) to potency.<sup>11</sup> Forms existing in particular things are imperfect, since (they are derived) partially and not according to the community of their *ratio*. Hence, they must be derived from some perfect—and not particular—forms.

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<sup>8</sup> *In De ebdo.*, l. 2, 80–85: “Et similiter etiam effectus dicitur participare suam causam, et precipue quando non adequat uirtutem sue cause, puta si dicamus quod aer participat lucem solis quia non recipit eam in claritate qua est in sole.”

<sup>9</sup> *In De anima* 2, c. 27, 218–219: “omne enim recipiens recipit aliquid secundum modum suum.” *De veritate*, q. 21 a. 6 ad 5: “ubicumque est aliquid receptum, oportet ibi esse modum, cum receptum limitetur secundum recipiens.” *In Sent.* 2, d. 3 q. 3 a. 1 co.: “unumquodque recipitur in aliquo per modum recipientis.” Cf. 1, d. 22 q. 1 a. 2 co.; 2, d. 15 q. 1 a. 2 ad 3; d. 19 q. 1 a. 3 ad 1; d. 30 q. 1 a. 2 ad 5; d. 32 q. 2 a. 3 co.; 3, d. 14 q. 1 a. 1 qc. 3 co.; 4, d. 36 q. 1 a. 4 co.; d. 44 q. 2 a. 1 qc. 3 ad 2; a. 4 qc. 1 co.; d. 49 q. 2 a. 1 co.; a. 2 co.; *ScG* 1, 43 n. 5; 2, 50 n. 6; 55 n. 9; 73 n. 31; 74 n. 8; 79 n. 7; 3, 79 n. 4; 85 n. 14; 86 n. 1; *STh* I, q. 79 a. 6 co.; q. 84 a. 1 co.; q. 85 a. 5 ad 3.; q. 89 a. 4 co.; I-II, q. 67 a. 2 co.; III, q. 54 a. 2 ad 1; q. 79 a. 6 ad 1. *In De anima* 3, c. 1, 131–150: “omne enim quod est in potencia ad aliquid et receptium eius caret eo ad quod est in potencia et cuius est receptiuus.”

<sup>10</sup> *In De div. nom.*, c. 5, l. 1: “omnis forma, recepta in aliquo, limitatur et finitur secundum capacitatem recipientis; unde, hoc corpus album non habet totam albedinem secundum totum posse albedinis. Sed si esset albedo separata, nihil deesset ei quod ad virtutem albedinis pertineret.” *De veritate*, q. 2 a. 2 ad 5: “omnis forma in aliquo recepta terminatur secundum modum recipientis”; q. 2 a. 3 co.; q. 2 a. 9 co.: “omnis forma recepta in aliqua materia finitur ad modum recipientis, et ita non habet intensionem infinitam”; q. 19 a. 1 co.; q. 20 a. 4 ad 1; q. 21 a. 6 co.; q. 22 a. 11 co.; q. 28 a. 3 ad 5; *De potentia*, q. 7 a. 10 ad 10; *Q. d. de anima*, a. 19 ad 10; a. 20 co.; *De malo*, q. 3 a. 13 ad 6; *De virtutibus*, q. 1 a. 1 ad 12; *Quodlibet* 7, q. 1 a. 1 co.; 9, q. 4 a. 1 co.; 3, q. 9 a. 1 co.; 12, q. 9 a. 1 co.; *In De causis*, l. 10; l. 24.

<sup>11</sup> *ScG* 1, 44 n. 8: “Omne quod est imperfectum, derivatur ab aliquo perfecto: nam perfecta naturaliter sunt priora imperfectis, sicut actus potentia. Sed formae in rebus particularibus existentes sunt imperfectae: quia partialiter, et non secundum communitatem suae rationis. Oportet igitur quod deriventur ab aliquibus formis perfectis et non particulatis.”

## 26.4. Consideration of That Which is Received

Of that which is received in something, we can consider both the (act of) *being* (*esse*) and the *ratio*.<sup>12</sup>

**1. According to its (act of) being,** (that which is received) is in that in which it is received by the mode of the recipient.<sup>13</sup>

The received form follows upon the mode of the recipient insofar as it has (its act of) being (*esse*) in the subject, for it is received in it materially or immaterially, uniformly or in multiple modes (i.e., depending on whether the subject is material or immaterial, etc.).<sup>14</sup>

For example, heat received in water has (its act of) being in water according to the mode of water: namely, insofar as it is in water as an accident (is) in a subject.<sup>15</sup>

**2. (According to its *ratio*,** that which is received) *draws* (*trahit*) the recipient itself to its *ratio*.<sup>16</sup>

Insofar as the nobilities that belong to the *ratio of form* are communicated to the receiving subject, the received form draws (*trahit*) the receiving subject to its mode.<sup>17</sup> And in this way, the subject is perfected and made nobler by the form.

For example, heat draws water from its natural disposition to this: that it should come to be hot (*quod fiat calida*), and that it should produce the act of heat (*faciat actum caloris*).<sup>18</sup> Likewise, light (draws) air (from its natural disposition, causing it to be lit, and causing it to produce the act of light), although not against the nature of air (► 15.24).

## 26.5. Community of Analogy and Participation

A community of analogy can be of two modes, either.<sup>19</sup>

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<sup>12</sup> *De veritate*, q. 24 a. 8 ad 6, 171–173: “eius quod recipitur in aliquo, potest considerari et esse et ratio.”

<sup>13</sup> *De veritate*, q. 24 a. 8 ad 6, 173–174: “Secundum quidem esse suum est in eo in quo recipitur, per modum recipientis.”

<sup>14</sup> *De veritate*, q. 12 a. 6 ad 4, 289–294: “forma recepta sequitur modum recipientis quantum ad aliquid, prout habet esse in subiecto: est enim in eo materialiter vel immaterialiter, uniformiter vel multipliciter, secundum exigentiam subiecti recipientis.”;

<sup>15</sup> *De veritate*, q. 24 a. 8 ad 6, 175–178: “sicut calor receptus in aqua habet esse in aqua per modum aquae, in quantum scilicet inest aquae ut accidens subiecto.”

<sup>16</sup> *De veritate*, q. 24 a. 8 ad 6, 175: “[quod recipitur] ipsum recipiens trahit ad suam rationem.”

<sup>17</sup> *De veritate*, q. 12 a. 6 ad 4, 294–299: “quantum ad aliquid forma recepta trahit subiectum recipiens ad modum suum, prout scilicet nobilitates quae sunt de ratione formae communicantur subiecto recipienti: sic enim subiectum per formam perficitur et nobilitatur.”;

<sup>18</sup> *De veritate*, q. 24 a. 8 ad 6, q. 24 a. 8 ad 6, 178–181: “[calor receptus in aqua] aquam trahit a naturali sua dispositione ad hoc quod fiat calida, et faciat actum caloris; et similiter lux aerem, licet non contra naturam aeris.”

<sup>19</sup> *In Sent.* 1, q. 1 a. 2 ad 2: “analogiae [...] communitas potest esse dupliciter.”

1. Because some (i.e., multiple things) participate (in) something one according to prior and posterior.<sup>20</sup>

For example, *potency* and *act* (participate in) the *ratio of being (ens)*; and likewise, *substance* and *accident*.<sup>21</sup>

2. Because one receives its (act of) being (*esse*) and (its) *ratio* from another.<sup>22</sup>

An un-participated principle is a cause of both the participations and the participants.<sup>23</sup>

## 26.6. Naming of a Participated Perfection

A twofold name is imposed on a participated perfection, either:<sup>24</sup>

1. According to the **common *ratio*** of *perfection*.<sup>25</sup>

(In this mode), the name is common by analogy to both the communicating principle itself and to all participants. For example, *goodness*, *beingness*, and such.<sup>26</sup>

2. According to the **proper mode** in which it is received.<sup>27</sup>

For example, the name *sense* is imposed to signify *cognition* according to some determinate mode in that which has it. Whence, the name (*sense*) is not common to all (modes of cognition).<sup>28</sup> And because of this, it is not a common name.

## 26.7. Predication by Essence and Predication by Participation

Something is said of something in two modes:<sup>29</sup> (1) **substantially** (*substantialiter*), i.e., **by essence** (*per essentiam*); (2) **by participation** (*per participationem*).

According to the modes in which *a subject is said to participate (in) an accident*, and *matter is said to participate (in) a form* (► 26.2, ¶3), it is true that *to be by essence (esse per*

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<sup>20</sup> *In Sent.* 1, q. 1 a. 2 ad 2: "Aut ex eo quod aliqua participant aliquid unum secundum prius et posterius."

<sup>21</sup> *In Sent.* 1, q. 1 a. 2 ad 2: "sicut potentia et actus [participant] rationem entis, et similiter substantia et accidens."

<sup>22</sup> *In Sent.* 1, q. 1 a. 2 ad 2: "aut ex eo quod unum esse et rationem ab altero recipit."

<sup>23</sup> *In De div. nom.*, c. 11, l. 4: "principium imparticipatum, causa est et participationum et participantium."

<sup>24</sup> *In Sent.* 1, d. 19 q. 2 a. 1 ad 3: "Perfectioni autem participatae duplex nomen imponitur."

<sup>25</sup> *In Sent.* 1, d. 19 q. 2 a. 1 ad 3: "Vel secundum rationem communem perfectionis illius."

<sup>26</sup> *In Sent.* 1, d. 19 q. 2 a. 1 ad 3: "et tunc nomen est commune et ipsi principio communicanti et omnibus participantibus, secundum analogiam, sicut bonitas, entitas et hujusmodi."

<sup>27</sup> *In Sent.* 1, d. 19 q. 2 a. 1 ad 3: "Vel secundum proprium modum quo recipitur vel est in aliqua creatura."

<sup>28</sup> *In Sent.* 1, d. 19 q. 2 a. 1 ad 3: "ut patet quod [...] hoc nomen sensus imponitur ad significandum cognitionem secundum aliquem modum determinatum habendi ipsam, et propter hoc non est commune omnibus."

<sup>29</sup> *In De ebd.*, l. 3, 42–44: "Dupliciter autem aliquid de aliquo dicitur, uno modo substantialiter, alio modo per participationem."

*essentiam*) and *to be by participation* (*esse per participationem*) are opposites, for an accident is other than (*praeter*) the nature of the subject, and form (is) other than (*praeter*) the substance itself (i.e., the essence itself) of matter.<sup>30</sup>

In the mode of participation whereby *a species participates (in) a genus* (► 26.2, mode 1), according to the opinion of PLATO, who posited that the Idea of *biped* and *animal* is other than (the Idea) of *man*, it is true that *to be by essence* (*esse per essentiam*) and *to be by participation* (*esse per participationem*) are opposites.<sup>31</sup>

On the other hand, according to the determination of ARISTOTLE, who posited that *man* truly is that which *animal* is, such that (*quasi*) the essence of *animal* does not exist without (*praeter*) the difference of *man* (► 14.14) **nothing prevents that which is said by participation from being said substantially** (true also of individuals; ► 26.2, ¶2).<sup>32</sup>

Indeed, whenever something is predicated of another by participation, there must be something other than (*praeter*) that which is participated (namely, the participant, which cannot be the same according to the same, since nothing participates in itself).<sup>33</sup>

However, something is participated in two modes:<sup>34</sup>

1. As that which exists pertaining to the essence of the participant (*quasi existens de substantia participantis*).<sup>35</sup>

For example, a genus is participated by a species (as that which pertains to its essence), for that belongs to the substance of the thing which falls in its definition (► 13.16).<sup>36</sup>

Therefore, whatever is predicated univocally of many (i.e., according to the same *ratio* or definition; ► 20.1) befits (*convenit*) any of those of which it is predicated by participation

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<sup>30</sup> *In De ebdo.*, l. 3, 47–55: “considerandum est, quod in ista questione presupponitur quod aliquid esse per essentiam et per participationem sint opposita. Et in uno quidem supradictorum participationis modorum manifeste hoc uerum est, scilicet secundum illum modum quo subiectum dicitur participare accidens uel materia formam. Est enim accidens praeter substantiam subiecti et forma praeter ipsam substantiam materie.”

<sup>31</sup> *In De ebdo.*, l. 3, 55–63: “Set in alio participationis modo, quo scilicet species participat genus, hoc etiam uerum est secundum sententiam Platonis qui posuit aliam esse ydeam animalis et bipedis et hominis.”

<sup>32</sup> *In De ebdo.*, l. 3, 55–63: “set secundum sententiam Aristotilis sententiam qui posuit quod homo uere est id quod est animal, quasi essentia animalis non existente praeter differentiam hominis, nihil prohibet id quod per participationem dicitur etiam substantialiter predicari.”

<sup>33</sup> *Quodlibet 2*, q. 2 a. 1 co.: “Quandocumque autem aliquid praedicatur de altero per participationem, oportet ibi aliquid esse praeter id quod participatur.”

<sup>34</sup> *Quodlibet 2*, q. 2 a. 1 co.: “Sed sciendum est, quod aliquid participatur dupliciter.”

<sup>35</sup> *Quodlibet 2*, q. 2 a. 1 co.: “Uno modo quasi existens de substantia participantis.”

<sup>36</sup> *Quodlibet 2*, q. 2 a. 1 co.: “sicut genus participatur a specie. [...] Id enim est de substantia rei quod cadit in eius definitione.”

(*secundum participationem*), as a species is said to participate in a genus, and an individual (is said to participate) in a species.<sup>37</sup>

Nonetheless, a name that is predicated by participation is said in respect to that which is predicated by itself (► 17); which (predication) is not pure equivocation, but a multiplicity of analogy (i.e., according to prior and posterior; ► 20).<sup>38</sup>

2. As that which exists not pertaining to the essence of the thing (*sicut aliquid non existens de essentia rei*).<sup>39</sup>

Everything that is other than the essence of the thing is said (to be an) *accident*.<sup>40</sup>

### 26.8. Accidental Participation of Differences in a Genus

No difference participates (in) a genus in such a way that (the) *genus* would be in the *ratio* of (the) *difference*, for then (the) *genus* would be posited twice in the definition of (the) *species* (e.g., *man* is a *rational-animal animal* if *rational*, too, is an *animal*).<sup>41</sup> Rather, (the) *difference* must be other than (*praeter*) that which is understood in the *ratio* of (a) *genus*.

Indeed, every genus is divided by some differences.<sup>42</sup> And differences participate (in) a genus only by accident insofar as the species (that are) constituted by the differences participate (essentially) in the genus.

### 26.9. Participation of the Mean in the Extremes

The mean participates in some mode (in) either extreme.<sup>43</sup> And insofar as it participates (in) one of them it is contrary (*contrariatur*) to the other.

For example, the equal, which is a mean between the greater and the less, is less in comparison to the greater, and greater in comparison to the less.<sup>44</sup> Whence, *equal* is

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<sup>37</sup> ScG 1, 32 n. 6: “Omne quod de pluribus praedicatur univoce, secundum participationem cuilibet eorum convenit de quo praedicatur: nam species participare dicitur genus, et individuum speciem.”

<sup>38</sup> *In Metaph.* 1, l. 14, §224: “nomen quod per participationem praedicatur, dicitur per respectum ad illud quod praedicatur per se, quod non est pura aequivocatio, sed multiplicitas analogiae.”

<sup>39</sup> *Quodlibet* 2, q. 2 a. 1 co.: “[Alio modo] participatur sicut aliquid non existens de essentia rei.”

<sup>40</sup> *Quodlibet* 2, q. 2 a. 1 co.: “cum omne quod est praeter essentiam rei, dicatur accidens [...]”

<sup>41</sup> ScG 1, 25 n. 6: “Nulla autem differentia participat genus, ita scilicet quod genus sit in ratione differentiae, quia sic genus poneretur bis in definitione speciei: sed oportet differentiam esse praeter id quod intelligitur in ratione generis.”

<sup>42</sup> *Comp. th.* 1, c. 13, 7–11: “omne genus differentiis aliquibus diuiditur; [...] differentie enim non participant genus nisi per accidens, in quantum species constitute per differentias genus participant.”

<sup>43</sup> *In Ethic.* 2, l. 10, 36–38 (cf. ARISTOTLE, *Ethica Nicomachea* B.8, 1108b15–19): “cum medium participet aequaliter utrumque extremum, in quantum participat unum eorum contrariatur alteri.”

<sup>44</sup> *In Ethic.* 2, l. 10, 38–43: “sicut aequale, quod est medium inter magnum et parvum, est quidem in comparatione ad magnum parvum et in comparatione ad parvum est magnum, et ideo aequale et magno opponitur secundum rationem parvi et parvo secundum rationem magni.”

opposed both to *great* according to the *ratio* of *less*, and to *less* according to the *ratio* of *great*.

This is why there is motion (not only) from a contrary into a mean, but also (from a mean) into a contrary.<sup>45</sup>

### 26.10. Equal vs. Unequal Participation

In those (things) that **differ materially**, nothing prevents many (things) from being found (to be) related *equally* (*ex aequo se habere*; cf. EUCLID's ratio *ex aequo* = δι' ἴσου λόγος; ► 6.11),<sup>46</sup> for in substances, the individuals of one species equally (*aequaliter*) participate (in) the *ratio* of (the) *species*; and in accidents, too, it is possible for diverse subjects to equally (*aequaliter*) participate (e.g., in the *ratio* of) *whiteness*.<sup>47</sup>

However, in those things that **differ formally**, *some order is always found*.<sup>48</sup> If one should consider it diligently, in every species of one genus he would always find one thing that is

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<sup>45</sup> *In Ethic.* 2, l. 10, 43–45: “et propter hoc est motus a contrario in medium sicut et in contrarium, ut dicitur in V Physicorum.” Cf. *In Physic.* 5, l. 1, n. 10 (cf. ARISTOTLE, *Physica* E.1, 224b28–30): “mutatio quae non est secundum accidens, non est in omnibus; sed est tantum *in contrariis et mediis*, quantum ad motum qui est in quantitate, qualitate et ubi; *et in contradictione*, quantum ad generationem et corruptionem, quorum termini sunt esse et non esse: et hoc patet per inductionem. Sub arte autem non cadunt nisi ea quae sunt determinata; nam infinitorum non est ars.” Ibid., n. 11 (cf. ARISTOTLE, *Physica* E.1, 224b30–35): “manifestat [Philosophus] quoddam quod dixerat, scilicet quod motus sit in mediis. Et dicit quod contingit mutari ex medio ad utrumque extremorum et e converso, in quantum scilicet possumus uti medio ut contrario respectu utriusque extremi. Medium enim in quantum habet convenientiam cum utroque extremorum, est quodammodo utrumque eorum; et ideo potest dici hoc ad illud, et illud ad hoc: sicut si dicam quod media vox inter gravem et acutam *est gravis ad ultimam*, idest per comparisonem ad acutam, et *subtilis*, idest acuta, per comparisonem *ad extremam*, idest ad gravem; et fuscum est album per comparisonem ad nigrum, et e converso.” Ibid., l. 8, n. 12 (cf. ARISTOTLE, *Physica* E.5, 229b14–22): “determinat [Philosophus] de contrarietate motus ex parte medii. Et dicit quod in quibuscumque contrariis invenitur medium, motus qui terminantur ad medium, hoc modo ponendi sunt esse contrarii, sicut illi qui terminantur ad contraria: quia motus utitur medio sicut contrario, ita quod ex medio contingit mutari in utrumque contrariorum. Sicut ex fusco, quod est medium inter album et nigrum, hoc modo mutatur in album, ac si mutaretur ex nigro in album; et e converso ex albo sic mutatur aliquid in fuscum, ac si mutaretur in nigrum; et ex nigro sic mutatur in fuscum, ac si mutaretur in album: quia fuscum, cum sit medium ad utrumque extremorum, dicitur utrumque; quia in comparatione albi est nigrum, et in comparatione nigri est album, ut supra dictum est. Ultimo autem concludit quod principaliter intendit, scilicet quod motus sit contrarius motui secundum contrarietatem utrorumque extremorum.”

<sup>46</sup> See EUCLID, *Opera Omnia*, vol. 2, 6.7–13: “Δι' ἴσου λόγος ἐστὶ πλειόνων ὄντων μεγεθῶν καὶ ἄλλων αὐτοῖς ἴσων τὸ πλῆθος σύνδυο λαμβανομένων καὶ ἐν τῷ αὐτῷ λόγῳ, ὅταν ἦ ὡς ἐν τοῖς πρώτοις μεγέθεσι τὸ πρῶτον πρὸς τὸ ἔσχατον, οὕτως ἐν τοῖς δευτέροις μεγέθεσι τὸ πρῶτον πρὸς τὸ ἔσχατον· ἢ ἄλλως· Λήψις τῶν ἄκρων καθ' ὑπεξαίρεσιν τῶν μέσων.” HEIBERG's version (ibid., 7): “Datis compluribus magnitudinibus et aliis iis numero aequalibus, ita ut bini coniuncti in eadem ratione sint, ex aequo ratio est, ubi erit, ut in prioribus magnitudinibus prima ad extremam, ita in alteris magnitudinibus prima ad extremam. uel aliter: ubi termini exteriores sumuntur omissis mediis.” HEIBERG adds in note 1 its algebraic representation, “Si  $a : b : c = \alpha : \beta : \gamma$ , ratio ex aequo erit  $a : c = \alpha : \gamma$ .”

<sup>47</sup> *In De causis*, l. 4: “In his autem quae materialiter differunt nihil prohibet inveniri multa ex aequo se habere, nam in substantiis individua unius speciei aequaliter speciei rationem participant; in accidentibus etiam possibile est diversa subiecta aequaliter participare albedinem.”

<sup>48</sup> *In De causis*, l. 4: “Sed in his quae formaliter differunt, semper quidam ordo invenitur. Si quis enim diligenter consideret, in omnibus speciebus unius generis semper inveniet unam alia perfectiorem, sicut in coloribus albedinem et in animalibus hominem. Et hoc ideo quia quae formaliter differunt, secundum aliquam contrarietatem differunt; est enim contrarietas differentia secundum formam, ut Philosophus dicit in X Metaphysicae.”

more perfect than the others, as whiteness in colors, and man in animals. And because they differ formally, they differ according to some contrariety, for *contrariety is a difference according to form*.

In contraries, there is always a nobler one and a viler one, because the first contrariety is privation and habit (► 43.9).<sup>49</sup> Wherefrom, as ARISTOTLE says, the species of things are like numbers, which are diversified in species following the addition of one over the another (► 16.7).

It is manifest that the more something is perfect, the more it is closer to a most perfect one (► 27).<sup>50</sup> For (that which is) good by essence is prior to (that which is) good by participation.<sup>51</sup>

### 26.11. What Is by Essence Is the Cause of That Which Is by Participation

In all those things that are said (analogically) according to prior and posterior, the first can be a cause of those that are (posterior to it); and that which is said by itself is the cause of that which is said by participation.<sup>52</sup>

Hence, in whatever genus of things, that which is by essence (*per essentiam*) is the proper cause of—and is prior, superior (*potius*), more perfect (*perfectius*), than—those (things) that are (in the same genus) by participation (*per participationem*).<sup>53</sup>

For example, the nature of fire (*natura ignis*; i.e., *igneitas*, *fireness*) is found (to be) more perfect in fire itself than in things (that are) afire.<sup>54</sup> And fire is the cause of all things afire

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<sup>49</sup> *In De causis*, l. 4: “In contrariis autem semper est unum nobilius et aliud vilius, ut dicitur in I Physicorum, et hoc ideo quia prima contrarietas est privatio et habitus, ut dicitur in X Metaphysicae. Et propter hoc in VIII Metaphysicae Philosophus dicit quod species rerum sunt sicut numeri, qui specie diversificantur secundum additionem unius super alterum.”

<sup>50</sup> *In De causis*, l. 4: “Manifestum est autem quod quanto aliquid est perfectius, tanto propinquius est uni perfectissimo.”

<sup>51</sup> *STh* I, q. 3 a. 2 co.: “bonum per essentiam, prius est bono per participationem.”

<sup>52</sup> *In Sent.* 2, d. 37 q. 1 a. 2 co.: “In omnibus autem quae secundum prius et posterius dicuntur, primum eorum quae sunt, potest esse causa; et per se dictum, est causa ejus quod per participationem dicitur.” *ScG* 2, 15 n. 5: “Quod per essentiam dicitur, est causa omnium quae per participationem dicuntur.”

<sup>53</sup> *Super Io.* 5, l. 5: “In quolibet autem genere rerum, quod est per essentiam, est causa eorum quae sunt per participationem.” As an example, St. Thomas notes that fire is the cause of all things afire: “sicut ignis est causa omnium ignitorum.” *In Sent.* 3, d. 33 q. 1 a. 1 qc. 2 ad 1: “prius est quod est per essentiam quam quod est per participationem.” *In Sent.* 4, d. 8 q. 2 a. 4 qc. 3 expos.: “quod est per essentiam, prius est quam id quod est per participationem.” *ScG* 1, 102 n. 4: “Quod per essentiam est, potius est eo quod per participationem dicitur.” That St. Thomas considers *potius* to be the equivalent of *perfectius* is evident from the example that he provides immediately: “sicut natura ignis perfectius invenitur in ipso igne quam in rebus ignitis.” *ScG* 3, 66 n. 7: “Quod est per essentiam tale, est propria causa eius quod est per participationem tale.” *STh* I, q. 87 a. 2 ad 3: “Omne autem quod est per participationem causatur ab eo quod est per essentiam.” *STh* III, q. 65 a. 3 co.: “Semper autem quod est per essentiam, potius est eo quod est per participationem.”

<sup>54</sup> *ScG* 1, 102 n. 4: “sicut natura ignis perfectius invenitur in ipso igne quam in rebus ignitis.” *ScG* 2, 15 n. 5: “sicut ignis est causa omnium ignitorum in quantum huiusmodi.” *ScG* 3, 66 n. 7: “sicut ignis est causa



as such (*est causa omnium ignitorum inquantum huiusmodi*), for all those things that are afire by participation are reduced to fire, which is such by its essence. Thus, that which is afire participates in fireness from that which is fire by its essence, and all things that are afire have in fire the cause of their being-afire (*ignitio*) in some mode.

Indeed, a thing is in act by some substantial or accidental form, since form is an act.<sup>55</sup> Thus, fire is fire in act by fireness (i.e., by its substantial nature), and (fire is) hot (in act) by heat (i.e., by an accidental nature that results from the substantial form of fire). Whence, an (action or an) operation befits (*convenit*) something only through some substantial or accidental form existing in it, for something acts or operates only insofar as it is in act (e.g., fire heats other things insofar as it is hot in act; and it is hot in act on account of its substantial form).

However, an exemplar form (►9.6) need not be of one species with the (thing) caused, for participants do not always participate by the mode of that which is participated.<sup>56</sup>

Thus, everything that is *x* (*illud*) by participation (*secundum participationem*) is reduced to that which is *x* (*illud*) by its essence as to a first and highest (*summum*) principle and cause.<sup>57</sup> For everything that befits (*convenit*) something by participation, is substantially (i.e., essentially) in another priorly.<sup>58</sup> And everything that is by participation is brought under (*subditur*) that which is by essence and universally.<sup>59</sup> Thus, everything that befits (*convenit*) something by participation, is found (to be) more perfect in that which is by essence, wherefrom it is derived into others (*a quo in alia derivatur*).<sup>60</sup>

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omnium ignitorum.” *STh* I, q. 87 a. 2 ad 3: “sicut omne ignitum causatur ab igne.” *Super Io.* 5, l. 5: “sicut omnia ignita per participationem reducuntur ad ignem, qui est per essentiam suam talis.” *Comp. th.* 1, c. 68, 20–22: “sicut ferrum ignitum participat igneitate ab eo quod est ignis per essentiam suam.” *Comp. th.* 1, c. 123, 29–30: “omnia enim ignita suae ignitionis ignem causam habent aliquo modo.”

<sup>55</sup> *De spirit. creat.*, a. 2 co.: “Nulla autem operatio convenit alicui nisi per aliquam formam in ipso existentem, vel substantialem vel accidentalem; quia nihil agit aut operatur nisi secundum quod est actu. Est autem unumquodque actu per formam aliquam vel substantialem vel accidentalem, cum forma sit actus; sicut ignis est actu ignis per igneitate, actu calidus per calorem.”

<sup>56</sup> *In Sent.* 3, d. 27 q. 2 a. 4 qc. 3 ad 1: “forma exemplaris non oportet quod sit unius speciei cum causatis: quia participantia non semper participant per modum participati.”

<sup>57</sup> *Super Io.* 5, l. 5: “omne illud quod est secundum participationem, reducitur ad aliquid quod sit illud per suam essentiam, sicut ad primum et ad summum.” *Comp. th.* 1, c. 68, 18–20: “omne quod habet aliquid per participationem reducitur in id quod habet illud per essentiam sicut in principium et causam.” *Comp. th.* 1, c. 123, 27–28: “Ea quae sunt per participationem, reducuntur in id quod est per essentiam, sicut in causam.” *ScG* 1, 98 n. 4: “Omne autem quod est per participationem, reducitur ad id quod est per seipsum.”

<sup>58</sup> *De spirit. creat.*, a. 10 co.: “omne quod convenit alicui per participationem, prius est in aliquo substantialiter; sicut si ferrum est ignitum, oportet esse in rebus aliquid quod sit ignis secundum suam substantiam et naturam.”

<sup>59</sup> *STh* I, q. 96 a. 1 co.: “Omne autem quod est per participationem, subditur ei quod est per essentiam et universaliter”

<sup>60</sup> *De sub. sep.*, c. 14, 49–52: “Omne autem quod convenit alicui per participationem, perfectius invenitur in eo quod per essentiam est, a quo in alia derivatur.”

## 26.12. Agreement

An agreement (*convenientia*) can be of one of two (modes):<sup>61</sup>

1. Insofar as two (things) participate in something one.
2. Insofar as (something) one is simply by itself (*unum per se est simpliciter*) and another participates in its likeness as much as it can. For example, if we should posit that heat (by itself) is without matter and that fire agrees with it, since it would participate (in) some (virtual quantity or *ratio*) of heat.

## 26.13. Consideration of Agreement

An agreement (*convenientia*) can be considered in one of two (modes):<sup>62</sup>

1. According to the properties of a nature. In this mode, for example, the soul and the body are very distant (e.g., although they agree in one act of being or living, they disagree in the passive properties of matter, on one hand, and the active properties of form, on the other).
2. According to the proportion of potency to act. In this mode, the soul and the body maximally agree (e.g., not only is matter susceptible of receiving the act of being that the form gives, but a relation of matter to form necessarily follows upon their union; ►46.12).

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<sup>61</sup> *In Sent.* 2, d. 16 q. 1 a. 1 ad 3: “convenientia potest esse dupliciter: aut duorum participantium aliquod unum [...] aut secundum quod unum per se est simpliciter, et alterum participat de similitudine ejus quantum potest; ut si poneremus calorem esse sine materia, et ignem convenire cum eo, ex hoc quod aliquid caloris participaret.” We were unable to find a definition of *convenientia*, but it seems to consist in some degree of community. See, for example, *In Sent.* 1, d. 10 q. 1 a. 4 ad 1: “Et rationem convenientiae assignat Augustinus in littera. Quia enim est communitas [...], decet ut communi nomine nominetur.” *STh* I, q. 36 a. 1 co.: “Et huius quidem convenientiae ratio sumi potest [...] ex ipsa communitate [...]” The order of community or dependence is the mode to which all other orders are reduced, as we will show.

<sup>62</sup> *In Sent.* 2, d. 1 q. 2 a. 4 ad 3: “Sciendum ergo, quod convenientia potest attendi dupliciter: aut secundum proprietates naturae; et sic anima et corpus multum distant: aut secundum proportionem potentiae ad actum; et sic anima et corpus maxime conveniunt.”

## 27. The Principle in Any Genus

As determined above, (1) there is a principle in every order (►8.2; 8.5); (2) a cause is a principle in some genus (►9); (3) in the same genus, there are prior and posterior causes (►11.3); (4) one ought always to reduce any question to a first cause (►11.6); and the first and maximum in each genus is the cause of those things that are posterior (►8.3). Here, we aim to determine the nature of this principle in a genus.

### 27.1. Genus: Properly vs. in Common

(The name) **genus** can be taken in two modes:<sup>1</sup>

#### 1. Properly (*proprie*), insofar as *in it*, an essence is predicated of many (►14).<sup>2</sup>

In this way, neither *good* nor *bad* are genera, since they are among the transcendentals, for *good* and *being* are convertible (*bonum et ens convertuntur*; ►30.10).<sup>3</sup>

2. **In common** (*communiter*), such that *everything that embraces and contains many (things) in its commonality* would be said (to be a) *genus* (e.g., we speak of the *medical genus*, but not such that one medical essence would be predicated of diverse things).<sup>4</sup>

In this way, *good* and *bad* are said (to be the) *genera of all contraries*, for all contraries are related in such a way that one of them is more noble and the other more vile.<sup>5</sup> And the more vile includes in itself privation, as black in respect of white, and cold in respect of hot. Wherefrom, ARISTOTLE says that coldness is the privation of heat.

In this mode, one of the contraries always pertains to the *good*, and the others to the *bad*.<sup>6</sup>

### 27.2. Division of the Common

The mode of dividing the common into those that are under it is twofold, just as the mode of community is twofold:<sup>7</sup>

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<sup>1</sup> *In Sent. 2*, d. 34 q. 1 a. 2 ad 1: "genus dupliciter potest accipi."

<sup>2</sup> *In Sent. 2*, d. 34 q. 1 a. 2 ad 1: "Uno modo proprie, prout praedicatur de pluribus in eo quod quid est."

<sup>3</sup> *In Sent. 2*, d. 34 q. 1 a. 2 ad 1: "et sic neque bonum neque malum sunt genera; quia sunt de transcendentibus, quia bonum et ens convertuntur."

<sup>4</sup> *In Sent. 2*, d. 34 q. 1 a. 2 ad 1: "Alio modo communiter, ut genus dicatur omne id quod sua communitate multa ambit et continet."

<sup>5</sup> *In Sent. 2*, d. 34 q. 1 a. 2 ad 1: "et sic bonum et malum dicuntur genera omnium contrariorum: quia, ut in 1 *Physic.* dicitur, omnia contraria hoc modo se habent quod alterum est nobilius, et alterum vilius; ita quod vilius privationem in se includit, sicut nigrum in respectu ad album, et frigidum in respectu ad calidum: propter quod in 1 *De generat.* dicitur, quod frigus est privatio caloris."

<sup>6</sup> *In Sent. 2*, d. 34 q. 1 a. 2 ad 1: "et per hunc modum semper alterum contrarium pertinet ad bonum, et reliquum ad malum."

<sup>7</sup> *In Sent. 2*, d. 42 q. 1 a. 3 co.: "est duplex modus dividendi commune in ea quae sub ipso sunt, sicut est duplex communitatis modus." *De malo*, q. 7 a. 1 ad 1: "duplex est divisio."

1. *The division by differences of the univocal into species.* In this division, the nature of the genus is participated equally in the species.<sup>8</sup>

For example, *animal* is divided into *man*, *horse*, and such (each of which participates equally in the nature of *animal*).<sup>9</sup>

When some (i.e., multiple) things are co-divided (*condividuntur*) equally (*aequaliter*), receiving a common predication, then one is not posited in the definition of the other (e.g., *horse* is not posited in the definition of *man*).<sup>10</sup>

2. *The division of that which is common by analogy*, which is predicated of one of the (things) that divide (the common) according to a perfect *ratio*, while (it is predicated) of the others imperfectly and according to something (*secundum quid*).<sup>11</sup> This division is as a mean between the equivocal and the univocal.

For example, *being* (*ens*) is divided into *substance* and *accident*, and into *being in act* and *being in potency*; yet (these are predicated unequally, for) the minimum (perfection) that can be (pondered) about the nature of being (*de natura entis*) is in *being in potency* and in *being by accident*.<sup>12</sup>

When (something) is predicated of (multiple things) in common according to prior and posterior (*per prius et posterius*), then the first is posited in the definition of the others.<sup>13</sup> Thus, *substance* (is posited) in the definition of accidents, for that which is by essence is prior to that which is by participation (*prius est quod est per essentiam quam quod est per participationem*; ► 26.11).

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<sup>8</sup> *In Sent.* 2, d. 42 q. 1 a. 3 co.: “Est enim quaedam divisio univoci in species per differentias quibus aequaliter natura generis in speciebus participatur.” *De malo*, q. 7 a. 1 ad 1: “una qua dividitur genus univocum in suas species, quae ex aequo participant genus.”

<sup>9</sup> *In Sent.* 2, d. 42 q. 1 a. 3 co.: “sicut animal dividitur in hominem et equum, et hujusmodi.” *De malo*, q. 7 a. 1 ad 1: “sicut animal in bovem et equum.”

<sup>10</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 2 ad 1: “quando aliqua condividuntur aequaliter recipientia communis praedicationem, tunc unum non ponitur in definitione alterius.”

<sup>11</sup> *In Sent.* 2, d. 42 q. 1 a. 3 co.: “alia vero divisio est ejus quod est commune per analogiam, quod quidem secundum perfectam rationem praedicatur de uno dividendum, et de altero imperfecte et secundum quid [...]: et haec divisio est quasi media inter aequivocum et univocum.” *De malo*, q. 7 a. 1 ad 1: “alia est divisio communis analogi in ea de quibus dicitur secundum prius et posterius [...]; et in talibus ratio communis perfecte salvatur in uno; in aliis autem secundum quid et per posterius.”

<sup>12</sup> *In Sent.* 2, d. 42 q. 1 a. 3 co.: “sicut ens dividitur in substantiam et accidens, et in ens actu et in ens potentia: et haec divisio est quasi media inter aequivocum et univocum; [...] minimum quod potest esse de natura entis est in ente in potentia et in ente per accidens.” Cf. *STh* I-II, q. 88 a. 1 ad 1: “divisio peccati venialis et mortalis non est divisio generis in species, quae aequaliter participant rationem generis, sed analogi in ea de quibus praedicatur secundum prius et posterius.” *De malo*, q. 7 a. 1 ad 1: “sicut ens dividitur per substantiam et accidens, et per potentiam et actum.”

<sup>13</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 2 ad 1: “sed quando commune praedicatur de eis per prius et posterius, tunc primum ponitur in definitione aliorum, sicut substantia in definitione accidentium [...]: quia prius est quod est per essentiam quam quod est per participationem.”

### 27.3. Modes of Priority Among the Parts of the Common

Of (the parts) that divide something common, one can be prior to another in two modes:<sup>14</sup>

1. According to the proper ratios or natures of those (parts) that divide (the common whole).<sup>15</sup> This mode (of priority) does not take away the univocity of a genus.

This is evident in numbers, in which *two* (*binarius*) is naturally prior to *three* (*ternario*) according to its proper *ratio*, but they both participate equally in the *ratio* of their genus (►21.15): namely, (the genus of) *number*, for just as *three* is a *multitude measured by one* (which is the *ratio* of *number*), so is *two*.<sup>16</sup>

2. According to the participation of the *ratio* of the common that is divided into them (i.e., according to a greater participation of the *ratio* of the common whole found in one of the parts into which it is divided).<sup>17</sup> This mode (of priority) impedes the univocity of a genus.

This is why *being* (*ens*) cannot be (properly speaking) the (predicable) genus of *substance* and of *accident*: because in the *ratio* itself of *being*, substance, which is *being by itself* (*ens per se*), has priority in respect of accident, which is *being by another and in another* (*ens per aliud et in alio*).<sup>18</sup>

Thus, it is evident that, that which is *being* by itself (*ens per se ipsum*), namely, substance, is naturally prior to all those that have (their act of) being (*esse*) only in comparison to substance.<sup>19</sup>

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<sup>14</sup> *In Peri.* 1, l. 8, 53–54: “unum diidentium aliquod commune potest esse prius altero dupliciter.” Cf. the anonymous *Summa totius Logicae Aristotelis*, tract. 6 cap. 6: “unum diidentium aliquod commune potest esse prius altero dupliciter.”

<sup>15</sup> *In Peri.* 1, l. 8, 55–56; 58: “uno modo, secundum proprias rationes aut naturas diidentium. [...] primum autem non tollit univocationem generis.” Cf. the anonymous *Summa totius Logicae Aristotelis*, tract. 6 cap. 6: “Uno modo secundum proprias rationes aut naturas diidentium. [...] Primum autem non tollit univocationem generis.”

<sup>16</sup> *In Peri.* 1, l. 8, 59–63: “ut manifestum est in numeris, in quibus binarius secundum propriam rationem naturaliter est prior ternario, set tamen equaliter participant rationem communis, scilicet numeri: ita enim est ternarius multitudo mensurata per unum sicut et binarius.” Cf. the anonymous *Summa totius Logicae Aristotelis*, tract. 6 cap. 6: “ut manifestum est in numeris, in quibus binarius secundum propriam rationem naturaliter est prior ternario; sed tamen aequaliter participant rationem communis, scilicet numeri: nam ita ternarius sicut et binarius est multitudo mensurata per unum.”

<sup>17</sup> *In Peri.* 1, l. 8, 56–57; 64: “alio modo secundum participationem rationis illius communis quod in ea diiditur. [...] set secundum impedit univocationem generis.” Cf. the anonymous *Summa totius Logicae Aristotelis*, tract. 6 cap. 6: “Alio modo secundum majorem participationem rationis illius communis quod in ea dividitur. [...] Secunda autem prioritas impedit univocationem generis.”

<sup>18</sup> *In Peri.* 1, l. 8, 64–68: “et propter hoc ens non potest esse genus substantie et accidentis: quia in ipsa ratione entis prioritatem habet substantia, que est ens per se, respectu accidentis, quod est ens per aliud et in alio.” Cf. the anonymous *Summa totius Logicae Aristotelis*, tract. 6 cap. 6: “et propter hoc, ens non potest esse genus substantie et accidentis, quia in ratione entis prius habet esse substantia, quae est ens per se, quam accidens, quod est ens in alio vel in aliud.”

<sup>19</sup> *In Ethic.* 1, l. 6, 112–115 (cf. ARISTOTLE, *Ethica Nicomachea* A.4, 1096a20–21): “manifestum est autem quod illud quod est ens per se ipsum, scilicet substantia, est naturaliter prior omnibus his quae non habent esse nisi in comparatione ad substantiam.”

For example, **quantity** is a *measure of substance*; **quality** is a *disposition of substance*; and **relation** (*ad aliquid*) is a *habitude (habitus) of substance*.<sup>20</sup> And the same occurs in all the other genera, all of which are assimilated to the progeny of being—that is, (to) substance, which principally is being, from which all other genera are propagated and derived, which also are said (to be) *beings (entia)* insofar as they befall substance (*accidunt substantiae*).<sup>21</sup>

In this mode too, *affirmation*, according to its proper *ratio*, is prior to *negation* because it is simpler, even if they participate equally (in) the *ratio* of *enunciation*.<sup>22</sup>

Platonists would not posit some Idea in those genera in which the prior and the posterior are found.<sup>23</sup> This is evident in numbers, for *two* is naturally prior to *three*, and so on. Hence, they did not say that *common number (numerus communis)* is some separate Idea.

On the other hand, they posited single, separated ideal numbers.<sup>24</sup> For example, *two*, *three*, and such. The reason for this is that those (things) in which the prior and the posterior is found seem not to be of one order, and consequently (seem) not to participate equally (in) one Idea.

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<sup>20</sup> *In Ethic.* 1, l. 6, 116–118: “sicut est quantitas quae est mensura substantiae et qualitas quae est dispositio substantiae et ad aliquid quod est habitudo substantiae.”

<sup>21</sup> *In Ethic.* 1, l. 6, 118–123 (cf. ARISTOTLE, *Ethica Nicomachea* A.4, 1096a21–23): “et idem est in aliis generibus quae omnia assimilantur propagini entis, id est substantiae quae est principaliter ens, a qua propagantur et derivantur omnia alia genera quae etiam in tantum dicuntur entia in quantum accidunt substantiae.”

<sup>22</sup> *In Peri.* 1, l. 8, 68–72: “Sic ergo affirmatio secundum propriam rationem prior est negatione, tamen equaliter participant rationem enunciationis quam supra posuit [Philosophus], quod enunciatio est oratio in qua est uero uel falsum.” Cf. the anonymous *Summa totius Logicae Aristotelis*, tract. 6 cap. 6: “dividit [Aristoteles] enunciationem ut genus in species; dividit enim eam in affirmationem et negationem, quae sunt species enunciationis: licet enim affirmatio sit prior negatione; non tamen propter hoc enunciatio de eis analogice praedicatur, sicut dictum est quod praedicatur de simpliciter una et conjunctione una. Notandum quod unum dividendum aliquod commune potest esse prius altero dupliciter [...]. Sic in proposito. Licet affirmatio primo modo, scilicet secundum suam naturam, sit prior negatione, non tamen secundo modo; immo aequaliter participant rationem enunciationis; utraque enim est oratio verum vel falsum significans. Est autem secundum suam naturam affirmatio prior negatione: nam affirmatio est enunciatio alicujus de aliquo, ut homo est animal; negatio vero est enunciatio alicujus ab aliquo, ut homo non est lapis. Cum autem enunciatio, ut dictum est, sit vox significativa, non immediate significat rem, sed mediante conceptu intellectus. Unde in omni enunciatione est tria considerare: scilicet ipsam vocem, quae est signum conceptus intellectus; et ipsum conceptum intellectus, qui est ipsa similitudo rei; et ipsam rem. Quantum ad vocem, prior est affirmatio negatione, quia minus habet de compositione quam negatio: plures enim dictiones sunt Socrates non currit quam Socrates currit: et per consequens est magis composita. Ex parte intellectus prior est affirmatio, quae significat compositionem, quam negatio, quae significat divisionem: posterior enim est divisio compositione, sicut non est corruptio nisi generatorum, sic non est divisio nisi compositorum. Ex parte etiam rei affirmatio quae significat esse, prior est negatione quae significat non esse, sicut habitus naturaliter prior est negatione.”

<sup>23</sup> *In Ethic.* 1, l. 6, 98–104 (cf. ARISTOTLE, *Ethica Nicomachea* A.4, 1096a17–19): “Quarum prima [ratio] sumitur ex ipsa positione Platoniorum, qui non faciebant aliquam ideam in illis generibus in quibus invenitur prius et posterius, sicut patet in numeris. Nam binarius naturaliter prior est ternario et sic inde, et ideo non dicebant Platonici, quod numerus communis esset quaedam idea separata.”

<sup>24</sup> *In Ethic.* 1, l. 6, 104–108: “ponebant autem singulos numeros ideales separatos, puta binarium, ternarium et similia. Et huius ratio est, quia ea in quibus invenitur prius et posterius, non videntur esse unius ordinis, et per consequens nec aequaliter unam ideam participare.”

#### 27.4. The Cause of Everything in a Genus

That which befits (*convenit*) something from its nature (*ex sua natura*), not from another cause (*non ex alia causa*), cannot be diminished or deficient, for should something essential be subtracted or added, it would already be another nature, as happens in numbers, in which a unit added or subtracted varies the species.<sup>25</sup> On the other hand, if something were found to be diminished and the nature or quiddity remained integral, it is evident that that (thing) does not depend simply on that nature but on something else, by whose removal it is diminished. Hence, that which befits something less than (it befits) others does not befit it only from its nature but from another cause.

Therefore, *that will be the cause of everything in some genus to which maximally befits the predication of that genus.*<sup>26</sup> Whence, we also see that whatever is maximally hot is the cause of heat in all hot things, and that which is maximally lucid (is) the cause of all the things that are lucid.

If one should consider the order of things, one would always find that that which is first and maximum in any genus is the cause of all the other (things) that are posterior in that genus, for the cause is more powerful (*potior*) than the effect.<sup>27</sup>

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<sup>25</sup> ScG 2, 15 n. 3: "Quod alicui convenit ex sua natura, non ex alia causa, minoratum in eo et deficiens esse non potest. Si enim naturae aliquid essenziale subtrahitur vel additur, iam altera natura erit: sicut et in numeris accidit, in quibus unitas addita vel subtracta speciem variat. Si autem, natura vel quidditate rei integra manente, aliquid minoratum inveniatur, iam patet quod illud non simpliciter dependet ex illa natura, sed ex aliquo alio, per cuius remotionem minoratur. Quod igitur alicui minus convenit quam aliis, non convenit ei ex sua natura tantum, sed ex alia causa."

<sup>26</sup> ScG 2, 15 n. 3: "Illud igitur erit causa omnium in aliquo genere cui maxime competit illius generis praedicatio: unde et quod maxime calidum est videmus esse causam caloris in omnibus calidis, et quod maxime lucidum causam omnium lucidorum."

<sup>27</sup> For the origin of this doctrine, St. Thomas frequently refers us to ARISTOTLE, *Metaphysica* α.1, 993b24–27: "ἕκαστον δὲ μάλιστα αὐτὸ τῶν ἄλλων καθ' ὃ καὶ τοῖς ἄλλοις ὑπάρχει τὸ συνώνυμον, οἷον τὸ πῦρ θερμώτατον· καὶ γὰρ τοῖς ἄλλοις τὸ αἴτιον τοῦτο τῆς θερμότητος· ὥστε καὶ ἀληθέστατον τὸ τοῖς ὑστέροις αἴτιον τοῦ ἀληθέσιν εἶναι." Whence, the example provided is most often that of fire, then believed to be an element and the cause of heat in compound bodies. St. Thomas contrasts this with the equivocal heat coming from the sun, then considered to be an incorruptible body (and, therefore, made from diverse matter). *In Metaph.* 2, l. 2, §292: "Unumquodque inter alia maxime dicitur, ex quo causatur in aliis aliquid univoce praedicatum de eis; sicut ignis est causa caloris in elementatis. Unde, cum calor univoce dicitur et de igne et de elementatis corporibus, sequitur quod ignis sit calidissimus. Facit autem mentionem de univocatione, quia quandoque contingit quod effectus non pervenit ad similitudinem causae secundum eandem rationem speciei, propter excellentiam ipsius causae. Sicut sol est causa caloris in istis inferioribus: non tamen inferiora corpora possunt recipere impressionem solis aut aliorum caelestium corporum secundum eandem rationem speciei, cum non communicent in materia. Et propter hoc non dicimus solem esse calidissimum sicut ignem, sed dicimus solem esse aliquid amplius quam calidissimum. Nomen autem veritatis non est proprium alicui speciei, sed se habet communiter ad omnia entia. Unde, quia illud quod est causa veritatis, est causa communicans cum effectu in nomine et ratione communi, sequitur quod illud, quod est posterioribus causa ut sint vera, sit verissimum." Notwithstanding the examples taken from ancient science, this principle is clearly true in any order of things. St. Thomas uses it profusely. We have synthesized the above statement from *De sub. sep.*, c. 9, 145–147: "si quis ordinem rerum consideret, semper inveniet id quod est maximum causam esse eorum quae sunt post ipsum." *In Sent.* 1, d. 32 q. 1 a. 3 co.: "cum omne quod est primum in aliquo genere, sit causa eorum quae sunt post [...]." *In Sent.* 2, d. 37 q. 2 a. 2 co.: "Primum enim in quolibet genere est causa eorum quae sunt post, ut in 2 *Metaphys.* dicitur." *In Sent.* 3, d. 36 q. 1 a. 1 co.: "illud quod est maximum in quolibet genere, est causa aliorum." *In Sent.* 4, d. 49 q. 1 a. 3 qc. 4 co.: "illud quod est primum in quolibet

## 27.5. Perfection of the First Principle

The principle in each genus must be perfect.<sup>28</sup> And the maximum in each genus is the same as that which is perfect (*maximum in unoquoque genere est idem quod perfectum est* < τὸ μέγιστον ἐν ἑκάστῳ γένει τέλειον). This is evident because **maximum** is *that which is not exceeded* (*quod non exceditur* < οὐ μὴ ἔστιν ὑπερβολή), and **perfect** is *that outside of which nothing can be taken* (*extra quod non potest aliquid sumi* = οὐ μὴ ἔστιν ἔξω λαβεῖν τι δυνατόν).

That the perfect is *that outside of which nothing can be taken*, is evident, for all (things) are said to be perfect because they come to an end (*deveniunt ad finem*); and there is nothing outside the end, for the **end** is *that which is last in each thing*, and *which contains the thing*; whence, nothing is outside the end.<sup>29</sup> Nor does that which is perfect need something external: rather, *the whole is contained under its perfection* (*totum continetur sub sua perfectione*).

The perfect in any genus is naturally prior because, as BOETHIUS says, the beginning (*initium*) is taken from the perfect.<sup>30</sup> Whenever one is found to be better than another in whatever (order of) things, that which is better is always prior according to nature.<sup>31</sup> Thus, in whatever genus, the perfect is naturally prior to the corrupted.

Even though the first principle in any genus is most perfect, not everything that is prior is necessarily more perfect, since something that is more imperfect may be prior in the order

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genere et maximum, est causa eorum quae sunt post." ScG 1, 41 n. 4: "Quod est maximum in unoquoque genere est causa aliorum quae sunt in illo genere: causa enim potior est effectus." ScG 3, 17 n. 3: "Quod est maximum in unoquoque genere, est causa omnium illorum quae sunt illius generis." ScG 3, 82 n. 6: "Primum in quolibet genere est causa eorum quae sunt post." ScG 3, 102 n. 7: "primum enim in quolibet genere causa invenitur eorum quae in illo genere consequuntur." In *Physic.* 7, l. 1, n. 6: "quod est primum in quolibet genere, est causa eorum quae sunt post." ScG 4, 27 n. 1: "id quod est in unoquoque genere maximum, causa aliorum esse videatur." *STh* I, q. 77 a. 6 co.: "primum est causa in quolibet genere." *STh* III, q. 56 a. 1 co.: "illud quod est primum in quolibet genere, est causa omnium eorum quae sunt post, ut dicitur in II *Metaphys.*"

<sup>28</sup> In *De caelo* 2, l. 10, n. 10: "In quolibet autem genere id quod est primum est causa eorum quae sunt post in eodem genere." In *Metaph.* 10, l. 5, §2027 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a10–12): "Maximum in unoquoque genere est idem quod perfectum est. Quod patet ex hoc, quod maximum est quod non exceditur; et perfectum est, extra quod non potest aliquid sumi." *Comp. th.* 1, c. 213, 15–16: "Principium enim in unoquoque genere oportet esse perfectum."

<sup>29</sup> In *Metaph.* 10, l. 5, §2028 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a14–16): "Et quod perfectum sit extra quod non potest aliquid sumi, patet; quia omnia dicuntur perfecta, eo quod deveniunt ad finem. Extra finem autem nihil est: quia finis est id quod est ultimum in omni re, et quod continet rem. Unde nihil est extra finem. Nec id quod perfectum est, indiget aliquo exteriori; sed totum continetur sub sua perfectione."

<sup>30</sup> *Contra retr.*, c. 7, 366–368: "perfectum in quolibet genere naturaliter prius est: natura enim, ut Boetius dicit, a perfectis sumit initium." The reference is to BOETHIUS, *De consol.* III, prosa 10: "Neque enim ab diminutis inconsummatisque natura rerum coepit exordium, sed ab integris absolutisque procedens" (PL 63, 76A).

<sup>31</sup> In *Metaph.* 3, l. 8, §439: "in quibuscumque invenitur unum alio melius, semper illud quod est melius, est prius secundum naturam." Cf. ARISTOTLE, *Metaphysica* B.3, 999a13–14: "ὅπου τὸ μὲν βέλτιον τὸ δὲ χεῖρον, αἰεὶ τὸ βέλτιον πρότερον." In *Polit.* 3, l. 1, n. 7: "in quolibet genere perfectum est naturaliter prius corrupto."



of generation (*in via generationis*), as the child (is more imperfect but prior in the order of generation; ►47.7) to the adult; and one who is learning, to one who knows scientifically.<sup>32</sup>

## 27.6. Participation in the Virtue of the First Principle

The more something approaches the principle in any genus, the more it participates in the effect of that principle.<sup>33</sup> *More* and *less* are said of diverse things insofar as they diversely approach something that maximally is, just as that is *hotter* which approaches what is *maximally hot*.<sup>34</sup>

However, there is nothing found that does not participate in the form of the small (according to dimensive quantity), for the small is found in the great, while the great is not found in the small (e.g., *one* is found in every number, but no number is found in *one*; hence, no number can be found that does not participate in the form of *one*, which *one* is most small, for no number is as small as *one*).<sup>35</sup> And the (thing) participated is clearly the cause of the participant (e.g., the *one* that is participated by any number is clearly the cause of that number, for every number is composed from a multitude of *ones*).

Whence, **principles in all genera are small in (dimensive) quantity (*parva quantitate*) but great in virtue (*magna virtute*)**.<sup>36</sup> (For example, *one*, the principle of number, is less than any number but greater in virtue, for all numbers exist virtually in *one*.)

## 27.7. Simplicity of the First Principle

In any genus, that which is first is the cause from which all the things that are of the genus are constituted in that genus—but it is impossible to proceed infinitely in some order of

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<sup>32</sup> *In Sent.* 3, d. 27 q. 1 a. 4 ad 2: “quamvis primum principium in quolibet genere sit perfectissimum, non tamen oportet quod omne quod est prius, sit perfectius, cum aliquid sit prius in via generationis quod est imperfectius, sicut puer viro, et addiscens sciente.”

<sup>33</sup> *STh* III, q. 27 a. 5 co.: “quanto aliquid magis appropinquat principio in quolibet genere, tanto magis participat effectum illius principii.”

<sup>34</sup> *STh* I, q. 2 a. 3 co.: “magis et minus dicuntur de diversis secundum quod appropinquant diversimode ad aliquid quod maxime est, sicut magis calidum est, quod magis appropinquat maxime calido. Est igitur aliquid quod est verissimum, et optimum, et nobilissimum, et per consequens maxime ens, nam quae sunt maxime vera, sunt maxime entia, ut dicitur II *Metaphys.* Quod autem dicitur maxime tale in aliquo genere, est causa omnium quae sunt illius generis, sicut ignis, qui est maxime calidus, est causa omnium calidorum, ut in eodem libro dicitur.” This constitutes the basis for the *fourth way*, which is taken from the degrees that are found in things (*Quarta via sumitur ex gradibus qui in rebus inveniuntur*).

<sup>35</sup> *In De div. nom.*, c. 9, l. 1: “nihil invenitur quod non participet formam parvi: parvum enim invenitur in magnis, sed magnum non invenitur in parvis; participatum autem videtur esse causa participantis.”

<sup>36</sup> St. Thomas concludes this from his reading of ARISTOTLE, *Metaphysica* Z.17, 1041a18–20: “πλήν εἴ τις λέγοι ὅτι ἀδιαίρετον πρὸς αὐτὸ ἕκαστον, τοῦτο δ’ ἦν τὸ ἐνὶ εἶναι: ἀλλὰ τοῦτο κοινόν γε κατὰ πάντων καὶ σύντομον.” He gives his interpretation *In Metaph.* 7, l. 17, §1654: “unumquodque est indivisibile ad seipsum. «Et est quod breve [σύντομον],» id est se habet ad modum principii, quod est parvum quantitate et maximum virtute.” *In De div. nom.*, c. 9, l. 1: “unde et principia in omnibus generibus sunt parva quantitate, sed magna virtute.” *In Sent.* 2, d. 3 q. 3 a. 2 co.: “principia sunt parva quantitate, et maxima virtute.” This is undoubtedly how we ought to interpret his famous saying in *De ente*, pr., 1–2: “parvus error in principio magnus est in fine secundum Philosophum in I Celi et mundi.” Cf. *In De caelo* 1, l. 9 n. 4: “principium quod est minimum quantitate, facit magnam differentiam in sequentibus.”

things.<sup>37</sup> Therefore, in every genus there must be a first *one* that is **most simple** in that genus, and the **measure** (►28) of all the things that are in that genus. Simpler (things) extend to more (things).<sup>38</sup> Whence, the virtue of the first principle of any genus extends universally to all the effects of that genus.

That in which something is found not mixed with a contrary is the maximum (in virtual quantity) and first in that genus—and is the cause of all other things (in that genus).<sup>39</sup> In all those (causes) that are a mean between two extremes, of which one is last and another first, it is necessary that that which is first be the cause of that which is posterior—i.e., (the first cause is the cause) of the mean and of the last.<sup>40</sup>

In any genus, the more something is prior, the more it is simple and consists in fewer, as (in the genus *body*) first bodies (i.e., elements) are simpler (than composite bodies).<sup>41</sup> And those (principles) that are *first* in any genus are in some mode simpler and consist in *one*. Thus, in every genus, we see that a multitude proceeds from some unity; and in whatever genus, there is found one first (i.e., a principle) that is the measure of all the things that are found in that genus.<sup>42</sup> Therefore, whatever things are found in agreement with something one, must depend on some *one* principle.

### 27.8. The *One* That is the Measure

That is said (to be) *one* in whatever genus which is its measure—i.e., that by which the quantity of the genus is known first.<sup>43</sup> And that which is the measure of whichever genus of quantity is said (to be the) *one* in that genus.

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<sup>37</sup> *In De causis*, l. 18: “in unoquoque genere est causa illud quod est primum in genere illo, a quo omnia quae sunt illius generis in illo genere constituuntur [...]; non est autem in aliquo rerum ordine in infinitum procedere.” *In Post. an.* 1, l. 36, 232–234: “in quolibet genere oportet esse unum primum quod est simplicissimum in genere illo et mensura omnium quae sunt illius generis.”

<sup>38</sup> *In Sent.* 2, d. 3 q. 3 a. 2 co.: “principia sunt parva quantitate, et maxima virtute, et simplicia ad plurima se extendunt.” *STh* III, q. 7 a. 9 co.: “Virtus autem primi principii alicuius generis universaliter se extendit ad omnes effectus illius generis.”

<sup>39</sup> *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “Illud autem in quo invenitur aliquid non permixtum contrario, est maximum et primum in genere illo, et causa omnium aliorum.”

<sup>40</sup> *In Metaph.* 2, l. 3, §301: “proponit [Philosophus] quamdam propositionem: scilicet, quod in omnibus his, quae sunt media inter duo extrema, quorum unum est ultimum, et aliud primum, necesse est quod illud quod est primum, sit causa posteriorum, scilicet medii et ultimi.” Cf. ARISTOTLE, *Metaphysica* α.2, 994a11–13: “τῶν γὰρ μέσων, ὧν ἐστὶ τι ἔσχατον καὶ πρότερον, ἀναγκάσιον εἶναι τὸ πρότερον αἴτιον τῶν μετ’ αὐτό.”

<sup>41</sup> *STh* I-II, q. 19 a. 2 co.: “in quolibet genere, quanto aliquid est prius, tanto est simplicius et in paucioribus consistens, sicut prima corpora sunt simplicia. Et ideo invenimus quod ea quae sunt prima in quolibet genere, sunt aliquo modo simplicia, et in uno consistunt.”

<sup>42</sup> *ScG* 1, 42 n. 16: “In unoquoque genere videmus multitudinem ab aliqua unitate procedere: et ideo in quolibet genere invenitur unum primum, quod est mensura omnium quae in illo genere inveniuntur. Quorumcumque igitur invenitur in aliquo uno convenientia, oportet quod ab aliquo uno principio dependant.”

<sup>43</sup> *In Metaph.* 10, l. 2, §1940: “dicitur mensura in aliis quantitibus, id [...] quo primo cognoscitur unumquodque eorum. Et id quod est mensura cuiuslibet generis quantitatis, dicitur unum in illo genere.”

The perfection of each thing—according to which its measuring is considered, and likewise its quantity—is from (its) first principle.<sup>44</sup> And this is what AUGUSTINE says, that *in those things that are great (but) not in bulk, better is the same as greater.*

Thus, in any genus there must be a first that is most simple in that genus, and the measure of all (things) that are of that genus.<sup>45</sup> And since a measure is homogeneous to the (thing) measured, such first indivisible (principles) must be diverse according to the diversity of genera; whence, (the measure) is not the same in all (genera): rather, each genus must have one first measure.

### 27.9. The Principle of a Genus

That which is maximally said in any genus—i.e., that to which the predication of the genus maximally befits—is the principle and cause of the other things in that genus, and the other things are said according to an order to it.<sup>46</sup>

However, *the principle of some genus* can be taken in two modes:<sup>47</sup>

1. The principle that **is in that genus** (► 29), as when we say that the first part of the line is the principle (i.e., since a part of any line is itself a line, and in this way, the first part of the line is its principle).<sup>48</sup>
2. The principle that **does not receive the predication** (of the genus), as the point (which is not said to be a line) is said to be the principle of the line.<sup>49</sup>

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<sup>44</sup> *De virtutibus*, q. 5 a. 3 co.: “perfectio uniuscuiusque rei secundum quam attenditur mensuratio eius, est a primo principio; similiter quantitas eius; et hoc est quod Augustinus dicit in VIII de Trinit., quod in his quae non mole magna sunt, idem est melius quod maius.”

<sup>45</sup> *In Post. an.* 1, l. 36, 231–238; 246–247 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b37–38; *Metaphysica* I.1, 1052b18–1053b8, *ad sensum*): “sicut habetur in X Metaphysice, in quolibet genere oportet esse unum primum quod est simplicissimum in genere illo et mensura omnium que sunt illius generis; et, quia mensura est homogenea mensurato, secundum diuersitatem generum oportet esse huiusmodi prima indiuisibilia diuersa, unde hoc non est idem in omnibus, set [...] in diuersis generibus sunt diuersa prima indiuisibilia.” *ScG* 3, 8 n. 8: “Unius autem generis oportet esse unam mensuram primam.”

<sup>46</sup> *STh* I-II, q. 90 a. 2 co.: “In quolibet autem genere id quod maxime dicitur, est principium aliorum, et alia dicuntur secundum ordinem ad ipsum.” *ScG* 2, 15 n. 3: “Illud igitur erit causa omnium in aliquo genere cui maxime competit illius generis praedicationem.” *De ente*, c. 6, 50–54: “illud quod dicitur maxime et uerissime in quolibet genere est causa eorum que sunt post in illo genere [...] ut in II Methaphysice dicitur.”

<sup>47</sup> *In Sent.* 4, d. 40 q. 1 a. 4 expos.: “Principium autem alicujus generis potest accipi dupliciter.”

<sup>48</sup> *In Sent.* 4, d. 40 q. 1 a. 4 expos.: “Uno modo principium quod est in genere illo; ut si primam partem lineae principium dicamus.”

<sup>49</sup> *In Sent.* 4, d. 40 q. 1 a. 4 expos.: “Alio modo principium, quia non recipit generis praedicationem, sicut principium lineae dicitur punctus.”



## 28. Measure

We have determined that the principle in any genus is something one, and that this one is the measure of everything in the genus. Here, we intend to clarify what a measure is.

### 28.1. Measure

**Measure** (*mensura* = μέτρον) is that by which the quantity of a thing is known (*id quo quantitas <rei> cognoscitur* = ὃ τὸ ποσὸν γινώσκειται).<sup>1</sup>

As ARISTOTLE says, since the *ratio* of one is to be indivisible (► 38), and since that which is in some mode indivisible in whatever genus is the measure, hence, *measure* is most properly said in that to which it belongs to be the first measure in whatever genus.<sup>2</sup> And mensuration is properly due to quantity, for that is properly measured of which the quantity is measured. Hence, *measure* most properly is said in quantity, from whence the *ratio* of *measure* is derived to the other genera. Now *measure* is nothing other than that by which the quantity of a thing is known, and the quantity of a thing is known by one or by number:

1. **By one** (*per unum* = ἐνί), as when we say, “one stadium” or “one foot.”<sup>3</sup>
2. **By number** (*per numerum* = ἀριθμῶ), as when we say, “three stadia” or “three feet.”<sup>4</sup>

Ultimately, however, every number is known by one because, taken several times, one renders whatever number.<sup>5</sup>

It follows, therefore, that every quantity—insofar as it is a quantity—is known by one.<sup>6</sup> ARISTOTLE adds *insofar as it is a quantity* (*in quantum quantitas* = ἢ ποσόν) so that this may refer to the measure of quantity, for properties and other accidents of quantity are known in another mode (► 28.4).

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<sup>1</sup> *In Metaph.* 10, I. 2, §1938 (cf. ARISTOTLE, *Metaphysica* I.1, 1052b20): “Mensura autem nihil aliud est quam id quo quantitas rei cognoscitur.” *In Sent.* 1, d. 8 q. 4 a. 2 ad 3: “dicitur enim mensura illud per quod innotescit quantitas rei.”

<sup>2</sup> *In Metaph.* 10, I. 2, §1938 (cf. ARISTOTLE, *Metaphysica* I.1, 1052b15–21): “Dicit ergo [Philosophus] primo, quod cum ratio unius sit indivisibile esse; id autem quod est aliquo modo indivisibile in quolibet genere sit mensura; maxime dicitur in hoc quod est esse primam mensuram cuiuslibet generis. Et hoc maxime proprie dicitur in quantitate, et inde derivatur ad alia genera ratio mensurae. Mensura autem nihil aliud est quam id quo quantitas rei cognoscitur. Quantitas vero rei cognoscitur per unum aut numerum.” *In Physic.* 4, I. 20, n. 10 (cf. ARISTOTLE, *Physica* Δ.12, 221b16–20): “Mensuratio enim proprie debetur quantitati: cuius ergo quantitas [...] mensuratur, illud proprie [...] mensuratur.” *In Sent.* 1, d. 8 q. 4 a. 2 ad 3: “mensura proprie dicitur in quantitatibus.”

<sup>3</sup> *In Metaph.* 10, I. 2, §1938: “Per unum quidem, sicut cum dicimus, unum stadium, vel unum pedem.”

<sup>4</sup> *In Metaph.* 10, I. 2, §1938: “Per numerum autem, sicut dicimus tria stadia, vel tres pedes.”

<sup>5</sup> *In Metaph.* 10, I. 2, §1938 (cf. ARISTOTLE, *Metaphysica* I.1, 1052b21–22): “Ulterius autem omnis numerus cognoscitur per unum, eo quod unitas aliquoties sumpta quemlibet numerum reddit.”

<sup>6</sup> *In Metaph.* 10, I. 2, §1938 (cf. ARISTOTLE, *Metaphysica* I.1, 1052b22): “Unde relinquitur quod omnis quantitas cognoscatur per unum. Addit autem «in quantum quantitas,» ut hoc referatur ad mensuram quantitatis. Nam proprietates et alia accidentia quantitatis alio modo cognoscuntur.”

Thus, as ARISTOTLE says, that by which quantity is first known is *one itself* (*ipsum unum* = αὐτὸ ἓν), that is, the unit (*unitas* = μονάς), which is the principle of number.<sup>7</sup> *One* in other species of quantity is not *one* itself, but something to which *one* befalls (*aliquid cui accidit unum*), as when we say, “one hand” or “one magnitude.” Whence, it follows that *one itself*, which is the first measure, is the principle of number insofar as it is number.

## 28.2. Measure as a Minimum

A thing in any genus is measured by that which is a minimum (in dimensive quantity) and the first principle in its genus.<sup>8</sup>

A measure is a **minimum** in the genus of quantity either:<sup>9</sup>

1. **Simply** (*simpliciter*), as in numbers, which are measured by the unit, which is a minimum simply.<sup>10</sup>
2. **According to our (im)position** (*secundum positionem nostram*), as in continua, in which there is no minimum simply.<sup>11</sup> Whence, we posit the span (*palmum*) in the place of a minimum to measure cloth; and the stadium, to measure a road.

Thus, *quantity* conveys (*importat*) the *ratio* of *measure*, which is found first in discrete quantity—that is, in numbers.<sup>12</sup> Secondarily, (it is found) in magnitudes, and—in some other mode—in all the other genera.

Wherefrom,<sup>13</sup> the name *measure* has been transferred (*transumptum est*) to all (other) genera, so that that which is *first*, *most simple*, and *most perfect* in whatever genus is said

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<sup>7</sup> *In Metaph.* 10, l. 2, §1939 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b23–24): “id quo primo cognoscitur quantitas est ipsum unum, idest unitas, quae est principium numeri. Nam unum in aliis speciebus quantitatis non est ipsum unum, sed aliquid cui accidit unum; sicut dicimus unam manum, aut unam magnitudinem. Unde sequitur, quod ipsum unum, quod est prima mensura, sit principium numeri secundum quod est numerus.”

<sup>8</sup> *De veritate*, q. 10 a. 1 co.: “Res autem uniuscuiusque generis mensuratur per id quod est minimum, et principium primum in suo genere, ut patet in X Metaphys.”

<sup>9</sup> *In Sent.* 1, d. 8 q. 4 a. 2 ad 3: “mensura [...] est minimum in genere quantitatis vel simpliciter [...] secundum positionem nostram.”

<sup>10</sup> *In Sent.* 1, d. 8 q. 4 a. 2 ad 3: “vel simpliciter, ut in numeris, quae mensurantur unitate, quae est minimum simpliciter.”

<sup>11</sup> *In Sent.* 1, d. 8 q. 4 a. 2 ad 3: “aut minimum secundum positionem nostram, sicut in continuis, in quibus non est minimum simpliciter; unde ponimus palmum loco minimi ad mensurandum pannos, vel stadium ad mensurandum viam.”

<sup>12</sup> *De virtutibus*, q. 5 a. 3 co.: “Quantitas autem importat rationem mensurae, quae primo quidem invenitur in numeris; secundario autem in magnitudinibus; et quodam alio modo in omnibus aliis generibus, ut patet in IX Metaph.” *In Metaph.* 10, l. 2, §1939: “ratio mensurae primo invenitur in discreta quantitate, quae est numerus.”

<sup>13</sup> *In Sent.* 1, d. 8 q. 4 a. 2 ad 3: “Exinde transumptum est nomen mensurae ad omnia genera, ut illud quod est primum in quolibet genere et simplicissimum et perfectissimum dicatur mensura omnium quae sunt in genere illo; eo quod unumquodque cognoscitur habere de veritate generis plus et minus, secundum quod magis accedit ad ipsum vel recedit, ut album in genere colorum.”

(to be the) *measure* of all those that are in that genus, since each (thing) is known to have more or less of the truth of a genus according as it approaches it or recedes from it—as white in the genus of colors.

### 28.3. One as a Measure

It belongs to the *ratio* of *one* to be a measure.<sup>14</sup> And this is maximally proper insofar as it is in quantity; and therefrom, in quality, and in the other genera, for that which is the measure must be indivisible either according to quantity or according to quality. And in this way, it follows that one should be indivisible either simply (*simpliciter*), as the unit that is the principle of number, or according to something (*secundum quid*): that is, insofar as it is one.

The reason that *one* is a measure of all things (*unum est mensura omnium* = πάντων μέτρον τὸ ἓν) is that *one* is *that at which division is terminated*; and those (material principles) from which the substance (i.e., the essence) of any one (thing) is, are known by division or resolution of the whole into (its) components, whether the parts should be according to quantity (*secundum quantitatem* = κατὰ τὸ ποσόον) or the parts should be according to species (*secundum speciem* = κατὰ τὸ εἶδος), as matter and form, and the elements of compound bodies.<sup>15</sup>

Hence, that which is one by itself (*per se unum* < τὸ ἓν) must be indivisible (*indivisible* = ἀδιαίρετον), since it is the measure by which the thing is known, for, in each (*in singulis* < ἐκάστων; i.e., in each whole), that which is first in composition—and last in resolution—is indivisible, and the thing is known by it.<sup>16</sup>

However, the indivisible is not found likewise in all things.<sup>17</sup> Some things are altogether indivisible, as the unit that is the principle of number; others are not altogether indivisible

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<sup>14</sup> *In Metaph.* 10, l. 2, §1960 (cf. ARISTOTLE, *Metaphysica* I.1, 1053b3–8): “de ratione unius est, quod sit mensura. Et hoc maxime proprium est, prout est in quantitate; deinde in qualitate, et in aliis generibus; quia id quod est mensura, debet esse indivisible, aut secundum quantitatem, aut secundum qualitatem. Et ita sequitur, quod unum sit indivisible, aut simpliciter, sicut unitas, quae est principium numeri, aut secundum quid, id est in quantum est unum.”

<sup>15</sup> *In Metaph.* 10, l. 2, §1952 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a17–20): “Hoc autem dicto, concludit [Philosophus] epilogando quae supra dicta sunt, scilicet quod unum est mensura omnium. Cuius ratio est, quia unum est ad quod terminatur divisio. Ea vero, ex quibus est substantia uniuscuiusque, cognoscuntur per divisionem sive resolutionem totius in componentia; sive sint partes secundum quantitatem, sive sint partes secundum speciem, ut materia et forma, et elementa corporum mixtorum.”

<sup>16</sup> *In Metaph.* 10, l. 2, §1952 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a20–21): “Et ideo oportet id quod est per se unum, esse indivisible, cum sit mensura qua cognoscitur res; quia quod in singulis est primum in compositione et ultimum in resolutione, est indivisible, et per hoc cognoscitur res, ut dictum est.”

<sup>17</sup> *In Metaph.* 10, l. 2, §1953 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a21–24): “non similiter in omnibus invenitur indivisible; sed quaedam sunt omnino indivisibilia, sicut unitas quae est principium numeri. Qaedam vero non sunt omnino indivisibilia, sed indivisibilia secundum sensum, secundum quod voluit auctoritas instituentium tale aliquid pro mensura; sicut mensura pedalis, quae quidem indivisibilis est proportione, sed non natura. Nam omne continuum forsan divisibile est.”

but indivisible according to sense (*indivisibilia secundum sensum* = ἀδιαίρετα πρὸς τὴν αἴσθησιν), insofar as an authority, in instituting, wants such a thing (to be used) as a measure: for example, the foot, which is divisible in (any mathematical) ratio (*proportione*) but not in nature, for every continuum is *perhaps* divisible.

ARISTOTLE says *perhaps* (*forsan* = ἴσως) because of the doubts of some who posited that magnitudes are composed from indivisibles; or because mathematical magnitudes are infinitely divisible, while natural magnitudes are not: for example, some minimal flesh is necessarily found (and some minimal iron, water, etc.).<sup>18</sup>

#### 28.4. Indivisible

**Indivisible** is said in three (modes, i.e.), in as many modes as also **one** is said, the *ratio* of which is (taken) from *non-division* (► 38):<sup>19</sup>

##### 1. Indivisible in continuity (*continuitate*; ► 39).<sup>20</sup>

Whence, something is said to be an indivisible continuum insofar as it is not divided in act, although it is divisible in potency.<sup>21</sup>

##### 2. Indivisible according to species (*secundum speciem*), as that is said to be *one* which has one species, even if it is composed of non-continuous parts (► 38.12).<sup>22</sup>

For example, a man, a house, or even an army.<sup>23</sup>

##### 3. The altogether indivisible (*penitus indivisibile*; ► 38.13).<sup>24</sup>

For example, the unit, and the point.<sup>25</sup>

As ARISTOTLE says, the point, which is some sign (*signum*; cf. σημεῖον = στιγμή) of division between the parts of a line, and likewise everything that is a division between the parts of

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<sup>18</sup> *In Metaph.* 10, l. 2, §1953: “Dicit autem [Philosophus] «forsan» propter dubitationem quorundam ponentium magnitudinem componi ex indivisibilibus; vel quia magnitudines naturales non dividuntur in infinitum, sed solae mathematicae. Est enim invenire minimam carnem, ut tangitur primo Physicorum.”

<sup>19</sup> *In De anima* 3, c. 5, 97–98: “indivisibile tripliciter dicitur, quot modis dicitur et unum, cuius ratio ex indiuisione est.”

<sup>20</sup> *In De anima* 3, c. 5, 99–100: “Dicitur enim uno modo aliquid unum continuitate.”

<sup>21</sup> *In De anima* 3, c. 5, 100–102 (cf. ARISTOTLE, *De anima* Γ.6, 430b6–7): “unde et id quod est continuum indivisibile dicitur in quantum non est diuisum actu, licet sit diuisibile potencia.”

<sup>22</sup> *In De anima* 3, c. 5, 135–170 (cf. ARISTOTLE, *De anima* Γ.6, 430b14–15): “ponit [Philosophus] alium modum indivisibilis: nam dicitur alio modo unum quod habet speciem unam, etiam si sit compositum ex partibus non continuis [...], et huic respondet indivisibile secundum speciem.”

<sup>23</sup> *In De anima* 3, c. 5, 139–140: “sicut homo aut domus aut etiam exercitus.”

<sup>24</sup> *In De anima* 3, c. 5, 171–173: “prosequitur [Philosophus] de indivisibili tercio modo dicto: dicitur enim unum quod est penitus indivisibile.”

<sup>25</sup> *In De anima* 3, c. 5, 173–174 (cf. ARISTOTLE, *De anima* Γ.6, 430b20–21): “ut punctus et unitas.”



a continuum, as an instant between the parts of time, and likewise other (altogether indivisibles), *are manifested to the intellect as a privation (sicut privatio = ὥσπερ ἡ στέρησις)*: that is, through the privation of the continuous and divisible.<sup>26</sup>

### 28.5. The *Ratio* of Measure Transferred from Number to Other Genera

A measure must be indivisible because *that measure is certain from which nothing can be subtracted or added*, as ARISTOTLE says.<sup>27</sup> And the *one* (itself) is the most certain measure (*mensura certissima = ἀκριβέστατον [μέτρον]*) because the *one* that is the principle of number is altogether indivisible: it does not continue to be *one* if it undergoes any addition of subtraction. But the measures of other genera imitate (*imitantur = μιμοῦνται*) this *one*, which is indivisible, taking something minimal as a measure insofar as it is possible.

Hence, as ARISTOTLE says, the *ratio* of *measure* is found first in numbers, for it belongs first and most properly to the *one* that is the principle of number.<sup>28</sup> Then, (it is found) in continuous quantities. Thereafter, however, it is transferred also to qualities insofar as in them can be found an excess of one quality above another, whether by mode of intension (*per modum intensionis*), as something is said to be whiter than another, or by mode of extension (*per modum extensionis*), as something that is in a greater surface is said to be a greater whiteness.

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<sup>26</sup> *In De anima* 3, c. 5, 174–182 (cf. ARISTOTLE, *De anima* Γ.6, 430b20–26): “Et de hoc ostendit [Philosophus] nunc quomodo intelligatur, dicens quod *punctum*, quod est quoddam signum diuisionis inter partes lineae, *et omne* quod est diuisio inter partes continui, sicut instans inter partes temporis et sic de aliis, *et omne* quod est *sic indiuisibile* actu et potencia ut punctus, *monstratur*, id est manifestatur intellectui, *sicut priuatio*, id est per priuationem continui et diuisibilis.”

<sup>27</sup> *In Metaph.* 10, l. 2, §1945 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b35–1053a4): “Assignat [Philosophus] autem rationem, quare mensuram oportet esse aliquid indiuisibile; quia scilicet hoc est certa mensura, a qua non potest aliquid auferri vel addi. Et ideo unum est mensura certissima; quia unum quod est principium numeri, est omnino indiuisibile, nullamque additionem aut subtractionem suscipiens manet unum. Sed mensurae aliorum generum quantitatis imitantur hoc unum, quod est indiuisibile, accipiens aliquid minimum pro mensura secundum quod possibile est. Quia si acciperetur aliquid magnum, utpote stadium in longitudinibus, et talentum in ponderibus, lateret, si aliquod modicum subtraheretur vel adderetur; et semper in maiori mensura hoc magis lateret quam in minori.”

<sup>28</sup> *In De sensu* 1, c. 6, 74–83: “sicut Philosophus tradit in X Methaphisice, ratio mensurae primo quidem inuenitur in numeris, secundo in quantitibus continuis, deinde uero transfertur etiam ad qualitates secundum quod in eis potest inueniri excessus unius qualitatis super aliam siue per modum intensionis, prout aliquid dicitur alio albius, siue per modum extensionis, prout dicitur albedo maior que est in maiori superficie.” *In Metaph.* 5, l. 8, §875: “Sed tamen haec ratio mensurae, licet primo conveniat uni quod est principium numeri, tamen per quamdam similitudinem derivatur ad unum in aliis generibus, ut in decimo huius Philosophus ostendet. Et secundum hoc ratio mensurae inuenitur in quolibet genere.” Cf. *In Metaph.* 10, l. 2, §1937: “Postquam ostendit Philosophus quot modis unum dicitur, et quae sit ratio unius, ad quam omnes modi reducuntur, scilicet esse indiuisibile; hic ex hac ratione unius ostendit quamdam eius proprietatem, scilicet esse mensuram: [...] ostendit, quomodo uni competit ratio mensurae, et aliis generibus accidentium. [...] ostendit quomodo unum habens rationem mensurae inueniatur in substantia [...] ostendit in quo genere primo inueniatur unum habens rationem mensurae; et quomodo exinde ad alia derivetur secundum propriam rationem mensurae. [...] ponit quomodo derivetur ad alia secundum quamdam similitudinem [...] ostendit ubi primo sit unum rationem mensurae habens, et quomodo exinde ad alia fiat derivatio [...] ostendit quomodo unum quod est mensura inueniatur in quantitate, et exinde ad alia genera derivetur [...] et] in qua specie quantitatis est primo [...] et] quomodo derivetur in alias species quantitatis.”

Thus, according to some (analogical) likeness (*secundum quamdam similitudinem*), the *ratio* of *measure* is derived from (the one in) *number* into a *one* in quality and in the other genera: *just as the one that is the measure of number is indivisible, so in all other genera of quantity something one, indivisible is the measure and principle.*<sup>29</sup>

For example, in measuring lines, men use as indivisible the measure of one foot.<sup>30</sup>

Everywhere, something indivisible—which is simple either according to quantity or according to quality—is sought as a measure (*pro mensura*):<sup>31</sup>

**1. According to quantity** (*secundum quantitatem* = τῷ ποσῶ), as the unit (is the measure) in number and the foot is a measure in lines.<sup>32</sup>

**2. According to quality** (*secundum qualitatem* = τῷ ποιῶ), as white is in some mode the measure of colors.<sup>33</sup>

In any genus, that which is most simple and most perfect is the measure of all others, for any one thing is the more perfect the more it approaches (*accedit*) the first principle of its genus.<sup>34</sup> Everything that is a measure is first of its genus and most simple.<sup>35</sup> And conversely, everything that is first and most simple is the measure (of its genus).

Hence, all take this (i.e., something indivisible) as a measure, both in liquids (*in humidis*), such as oil and wine, in solids, such as grain and barley, in weights and dimensions, which

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<sup>29</sup> *In Metaph.* 10, l. 2, §1944 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b31–32): “ostendit [Philosophus] qualiter a numero derivetur ratio mensurae ad alia. [...] Dicit ergo primo, quod hoc modo derivatur ratio mensurae a numero ad alias quantitates, quod sicut unum quod est mensura numeri est indivisibile, ita in omnibus aliis generibus quantitatis aliquod unum indivisibile est mensura et principium.” Cf. §1937.

<sup>30</sup> *In Metaph.* 10, l. 2, §1944 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b32–33): “Sicut in mensuratione linearum utuntur homines quasi indivisibili, «mensura pedali,» idest unius pedis.”

<sup>31</sup> *In Metaph.* 10, l. 2, §1944 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b33–35): “ubique enim quaeritur pro mensura aliquid indivisibile, quod est aliquod simplex, vel secundum qualitatem, vel secundum quantitatem.”

<sup>32</sup> *In Metaph.* 10, l. 2, §1944 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b35): “Secundum quantitatem vero, ut unitas in numero, et mensura pedalis in lineis.”

<sup>33</sup> *In Metaph.* 10, l. 2, §1944 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b35): “Secundum qualitatem quidem, ut album in coloribus, quod quodammodo est mensura colorum, ut dicitur infra.”

<sup>34</sup> St. Thomas uses here the example of white among colors, and of daily motion among motions. The former is valid if we take it to mean that all colors derive from white as from something one. The latter example can be replaced in modern science with the motion of the whole universe. *De virtutibus*, q. 5 a. 3 co.: “In quolibet enim genere id quod est simplicissimum et perfectissimum, est mensura omnium aliorum, ut in coloribus albedo, et in motibus motus diurnus; eo quod unaquaeque res tanto perfectior est, quanto magis accedit ad primum sui generis principium.”

<sup>35</sup> *STh* I, q. 66 a. 4 ad 3: “omnia mensurantur primo sui generis.” *Quodlibet* 5, q. 4 co.: “semper illud quod est simplicissimum, est mensura in quolibet genere, sicut dicitur in X *Metaph.*” *In De div. nom.*, c. 5, l. 1: “principium in quolibet genere et est mensura eorum quae sunt in genere illo.” *In Physic.* 8, l. 20, n. 2 (cf. ARISTOTLE, *Physica* Θ.9, 265b8–11): “omnia enim mensurantur primo sui generis, ut in X *Metaphys.* ostenditur. Et sic ista proposito convertibilis est: omne quod est mensura, est primum sui generis; et omne quod est primum, est mensura.”

are signified (in ARISTOTLE's text) by *heavy* and *magnitude* (< καὶ βάρους καὶ μεγέθους), which (measure) is first found such that some unknown sensible (quantity) cannot be taken away from or added to it.<sup>36</sup> And then they reckon to know the quantity of a thing with certitude (*certitudinaliter*) when they know (it) through such a minimum measure.

For example, in (the genus of) heaviness (*in gravitate* = ἐν βάρει), a weight (*ponderum*) such as the ounce or mina (*uncia, sive mna* = μνᾶ)—that is, something minimum—is taken as one, indivisible by supposition (*per suppositionem*), which is not, however, altogether simple, for whatever weight is divisible into smaller weights.<sup>37</sup>

Likewise, men measure motion by a uniform and quickest motion that has the minimum of time.<sup>38</sup> Hence, they take in astronomy such principle in order to measure.

And since the lowness and highness of sounds occurs from the quickness and slowness of motion, as determined in music (i.e., harmonics), ARISTOTLE supplies the example of measuring concerning sounds, saying that in music, the first measure is the difference of two semitones, for the tone is divided into two unequal semitones.<sup>39</sup> Likewise, in voices, the measure is the element (i.e., the syllable), since also the shortness or longness of voices follow upon the quickness or slowness of motion; and the vocal phoneme is more a one and a first than the consonant.

All these measures are something one: but not in such a way that some measure would be common to all things; rather, because any measure is in itself something one.<sup>40</sup>

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<sup>36</sup> *In Metaph.* 10, l. 2, §1946 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a5–8): “Et ideo omnes accipiunt hoc pro mensura tam in humidis, ut est oleum et vinum, quam in siccis, ut est granum et hordeum, quam in ponderibus et dimensionibus, quae significantur per grave et magnitudinem; quod primo invenitur tale, ut ab eo non possit aliquid auferri sensibile vel addi quod lateat. Et tunc putant se cognoscere quantitatem rei certitudinaliter, quando cognoscunt per huiusmodi mensuram minimam.”

<sup>37</sup> *In Post. an.* 1, l. 36, 238–243 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b38): “in gravitate ponderum accipitur ut unum indivisibile *uncia* siue *mna*, idest quoddam minimum pondus, quod tamen non est simplex omnino, quia quodlibet pondus est diuisibile in minora pondera, set accipitur ut simplex per suppositionem.”

<sup>38</sup> Although St. Thomas refers us to diurnal motion, the same principle is at work in atomic clocks. *In Metaph.* 10, l. 2, §1947 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a8–12): “etiam motum mensurant homines «motu simplici,» idest uniformi et velocissimo quod habet minimum de tempore. Et ideo in astrologia accipiunt tale principium ad mensurandum. Accipiunt enim motum primi caeli, scilicet motum diurnum, qui est regularis et velocissimus, ad quem iudicant et mensurant omnes alios motus.”

<sup>39</sup> *In Metaph.* 10, l. 2, §1948 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a12–13): “Et quia ex velocitate et tarditate motuum contingit gravitas et acuitas in sonis, ut determinatur in musica, subdit exemplum de mensuratione sonorum; dicens, quod in musica prima mensura «diesis est,» idest differentia duorum semitonorum. Tonus enim dividitur in duo semitona inaequalia, ut in musica probatur. Et similiter in voce, mensura est elementum, quia etiam brevitatem et longitudo vocis velocitatem et tarditatem motus consequitur.” *In Metaph.* 5, l. 8, §873 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b21–23): “In vocibus autem unum primum et minimum est litera vocalis, aut consonans; et magis vocalis quam consonans.”

<sup>40</sup> *In Metaph.* 10, l. 2, §1949 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a13–14): “Omnes autem istae mensurae sunt aliquid unum: non ita quod aliqua mensura sit communis omnibus; sed quia quaelibet mensura in se est aliquid unum.”

## 28.6. Homogeneity of Measure and Measured

All those (things) that pertain to measure are in some mode conveyed (*importantur*) either through the mode of continuous quantity or (through the mode) of discrete (quantity).<sup>41</sup> Yet, the measure must always be a cognate (*cognatum* = συγγενής): that is, of the same nature or measure with the (thing) measured, just as the measure of magnitudes must be a magnitude.<sup>42</sup>

However, it is not enough for a measure to agree (*conveniat*) in a common nature, as all magnitudes (e.g., lines, surfaces, and bodies) agree (in that each is a *magnitude*): there must be an agreement of the measure to the thing measured in a *special* nature according to each (*secundum unumquodque* = καθ' ἕκαστον, i.e., according to each genus), such that the measure of a longitude would be a longitude; of a latitude, a latitude; a voice, of a voice; a weight, of a weight; and a unit, of units.<sup>43</sup>

It is in this way (i.e., that a *unit is the measure of units*) that we must take (the homogeneity between unit and units) in order that we may speak without fallacy (*absque calumnia*),<sup>44</sup> and not that that a number should be the measure of numbers, for it is not *number* that has the *ratio* of *first measure*, but *unit*. And if a unit is the measure, we ought to say—to signify the agreement between measure and measured—that a unit is the measure of units, and not of numbers.

However, if the truth of the thing is considered, this must also be conceded: that a *number is the measure of numbers* and (that) a *unit (is the measure) of numbers* should be taken likewise too.<sup>45</sup> However, because of the difference that is seen to exist between *unit* and

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<sup>41</sup> *In Sent.* 4, d. 16 q. 3 a. 1 qc. 2 ad 6: “omnia quae ad mensuram pertinent vel per modum quantitatis continuae vel discretuae, importantur in quomodo.”

<sup>42</sup> *In Metaph.* 10, l. 2, §1954 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a24–25): “«metrum,» idest mensura, semper debet esse cognatum, scilicet eiusdem naturae vel mensurae, cum mensurato: sicut mensura magnitudinum debet esse magnitudo.”

<sup>43</sup> *In Metaph.* 10, l. 2, §1954 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a25–27): “non sufficit quod conveniat in natura communi, sicut omnes magnitudines conveniunt: sed oportet esse convenientiam mensurae ad mensuratum in natura speciali secundum unumquodque, sic quod longitudinis sit longitudo mensura, latitudinis latitudo, vox vocis, et gravitas gravitatis, et unitatum unitas.”

<sup>44</sup> *In Metaph.* 10, l. 2, §1955 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a27–30): “Sic enim oportet accipere ut absque calumnia loquamur; sed non quod numerorum mensura sit numerus. Numerus autem non habet rationem mensurae primae, sed unitas. Et si unitas mensura est, ad significandum convenientiam inter mensuram et mensuratum, oportet dicere, quod unitas sit mensura unitatum, et non numerorum.”

<sup>45</sup> *In Metaph.* 10, l. 2, §1955 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a30): “Et tamen si rei veritas attendatur, oportebit hoc etiam concedere, quod numerus esset mensura numerorum, aut etiam unitas numerorum similiter acciperetur. Sed non similiter dignum videtur dicere unitatem esse mensuram unitatum, et numerum numeri, vel unitatem numeri; propter differentiam, quae videtur esse inter unitatem et numerum. Sed istam differentiam observare, idem est, ac si quis dignum diceret quod unitates essent mensurae unitatum, sed non unitas; quia unitas differt ab unitatibus ut singulariter prolatum ab his quae pluraliter proferuntur. Et similis ratio est de numero ad unitatem; quia numerus nihil aliud est quam pluralitas unitatum. Unde nihil aliud est dicere unitatem esse mensuram numeri, quam unitatem esse mensuram unitatum.”

*number*, it does not seem as worthy to say that *a unit is the measure of units* and (that) *a number (is the measure) of numbers*, or (that) *a unit (is the measure) of number*. However, it is the same to observe this difference even if someone should say that it is worthy that *units*—and not *a unit*—should be the measures of units, for *a unit* differs from *units* as (that which is) singularly proffered (differs) from those that are plurally proffered. And the *ratio* of *number* to *unit* is alike, for **number** is nothing other than *a plurality of units* (*pluralitas unitatum* = πλῆθος μονάδων). Whence, to say that *a unit is the measure of number* is nothing other than (to say that) *a unit is a measure of units*.

(To summarize), principles must be taken from the same genus, for each thing is measured by something of its own genus.<sup>46</sup> And the *ratio* of *measure* must be taken from the (thing) measured.<sup>47</sup>

### 28.7. Intrinsic vs. Extrinsic Measure

Measure is twofold:<sup>48</sup>

**1. Intrinsic**, which is in the thing measured as an accident in a subject; and this is multiplied to multiply the thing measured.<sup>49</sup>

For example, multiple lines measure the length of multiple equal bodies.<sup>50</sup>

**2. Extrinsic**, which does not need to be multiplied to multiply the things measured: instead, it is (something) one as *in a subject (in relation) to which* many are measured.<sup>51</sup>

For example, many cloths are measured (in relation) to the length of one fathom.<sup>52</sup>

### 28.8. Not of One Genus Simply

A measure, insofar as it is the principle of knowing the thing measured, is indeed of one genus with the thing measured—but *not simply (non simpliciter)*.<sup>53</sup> This is evident in that

<sup>46</sup> *STh* III, q. 55 a. 5 co.: “oportet enim principia ex eodem genere assumi, ut dicitur in I Posteriorum.” *In Physic.* 4, l. 20, n. 2 (cf. ARISTOTLE, *Physica* Δ.12, 220b32–221a7): “unumquodque mensuratur per aliquid sui generis, ut dicitur in X Metaphysicae.”

<sup>47</sup> *In Sent.* 2, d. 2 q. 1 a. 1 co.: “oportet enim rationem mensurae ex mensurato accipere.”

<sup>48</sup> *In Sent.* 2, d. 2 q. 1 a. 2 ad 1: “mensura est duplex.”

<sup>49</sup> *In Sent.* 2, d. 2 q. 1 a. 2 ad 1: “Quaedam intrinseca, quae est in mensurato sicut accidens in subjecto; et haec multiplicatur ad multiplicationem mensurati.”

<sup>50</sup> *In Sent.* 2, d. 2 q. 1 a. 2 ad 1: “sicut plures lineae sunt quae mesurant longitudinem plurium corporum aequalium.”

<sup>51</sup> *In Sent.* 2, d. 2 q. 1 a. 2 ad 1: “Est etiam quaedam mensura extrinseca; et hanc non est necesse multiplicari ad multiplicationem mensuratorum, sed est in uno sicut in subjecto ad quod multa mesurantur.”

<sup>52</sup> *In Sent.* 2, d. 2 q. 1 a. 2 ad 1: “sicut multi panni mesurantur ad longitudinem unius ulnae.”

<sup>53</sup> *De veritate*, q. 8 a. 11 ad 11: “mensura, in quantum est principium cognoscendi mensuratum est unius generis cum mensurato, sed non simpliciter; sicut patet quod ulna est mensura panni, et non convenit cum eo nisi in quantitate: sic enim est mensura eius.” *In Physic.* 4, l. 23, n. 12: “Illud enim quod

a fathom is a measure for cloth but agrees with it only in quantity—and it is in this way alone that it is its measure. Thus, when a measure is taken of one genus, that which is measured is not diverse from the measure. Rather, multiple measures make up one whole, as multiple units make up one number—and multiple measures of cloth make up a quantity of cloth.

### 28.9. Not Necessarily One in Number

Although that which is a measure has the *ratio* of *one* insofar as it attains indivisibility, it need not be something one in number.<sup>54</sup> Sometimes, the things that measure are multiple (although they are taken as something indivisible, and therefore *one*).

For example, in (the qualitative genus of) melodies (*in melodiis* = ἐν μέλει) or consonant (sounds), what is taken as *one*, *principle*, *measure* is either: (1) the tone (*tonus*), which consists in the ratio of 8 : 9 (*sesquioctava proportione*, i.e., a ratio containing within itself the whole of eight and one eighth of eight; ► 5.2, the superparticular species of ratio); or (2) the semitone (*diesis* = δίεσις), for the tone is divided into two unequal semitones, and the minimal semitone is called *diesis*, which is the minimum in consonant (sounds).<sup>55</sup> Thus, in melodies, (the things that are used as a measure) are two (unequal) semitones, even if they are not (separately) discernible in hearing due to their smallness, for sense does not perceive very small differences; yet, their difference is perceived in the *ratios* (*in rationibus* = ἐν τοῖς λόγοις): that is, according to diverse *ratios* of proportions, since they are caused from diverse numerical ratios (► 6.4).

Likewise, too, that by which we measure voices is multiple, for the quantity of one meter or of one foot is measured from diverse syllables, of which some are short and others (are) long.<sup>56</sup>

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mensuratur, non videtur esse aliud quam mensura: sed multae mensurae videntur facere unum totum, sicut multae unitates unum numerum, et multae mensurae panni unam quantitatem panni. Et hoc verum est, quando accipitur mensura unius generis.” Cf. ARISTOTLE, *Physica* Δ.15, 223b33–224a2: “τὸ μέτρον οὐδὲν ἄλλο παρεμφαίνεται τῷ μετρομένῳ, ἀλλ’ ἢ πλείω μέτρα τὸ ὅλον.”

<sup>54</sup> *In Metaph.* 10, l. 2, §1950 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a14–16): “licet id quod est mensura habeat rationem unius, in quantum accedit ad indivisibilitatem, non tamen necessarium est unum numero esse quod mensurat. Sed aliquando plura sunt mensurantia.”

<sup>55</sup> *In Metaph.* 10, l. 2, §1950 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a14–16): “sicut in melodiis sunt duae dieses, id est duo semitona. Sed propter parvitatem non discernitur secundum auditum. Nam sensus non percipit differentiam valde parvorum, sed eorum differentia percipitur in rationibus, id est secundum diversas rationes proportionum, quia ex diversis proportionibus numeralibus causantur.” *In Metaph.* 5, l. 8, §873 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b21–23): “In genere enim consonantiarum est unum, quod est diesis, quod est minimum in consonantiis. Diesis enim est semitonium minus. Dividitur enim tonus in duo semitonia inaequalia, quorum unus dicitur diesis.” *In Post. an.* 1, l. 36, 243–246 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b38–39): “in melodiis autem accipitur ut unum principium *tonus*, qui consistit in sesquioctava proportione, uel *diesis*, quod <est> differentia toni et semitonii.”

<sup>56</sup> *In Metaph.* 10, l. 2, §1951 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a17): “Similiter etiam voces quibus etiam mensuramus, plures sunt. Quantitas enim unius metri vel unius pedis, mensuratur ex diversis syllabis, quarum aliae sunt breves, et aliae longae.”

Likewise, too, (that by which we measure) the diameter of the circle or of the square is (something multiple).<sup>57</sup>

Indeed, whatever magnitude is measured by two (magnitudes), for an unknown quantity is found only by two known quantities.<sup>58</sup>

### 28.10. Cognition as Measuring

ARISTOTLE shows how measure is transferred to some (other genera) according to likeness (*secundum similitudinem*).<sup>59</sup> He says that, since it has been said that *measure* is *that by which the quantity of a thing is known*, we say that science (*scientia* = ἐπιστήμη) is the measure of things (*mensuram rerum* = μέτρον τῶν πραγμάτων) knowable by science (*scibilium*), and sense knowledge (*sensum* = αἴσθησις, is the measure) of (things) knowable by sense (*sensibilium*), since we know something by them: namely, by sense knowledge (we know) things knowable by sense; and by science (we know) things knowable by science. Not, however, in the same mode as a measure, for by a measure something is known as by a principle of knowing, while by scientific and sense knowledge (something is known) as by a cognitive potency or (by) a cognitive habit (which is a mean between the potency and the act: e.g., the habit of geometry).

Hence, by this likeness, (science and sense) are said (to be) *measures*, for, according to the truth of the thing, rather than measuring, they are measured. Indeed, not because we sense or scientifically know something it is so in the nature of things (i.e., in reality): rather, because it is so in the nature of things, we truly sense or scientifically know something.<sup>60</sup> And thus, it happens to us that, in (the act of) sensing and scientifically knowing, we are measured by the things that are outside of us.

In (the act of) knowing and measuring ourselves, as by something else that measures us, we know how much we are in corporeal quantity through a cubital measure applied to

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<sup>57</sup> *In Metaph.* 10, l. 2, §1951 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a17–18): “Similiter etiam est diameter circuli vel quadrati, et etiam latus quadrati.”

<sup>58</sup> *In Metaph.* 10, l. 2, §1951 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a17): “et quaelibet magnitudo mensuratur duobus: non enim invenitur quantitas ignota nisi per duas quantitates notas.”

<sup>59</sup> *In Metaph.* 10, l. 2, §1956 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a31–32): “Ostendit [Philosophus] qualiter mensura transfertur ad quaedam secundum similitudinem; dicens, quod cum dictum sit quod mensura est, qua quantitas rei cognoscitur, dicemus scientiam esse mensuram rerum scibilium et sensum rerum sensibilium, quia ipsis aliquid cognoscimus, sensu scilicet sensibilia et scientia scibilia. Non tamen eodem modo sicut mensura. Nam per mensuram cognoscitur aliquid sicut per principium cognoscendi: per sensum autem et scientiam sicut per potentiam cognoscitivam, aut habitum cognoscitivum.”

<sup>60</sup> *In Metaph.* 10, l. 2, §1957 (cf. ARISTOTLE, *Metaphysica* I.1, 1053a32–33): “Sic igitur per hanc similitudinem dicuntur mensurae, quia secundum rei veritatem magis mensurantur quam mensurent. Non enim quia nos aliquid sentimus aut scimus, ideo sic est in rerum natura. Sed quia sic est in rerum natura, ideo vero aliquid scimus, aut sentimus, ut dicitur nono Metaphysicorum. Et sic accidit nobis, quod in sentiendo et sciendo mensuramur per res quae extra nos sunt.”

us.<sup>61</sup> And thus, just as the externally applied cubit is the measure of our corporeal quantity, so things scientifically known or apprehended by sense are the measure through which it can be known whether we truly know something by sensing or by understanding.

On the other hand, if there is a science that is the cause of the thing known, it must be its measure.<sup>62</sup> For example, the science of the artificer is the measure of artifacts, since each of the artifacts is perfect according as it attains a likeness to the art.

On the other hand, PROTAGORAS said that man is the measure of all things insofar as he knows or senses because science and sense are the measure of sensible and knowable substances, for the Protagoreans said that things are such because we so sense them or we so opine about them.<sup>63</sup> Hence, though saying nothing great, they seem however to say something, for they secretly insinuate what they want to say.

### 28.11. Thing and Understanding Compared as Measure

Something (*aliqua res*) is compared to understanding (*ad intellectum*) in two modes:<sup>64</sup>

#### 1. As measure to measured (*sicut mensura ad mensuratum*).<sup>65</sup>

Natural things are compared to the human speculative understanding in this mode.<sup>66</sup> Hence, an understanding is said to be true insofar as it is conformed (*conformatur*) to the thing; and false, insofar as it is inconsistent (*discordat*) with the thing.

A natural thing is not said to be true by comparison to our intellect, as the ancient natural (scientists) posited, estimating the truth of things to be only in seeming (to be).<sup>67</sup> According

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<sup>61</sup> *In Metaph.* 10, l. 2, §1958 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a33–35): “Nobis autem cognoscentibus et mensurantibus, sicut aliquo alio nos mesurante, cognoscimus quanti sumus in quantitate corporali per mensuram cubitalem applicatam nobis. Et sic sicut cubitus exterius appositus est mensura quantitatis corporalis nostrae, ita res scitae vel per sensum apprehensae, sunt mensurae per quas potest sciri utrum vere cognoscamus aliquid per sensum vel per intellectum.”

<sup>62</sup> *In Metaph.* 10, l. 2, §1959: “Si qua vero scientia est quae est causa rei scitae, oportebit quod sit eius mensura. Ut scientia artificis est mensura artificiorum; quia unumquodque artificiatum secundum hoc perfectum est, quod attingit ad similitudinem artis. Et hoc modo se habet scientia Dei respectu omnium.”

<sup>63</sup> *In Metaph.* 10, l. 2, §1959 (cf. ARISTOTLE, *Metaphysica* l.1, 1053a35–b3): “Sed Protagoras dixit hominem esse mensuram omnium rerum in quantum est sciens aut sentiens, quia scientia et sensus sunt mensura substantiarum, scilicet sensibilium et scibilium. Dicebant enim Protagorici, ut in quarto habitum est, quod res sunt tales, quia sic sentimus eas, vel sic opinamur in eis. Cum igitur nihil superabundans vel magnum dicant, videntur tamen aliquid dicere, quia occulte insinuant quae dicere volunt.”

<sup>64</sup> *In Peri.* 1, l. 3, 114–115: “Considerandum autem quod aliqua res comparatur ad intellectum dupliciter.”

<sup>65</sup> *In Peri.* 1, l. 3, 116: “Vno modo sicut mensura ad mensuratum.”

<sup>66</sup> *In Peri.* 1, l. 3, 116–120: “et sic comparantur res naturales ad intellectum speculativum humanum. Et ideo intellectus dicitur verus secundum quod conformatur rei, falsus autem secundum quod discordat a re.”

<sup>67</sup> *In Peri.* 1, l. 3, 120–127: “Res autem naturalis non dicitur esse vera per comparisonem ad intellectum nostrum, sicut posuerunt quidam antiqui Naturales, estimantes rerum veritatem esse solum in hoc quod est uideri: secundum hoc enim sequeretur quod contradictoria essent simul vera, quia contradictoria cadunt sub diversorum opinionibus.”



to this (opinion), it would follow that contradictories should be simultaneously true, since contradictories fall under the opinions of diverse (thinkers).

Things are said (to be) true or false in comparison to our understanding not essentially or formally but effectively: namely, insofar as they are naturally apt to produce of themselves (*de se*) a true or a false estimation.<sup>68</sup> And according to this, gold is said (to be) *true* or *false*.

## 2. As measured to measure (*sicut mensuratum ad mensuram*).<sup>69</sup>

This is evident in practical understanding, which is a cause of things.<sup>70</sup> Whence, the work of the artificer is said to be true insofar as it attains the *ratio* of the art and false insofar as it falls short of the *ratio* of the art.<sup>71</sup>

### 28.12. Truth as Comparison to a Measure

(Again), that which is the principle of knowing is not the same in all genera: the principles of diverse genera are diverse.<sup>72</sup>

Just as a thing is said (to be) *true* by comparison to its measure, so, too, sensing and understanding (are said to be true by comparison to their measure), whose measure is the thing outside the soul.<sup>73</sup> Whence, sense is said (to be) *true* when, by (its) form, it

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<sup>68</sup> *In Peri.* 1, l. 3, 127–132: “Dicuntur tamen aliqua res uera uel falsa per comparisonem ad intellectum nostrum, non essentialiter uel formaliter, sed effectiue, in quantum scilicet nata est facere de se ueram uel falsam estimationem; et secundum hoc dicitur aurum uerum uel falsum.”

<sup>69</sup> *In Peri.* 1, l. 3, 133–134: “Alio uero modo res comparantur ad intellectum sicut mensuratum ad mensuram.”

<sup>70</sup> *In Peri.* 1, l. 3, 134–138: “ut patet in intellectu practico, qui est causa rerum. Vnde opus artificis dicitur esse uerum in quantum attingit ad rationem artis, falsum uero in quantum deficit a ratione artis.”

<sup>71</sup> As St. Thomas immediately explains, all—even natural—things are compared to divine understanding as artefacts to art. Consequently, anything is said to be true insofar as it has a proper form whereby divine art is imitated, for false gold is true pyrite. And in this mode, being (*ens*) and true (*verum*) are convertible, since any natural thing conforms to divine art by its form. Whence, ARISTOTLE calls form *something divine*. *In Peri.* 1, l. 3, 138–147: “Et quia omnia, etiam naturalia, comparantur ad intellectum diuinum sicut artificialia ad artem, consequens est ut quelibet res dicatur esse uera secundum quod habet propriam formam secundum quam imitatur artem diuinam: nam falsum aurum est uerum aurum. Et hoc modo ens et uerum conuertuntur, quia quelibet res naturalis per suam formam arti diuine conformatur. Vnde et Philosophus in I Physicorum formam nominat quicquam diuinum.” See *In Physic.* 1, l. 15, n. 7 (cf. ARISTOTLE, *Physica* A.15, 192a13–19): “forma est quoddam diuinum et optimum et appetibile. Diuinum quidem est, quia omnis forma est quaedam participatio similitudinis diuini esse, quod est actus purus: unumquodque enim in tantum est actu in quantum habet formam. Optimum autem est, quia actus est perfectio potentiae et bonum eius: et per consequens sequitur quod sit appetibile, quia unumquodque appetit suam perfectionem.”

<sup>72</sup> *In Metaph.* 5, l. 8, §873 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b21–23): “Hoc autem unum, quod est principium cognoscendi, non est idem in omnibus generibus.” *In De anima* 1, c. 12, 69: “diuersorum generum diuersa sunt principia.”

<sup>73</sup> *In Peri.* 1, l. 3, 149–157: “Et, sicut dicitur res uera per comparisonem ad suam mensuram, ita etiam et sensus uel intellectus, cuius mensura est res extra animam: unde sensus dicitur uerus quando per formam <suam> conformatur rei extra animam existentis. Et sic intelligitur quod sensus proprii sensibilis sit uerus. Et hoc etiam modo intellectus apprehendens quod quid est absque compositione et diuisione semper est uerus, ut dicitur in III De anima.” See *In De anima* 3, c. 5, 216–242 (cf. ARISTOTLE, *De anima*

conforms to the thing that exists outside the soul: it is in this way that sensing of the proper sensible (object) is true. And also, in this mode, the intellect that apprehends an essence (*quod quid est*), without composition or division, is always true.

Nonetheless, one ought to consider that, although the sensing of the proper object is true, (sense) does not know this (to be) true, for it cannot know the habitude of its conformity to the thing: rather, it only apprehends the thing.<sup>74</sup> On the other hand, the intellect can know in this mode the habitude of conformity. Hence, only the intellect can know truth. Whence, ARISTOTLE says that truth is only in the mind: namely, as in that which is cognizant of the truth; but to know the aforesaid habitude of conformity is only to judge that the thing is—or is not—so, which is to compose and divide. Hence, the intellect knows truth only (by) composing or dividing through its judgment, which judgment, if it should accord with (*consonet*) things, will be true: for example, when the intellect judges that a thing that is, is; or that a thing that is not, is not; and (it will be) false when it discords (*dissonat*) from the thing: for example, when it judges that what is, is not; or that what is not, is. Whence, it is evident that truth and falsehood, as (existing) in one who knows and says, is only about composition and division.

[Since voices are signs of understandings,<sup>75</sup> that voice will be true which signifies a true understanding; and (that voice will be) false which signifies a false understanding,

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Γ.6, 430b26–30): “dicit [Philosophus] quod *dictio* qua dicit intellectus *aliquid de aliquo*, sicut contingit in affirmatione, semper est *uera aut falsa*, set *intellectus non* semper est uerus aut falsus, quia est intellectus incomplexorum qui neque est uerus neque falsus quantum ad id quod intelligitur: ueritas enim et falsitas consistit in quadam comparatione unius ad alterum, que quidem est in compositione et diuisione intellectus, non autem in intelligibili incompleto. Set tamen, licet ipsum intelligibile incompleto non sit neque uerum neque falsum, tamen intellectus intelligendo ipsum uerus est in quantum adequatur rei intellecte; et ideo subdit quod intellectus *qui est ipsius quid est secundum hoc quod aliquid erat esse*, id est secundum quod intelligit quid est res, *uerus est semper, et non secundum quod intelligit aliquid de aliquo*. Et huius rationem assignat quia quod quid est est proprium obiectum intellectus, unde, sicut uisus nunquam decipitur in proprio obiecto, ita nec intellectus in cognoscendo quod quid est, unde intellectus nunquam decipitur in cognoscendo quod quid est homo; set, sicut uisus non semper uerus est in iudicando de hiis que sunt adiuncta proprio obiecto, puta *si album est homo uel non*, sic nec intellectus semper est uerus in componendo aliquid alicui.”

<sup>74</sup> *In Peri.* 1, l. 3, 158–180: “Est autem considerandum quod, quamuis sensus proprii obiecti sit uerus, non tamen cognoscit hoc uerum: non enim potest cognoscere habitudinem conformitatis sui ad rem, set solam rem apprehendit; intellectus autem potest huiusmodi habitudinem conformitatis cognoscere, et ideo solus intellectus potest cognoscere ueritatem: unde et Philosophus dicit in VI Metaphisice quod ueritas est solum in mente, scilicet sicut in cognoscente ueritatem. Cognoscere autem predictam conformitatis habitudinem nichil est aliud quam iudicare ita esse in re uel non esse, quod est componere et diuidere, et ideo intellectus non cognoscit ueritatem nisi componendo uel diuidendo per suum iudicium. Quod quidem iudicium, si consonet rebus, erit uerum, puta cum intellectus iudicat rem esse que est, uel non esse que non est, falsum autem quando dissonat a re, puta cum iudicat non esse quod est uel esse quod non est. Vnde patet quod ueritas et falsitas sicut in cognoscente et dicente non est nisi circa compositionem et diuisionem. Et hoc modo hic Philosophus loquitur.” Cf. ARISTOTLE, *Metaphysica* E.4, 1027b25–27: “οὐ γὰρ ἔστι τὸ ψεῦδος καὶ τὸ ἀληθές ἐν τοῖς πράγμασιν, οἷον τὸ μὲν ἀγαθὸν ἀληθές τὸ δὲ κακὸν εὐθὺς ψεῦδος, ἀλλ’ ἐν διανοίᾳ.”

<sup>75</sup> *In Peri.* 1, l. 3, 181–187: “[Et, quia uoces sunt signa intellectuum, erit uox uera que significat uerum intellectum, falsa autem que significat falsum intellectum, quamuis uox, in quantum est res quedam, dicatur uera sicut et alie res; unde hec uox: «Homo est asinus», est uera uox et uerum signum, set, quia

although a voice—as also other things—is said (to be) *true* insofar as it is something (*res quaedam*). Whence, the voice “Homer is an ass” is a true voice and a true sign. However, since it is a sign of a false (understanding), it is said (to be) *false*.]

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est signum falsi, ideo dicitur falsa.]” We include this text in brackets because the Leonine edition’s critical apparatus notes the following: “*Hi uersus adnotatio quaedam ipsius Thomae esse uidentur, quae cum in margine addita esset, non loco inserta est.*”



## 29. In a Genus

We examine here how something is said to be in a genus.

### 29.1. To Be in Something

ARISTOTLE posits eight modes in which something is said **to be in something** (*aliquid in aliquo dicitur esse* < ἄλλο ἐν ἄλλῳ λέγεται):<sup>1</sup>

1. As a **part in its whole** (*pars in < suo > toto* = τὸ μέρος ἐν τῷ ὅλῳ).<sup>2</sup> For example, as a finger is said to be in a hand.
2. As a **whole in (its) parts** (*totum... in partibus* = τὸ ὅλον ἐν τοῖς μέρεσιν), for a whole is not other than its parts (*praeter partes* = παρὰ τὰ μέρη).<sup>3</sup>
3. As a **species in its genus** (*species in < suo > genere* = εἶδος ἐν γένει).<sup>4</sup> For example, as *man* is said to be in *animal*.
4. As a **genus in its species** (*genus... in speciebus* = τὸ γένος ἐν τῷ εἴδει), for the genus (e.g., *animal*) is part of the definition of the species (e.g., *man*), as is the difference (e.g., *rational*); whence, both genus and difference (e.g., *animal* and *rational*) are somehow said to be in the species (e.g., *man*) as parts in a whole (► 13.16).<sup>5</sup>
5. As a **form in matter** (*forma in materia* = τὸ εἶδος ἐν τῇ ὕλῃ), whether it is an accidental form in (its) subject or a substantial form in (its) matter.<sup>6</sup>
6. As a **thing moved (quod movetur) in the first mover** (*in primo motivo* = ἐν τῷ πρώτῳ κινήτικῳ).<sup>7</sup> For example, as the affairs of the Greeks are said to be in the king of Greece.

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<sup>1</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a14–23): “Ponit ergo [Philosophus] octo modos quibus aliquid in aliquo dicitur esse.”

<sup>2</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a15–16): “Quorum primus est, sicut digitus dicitur esse in manu, et universaliter quaecumque alia pars in suo toto.”

<sup>3</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a16–17): “Secundus modus est, prout totum dicitur esse in partibus. Et quia iste modus non est adeo consuetus sicut primus, ad eius manifestationem subiungit quod totum non est praeter partes, et sic oportet ut intelligatur esse in partibus.”

<sup>4</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a17–18): “Tertius modus est, sicut homo dicitur esse in animali, vel quaecumque alia species in suo genere.”

<sup>5</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a18–20): “Quartus modus est, sicut genus dicitur esse in speciebus. Et ne iste modus extraneus videatur, rationem innuit quare hoc dicit: nam genus est pars definitionis speciei, et etiam differentia; unde quodammodo et genus et differentia dicuntur esse in specie sicut partes in toto.”

<sup>6</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a20–21): “Quintus modus est, sicut sanitas dicitur esse in calidis et frigidis, quorum contemperantia constituit sanitatem; et universaliter quaecumque alia forma in materia vel subiecto, sive sit accidentalis sive substantialis.”

<sup>7</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a21–22): “Sextus modus, sicut res Graecorum dicuntur esse in rege Graeciae, et universaliter omne quod movetur est in primo motivo. Per hunc etiam modum dicere possum aliquid esse in me, quia est in potestate mea ut faciam illud.”

7. As **something** (*aliquid*) **in the end** (*in fine* = ἐν τῷ τέλει).<sup>8</sup> For example, as the heart is said to be in something it desires and loves.

8. As a **placed** (*locatum*) **in a place** (*in loco* = ἐν τόπῳ).<sup>9</sup> For example, as something is said to be *in a vessel*.

◀ ARISTOTLE seems to omit the mode in which something is said to be in something as **in time**, but this is reduced to the eighth mode (¶8), for just as place is the measure of the mobile, so is time the measure of motion (▶ 33.6; 35.4).<sup>10</sup>

## 29.2. Reduction to *Being in a Place*

Something is said to be *in something* most properly (*maxime proprie* = κυριώτατον) in the eighth mode, as ARISTOTLE says.<sup>11</sup> Whence, all other modes must somehow be reduced to this mode whereby something is said *to be in something* as *in a place*, according to the rule that he consigns in his *Metaphysics* (to wit, such that the other modes are reduced to the principle whence the thing—i.e., *to be in something*—is first known, ὅθεν γνωστὸν τὸ πρᾶγμα πρῶτον, since the other modes are analogically predicated in respect of that one principle, λέγεται πολλαχῶς... ἀλλ' ἅπαν πρὸς μίαν ἀρχήν; ▶ 8.11; 20).<sup>12</sup> This is evident as follows:

1. **(An integral part is in its integral whole.)** The placed (*locatum*) is contained or included (*continetur, sive includitur*) by a place (*a loco*), and it has rest and fixedness in it.<sup>13</sup> Therefore, most proximately to this mode, a part is said to be in an integral whole, in which it is included in act. Whence ARISTOTLE says that the placed is as a separated part (▶ 35.4); and an (integral) part is as some conjoined, placed (thing).<sup>14</sup>

<sup>8</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a22–23): “Septimo modo dicitur aliquid esse in aliquo, sicut in quodam optimo diligibili et desiderabili, et universaliter sicut in fine. Et per hunc modum dicitur esse cor alicuius in aliqua re quam desiderat et amat.”

<sup>9</sup> *In Physic.* 4, l. 4, n. 2 (cf. ARISTOTLE, *Physica* Δ.3, 210a24): “Octavo modo dicitur esse aliquid in aliquo sicut in vase, et universaliter sicut locatum in loco.”

<sup>10</sup> *In Physic.* 4, l. 4, n. 2: “Videtur autem praetermittere modum quo aliquid est in aliquo sicut in tempore: sed hic reducitur ad hunc octavum modum; nam sicut locus est mensura mobilis, ita tempus est mensura motus.”

<sup>11</sup> *In Physic.* 4, l. 4, n. 3 (cf. ARISTOTLE, *Physica* Δ.3, 210a24): “Dicit autem [Philosophus] quod secundum hunc octavum modum maxime proprie dicitur esse aliquid in aliquo. Unde oportet secundum regulam quam tradit in IV et V *Metaphys.* quod omnes alii modi reducantur aliquo modo ad hunc modum quo aliquid est in aliquo sicut in loco. Quod sic patet.”

<sup>12</sup> See *In Metaph.* 5, l. 1, §759 (cf. ARISTOTLE, *Metaphysica* Δ.1, 1013a14–15); *ibid.* 4, l. 1, §535 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b5–6).

<sup>13</sup> *In Physic.* 4, l. 4, n. 3: “Locatum enim continetur, sive includitur a loco, et in eo habet quietem et fixationem. Propinquissime igitur ad hunc modum pars dicitur esse in toto integrali, in quo actu includitur: unde etiam infra dicitur quod locatum est sicut pars separata, et pars est sicut quoddam locatum coniunctum.”

<sup>14</sup> See ARISTOTLE, *Physica* Δ.4, 211b21–23: “ταυτό ποιήσει τὰ μόρια πάντα ἐν τῷ ὄλῳ ὅπερ ἅπαν τὸ ὕδωρ ἐν τῷ ἀγγεῖῳ.” Cf. *In Physic.* 4, l. 6, n. 7: “Omnis autem pars continetur a toto sicut locatum a vase.” *In Physic.* 4, l. 8, n. 5: “corpus locatum se habet ad corpus continens sicut quaedam pars ad totum, divisa

**2. (A part of a *ratio* is in its *ratio*.)** The whole that is according to *ratio* is taken in the likeness (*ad similitudinem*) of this (integral) whole.<sup>15</sup> Whence, consequently, that which is in some *ratio* is said to be in it, as (the species) *animal* (is said to be) in (the genus) *man*.

**3. (A subjective part is in its universal whole.)** Just as the part of an integral whole can be included in the whole according to act, so a part of a universal whole (can be) included in the whole according to potency, for the genus extends—in potency—to more (things) than the species, even if the species has more (differences) in act. Whence, consequently too, a species is said to be in a genus.<sup>16</sup>

**4. (Form is in matter.)** As the species is contained in the potency of the genus, so (is) a form (contained) in the potency of matter.<sup>17</sup> Wherefrom, form is said to be in matter.

**5. (A whole is in its parts.)** Since the whole has the *ratio* of *form* in respect to the parts, consequently, too, a whole is said to be in the parts.<sup>18</sup>

**6. (A moved thing is in its first mover.)** Just as a form is included under the passive potency of matter, so is an effect included under the active potency of the agent.<sup>19</sup> Whence, also, something is said to be in the first mover.

**7. (An affect is in its end.)** Thereafter, it is manifest that the appetite rests in the desired and loved good, and it is fixed in it—as (is) also the placed (*locatum*) in a place.<sup>20</sup> Whence, also the affect of the lover is said to be in the (thing) loved.

◀ And, in this way, it is evident that all the other modes are derived from the last (▶ 29.1, ¶8; i.e., insofar as something is said to be *in a place*), which is maximally proper.<sup>21</sup>

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tamen. Et hoc manifestius apparet in corporibus quae sunt facilis divisionis, sicut est aer vel aqua: horum enim partes possunt moveri ab aliquo in toto, sicut locatum movetur in loco.” ARISTOTLE, *Physica* Δ.5, 212b34–213a1: “τὸ μέρος τόδε ἐν ὅλῳ τῷ τόπῳ ὡς διαιρετὸν μέρος πρὸς ὅλον ἐστίν, οἷον ὅταν ὕδατος κινήσῃ τις μόριον ἢ ἀέρος.”

<sup>15</sup> *In Physic.* 4, l. 4, n. 3: “Totum autem quod est secundum rationem, ad similitudinem huius totius sumitur: unde consequenter dicitur id quod est in ratione alicuius, esse in eo; ut animal in homine.”

<sup>16</sup> *In Physic.* 4, l. 4, n. 3: “Contingit autem sicut partem totius integralis includi in toto secundum actum, ita partem totius universalis includi in toto secundum potentiam: nam genus ad plura se extendit in potentia quam species, licet species habeat plura in actu: unde consequenter dicitur esse etiam species in genere.”

<sup>17</sup> *In Physic.* 4, l. 4, n. 3: “Et quia sicut species continetur in potentia generis, ita forma in potentia materiae, ulterius dicitur forma esse in materia.”

<sup>18</sup> *In Physic.* 4, l. 4, n. 3: “Et quia totum habet rationem formae respectu partium, ut dictum est in secundo; consequenter etiam totum dicitur esse in partibus.”

<sup>19</sup> *In Physic.* 4, l. 4, n. 3: “Sicut autem forma includitur sub potentia passiva materiae, ita effectus includitur sub potentia activa agentis: unde et dicitur aliquid esse in primo motivo.”

<sup>20</sup> *In Physic.* 4, l. 4, n. 3: “Deinde autem manifestum est quod appetitus quiescit in bono desiderato et amato, et in eo fixatur, sicut et locatum in loco: unde etiam dicitur affectus amantis esse in amato.”

<sup>21</sup> *In Physic.* 4, l. 4, n. 3: “Et sic patet quod omnes alii modi derivantur ab ultimo, qui est maxime proprius.”

### 29.3. Contained in Something in Act vs. Virtually

Something is contained in another in two modes:<sup>22</sup>

1. **In act** (*in actu*), as the placed (is contained) in a place (*sicut locatum in loco*).<sup>23</sup>
2. **Virtually** (*virtute*), as an effect (is contained) in (its) cause (► 23.12); as a complement (is contained) in the incomplete: for example, a genus potentially (*potestate*) contains (its) species; and as a whole tree is contained in a seed.<sup>24</sup>

### 29.4. In a Subject vs. in an Efficient Cause

Something is said to be in something in two modes:<sup>25</sup>

1. **As in a proper subject.** And the proper subject of some accident is coequal (*coaequatur*) with the accident itself.<sup>26</sup> For example, if we want to consider the proper subject of happiness and of virtue, since happiness and virtue are proper to man, the proper subject of one and of the other will be that which is proper to man: namely, the rational part of the soul.

Thus, the form of a house is in stones and wood as in (its) proper subject.<sup>27</sup>

2. **As in (its efficient) cause** (► 23.12). And the (efficient) cause is twofold (► 46.14):<sup>28</sup>

(a) *Principal*.<sup>29</sup> Something is in the principal cause according to the likeness of the form (*secundum similitudinem formae*), either of the same species, if the cause is univocal, e.g., as man begets man, and fire (generates) fire, or according to some more excellent form, if the agent is not univocal, as the sun generates a man (► 46.19).

Thus, the form of a house is in the soul of the artificer as in (its) principal cause.<sup>30</sup>

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<sup>22</sup> *STh* I-II, q. 107 a. 3 co.: “aliquid continetur in alio dupliciter. Uno modo, in actu [...]. Alio modo, virtute.”

<sup>23</sup> *STh* I-II, q. 107 a. 3 co.: “Uno modo, in actu, sicut locatum in loco.”

<sup>24</sup> *STh* I-II, q. 107 a. 3 co.: “Alio modo, virtute, sicut effectus in causa, vel complementum in incompleto, sicut genus continet species potestate, et sicut tota arbor continetur in semine.”

<sup>25</sup> *De malo*, q. 4 a. 3 co.: “aliquid dupliciter dicitur esse in aliquo: uno modo sicut in proprio subiecto, alio modo sicut in causa.” *STh* I-II, q. 83 a. 1 co.: “aliquid potest esse in aliquo dupliciter, uno modo, sicut in causa, vel principali vel instrumentali; alio modo, sicut in subiecto.”

<sup>26</sup> *De malo*, q. 4 a. 3 co.: “Proprium autem subiectum alicuius accidentis coaequatur ipsi accidenti; puta, si volumus considerare proprium subiectum felicitatis et virtutis, cum felicitas et virtus sint propria hominis, proprium subiectum utriusque erit id quod est proprium hominis, scilicet pars animae rationalis, ut Philosophus probat in I Ethic.”

<sup>27</sup> *De malo*, q. 4 a. 3 co.: “est forma domus in lapidibus et lignis, tamquam in proprio subiecto.”

<sup>28</sup> *De malo*, q. 4 a. 3 co.: “Causa autem est duplex, scilicet instrumentalis et principalis.”

<sup>29</sup> *De malo*, q. 4 a. 3 co.: “In principali quidem causa est aliquid secundum similitudinem formae, vel eiusdem speciei, si sit causa univoca; puta, cum homo generat hominem, vel ignis ignem; vel secundum aliquam excellentiorem formam, si sit agens non univocum; sicut sol generat hominem.”

<sup>30</sup> *De malo*, q. 4 a. 3 co.: “est forma domus [...] in anima artificis, tamquam in causa principali.”



(b) *Instrumental*.<sup>31</sup> Some effect is in an instrumental cause according to the virtue that the instrument receives from the principal cause insofar as it is moved by it.

Thus, the form of a house is in a saw and in an ax as in an instrumental cause.<sup>32</sup>

## 29.5. Being in Itself

As ARISTOTLE says, something can be understood to be in itself (*in seipso* = ἐν ἑαυτῷ) in two modes:<sup>33</sup>

### 1. First and by itself (*primo et per se* < καθ' αὐτό... πρώτως).<sup>34</sup>

ARISTOTLE shows that nothing can be first (*primo*) in itself: neither by itself (*per se*; ► 29.7) nor by accident (*per accidens*; ► 29.8).<sup>35</sup> However, it should be noted that sometimes something is said to be in itself not according to an affirmative understanding, as ARISTOTLE here disapproves, but according to a negative understanding, insofar as *to be in itself* signifies only *not to be in another* (e.g., as substance *is in itself*; ► 33.1).<sup>36</sup>

### 2. According to another (*secundum alterum* = καθ' ἕτερον): that is, according to a part (*secundum partem* < κατὰ τὰ μέρη).<sup>37</sup>

In this mode,<sup>38</sup> something can (truly) be said to be in itself, for two parts of some whole are related in such a way that if one should be (*that*) *in which something is*, and the other should be *what is in it*, it follows that the whole would be said (to be) both *that in which it*

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<sup>31</sup> *De malo*, q. 4 a. 3 co.: “In causa autem instrumentali est aliquis effectus secundum virtutem quam recipit instrumentum a causa principali, in quantum movetur ab ea.”

<sup>32</sup> *De malo*, q. 4 a. 3 co.: “est forma domus [...] in serra et securi tamquam in causa instrumentali.”

<sup>33</sup> *In Physic.* 4, l. 4, n. 5 (cf. ARISTOTLE, *Physica* Δ.3, 210a26–27): “ostendit [Philosophus] quomodo possit esse aliquid in seipso [...]. Dicit ergo primo quod dupliciter potest intelligi aliquid esse in seipso: uno modo primo et per se; alio modo secundum alterum, idest secundum partem.”

<sup>34</sup> *In Physic.* 4, l. 4, n. 5 (cf. ARISTOTLE, *Physica* Δ.3, 210a27): “uno modo primo et per se.”

<sup>35</sup> *In Physic.* 4, l. 4, n. 7 (cf. ARISTOTLE, *Physica* Δ.3, 210b8–22): “ostendit iam [Philosophus] quod nihil est primo in seipso. Et primo ostendit quod non sit aliquid primo in seipso per se; secundo quod non sit aliquid primo in seipso per accidens.” Ibid., n. 6 (cf. ARISTOTLE, *Physica* Δ.3, 210a33–34): “ostendit [Philosophus] quod non contingit aliquid esse primo in seipso. Et primo proponit quod intendit, distinguens utrumque modum quo aliquid est in seipso, et quo non est; secundo probat propositum [...]. Dicit ergo quod non contingit aliquid esse primo in seipso.” Ibid., n. 9 (cf. ARISTOTLE, *Physica* Δ.3, 210b21–22): “Sic igitur patet quod impossibile est aliquid esse primo in seipso.”

<sup>36</sup> *In Physic.* 4, l. 4, n. 9: “Sciendum tamen quod aliquando dicitur aliquid esse in seipso, non secundum intellectum affirmativum, sicut hic reprobatur Philosophus, sed secundum intellectum negativum, prout esse in seipso non significat nisi non esse in alio.”

<sup>37</sup> *In Physic.* 4, l. 4, n. 5 (cf. ARISTOTLE, *Physica* Δ.3, 210a27): “alio modo secundum alterum, idest secundum partem.”

<sup>38</sup> *In Physic.* 4, l. 4, n. 5 (cf. ARISTOTLE, *Physica* Δ.3, 210a27–29): “isto secundo modo potest dici aliquid esse in seipso. Cum enim alicuius totius duae partes ita se habeant quod una sit in quo est aliquid, et alia sit quod est in illa, sequitur quod totum dicatur et *in quo est* ratione unius partis, et *quod est in hoc* ratione alterius: et sic totum dicetur esse in seipso. [...] Per hunc igitur modum contingit aliquid idem esse in seipso.”

is, by reason of one part, and *that which is in this*, by reason of the other. And in this way, the whole would be said to be in itself.

Indeed, we find that something is said of something according to a part.<sup>39</sup> For example, something is said (to be) *white* because its surface is white; and a man is said (to be a) *scientific knower* (*sciens*) because there is science in (his) reasoning part.

Hence, if a flask should be taken (to be) full of wine as some whole whose parts are the flask and the wine, neither of its parts will be in itself—that is, neither the flask nor the wine.<sup>40</sup> However, *this whole*—namely, the flask of wine—will be in itself insofar as one and the other—namely, both the wine that is in the flask, and the flask in which the wine is—is its part.

### 29.6. Being *First* in Something

ARISTOTLE shows the difference between *being first in something* and (*being in something but*) *not first*.<sup>41</sup>

Thus, the (color) white is said to be in a body because the (colored) surface is in the body. Whence, (the color white) is not *first* in the body but in the surface.<sup>42</sup>

Likewise, science (*scientia* = ἐπιστήμη) is said to be first in the soul (*in anima* = ἐν ψυχῇ), and not in man, in which it is through the soul.<sup>43</sup>

Hence, according to the surface and to the soul, there are appellations by which man is named *white* or *scientific knower* (*sciens*), since the surface and the soul are as parts in man: not that a surface would be a part, but that it is related by the mode of a part (*se habet ad modum partis*) insofar as it is something of man, as the terminus of (his) body.<sup>44</sup>

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<sup>39</sup> *In Physic.* 4, l. 4, n. 5 (cf. ARISTOTLE, *Physica* Δ.3, 210a29–30): “Invenimus enim quod aliquid dicitur de aliquo secundum partem, sicut aliquis dicitur albus quia superficies eius est alba, et homo dicitur sciens quia scientia est in parte ratiocinativa.”

<sup>40</sup> *In Physic.* 4, l. 4, n. 5 (cf. ARISTOTLE, *Physica* Δ.3, 210a29–33): “Si igitur accipiatur amphora plena vino sicut quoddam totum cuius partes sunt amphora et vinum, neutra partium eius erit in seipsa, idest neque amphora neque vinum, sed hoc totum, scilicet amphora vini, erit in seipsa, inquantum utrumque est pars eius, scilicet et vinum quod est in amphora, et amphora in qua est vinum.”

<sup>41</sup> *In Physic.* 4, l. 4, n. 6 (ARISTOTLE, *Physica* Δ.3, 210a33–b8): “manifestat [Philosophus] quid sit aliquid esse primo in seipso, per oppositum.” *Ibid.*, n. 7: “ostensa differentia inter hoc quod est esse primo in aliquo et non primo [...]” St. Thomas is referring here to what he has just commented in *ibid.*, n. 6. Thus, as he says, ARISTOTLE shows what it is for something to be *first* in itself *through the opposite*.

<sup>42</sup> *In Physic.* 4, l. 4, n. 6 (cf. ARISTOTLE, *Physica* Δ.3, 210a34–b1): “Album enim dicitur esse in corpore, quia superficies est in corpore: unde non est primo in corpore, sed in superficie.”

<sup>43</sup> *In Physic.* 4, l. 4, n. 6 (cf. ARISTOTLE, *Physica* Δ.3, 210b1): “Et similiter scientia primo dicitur esse in anima, non autem in homine, in quo est per animam.”

<sup>44</sup> *In Physic.* 4, l. 4, n. 6 (cf. ARISTOTLE, *Physica* Δ.3, 210b1–2): “Et secundum hoc, scilicet secundum animam et superficiem, sunt appellationes quibus nominatur homo albus vel sciens, cum anima et superficies sint sicut partes in homine: non quod superficies sit pars, sed quia se habet ad modum partis, inquantum est aliquid hominis, ut terminus corporis.”

Now if wine and flask are taken separately one from the other (*seorsum ab invicem*), they are not parts.<sup>45</sup> Whence, it befits neither to be in itself. However, when they are (taken) simultaneously (*simul*), as when the flask is full of wine, because both flask and wine are parts, the same will be in itself not *first* but through the parts (*per partes*), as the (color) white is not first in man, but through the body; and in the body, through the surface.

Moreover, *that in which something is first* is not the same as *that which is in it*, just as the (color) white (is not the same) as the surface because the white and the surface are diverse (*altera = ἕτερα*) according to species (*secundum speciem = τῷ εἶδει*), and the nature (*natura = φύσις*) and potency (*potentia = δύναμις*) of one and of the other is diverse (*alia = ἄλλη*).<sup>46</sup>

### 29.7. Something Cannot Be *First and by Itself* in Itself

ARISTOTLE shows that nothing can be first (*primo*) in itself by itself (*per se*) in two ways:<sup>47</sup>

**1. Inductively** (*inductive = ἐπακτικῶς*).<sup>48</sup> Considering by induction, one by one, the afore-determined modes in which something is said to be in something (►29.1), it is evident that nothing is in itself *first and by itself* (*primo et per se*), for nothing is its own whole, (its own) part, or (its own) genus, etc.

ARISTOTLE posits this, concluding from the premises, because, as (this) is evident in the (color) white and in the surface, which are related as form and matter, which are diverse according to species and virtue, so too can the other modes be considered.<sup>49</sup>

**2. Rationally** (*ratione = τῷ λόγῳ*).<sup>50</sup> It is manifest through reasoning (*per rationem*) that it is impossible for something to be first and by itself in itself, for if something should be

<sup>45</sup> *In Physic.* 4, l. 4, n. 6 (cf. ARISTOTLE, *Physica* Δ.3, 210b2–5): “Si autem accipiatur vinum et amphora seorsum ab invicem, non sunt partes: unde neutri competit esse in seipso. Sed cum sunt simul, utpote cum amphora est plena vino, propter hoc quod et amphora et vinum sunt partes, idem erit in seipso, ut expositum est, non primo, sed per partes: sicut album non primo est in homine, sed per corpus, et in corpore per superficiem.”

<sup>46</sup> *In Physic.* 4, l. 4, n. 6 (cf. ARISTOTLE, *Physica* Δ.3, 210b5–8): “Nec est idem id in quo est aliquid primo, et quod est in eo, sicut album et superficies: quia altera sunt secundum speciem superficies et album, et alia est natura et potentia utriusque.”

<sup>47</sup> *In Physic.* 4, l. 4, n. 7 (cf. ARISTOTLE, *Physica* Δ.3, 210b8–17): “primo ostendit [Philosophus] quod non sit aliquid primo in seipso per se [...]. Primum ostendit dupliciter, scilicet inductive et ratione.”

<sup>48</sup> *In Physic.* 4, l. 4, n. 7 (cf. ARISTOTLE, *Physica* Δ.3, 210b8–9): “Dicit ergo ergo [Philosophus] primo quod considerando per inductionem in singulis modis supra determinatis quibus dicitur aliquid esse in aliquo, apparet quod nihil est in seipso primo et per se: neque enim aliquid est totum sui ipsius, neque pars neque genus, et sic de aliis.”

<sup>49</sup> *In Physic.* 4, l. 4, n. 7: “Ponit autem hoc concludendo ex praemissis, quia sicut manifestum est in albo et in superficie, quae se habent ut forma et materia, quod sunt aliud secundum speciem et virtutem, ita etiam potest in omnibus aliis modis considerari.”

<sup>50</sup> *In Physic.* 4, l. 4, n. 8 (cf. ARISTOTLE, *Physica* Δ.3, 210b10–11): “probat [Philosophus] idem ratione. Et dicit manifestum esse per rationem quod impossibile est aliquid esse primo et per se in seipso. Si enim aliquid primo et per se sit in seipso, oportet quod eidem et secundum idem conveniat ratio eius in quo

first and by itself in itself, the same *ratio* of *that in which something is*—and according to the same—would have to befit also the *ratio* of *that which is in it*. Whence, one and the other—namely, the container as much as the contained—would have to be the other.

For example, *flask* would be *vessel* and *wine*—and *wine* would be *wine* and *flask*—if something should be first and by itself in itself.<sup>51</sup> Whence, once this is posited—namely, that *wine* should be *wine* and *flask*, and that *flask* should be *wine* and *flask*—, if someone should say that one of them would be in the other—for example, the wine in the flask—, it follows that the wine would be received in the flask not insofar as it is wine but insofar as *wine* is *flask*. Wherefore, if it befits the flask to be in the flask first and by itself—because something is posited to be in itself first and by itself—, it follows that something could be said to be in the flask only insofar as it itself is the flask. And in this way, if the wine is said to be in the flask, it follows that to be in the flask befits the wine not insofar as *wine* is *wine*, but insofar as *wine* is *flask*. But this is unbecoming (*inconueniens*).

Whence, it is manifest that *that in which* (*id in quo* < ἐν ᾧ) and *that which in this* (*quod in hoc* < ἐν τούτῳ) is according to a diverse *ratio* (*secundum alteram rationem*), for the *ratio* of *that which is in something* is other than (the *ratio*) of *that in which something is*.<sup>52</sup>

### 29.8. Something Cannot Be *First and by Accident* in Itself

ARISTOTLE also shows that nothing can be first (*primo*) in itself by accident (*secundum accidens*).<sup>53</sup>

Something is said to be in something by accident when it is in it on account of something else that exists in it.<sup>54</sup> For example, if we should say that a man is in the sea because he

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est aliquid, et ratio eius quod est in eo. Unde oportet quod utrumque, scilicet tam continens quam contentum, sit utrumque.”

<sup>51</sup> *In Physic.* 4, l. 4, n. 8 (cf. ARISTOTLE, *Physica* Δ.3, 210b11–16): “ut puta quod amphora sit vas et vinum, et vinum sit vinum et amphora, si primo et per se contingit aliquid esse in seipso. Unde hoc posito, scilicet quod vinum sit amphora et vinum, et amphora sit vinum et amphora, si quis dicat quod alterum eorum sit in altero, ut puta vinum in amphora, sequitur quod vinum recipiatur in amphora non in quantum vinum est, sed in quantum vinum est illa, scilicet amphora. Quare, si esse in amphora primo et per se convenit amphorae ex eo quod ponitur aliquid primo et per se in seipso esse, sequitur quod nihil possit dici esse in amphora, nisi in quantum ipsum est amphora. Et sic, si vinum dicatur esse in amphora, sequitur quod esse in amphora competit vino, non secundum quod vinum est vinum, sed secundum quod vinum est amphora. Et eadem ratione, si amphora recipiat vinum, recipiet ipsum non in quantum amphora est amphora, sed in quantum amphora est vinum. Hoc autem est inconueniens.”

<sup>52</sup> *In Physic.* 4, l. 4, n. 8 (cf. ARISTOTLE, *Physica* Δ.3, 210b16–17): “Unde manifestum est, quod secundum alteram rationem est *id in quo*, et *quod in hoc*. Alia est enim ratio eius quod est in aliquo, et eius in quo est aliquid. Non potest ergo per se et primo aliquid esse in seipso.”

<sup>53</sup> *In Physic.* 4, l. 4, n. 9 (cf. ARISTOTLE, *Physica* Δ.3, 210b18–22): “ostendit [Philosophus] quod non sit aliquid primo in seipso etiam secundum accidens.”

<sup>54</sup> *In Physic.* 4, l. 4, n. 9: “Dicitur enim aliquid esse in aliquo secundum accidens, quando est in eo propter aliquid aliud in eo existens; ut si dicamus hominem esse in mari, quia est in navi, quae est in mari: in hac tamen primo dicitur esse, idest non propter partem.”

is in a ship that is in the sea, he is nonetheless said to be in the former (i.e., in the ship) first—that is, not on account of a part.

Therefore, if something could be in itself first—not indeed by itself but by accident—, it follows that it would be in itself on account of something else being in it.<sup>55</sup>

In this way, it follows that two bodies would be in the same (< δύο ἐν ταύτῳ ἔσται): namely, the body that is in it, and the very same that is in itself.<sup>56</sup> Thus, the flask will be in itself by accident if the flask itself—whose nature is to receive something—should be in itself, and again, that of which it is receptive—namely, the wine. Therefore, both the flask and the wine would be in the flask, if on account of the wine being in the flask it follows that the flask is in itself—and in this way, two bodies would be in the same.

### 29.9. Contained in a Genus

Something is contained **in a genus** in two modes:<sup>57</sup>

**1. Simply, by itself and properly** (*simpliciter et proprie, per se et proprie*), as a species is contained under a genus (e.g., as *two* is contained in *number*, or *man* in *animal*); and those things that receive the predication of the genus (e.g., as the first part of a line).<sup>58</sup>

**2. By reduction** (*per reductionem*), either:<sup>59</sup>

**(a)** As the principles of a genus are reduced to their genus.<sup>60</sup>

For example, matter and (substantial) form are reduced to the genus of substance as principles.<sup>61</sup> Likewise, unit and point are reduced to the genus of quantity as principles, even though neither is a quantity (i.e., the unit is the principle of any number, but not itself a number; and the point is the principle of the line, but not itself a continuous quantity).

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<sup>55</sup> *In Physic.* 4, l. 4, n. 9: “Si igitur contingat aliquid esse in seipso primo, non per se quidem, sed per accidens, sequitur quod sit in seipso propter hoc quod aliquid aliud sit in ipso.”

<sup>56</sup> *In Physic.* 4, l. 4, n. 9 (cf. ARISTOTLE, *Physica* Δ.3, 210b18–21): “Et sic sequitur quod duo corpora sint in eodem, scilicet illud corpus quod est in eo, et ipsummet quod est in seipso. Sic enim amphora erit in seipsa per accidens, si ipsa amphora, cuius natura est ut recipiat aliquid, sit in seipsa, et iterum illud cuius est receptivum, scilicet vinum: ergo in amphora erit et amphora et vinum, si propter hoc quod vinum est in amphora, sequitur amphoram esse in seipsa: et sic duo corpora essent in eodem.”

<sup>57</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 3: “in genere continetur aliquid dupliciter.” *STh* I, q. 3 a. 5 co.: “aliquid est in genere dupliciter.”

<sup>58</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 3: “vel per se et proprie, sicut species, et ea quae recipiunt praedicationem generis.” *STh* I, q. 3 a. 5 co.: “Uno modo simpliciter et proprie; sicut species, quae sub genere continentur.”

<sup>59</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 3: “vel per reductionem.” *STh* I, q. 3 a. 5 co.: “Alio modo, per reductionem.”

<sup>60</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 3: “sicut principia generis.” *STh* I, q. 3 a. 5 co.: “sicut principia.”

<sup>61</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 3: “ut materia et forma ad substantiam; et unitas et punctus ad quantitatem; quamvis neutrum sit quantitas.” *STh* I, q. 3 a. 5 co.: “sicut punctus et unitas reducuntur ad genus quantitatis, sicut principia.”

(b) As a privation is reduced to the genus of its habit (*habitus*, i.e., possession; ► 42.11).<sup>62</sup>

For example, *blindness* (i.e., the privation of sight, is reduced to the possession of sight).<sup>63</sup>

### 29.10. In a Genus by Reduction

A principle that is reduced to some genus does not extend beyond that genus, as the point is the principle only of continuous quantity, and the unit (is the principle only) of discrete quantity (i.e., number).<sup>64</sup> Whence, principles are homogeneous to (i.e., of the same genus as) those things that are from them (► 28.6).<sup>65</sup>

Likewise, the last (*ultimum*) that is something of a thing (*aliquid rei*) is not reduced into another genus.<sup>66</sup> Rather, it is in the same genus either by itself (*per se*), as the last part of a line (is in the genus of *line*), or by reduction (*per reductionem*), as the (last) point (is reduced) to (the genus of) line (as its terminus).

Everything that is imperfect falls under the same genus with the perfect: not indeed as a species, but by reduction, as first matter is in the genus of substance.<sup>67</sup> Hence, the imperfect is reduced to the perfect.<sup>68</sup> And if there is something imperfect in some genus, something perfect is found in that genus before it according to the order of nature, for the perfect is prior in nature to the imperfect.<sup>69</sup>

### 29.11. In a Genus as Perfect vs. as Imperfect

It is manifest that in all genera something can be in two (modes): either as perfect or as imperfect.<sup>70</sup> The reason of this is because privation-habit is the first contrariety that is preserved in all contraries (► 43.9).<sup>71</sup> Whence, since all genera are divided by contrary differences, in all genera there must be a perfect and an imperfect.

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<sup>62</sup> *STh* I, q. 3 a. 5 co.: “sicut [...] privationes, [...] et omnis privatio, reducitur ad genus sui habitus.”

<sup>63</sup> *STh* I, q. 3 a. 5 co.: “sicut [...] caecitas.”

<sup>64</sup> *STh* I, q. 3 a. 5 co.: “principium quod reducitur in aliquod genus, non se extendit ultra genus illud, sicut punctum non est principium nisi quantitatis continuae, et unitas quantitatis discretiae.”

<sup>65</sup> *In Metaph.* 12, l. 4 §2460: “Cum enim principia sint homogenea his quae sunt ab eis [...].”

<sup>66</sup> *In Sent.* 2, d. 27 q. 1 a. 1 ad 1: “ultimum quod est aliquid rei, non reducitur in aliud genus, sed est in eodem genere, vel per se, sicut ultima pars lineae, vel per reductionem, sicut punctus ad lineam.”

<sup>67</sup> *In Physic.* 3, l. 1, n. 7: “omne autem quod est imperfectum, sub eodem genere cadit cum perfecto, non quidem sicut species, sed per reductionem (sicut materia prima est in genere substantiae).”

<sup>68</sup> *In Physic.* 3, l. 5, n. 17: “imperfectum reducitur ad perfectum.”

<sup>69</sup> *ScG* 2, 91 n. 5: “Si est aliquid imperfectum in aliquo genere, invenitur ante illud, secundum naturae ordinem, aliquid in genere illo perfectum: perfectum enim natura prius est imperfecto.”

<sup>70</sup> *In Physic.* 3, l. 1, n. 8 (cf. ARISTOTLE, *Physica* Γ.1, 201a3–9): “Manifestum est enim quod in omnibus generibus contingit aliquid esse dupliciter, vel sicut perfectum, vel sicut imperfectum.”

<sup>71</sup> *In Physic.* 3, l. 1, n. 8: “Cuius ratio est, quia privatio et habitus est prima contrarietas, quae in omnibus contrariis salvatur, ut in X *Metaphys.* dicitur. Unde, cum omnia genera dividantur contrariis differentiis, oportet in omnibus generibus esse perfectum et imperfectum.” Cf. *In Metaph.* 10, l. 6, §§2036–8 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a33–35)

For example, in substance, something is as form, and something as privation.<sup>72</sup> In quality, something is as white, which is perfect, and something as black, which is as imperfect. In quantity, something is a perfect quantity and something imperfect. In place, something is above, which is as perfect, and something below, which is as imperfect; or light and heavy, which are placed in (the genus of) *where (ubi)* by reason of (their natural) inclination.

The contrariety of differences that is in every genus is considered according to the common root of contrariety, which is excellence and defect, into which opposition all contraries are reduced, for all differences dividing some genus are related in such a way that one of them is as abundant and another as deficient in respect of the other.<sup>73</sup> Because of this, ARISTOTLE says that the definitions of things are like numbers, whose species vary by addition or subtraction of a unit (► 16.7).

However, it is not necessary that in whatever genus there be contrariety according to the proper ratio of *this* and *that* species, but only according to the common ratio of excellence and defect.<sup>74</sup> Since contraries are those that are maximally distant, contrariety must be found in any genus: (i.e.), that there be found two maximally distant termini between which all of those that are in that genus fall.

However, this (contrariety between extreme termini) would not suffice for there to be motion in that genus unless it were possible to traverse continuously from one extreme into another.<sup>75</sup> Therefore, in some genera these two conditions (i.e., extreme contrariety, and continuity) are lacking.

This is evident in numbers,<sup>76</sup> for although all species of numbers differ according to excellence and defect, nonetheless, two maximally distant extremes cannot be taken in

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<sup>72</sup> *In Physic.* 3, l. 1, n. 8 (cf. ARISTOTLE, *Physica* Γ.1, 201a3–8): “sicut in substantia aliquid est ut forma, et aliquid ut privatio; et in qualitate aliquid est ut album quod est perfectum, et aliquid ut nigrum, quod est quasi imperfectum; et in quantitate, aliquid est quantitas perfecta et aliquid imperfecta; et in loco aliquid est sursum, quod est quasi perfectum, et aliquid deorsum, quod est quasi imperfectum; vel leve et grave, quae ponuntur in ubi, ratione inclinationis.”

<sup>73</sup> *In Physic.* 5, l. 3, n. 5: “contrarietas differentiarum, quae est in omnibus generibus, attenditur secundum communem radicem contrarietatis, quae quidem est excellentia et defectus, ad quam oppositionem omnia contraria reducuntur, ut in primo huius habitum est. Omnes enim differentiae dividentes aliquod genus, hoc modo se habent, quod una earum est ut abundans, et alia ut deficiens respectu alterius. Propter quod Aristoteles dicit in VIII Metaphys., quod definitiones rerum sunt sicut numeri, quorum species variantur per additionem et subtractionem unitatis.”

<sup>74</sup> *In Physic.* 5, l. 3, n. 5: “Non tamen oportet quod in quolibet genere sit contrarietas secundum propriam rationem huius et illius speciei; sed solum secundum communem rationem excellentiae et defectus. Quia enim contraria sunt quae maxime distant, oportet quod in quocumque genere invenitur contrarietas, quod inveniatur duo termini maxime distantes, inter quos cadunt omnia quae sunt illius generis.”

<sup>75</sup> *In Physic.* 5, l. 3, n. 5: “Nec hoc sufficeret ad hoc quod in illo genere esset motus, nisi de uno extremo in aliud contingeret continue pervenire. In quibusdam ergo generibus hae duae conditiones desunt.”

<sup>76</sup> *In Physic.* 5, l. 3, n. 5: “ut patet in numeris. Quamvis enim omnes species numerorum differant secundum excellentiam et defectum; tamen non est accipere duo extrema maxime distantia in illo genere: est enim accipere minimum numerum, scilicet dualitatem, non tamen maximum. Similiter inter

that genus, for a minimum number—namely, two—can be taken, but not a maximum. Moreover, among the species of numbers there is no continuity, for any species of number is formally perfected by a unit, which is indivisible, and non-continuous to another unit.

Likewise, also, in the genus of substance.<sup>77</sup> If one takes *that which substance is*, there is nothing contrary to it; but if formal differences in the genus of substance are taken, contrariety is found in them, for there are forms of diverse species differing from each other according to excellence and defect, insofar as one form is more noble than another. And because of this, there can be diverse affections caused from diverse forms.

However, one form of a species, according to its proper *ratio*, does not have contrariety to another.<sup>78</sup> Firstly, because, in substantial forms, the maximum distance between any two forms is not considered in such a way that from one of them we could only come orderly (into another) through a mean: rather, matter, when it loses one form, can indifferently receive diverse forms without order. Whence, when one element comes to be from another, it is not necessary for there to be a transit through a mean element.

Secondly,<sup>79</sup> since the substantial (act of) being (*esse substantiale*) of anything is *in something* indivisible, some (kind of) continuity cannot be considered in substantial forms in such a way that there could be continuous motion from one form into another according to the remission of one form and the intension of another.

## 29.12. In a Genus by Itself and Simply vs. by Another and According to Something

Whatever is in any genus by itself and simply (*per se et simpliciter*) is prior to that which is (in the genus) by another and according to something (*per aliud et secundum quid*).<sup>80</sup>

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species numerorum non est continuitas; quia quaelibet species numerorum formaliter perficitur per unitatem, quae indivisibilis est, et alteri unitati non continua.”

<sup>77</sup> *In Physic.* 5, l. 3, n. 5: “Et similiter etiam est in genere substantiae. Sunt enim formae diversarum specierum ab invicem differentes secundum excellentiam et defectum, inquantum una forma est nobilior alia; et propter hoc ex diversis formis possunt causari diversae passiones.” *Ibid.*, l. 11, n. 15: “Si enim accipiatur ipsum quod est substantia, nihil est ei contrarium: si vero accipiantur formales differentiae in genere substantiae, contrarietas in eis invenitur.”

<sup>78</sup> *In Physic.* 5, l. 3, n. 5: “tamen una forma speciei secundum propriam suam rationem non habet contrarietatem ad aliam. Primo quidem quia in formis substantialibus non attenditur maxima distantia inter aliquas duas formas, ita quod ab una earum non veniatur ordinatim nisi per media: sed materia dum exiit una forma, potest indifferenter recipere diversas formas absque ordine. Unde Aristoteles dicit in II de generatione, quod cum ex terra fit ignis, non oportet quod fiat transitus per media elementa.”

<sup>79</sup> *In Physic.* 5, l. 3, n. 5: “Secundo quia, cum esse substantiale cuiuslibet rei sit in aliquo indivisibili, non potest aliqua continuitas attendi in formis substantialibus, ut motus continuus possit esse de una forma in aliam secundum remissionem unius formae et intensionem alterius.” As St. Thomas says in the same place, that there is no motion in substance can also be proven because the subject of a substantial form is a being in potency only. *Ibid.*: “possit et alia ratione probari quod motus non est in substantia, quam supra posuit: quia scilicet subiectum formae substantialis est ens in potentia tantum.”

<sup>80</sup> *In Metaph.* 7, l. 1, §1248 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a15–20): “Quod est per se et simpliciter in unoquoque genere, est prius eo quod est per aliud et secundum quid.” *Quodlibet* 1, q. 10 a. 1 co.: “necesse est enim ut id quod est per se, sit causa in unoquoque genere.”



The one that is the principle in any genus is (in the genus) not by accident (*per accidens*) but by itself (*per se*), for everything that is by accident, is reduced to that which is by itself as to a principle.<sup>81</sup>

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<sup>81</sup> *STh* I-II, q. 19 a. 2 co.: “Illud autem unum quod est principium in quolibet genere, non est per accidens, sed per se, quia omne quod est per accidens, reducitur ad id quod est per se, sicut ad principium.”



## 30. Being

We began this part with the aim of determining what a principle is. However, as AVICENNA says, principle is not universally a principle of being; for, if it should be a principle of being universally, it would be a principle of itself (i.e., since any principle is itself a being): rather, there is no principle of being universally; for a principle is a principle of a caused being; whence, principle is (in general) a principle of some being.<sup>1</sup> Thus, having determined what a principle is and what kinds of principles there are, we seek now to determine what kind of being a principle is—and what kind of one, since it is a one (► 27.8).

### 30.1. Being (*ens*)

**Being** (*ens* = τὸ ὄν) signifies *that which is* (*quod est*).<sup>2</sup>

Even though *being* signifies *that which is*, it does not signify that the thing is or is not, for it does not principally signify the composition that is conveyed in (the verb) *is* (*est*): rather, it co-signifies it insofar as it signifies a thing that has (an act of) being (*significat rem habentem esse*).<sup>3</sup> Whence, such a co-signification does not suffice in respect of truth or falsity, since the composition in which truth and falsity consists can only be understood insofar as it joins (*innectit*) the extreme (terms) of the composition (► 19.1).

### 30.2. Common Being (*ens commune*)

**Common being** (*ens commune*) is *that (being) to which no addition is made*.<sup>4</sup>

However, it does not belong to the *ratio* of *common being* that addition *cannot* be made to it.<sup>5</sup> This is similar to how the difference *rational* is not added to common *animal* in its

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<sup>1</sup> AVICENNA, *The Metaphysics of The Healing*, 10, 16–19: “المبدأ ليس مبدأ للموجود كله، ولو كان مبدأ للموجود كله” Cf. AVICENNA, *Liber de philosophia prima*, 1.2, 58–62: “principium non est principium omnium entium [sic]. Si enim principium omnium entium esset principium, tunc esset principium sui ipsius; ens autem in se absolute non habet principium; sed habet principium unumquodque esse quod scitur [sic]. Principium igitur est principium aliquibus entibus.”

<sup>2</sup> *In Peri.* 1, l. 5, 363: “‘ens’ nichil est aliud quam ‘quod est’.”

<sup>3</sup> *In Peri.* 1, l. 5, 355–376 (cf. ARISTOTLE, *De interpretatione* 3, 16b23–25): “ut magis sequamur uerba Aristotilis, considerandum est quod ipse dixerat quod uerbum non significat rem esse uel non esse; addit autem quod non solum uerbum non significat rem esse uel non esse, set nec ipsum ‘ens’ significat rem esse uel non esse, et hoc est quod dicit: «nichil est,» idest non significat aliquid esse. Et tamen maxime uidebatur de hoc quod dico ‘ens’, quia ‘ens’ nichil est aliud quam ‘quod est’, et sic uidetur <et> rem significare, per hoc quod dico <‘quod’, et esse, per hoc quod dico> ‘est’. Et si quidem hec dictio ‘ens’ significaret esse principaliter sicut significat rem que habet esse, procul dubio significaret aliquid esse; set ipsam compositionem, que importatur in hoc quod dico ‘est’, non principaliter significat, set consignificat eam in quantum significat rem habentem esse; unde talis consignificatio compositionis non sufficit ad ueritatem uel falsitatem, quia compositio in qua consistit ueritas et falsitas non potest intelligi nisi secundum quod innectit extrema compositionis.”

<sup>4</sup> *De potentia*, q. 7 a. 2 ad 6: “ens commune est [ens] cui non fit additio.” *In Sent.* 1, d. 8 q. 4 a. 1 ad 1: “ens commune est sine additione.”

<sup>5</sup> *De potentia*, q. 7 a. 2 ad 6: “ens commune est cui non fit additio, de cuius tamen ratione non est ut ei additio fieri non possit [...]. Sicut et animali communi non fit additio, in sua ratione, rationalis differentiae;

*ratio*, and yet it does not belong to the *ratio* of *animal* that no addition can be made to it, for this belongs to the *ratio* of *irrational animal*, which is a species of *animal*.

If the condition *without addition* were to be included in the understanding of *common being*, no addition could ever be made to it, since it would be against its *ratio*.<sup>6</sup> Hence, (this *being*) is common because it does not convey (*non dicit*) in its *ratio* some addition, yet addition can be made to it, so that it would be determined to (some) *proper (being)*.

Likewise, common *animal* is said (to be) *without reason* because neither *to have reason* nor *not to have (reason)* belongs to its understanding.<sup>7</sup> On the other hand, ass is said to be *without reason* because in its understanding is included the negation of *reason*, and it is determined by this (negation) according to a proper difference.

That must be perfect in itself which cannot receive addition (► 23.1; therefore, common being is imperfect).<sup>8</sup> Every common is preserved in (every) proper, where addition is made to it (therefore, the ratio of *common being* is preserved in every proper being).

As ARISTOTLE shows, all beings are reduced to something one: common being (< [τὸ ὄν ἢ ὄν καθόλου καὶ οὐ κατὰ μέρος]).<sup>9</sup>

Since the being that is first by community is the same by essence (in respect) of whatever thing, it exceeds no proportion.<sup>10</sup> Hence, it is known in the cognition of anything.

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non tamen est de ratione eius quod ei additio fieri non possit; hoc enim est de ratione animalis irrationalis, quae est species animalis." *In Sent.* 1, d. 8 q. 4 a. 1 ad 1: "aliquid esse sine additione dicitur dupliciter. Aut de cuius ratione est ut nihil sibi addatur [...]. Aut ita quod non sit de ratione ejus quod fiat sibi additio, neque quod non fiat, et hoc modo ens commune est sine additione."

<sup>6</sup> *In Sent.* 1, d. 8 q. 4 a. 1 ad 1: "In intellectu enim entis non includitur ista conditio, sine additione; alias nunquam posset sibi fieri additio, quia esset contra rationem ejus; et ideo commune est, quia in sui ratione non dicit aliquam additionem, sed potest sibi fieri additio ut determinetur ad proprium."

<sup>7</sup> *In Sent.* 1, d. 8 q. 4 a. 1 ad 1: "sicut etiam animal commune dicitur esse sine ratione, quia de intellectu ejus non est habere rationem, neque non habere; asinus autem dicitur sine ratione esse, quia in intellectu ejus includitur negatio rationis, et per hoc determinatur secundum differentiam propriam."

<sup>8</sup> *In Sent.* 1, d. 8 q. 4 a. 1 ad 1: "aliquid esse sine additione dicitur dupliciter. Aut de cuius ratione est ut nihil sibi addatur: et sic dicitur de Deo: hoc enim oportet perfectum esse in se ex quo additionem non recipit; nec potest esse commune, quia omne commune salvatur in proprio, ubi sibi fit additio. Aut ita quod non sit de ratione ejus quod fiat sibi additio [...]. Unde patet quod negationes dictae de Deo, non designant in ipso aliquam compositionem." *De potentia*, q. 7 a. 2 ad 6: "esse divinum est esse cui non fit additio, et de eius ratione est ut ei additio fieri non possit; unde divinum esse non est esse commune." As St. Thomas explains, common being is the proper effect of the highest cause: namely, of God. *STh I-II*, q. 66 a. 5 ad 4: "ens commune est proprius effectus causae altissimae, scilicet Dei." *De veritate*, q. 10 a. 12 ad s.c. 10: "Deus non solum cognoscitur in effectu iustitiae, sed in aliis etiam suis effectibus; unde, dato quod ab aliquo non cognoscatur ut iustus, non sequitur quod nullo modo cognoscatur. Nec potest esse quod nullus eius effectus cognoscatur, cum eius effectus sit ens commune, quod incognitum esse non potest."

<sup>9</sup> *In Metaph.* 11, l. 3, §2195 (cf. ARISTOTLE, *Metaphysica* K.3, 1060b31–32): "ostendit [Philosophus] quod omnia entia reducuntur ad aliquod unum commune ens."

<sup>10</sup> *De veritate*, q. 10 a. 11 ad 10: "ens quod est primum per communitatem, cum sit idem per essentiam cuiuslibet rei, nullius proportionem excedit; et ideo in cognitione cuiuslibet rei ipsum cognoscitur."

### 30.3. Being (esse)

**Being** (esse = τὸ εἶναι) is said in two (or rather three) modes:<sup>11</sup>

1. The **quiddity** or **nature** itself of the thing (*ipsa quidditas vel natura rei*) is said (to be a) *being* (► 18.3, footnote 5).<sup>12</sup>

For example, it is said that a definition is *a speech that signifies what the being is (oratio significans quid est esse)*, for a definition signifies the quiddity of a thing.<sup>13</sup>

2. The **act itself of the essence** (*ipse actus essentiae*) is said (to be a) *being*.<sup>14</sup>

For example, *living (vivere, i.e., to live)* is the *being* of living things (*esse viventibus*): not (their) second act, which is an operation (e.g., to reproduce), but (their) first act.<sup>15</sup>

3. **That which signifies the truth of the composition in propositions** (*quod significat veritatem compositionis in propositionibus*) is said to be a *being* insofar as *is (est)* is said to be a copula (i.e., a link between subject and predicate in a proposition; ► 19.1).<sup>16</sup>

According to this (mode), (being, esse) is in the understanding that composes and divides insofar as its complement (is concerned), but is founded in the being of the thing that is the act of the essence (i.e., *being* in mode ¶3 is founded on *being* in mode ¶2; and the copula is a sign of that which completes, perfects the composition found in a proposition).<sup>17</sup>

### 30.4. Division of Being: by Itself vs. by Accident

As ARISTOTLE says, *being (ens = τὸ ὄν)* is said *by itself (per se, secundum se = καθ' αὐτό)* and *by accident (per accidens, secundum accidens = κατὰ συμβεβηκός)*.<sup>18</sup> This division

<sup>11</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “esse dicitur dupliciter. Uno modo [...]. Alio modo [...]. Tertio modo [...].”

<sup>12</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “Uno modo dicitur esse ipsa quidditas vel natura rei.”

<sup>13</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “sicut dicitur quod definitio est oratio significans quid est esse; definitio enim quidditatem rei significat.”

<sup>14</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “Alio modo dicitur esse ipse actus essentiae.”

<sup>15</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “sicut vivere, quod est esse viventibus, est animae actus; non actus secundus, qui est operatio, sed actus primus.”

<sup>16</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “Tertio modo dicitur esse quod significat veritatem compositionis in propositionibus, secundum quod est dicitur copula.”

<sup>17</sup> *In Sent.* 1, d. 33 q. 1 a. 1 ad 1: “et secundum hoc est in intellectu componente et dividente quantum ad sui complementum; sed fundatur in esse rei, quod est actus essentiae.”

<sup>18</sup> *In Metaph.* 5, l. 9, §885 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a7–8): “Philosophus distinguit [...] ens in ens per se et per accidens. [...] Dicit ergo, quod ens dicitur quoddam secundum se, et quoddam secundum accidens. Sciendum tamen est quod illa divisio entis non est eadem cum illa divisione qua dividitur ens in substantiam et accidens. Quod ex hoc patet, quia ipse postmodum, ens secundum se dividit in decem praedicamenta, quorum novem sunt de genere accidentis. Ens igitur dividitur in substantiam et accidens, secundum absolutam entis considerationem, sicut ipsa albedo in se considerata dicitur accidens, et homo substantia.”

of *being* is not the same as the division into *substance* and *accident*. This is evident because, in the latter mode, ARISTOTLE divides *being by itself* (*ens secundum se*) into ten categories, of which nine concern the genus of *accident*. Therefore, *being* is divided into *substance* and *accident* according to an absolute consideration of *being*, as *whiteness* (*albedo*) itself, considered in itself (*in se*), is said (to be an) *accident*, and *man* (considered in itself is said to be a) *substance*.

Here, *being by accident* is to be taken by a comparison of accident to substance.<sup>19</sup> This comparison is signified by the verb *is* (*est*) in *man is white*, whence the whole *man is white* is a being by accident.

Hence, it is evident that the division of *being* into *by itself* and *by accident* is considered insofar as something is predicated of something (either) *by itself* or *by accident* (► 17.9), while the division of *being* into *substance* and *accident* is considered insofar as *this something*, in its nature, is either a substance or an accident.<sup>20</sup>

ARISTOTLE distinguishes the mode of being by itself: first, the being that is outside the soul, which is the perfect being and is distinguished into ten categories; secondly, he posits another mode of being according as it is only in the mind; thirdly, he divides being by potency and act (► 32.6).<sup>21</sup>

### 30.5. Division of Being by Itself: Common Being vs. Being of *Ratio*

As ARISTOTLE says, *being* (*ens* = τὸ ὄν and *esse* = τὸ εἶναι) is said by itself in two modes:<sup>22</sup>

1. Insofar as *being* (*ens*) signifies **the entity of a thing** (*significat entitatem rei*),<sup>23</sup> i.e., the essence of a thing existing outside the soul, whose being (*esse*) pertains to the nature

<sup>19</sup> *In Metaph.* 5, l. 9, §885: “Sed ens secundum accidens prout hic sumitur, oportet accipi per comparationem accidentis ad substantiam. Quae quidem comparatio significatur hoc verbo, est, cum dicitur, homo est albus. Unde hoc totum, homo est albus, est ens per accidens.”

<sup>20</sup> *In Metaph.* 5, l. 9, §885: “Unde patet quod divisio entis secundum se et secundum accidens, attenditur secundum quod aliquid praedicatur de aliquo per se vel per accidens. Divisio vero entis in substantiam et accidens attenditur secundum hoc quod aliquid in natura sua est vel substantia vel accidens.”

<sup>21</sup> *In Metaph.* 5, l. 9, §889: “distinguit [Philosophus] modum entis per se: et circa hoc tria facit. Primo distinguit ens, quod est extra animam, per decem praedicamenta, quod est ens perfectum. Secundo ponit alium modum entis, secundum quod est tantum in mente [...]. Tertio dividit ens per potentiam et actum.”

<sup>22</sup> *In Metaph.* 5, l. 9, §889 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a22–23): “distinguit [Philosophus] modum entis per se: et circa hoc tria facit. Primo distinguit ens, quod est extra animam, [...]. Secundo ponit alium modum entis, secundum quod est tantum in mente [...]. Tertio dividit ens per potentiam et actum [...].” *De ente*, c. 1, 1–3: “sicut in V Methaphisice Philosophus dicit, ens per se dupliciter dicitur.” *De potentia*, q. 7 a. 9 co.: “ens rationis dividitur contra ens divisum per decem praedicamenta ut patet V Metaph.” *STh* I, q. 48 a. 2 ad 2: “sicut dicitur in V Metaphys., ens dupliciter dicitur.” *In Sent.* 3, d. 6 q. 2 a. 2 co.: “secundum Philosophum 5 Metaph., esse duobus modis dicitur.” *In Sent.* 3, d. 34 q. 1 a. 1 co.: “Philosophus ostendit quod ens multipliciter dicitur.” *In Sent.* 3, d. 37 q. 1 a. 2 ad 3: “ens dicitur dupliciter.”

<sup>23</sup> *De ente*, c. 1, 3–4: “uno modo quod diuiditur per decem genera.” *De potentia*, q. 7 a. 9 co.: “ens divisum per decem praedicamenta.” *STh* I, q. 48 a. 2 ad 2: “Uno modo, secundum quod significat entitatem rei,

of the thing. And this *being* (*ens*, *esse*) is divided into ten predicaments—that is, categories or (supreme) genera—not, however, univocally, for *being* (*esse*) does not pertain to all (genera) according to the same *ratio*: rather, (it pertains) to substance by itself; and to the other (genera), diversely.

In this mode, only that is said (to be a) *being* which posits something in the thing.<sup>24</sup> Hence, in this mode, *being* is convertible with *thing*; and no privation is a being. Whence, blindness and such (privations and negations) are not beings, for *being* in this mode signifies something existing in nature, whether it is a substance, as man, or an accident, as a color.

In this mode, (the act of) being (*esse*) is in the thing and is the act of the being (*actus entis*) that results from the principles of the thing, as glowing (*lucere*) is the act of the lucent (*actus lucentis*).<sup>25</sup> Sometimes, however, *being* (*esse*) is taken for *essence* (*essentia*), according to which the thing is, for its principles have customarily been signified by the act, as a potency or a habit (e.g., by *sight* we understand either the potency of seeing or its act; and by *prudence* we understand either the habit or its act; ► 30.3).

**2. The being of *ratio* (*ens rationis*; ► 21.7),** which is only in the mind, signifies the truth of propositions and consists in composition, whose note is the verb *is* (*est*) according as it is a copula.<sup>26</sup> This is the *being* (*ens*) whereby one responds to the question “is it?”

In this mode, *everything of which an affirmative proposition can be formed* can be said (to be a) *being* (*ens*), even if it posits nothing in the thing.<sup>27</sup> Thus, privations and negations

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prout dividitur per decem praedicamenta.” *In Sent.* 3, d. 6 q. 2 a. 2 co.: “Alio modo dicitur esse, quod pertinet ad naturam rei, secundum quod dividitur secundum decem genera.” *In Sent.* 3, d. 34 q. 1 a. 1 co.: “Uno enim modo dicitur ens quod per decem genera dividitur.” *In Sent.* 3, d. 37 q. 1 a. 2 ad 3: “Uno modo quod significat essentiam rei extra animam existentis.” *Quodlibet* 2, q. 2 a. 1 co.: “Sed verum est quod hoc nomen ens, secundum quod importat rem cui competit huiusmodi esse, sic significat essentiam rei, et dividitur per decem genera; non tamen univoce, quia non eodem ratione competit omnibus esse; sed substantiae quidem per se, aliis autem aliter.”

<sup>24</sup> *De ente*, c. 1, 11–13: “Sed primo modo non potest dici ens nisi quod aliquid in re ponit; unde primo modo cecitas et huiusmodi non sunt entia.” *STh* I, q. 48 a. 2 ad 2: “et sic convertitur cum re. Et hoc modo, nulla privatio est ens.” *In Sent.* 3, d. 34 q. 1 a. 1 co.: “et sic ens significat aliquid in natura existens; sive sit substantia, ut homo; sive accidens, ut color.”

<sup>25</sup> *In Sent.* 3, d. 6 q. 2 a. 2 co.: “et hoc quidem esse est in re, et est actus entis resultans ex principiis rei, sicut lucere est actus lucentis. Aliquando tamen sumitur esse pro essentia, secundum quam res est: quia per actus consueverunt significari eorum principia, ut potentiae vel habitus.”

<sup>26</sup> *De ente*, c. 1, 4–5: “alio modo quod significat propositionum ueritatem.” *De potentia*, q. 7 a. 9 co.: “ens rationis.” *STh* I, q. 48 a. 2 ad 2: “Alio modo dicitur ens, quod significat ueritatem propositionis, quae in compositione consistit, cuius nota est hoc uerbum est, et hoc est ens quo respondetur ad quaestionem an est.” *In Sent.* 3, d. 6 q. 2 a. 2 co.: “Uno modo secundum quod significat ueritatem propositionis, secundum quod est copula.” *In Sent.* 3, d. 34 q. 1 a. 1 co.: “Alio modo dicitur ens, quod significat ueritatem propositionis.” *In Sent.* 3, d. 37 q. 1 a. 2 ad 3: “Alio modo secundum quod significat ueritatem propositionis.”

<sup>27</sup> *De ente*, c. 1, 5–11: “Horum autem differentia est quia secundo modo potest dici ens omne illud de quo affirmatiua propositio formari potest, etiam si illud in re nichil ponat; per quem modum priuationes et negationes entia dicuntur: dicimus enim quod affirmatio est opposita negationi, et quod cecitas est in oculo.” *STh* I, q. 48 a. 2 ad 2: “Et sic caecitatem dicimus esse in oculo, vel quamcumque aliam

are said (to be) *beings*: we say that affirmation *is* opposed to negation; and that blindness *is* in the eye; or (that) whatever other privation (*is* in a subject). Likewise, in this mode, deformity is said *to be* (*esse*): not because it has a being (*esse*) in the thing, but because the intellect composes a privation with a subject, as (though it were) some form.

Whence, just as from the composition (*ex compositione*) of a form toward a subject or toward matter (*ad subjectum vel ad materiam*) some substantial or accidental being (*esse substantiale vel accidentale*) results (*relinquitur*), so too by some being (*esse*) the intellect signifies the composition of privation with a subject.<sup>28</sup> But this being (*esse*) is only a being of *ratio* (*esse rationis*), for in the thing it is rather a non-being (*non esse*).

In this mode, *being* (*esse*, i.e., to be) and *is* (*est*) also signify the composition or division of a proposition that the intellect discovers (*adinvenit*) and makes (*facit*) in composing and dividing.<sup>29</sup> Whence, ARISTOTLE says that *being* (*esse*) signifies *that* something said *is true* (*quia verum* = ὅτι ἀληθές). Whence, the truth of a proposition can be said (to be) the truth of a thing through a cause, for a statement (*oratio*) is true or false *because* a thing is or is not. Thus, when we say that something is, we signify that a proposition is true; and when we say that it is not, we signify that it is not true. And this (happens) either by affirming or by negating: by affirming, as when we say, “Socrates is white” because this is true; by negating, as when (we say), “Socrates is not white” because it is true: namely, that he is not white. Likewise, we say that the diameter (of the square) is not commensurable with the side because this is false: namely, that it is not incommensurable.

This being (*esse*) is not in the thing but in the mind, which conjoins a predicate with a subject.<sup>30</sup> Whence, as AVERROES says, being (*ens*) in this mode is an accidental predicate

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privationem.” *In Sent.* 3, d. 37 q. 1 a. 2 ad 3: “et sic deformitas dicitur esse, non propter hoc quod in re esse habeat, sed quia intellectus componit privationem cum subjecto, sicut formam quamdam.”

<sup>28</sup> *In Sent.* 3, d. 37 q. 1 a. 2 ad 3: “Unde sicut ex compositione formae ad subjectum vel ad materiam, relinquitur quoddam esse substantiale vel accidentale; ita etiam intellectus compositionem privationis cum subjecto per quoddam esse significat. Sed hoc esse non est nisi esse rationis, cum in re potius sit non esse.”

<sup>29</sup> *In Metaph.* 5, l. 9, §895 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a31–35): “ponit [Philosophus] alium modum entis, secundum quod esse et est, significant compositionem propositionis, quam facit intellectus componens et dividens. Unde dicit, quod esse significat veritatem rei. Vel sicut alia translatio melius habet quod esse significat quia aliquid dictum est verum. Unde veritas propositionis potest dici veritas rei per causam. Nam ex eo quod res est vel non est, oratio vera vel falsa est. Cum enim dicimus aliquid esse, significamus propositionem esse veram. Et cum dicimus non esse, significamus non esse veram; et hoc sive in affirmando, sive in negando. In affirmando quidem, sicut dicimus quod Socrates est albus, quia hoc verum est. In negando vero, ut Socrates non est albus, quia hoc est verum, scilicet ipsum esse non album. Et similiter dicimus, quod non est diameter incommensurabilis lateri quadrati, quia hoc est falsum, scilicet non esse ipsum non commensurabilem.” St. Thomas relays two readings here, preferring that of William of MOERBEKE. *In Sent.* 3, d. 34 q. 1 a. 1 co.: “prout dicitur, quod affirmatio est vera, quando significat esse de eo quod est; et negatio, quando significat non esse de eo quod non est; et hoc ens compositionem significat, quam intellectus componens et dividens adinvenit.”

<sup>30</sup> *In Sent.* 3, d. 6 q. 2 a. 2 co.: “et sic, ut Commentator ibidem dicit, ens est praedicatum accidentale; et hoc esse non est in re, sed in mente, quae conjungit praedicatum cum subjecto, ut dicit Philosophus in



in the way that everything that is other than the essence of the thing is said (to be an) *accident* (► 26.7).<sup>31</sup> Wherefrom, the *being* (*esse*) that pertains to the question “is it?” is an accident. Thus, AVERROES says that the proposition “Socrates is” pertains to an accidental predicate—insofar as it conveys the entity of a thing or the truth of a proposition.

### 30.6. Common Being and Being of *Ratio* Related

Whatever (things) are said (to be) *beings* (*entia*) according to the first mode (i.e., insofar as *being* signifies the essence of a thing existing outside the mind), are beings according to the second mode (i.e., beings of *ratio*), for everything that has a natural being (*naturale esse*) in things (*in rebus*) can be signified to be (*esse*) by an affirmative proposition, as when we say, “color *is*,” or “man *is*.”<sup>32</sup>

However, not all those that are beings according to the second mode are beings according to the first, for an affirmative proposition is formed concerning a privation or concerning blindness when we say “blindness *is*,” and nonetheless blindness is not something in the nature of things (*in rerum natura*): rather, it is the removal of some being.<sup>33</sup> Hence, also privations and negations are said to be (*esse*) beings (*entia*) according to this second mode, but not according to the first.

*Being* (*ens*) is predicated diversely according to each of these modes, for, taken according to the first mode, it is a substantial predicate, and it pertains to the question “what is it?”; but according to the second mode, it is an accidental predicate, as AVERROES says in the same place, and pertains to the question “is it?”<sup>34</sup>

The second mode is compared to the first as effect to cause: because something in the nature of things is, there follows the truth or falsity in a proposition, which the intellect signifies by the verb *is* insofar as it is the verbal copula. However, since the intellect

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6 Metaph.” *Quodlibet* 2, q. 2 a. 1 co.: “cum omne quod est praeter essentiam rei, dicatur accidens; esse quod pertinet ad quaestionem an est, est accidens. Et ideo Commentator dicit in V Metaphysic., quod ista propositio, Socrates est, est de accidentali praedicato, secundum quod importat entitatem rei, vel veritatem propositionis.”

<sup>31</sup> See AVERROES, *tafsir ma ba’d at-tabi’at*, Comm. 14 on Book V, Tome VI, 560.3–561.4.

<sup>32</sup> *In Sent.* 3, d. 34 q. 1 a. 1 co.: “Quaecumque ergo dicuntur entia quantum ad primum modum, sunt entia quantum ad secundum modum: quia omne quod habet naturale esse in rebus, potest significari per propositionem affirmativam esse; ut cum dicitur: color est, vel homo est.”

<sup>33</sup> *In Sent.* 3, d. 34 q. 1 a. 1 co.: “Non autem omnia quae sunt entia quantum ad secundum modum, sunt entia quantum ad primum: quia de privatione, ut de caecitate, formatur una affirmativa propositio, cum dicitur, caecitas est; nec tamen caecitas aliquid est in rerum natura; sed est magis alicujus entis remotio: et ideo etiam privationes et negationes dicuntur esse entia quantum ad secundum modum, sed non quantum ad primum.”

<sup>34</sup> *In Sent.* 3, d. 34 q. 1 a. 1 co.: “Ens autem secundum utrumque istorum modorum diversimode praedicatur: quia secundum primum modum acceptum, est praedicatum substantiale, et pertinet ad quaestionem quid est: sed quantum ad secundum modum, est praedicatum accidentale, ut Commentator ibidem dicit, et pertinet ad quaestionem an est.” Again, in AVERROES, *tafsir ma ba’d at-tabi’at*, Comm. 14 on Book V, Tome VI, 560.3–561.4.

considers something that in itself is a non-being (*non ens*) as (though it were) some being (*quoddam ens*), as (happens in the case of) negation and others such (e.g., privation), hence, sometimes it is said of something in this second mode and not in the first.<sup>35</sup>

Thus, that blindness *is*, is said in the second mode because the proposition by which something is said to be blind is true; but it is not said to be true in the first mode, for blindness does not have some being (*esse*) in things: rather, it is the privation of some being.<sup>36</sup> However, it may happen to anything that something is truly affirmed of it in voice or in understanding, for a thing is not referred to science: rather, the contrary (►28.11).

The being (*esse*) that each thing has in its nature is substantial.<sup>37</sup> Hence, when one says, “Socrates *is*,” if taken in the first mode, it is (predicated) of a substantial predicate, for being (*ens*) is higher (*superius*) in respect of any being, as *animal* in respect of *man*. If taken, on the other hand, in the second mode, it is (predicated) of an accidental predicate.

### 30.7. Being and Essence

The name *essence* (*essentia*), which is not determined to some genus and is therefore most common (*communissimum*), is taken from *being* (*esse*).<sup>38</sup> However, it is not taken from *being* (*non sumitur ab ente*) in the second mode (i.e., insofar as it is a being of *ratio*), for in this mode, some (things) are said (to be) *beings* (*entia*) which do not have an essence, as is evident of privations (e.g., blindness).<sup>39</sup> Rather, *essence* is taken from *being* according to the first mode (i.e., insofar as *being* signifies the entity of a thing). Whence, AVERROES says that *being* (*ens* = هوية *huwīya*, موجود *mawǧūd*) in the first mode is what signifies the essence of the thing (*essentia rei* = ذات الشيء *dāt aš-šay*).<sup>40</sup>

<sup>35</sup> *In Metaph.* 5, l. 9, §896: “Sciendum est autem quod iste secundus modus comparatur ad primum, sicut effectus ad causam. Ex hoc enim quod aliquid in rerum natura est, sequitur veritas et falsitas in propositione, quam intellectus significat per hoc verbum est prout est verbalis copula. Sed, quia aliquid, quod est in se non ens, intellectus considerat ut quoddam ens, sicut negationem et huiusmodi, ideo quandoque dicitur esse de aliquo hoc secundo modo, et non primo.”

<sup>36</sup> *In Metaph.* 5, l. 9, §896: “Dicitur enim, quod caecitas est secundo modo, ex eo quod vera est propositio, qua dicitur aliquid esse caecum; non tamen dicitur quod sit primo modo vera. Nam caecitas non habet aliquod esse in rebus, sed magis est privatio alicuius esse. Accidit autem unicuique rei quod aliquid de ipsa vere affirmetur intellectu vel voce. Nam res non refertur ad scientiam, sed e converso.”

<sup>37</sup> *In Metaph.* 5, l. 9, §896: “Esse vero quod in sui natura unaquaeque res habet, est substantiale. Et ideo, cum dicitur, Socrates est, si ille est primo modo accipiatur, est de praedicato substantiali. Nam ens est superius ad unumquodque entium, sicut animal ad hominem. Si autem accipiatur secundo modo, est de praedicato accidentali.”

<sup>38</sup> *STh* I, q. 29 a. 1 ad 4: “convenientius fuit quod in definitione personae, quae est singulare alicuius generis determinati, uteretur [nomen] naturae, quam essentiae, quae sumitur ab esse, quod est communissimum.”

<sup>39</sup> *De ente*, c. 1, 14–20: “Nomen igitur essentiae non sumitur ab ente secundo modo dicto: aliqua enim hoc modo dicuntur entia quae essentiam non habent, ut patet in privationibus; sed sumitur essentia ab ente primo modo dicto. Vnde Commentator in eodem loco dicit quod ens primo modo dictum est quod significat essentiam rei.”

<sup>40</sup> See AVERROES, *tafsir ma ba’d at-tabī’at*, Comm. 14 on Book V, Tome VI, 561.5–7: “ولكن ينبغي ان تعلم “بالجملة ان اسم الهوية التي تدل على ذات الشيء غير اسم الهوية التي تدل على الصادق وكذلك اسم الموجود الذي يدل على ذات

And since, in this mode, *being* is divided into ten genera, *essence* must signify something common to all natures (*aliquid commune omnibus naturis*) whereby diverse beings are placed in diverse genera and species (*per quas diversa entia in diversis generibus et speciebus collocantur*): for example, *humanity* is the essence of man, and so on.<sup>41</sup>

### 30.8. Addition to *Being*

As AVICENNA says, *being* (*ens* = موجود *mawǧūd*) is what the intellect conceives first as most known, and that into which (the intellect) resolves all other conceptions.<sup>42</sup> Whence, all other conceptions of the intellect must be taken by addition to *being*.

However, some (*ratios*) cannot be added to *being* as extraneous according to the mode whereby a difference is added to a genus (e.g., the predicable genus *animal* + *rational*), or an accident to a subject (e.g., the subject genus *surface* + a *boundary*, ► 14.2), because any nature is essentially a being.<sup>43</sup> Whence, ARISTOTLE also proves that *being* cannot be a genus. Yet, some (*ratios*) are said to be added over *being* insofar as they express a mode of being itself that the name *being* does not express. This can occur in two modes:

1. Such that the expressed mode would be **some special mode of being**, for there are diverse degrees of entity (*gradus entitatis*) according to which diverse modes of being (*modi essendi*) are taken; and the diverse genera of things are taken on a par with these modes (*iuxta hos modos*).<sup>44</sup> Thus, *substance* does not add over *being* some difference that would designate some nature added over being: rather, by the name of *substance* is

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”الشئ هو غير الموجود الذي يدل على الصادق. For AVERROES’s own explanation of the two renderings of *being* in Arab translations, see *ibid.*, 557.5–15 (هوية), 557.16–558.1 (موجود), and 558.1–6 (هوية) compared to (موجود).

<sup>41</sup> *De ente*, c. 1, 20–25: “Et quia, ut dictum est, ens hoc modo dictum diuiditur per decem genera, oportet ut essentia significet aliquid commune omnibus naturis per quas diuersa entia in diuersis generibus et speciebus collocantur, sicut humanitas est essentia hominis, et sic de aliis.”

<sup>42</sup> *De veritate*, q. 1 a. 1 co., 100–105: “illud autem quod primo intellectus concipit quasi notissimum, et in quod conceptiones omnes resoluit, est ens, ut Avicenna dicit in principio suae Metaphysicae. Unde oportet quod omnes aliae conceptiones intellectus accipiantur ex additione ad ens.” Cf. Simone VAN RIET (ed.), *Avicenna Latinus: Liber de philosophia prima sive scientia divina*, 3 vols. (Leiden: Brill, 1977), I.5 A29, vol. 1, 31: “Dicemus igitur quod res [الشئ *aš-šay*] et ens [الموجود *al-mawǧūd*] et necesse [الضروري *aḍ-ḍarūrī*] talia sunt statim imprimuntur in anima prima impressione, quae non acquiritur ex aliis notioribus se, sicut credulitas quae habet prima principia, ex quibus ipsa provenit per se, et est alia ab eis, sed propter ea.”

<sup>43</sup> *De veritate*, q. 1 a. 1 co., 106–114: “Sed enti non possunt addi aliqua quasi extranea per modum quo differentia additur generi, vel accidens subiecto, quia quaelibet natura est essentialiter ens; unde probat etiam Philosophus in III Metaphys., quod ens non potest esse genus, sed secundum hoc aliqua dicuntur addere super ens, in quantum exprimunt modum ipsius entis qui nomine entis non exprimitur, quod dupliciter contingit.”

<sup>44</sup> *De veritate*, q. 1 a. 1 co., 114–123: “Uno modo ut modus expressus sit aliquis specialis modus entis. Sunt enim diversi gradus entitatis, secundum quos accipiuntur diversi modi essendi, et iuxta hos modos accipiuntur diversa rerum genera: substantia enim non addit super ens aliquam differentiam, quae designet aliquam naturam superadditam enti, sed nomine substantiae exprimitur specialis quidam modus essendi, scilicet per se ens; et ita est in aliis generibus.”

expressed a special mode of being—namely, *being by itself* (*per se ens*); and (the same) is so in the other genera.

2. Such that the mode expressed would be **a general mode that follows upon every being**.<sup>45</sup> And this mode can be taken in two modes:

(a) Insofar as (the general mode) follows upon whichever being **in itself** (*ens in se*; ► 30.9).<sup>46</sup>

(b) Insofar as (the general mode) follows upon one being **in order to another** (*in ordine ad aliud*; ► 30.10).<sup>47</sup>

### 30.9. Addition to *Being Following Being in Itself: Thing and One*

This mode (whereby something added to *being* expresses a general mode that follows upon whichever being in itself) is twofold, for something is expressed in being either affirmatively or negatively:<sup>48</sup>

#### 1. Affirmatively

Nothing is found affirmatively said in absolute that can be taken in every being except its *essence*, according to which it is said to be (*esse dicitur*; or, is said [to be a] *being*).<sup>49</sup> And in this way, the name **thing** (*res*) is imposed. Thus, just as the name *man* (i.e., *human being*) is imposed from the quiddity or nature of man, so the name *thing* is imposed from quiddity alone (i.e., from the quiddity of *being*, the *that which in that which is*).

The name *thing*, according to AVICENNA, differs from *being* in this: that being (*ens*) is taken from the act of being (*ab actu essendi*), whereas the name *thing* expresses the quiddity or essence of a being.<sup>50</sup>

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<sup>45</sup> *De veritate*, q. 1 a. 1 co., 124–126: “Alio modo ita quod modus expressus sit modus generalis consequens omne ens; et hic modus dupliciter accipi potest.”

<sup>46</sup> *De veritate*, q. 1 a. 1 co., 126–128: “uno modo secundum quod consequitur unumquodque ens in se.”

<sup>47</sup> *De veritate*, q. 1 a. 1 co., 128–129: “alio modo secundum quod consequitur unum ens in ordine ad aliud.”

<sup>48</sup> *De veritate*, q. 1 a. 1 co., 129–131: “Si primo modo [sc., secundum quod modus expressus sit modus generalis consequens unumquodque ens in se], hoc est dupliciter quia vel exprimitur in ente aliquid affirmative vel negative.”

<sup>49</sup> *De veritate*, q. 1 a. 1 co., 131–135: “Non autem invenitur aliquid affirmative dictum absolute quod possit accipi in omni ente, nisi essentia eius, secundum quam esse dicitur; et sic imponitur hoc nomen res.” *In Metaph.* 4, l. 2, §553: “hoc nomen homo, imponitur a quidditate, sive a natura hominis; et hoc nomen res imponitur a quidditate tantum.”

<sup>50</sup> *De veritate*, q. 1 a. 1 co., 135–139: “in hoc differt [hoc nomen res] ab ente, secundum Avicennam in principio *Metaphysicae*, quod ens sumitur ab actu essendi, sed nomen rei exprimit quidditatem vel essentiam entis.” *In Metaph.* 4, l. 2, §553: “hoc vero nomen ens, imponitur ab actu essendi.” See AVICENNA, *The Metaphysics of The Healing*, 24, 1–13. Cf. AVICENNA, *Liber de philosophia prima*, 1.6, 34.45–61.

## 2. Negatively

The negation that follows upon every being in absolute is *non-division*.<sup>51</sup> And this is what the name **one** expresses, for one is nothing other than *undivided being* (► 38).

Since that which has an essence—and a quiddity through that essence—is the same as that which is in itself undivided, these three—*thing*, *being*, and *one*—signify altogether the same, but according to diverse *ratios*.<sup>52</sup>

### 30.10. Addition to *Being* Following an Order to Another: *Something, True, Good*

The mode according to an order of one to another can be twofold:<sup>53</sup>

#### 1. According to the division of one (being) from another

This is what the name **something** (*aliquid*) expresses, for *something* is said (to be), as it were, *some-other thing* (*aliud quid*).<sup>54</sup> Whence, just as *being* is said (to be) *one* insofar as it is *undivided in itself*, so *something* is said insofar as it is *divided from others*.

#### 2. According to an agreement (*secundum convenientiam*) of one being to another

This can only be if something is taken that would naturally agree with every being.<sup>55</sup> And this is the soul, which in some way is all things, as ARISTOTLE says.<sup>56</sup> However, in the soul there is a cognitive power (*vis cognitiva*) and an appetitive power (*appetitiva*). Thus,

**(a)** The name **true** (*verum*) expresses the agreement of being to intellect,<sup>57</sup> for all cognition comes to its perfection (*perficitur*) by the assimilation of the knower to the thing known

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<sup>51</sup> *De veritate*, q. 1 a. 1 co., 139–142: “negatio autem consequens omne ens absolute, est indivisio; et hanc exprimit hoc nomen unum: nihil aliud enim est unum quam ens indivisum.” *In Metaph.* 4, l. 2, §553: “hoc nomen unum, ab ordine vel indivisione [imponitur]. Est enim unum ens indivisum.”

<sup>52</sup> *In Metaph.* 4, l. 2, §553: “Idem autem est quod habet essentiam et quidditatem per illam essentiam, et quod est in se indivisum. Unde ista tria, res, ens, unum, significant omnino idem, sed secundum diversas rationes.”

<sup>53</sup> *De veritate*, q. 1 a. 1 co., 142–144: “Si autem modus entis accipiatur secundo modo, scilicet secundum ordinem unius ad alterum, hoc potest esse dupliciter.”

<sup>54</sup> *De veritate*, q. 1 a. 1 co., 145–150: “Uno modo secundum divisionem unius ab altero; et hoc exprimit hoc nomen aliquid: dicitur enim aliquid quasi aliud quid; unde sicut ens dicitur unum, in quantum est indivisum in se, ita dicitur aliquid, in quantum est ab aliis divisum.”

<sup>55</sup> *De veritate*, q. 1 a. 1 co., 150–156: “Alio modo secundum convenientiam unius entis ad aliud; et hoc quidem non potest esse nisi accipiatur aliquid quod natum sit convenire cum omni ente: hoc autem est anima, quae quodam modo est omnia, ut dicitur in III De anima. In anima autem est vis cognitiva et appetitiva.” See ARISTOTLE, *De anima* Γ.8, 431b21–23: “ἡ ψυχὴ τὰ ὄντα πῶς ἐστι πάντα. ἢ γὰρ αἰσθητὰ τὰ ὄντα ἢ νοητὰ, ἔστι δ’ ἡ ἐπιστήμη μὲν τὰ ἐπιστητὰ πῶς, ἢ δ’ αἴσθησις τὰ αἰσθητὰ”; cf. *In De anima* 3, c. 7, 15–21: “*anima quodam modo est omnia: omnia enim que sunt aut sunt sensibilia aut intelligibilia, anima autem est quodam modo et sensibilia et intelligibilia, quia in anima est sensus et intellectus siue sciencia, sensus autem quodam modo est ipsa sensibilia et intellectus intelligibilia siue sciencia scibilia.*”

<sup>56</sup> ARISTOTLE, *De anima* Γ.8, 431b21: “ἡ ψυχὴ τὰ ὄντα πῶς ἐστι πάντα.” Cf. *In De anima* 3, c. 7, 13–36.

<sup>57</sup> *De veritate*, q. 1 a. 1 co., 159–166: “convenientiam vero entis ad intellectum exprimit hoc nomen verum. Omnis autem cognitio perficitur per assimilationem cognoscentis ad rem cognitam, ita quod assimilatio

(*per assimilationem cognoscentis ad rem cognitam*), such that the said assimilation is a cause of cognition, as sight knows color because it is disposed according to the species of color.

Therefore, the first comparison of being to intellect is such that being would agree with understanding.<sup>58</sup> This concordance (*concordia*) is called *adequacy* (*adaequatio*) of intellect and thing, and the *ratio* of *true* comes to its perfection (*perficitur*, i.e., is completed, reaches its terminus) in this. Hence, this is what *true* adds over *being*: namely, an agreement (*conformitas*) or adequacy of thing and intellect; and the cognition of a thing follows upon this agreement. Thus, the entity of a thing precedes the *ratio* of *true*, while cognition is an effect of truth.

**(b)** The name **good** (*bonum*) expresses the agreement (*convenientia*) of being to appetite.<sup>59</sup> Whence, ARISTOTLE says that **good** is *that which all desire* (*quod omnia appetunt* = οὐ πᾶντ' ἐφίεται).

Since *good* is *that which all desire*, and this (i.e., *that which all desire*) has the *ratio* of *end*, it is evident that *good* conveys the *ratio* of *end*.<sup>60</sup> However, the *ratio* of *good* presupposes the *ratio* of *efficient cause* and the *ratio* of *formal cause*, for that which is first in causing is last in the thing caused (►10.13).

**(c)** **Good** and **beautiful** (*pulchrum*) are the same in subject, since they are founded on the same thing: namely, on form.<sup>61</sup> And because of this, the good is praised as beautiful. They

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dicta est causa cognitionis, sicut visus per hoc quod disponitur secundum speciem coloris, cognoscit colorem.”

<sup>58</sup> *De veritate*, q. 1 a. 1 co., 166–176: “prima ergo comparatio entis ad intellectum est ut ens intellectui concordet, quae quidem concordia adaequatio intellectus et rei dicitur, et in hoc formaliter ratio veri perficitur. Hoc est ergo quod addit verum super ens, scilicet conformitatem, sive adaequationem rei et intellectus, ad quam conformitatem, ut dictum est, sequitur cognitio rei: sic ergo entitas rei praecedat rationem veritatis, sed cognitio est quidam veritatis effectus.”

<sup>59</sup> *De veritate*, q. 1 a. 1 co., 156–159: “Convenientiam ergo entis ad appetitum exprimit hoc nomen bonum, unde in principio Ethicorum dicitur quod «bonum est quod omnia appetunt».” Cf. *In Ethic.* 1, l. 1, 150–160 (cf. ARISTOTLE, *Ethica Nicomachea* A.1, 1094a3) “considerandum est quod bonum numeratur inter prima, adeo quod secundum Platonicos bonum est prius ente, sed secundum rei veritatem bonum cum ente convertitur. Prima autem non possunt notificari per aliqua priora, sed notificantur per posteriora, sicut causae per proprios effectus. Cum autem bonum proprie sit motivum appetitus, describitur bonum per motum appetitus, sicut solet manifestari vis motiva per motum. Et ideo dicit [Philosophus] quod philosophi bene enuntiaverunt bonum esse id quod omnia appetunt.”

<sup>60</sup> *STh* I, q. 5 a. 4 co.: “cum bonum sit quod omnia appetunt, hoc autem habet rationem finis; manifestum est quod bonum rationem finis importat. Sed tamen ratio boni praesupponit rationem causae efficientis, et rationem causae formalis. Videmus enim quod id quod est primum in causando, ultimum est in causato.”

<sup>61</sup> *STh* I, q. 5 a. 4 ad 1: “Ad primum ergo dicendum quod pulchrum et bonum in subiecto quidem sunt idem, quia super eandem rem fundantur, scilicet super formam, et propter hoc, bonum laudatur ut pulchrum. Sed ratione differunt. Nam bonum proprie respicit appetitum, est enim bonum quod omnia appetunt. Et ideo habet rationem finis, nam appetitus est quasi quidam motus ad rem. Pulchrum autem respicit vim cognoscitivam, pulchra enim dicuntur quae visa placent.”

differ, however, in *ratio*, since *good* properly has a regard to appetite, for *good* is *that which all desire*. And thus, it has the *ratio* of *end*, for the (act of the) appetite is as some motion towards the thing. *Beautiful*, on the other hand, has a regard to a cognitive virtue, for those (things) that please sight are said (to be) *beautiful*.

Whence, the beautiful consists in due proportion, since sense delights in duly proportioned things as (delighting) in (things that are) its like, for also sense—as every cognitive virtue—is some (sort of) reason (*ratio quaedam est*).<sup>62</sup> And since cognition comes to be through assimilation (*per assimilationem*), and likeness (*similitudo*) has a regard to form, the beautiful properly pertains to the formal cause.

### 30.11. *Being* and *One* are not *Genera*

No category is predicated of those (species) that are contained under another category.<sup>63</sup> Nor is (a category) universally predicated of those that follow in common (*communiter*) upon *being*, which are *act* and *potency*, *perfect* and *imperfect*, *prior* and *posterior*, and such others. And it is impossible to use *being* (*ens*) as one *ratio* and one nature, for *being* is not a genus (that is, properly speaking; ►27.1): rather, it is said in multiple (modes) of diverse (natures), while one genus or one species has (only) one nature.<sup>64</sup>

*Being* cannot be contracted (*contrahi*) into something determinate in the same mode in which a genus is contracted into species by differences.<sup>65</sup> We see that differences added to a genus diversify it, and yet they are outside (*praeter*) its essence or substance, for differences do not participate (in) a genus, as ARISTOTLE says in his *Topics*.

(ARISTOTLE explains therein that the definition of **to participate** [τὸ μετέχειν] is *to receive* [τὸ ἐπιδέχασθαι = *recipere*] *the ratio of that which is participated* [τὸν τοῦ μετεχομένου λόγον].<sup>66</sup> Thus, it is evident that species participate in genera, not genera in species, for

<sup>62</sup> *Sth* I, q. 5 a. 4 ad 1: “Unde pulchrum in debita proportione consistit, quia sensus delectatur in rebus debite proportionatis, sicut in sibi similibus; nam et sensus ratio quaedam est, et omnis virtus cognoscitiva. Et quia cognitio fit per assimilationem, similitudo autem respicit formam, pulchrum proprie pertinet ad rationem causae formalis.”

<sup>63</sup> *In Post. an.* 1, l. 27, 188–193: “nullum predicamentum predicatur de hiis que continentur sub alio predicamento, neque etiam uniuersaliter predicatur de hiis que communiter consequuntur ens, que sunt actus et potencia, perfectum et imperfectum, prius et posterius, et alia huiusmodi.”

<sup>64</sup> *In Metaph.* 1, l. 9, §139: “Sed in hoc decipiebantur [antiqui naturales], quia utebantur ente quasi una ratione et una natura sicut est natura alicuius generis; hoc enim est impossibile. Ens enim non est genus, sed multipliciter dicitur de diversis. Et ideo in primo Physicorum dicitur quod haec est falsa, ens est unum: non enim habet unam naturam sicut unum genus vel una species.”

<sup>65</sup> *In Metaph.* 5, l. 9, §889: “Sciendum est enim quod ens non potest hoc modo contrahi ad aliquid determinatum, sicut genus contrahitur ad species per differentias. Nam differentia, cum non participet genus, est extra essentiam generis.” Ibid. 1, l. 9, §138: “Sicut etiam videmus quod differentiae aduenientes generi diversificant ipsum, quae tamen sunt praeter substantiam eius. Non enim participant differentiae genus, ut dicitur quarto Topicorum.”

<sup>66</sup> See ARISTOTLE, *Topica* Δ.1, 121a11–13: “ὄρος δὲ τοῦ μετέχειν τὸ ἐπιδέχασθαι τὸν τοῦ μετεχομένου λόγον. δῆλον οὖν ὅτι τὰ μὲν εἶδη μετέχει τῶν γενῶν, τὰ δὲ γένη τῶν εἰδῶν οὐ· τὸ μὲν γὰρ εἶδος ἐπιδέχεται

a species receives the *ratio* of the genus, whereas a genus does not receive the *ratio* of the species. And it is likewise evident that differences do not participate in the genus, for that which participates in a genus is always either a species or an individual; ►26.2.)

(If differences should participate in a genus), the genus would belong to their substance (i.e., to their essence).<sup>67</sup> And there would be an absurdity (*nugatio*) in a definition if, having posited a genus, a difference should be added, if the genus belonged to its substance, as there would be an absurdity if species were added. Also, (if differences should participate in a genus) a difference would differ in nothing from a species.

Likewise, that something should be added (*superveniat, per additionem*) to the ratio of *being* whereby it would be diversified is unintelligible, for that which is added to *being* must be extraneous to *being*, and what is outside the substance or essence of being must be *non-being*, which is nothing, and (nothing) cannot diversify or be a difference of *being*.<sup>68</sup>

Thus, *one* (*unum*) and *being* (*ens*), which are the most common (universals) of all, for they are predicated of all things, cannot be genera.<sup>69</sup> ARISTOTLE proves this so: since a difference added to a genus constitutes a species (►13.16), it is impossible for a species without a genus or for a genus without a species to be predicated of a difference. As he says, a species is not predicated of the proper differences of a genus (►30.12), nor a genus without a species (►30.13), because a genus is predicated of differences insofar as they are in a species.<sup>70</sup> But no difference can be taken of which *being* and *one* are not

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τὸν τοῦ γένους λόγον, τὸ δὲ γένος τὸν τοῦ εἶδους οὔ.” Ibid. Δ.2, 122b20–24, “οὐδὲ δοκεῖ μετέχειν ἡ διαφορὰ τοῦ γένους· πᾶν γὰρ τὸ μετέχον τοῦ γένους ἢ εἶδος ἢ ἄτομόν ἐστιν, ἡ δὲ διαφορὰ οὔτε εἶδος οὔτε ἄτομόν ἐστιν. δῆλον οὖν ὅτι οὐ μετέχει τοῦ γένους ἡ διαφορὰ, ὡστ’ οὐδὲ τὸ περὶ τὸν εἶδος ἂν εἴη ἀλλὰ διαφορὰ, ἐπειδὴ οὐ μετέχει τοῦ γένους.”

<sup>67</sup> In *Metaph.* 1, l. 9, §138: Aliter genus esset de substantia differentiae, et in definitionibus esset nugatio, si posito genere, adderetur differentia, si de eius substantia esset genus, sicut esset nugatio si species adderetur. In nullo etiam differentia a specie differret.”

<sup>68</sup> In *Metaph.* 1, l. 9, §138: “non potest intelligi quod ad rationem entis aliquid superveniat per quod diversificetur: quia illud quod supervenit enti, oportet esse extraneum ab ente. Quod autem est huiusmodi, est nihil. [...] Ea vero quae sunt praeter substantiam entis, oportet esse non ens, et ita non possunt diversificare ens.” Ibid. 5, l. 9, §889: “Nihil autem posset esse extra essentiam entis, quod per additionem ad ens aliquam speciem entis constituat: nam quod est extra ens, nihil est, et differentia esse non potest. Unde in tertio huius probavit Philosophus, quod ens, genus esse non potest.” *STh* I, q. 3 a. 5 co.: “Ostendit autem Philosophus in III *Metaphys.*, quod ens non potest esse genus alicuius, omne enim genus habet differentias quae sunt extra essentiam generis; nulla autem differentia posset inveniri, quae esset extra ens; quia non ens non potest esse differentia.”

<sup>69</sup> In *Metaph.* 3, l. 8, §§432-433 (cf. ARISTOTLE, *Metaphysica* B.3, 998b17–22): “communissima omnium sunt unum et ens, quae de omnibus praedicantur. [...] Quod autem ens et unum non possint esse genera, probat [Philosophus] tali ratione. Quia cum differentia addita generi constituat speciem, de differentia praedicari non poterit nec species sine genere, nec genus sine speciebus.”

<sup>70</sup> In *Metaph.* 3, l. 8, §433 (cf. ARISTOTLE, *Metaphysica* B.3, 998b22–28): “Et ideo dicit [Philosophus], quod de propriis differentiis generis non praedicatur species, nec genus sine speciebus, quia scilicet genus praedicatur de differentiis secundum quod sunt in speciebus. Nulla autem differentia potest accipi de qua non praedicatur ens et unum, quia quaelibet differentia cuiuslibet generis est ens et est una, alioquin non posset constituere unam aliquam speciem entis. Ergo impossibile est quod unum et ens sint genera.”



predicated, because whatever difference of whichever genus is a *being* and is *one*—otherwise, (a difference) could not constitute some *one* species of *being*. Therefore, it is impossible for *one* and *being* to be genera.

### 30.12. A Species Cannot be Predicated of a Difference

That a species cannot be predicated of a difference—except perhaps by accident—is evident for two (reasons):<sup>71</sup>

1. A difference is in more (things) than a species, as PORPHYRY consigns.<sup>72</sup>

(PORPHYRY explains that a difference is often considered in many species: for example, *quadruped* is considered in many animals different in species; but a species is only in individuals, which are under the species.)<sup>73</sup>

2. Since a difference is posited in the definition of a species, a species could only be predicated by itself (*per se*) of the difference if the difference were understood to be the subject of the species, as *number* is the subject of *even*, in whose definition it is posited; but this is not how (a difference) is related (to a substantial species): rather, a difference is some form of a species.<sup>74</sup>

(In other words, every number is either even or odd; whence, *number* is posited as a proper subject in the definition of *even*, which is a property of *number* but not a species, since species of numbers are, for example, *two* and *three*.<sup>75</sup> On the other hand, *rational* is not the subject of *man*, but a [part of the substantial] form of *man*.)

### 30.13. A Genus Cannot be Predicated of a Difference

A genus taken alone (*per se*; ► 17.6) cannot be predicated of a difference according to predication by itself (*per se*; ► 17.8) because:<sup>76</sup>

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<sup>71</sup> *In Metaph.* 3, l. 8, §433: “Quod autem species de differentia praedicari non possit, patet ex duobus. [...] Non ergo posset species praedicari de differentia, nisi forte per accidens.”

<sup>72</sup> *In Metaph.* 3, l. 8, §433: “Primo quidem, quia differentia in plus est quam species, ut Porphyrius tradit.”

<sup>73</sup> See PORPHYRY, *Isagoge et in Aristotelis categorias commentarium*, ed. Adolf BUSSE, *Commentaria in Aristotelem Graeca*, (Berlin: Reimer, 1887), 18.19–21: “ἡ μὲν διαφορά ἐπὶ πλείονων πολλάκις εἰδῶν θεωρεῖται, ὡς τὸ τετράπουν ἐπὶ πλείστων ζῶων τῷ εἶδει διαφερόντων, τὸ δὲ εἶδος ἐπὶ μόνων τῶν ὑπὸ τὸ εἶδος ἀτόμων ἐστίν.” Cf. BOETHIUS’s translation in *ibid.*, 46–47: “differentia quidem in pluribus saepe speciebus consideratur, quemadmodum quadrupes in pluribus animalibus specie differentibus, species vero in solis his quae sub specie sunt individuus est.”

<sup>74</sup> *In Metaph.* 3, l. 8, §433: “Secundo, quia cum differentia ponatur in definitione speciei, non posset species praedicari per se de differentia, nisi intelligeretur quod differentia esset subiectum speciei, sicut numerus est subiectum paris, in cuius definitione ponitur. Hoc autem non sic se habet; sed magis differentia est quaedam forma speciei.”

<sup>75</sup> See ARISTOTLE, *Topica* Δ.2, 122b18–20: “Καὶ εἰ τὴν διαφοράν εἰς τὸ γένος ἔθηκεν, οἷον τὸ περιπτόν ὅπερ ἀριθμόν. Διαφορὰ γὰρ ἀριθμοῦ τὸ περιπτόν, οὐκ εἶδος ἐστίν.”

<sup>76</sup> *In Metaph.* 3, l. 8, §433: “Similiter etiam nec genus per se sumptum, potest praedicari de differentia praedicatione per se.”

1. A genus is not posited in the definition of a difference, since a difference does not participate (in) a genus (► 26.2), as ARISTOTLE says.<sup>77</sup>

2. Nor is a difference posited in the definition of a genus.<sup>78</sup>

Therefore, a genus is in no mode predicated of a difference.<sup>79</sup> It is predicated, however, of that which has a difference: that is, of a species, which has a difference in act (whereas the genus has all differences and species in potency, as matter has all termini and forms).

### 30.14. *Being is Said According to Prior and Posterior*

As ARISTOTLE says, *being* (*ens* = τὸ ὄν), or *that which is* (*quod est*), is said in multiple modes (*dicitur multipliciter* = λέγεται πολλαχῶς).<sup>80</sup> It is not, however, said equivocally, but in respect to one (*ad unum* = πρὸς ἓν): not indeed to one that is one only in ratio, but that is one as *some one nature* (*una quaedam natura* < πρὸς... μίαν τινὰ φύσιν).<sup>81</sup>

As in the above examples (concerning how *healthy* is said in multiple modes but in respect to one end, and *medical* is said in multiple modes but in respect to one efficient cause; ► 20.9), so *being* is said in multiple (modes).<sup>82</sup> Hence, every *being* is said in respect to one first. However, this *first* is not an end or an efficient (cause), as in the aforesaid examples, but a subject.

1. Some are said (to be) *beings* (*entia vel esse*) because they have (an act of) being (*esse*) by themselves, as substances (*substantiae* = οὐσίαι), which are said (to be) *beings* (*entia*) principally and priorly.<sup>83</sup>

2. Others (are said to be beings) because they are affections or properties of substance (*passiones sive proprietates substantiae* = πάθη οὐσίας).<sup>84</sup>

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<sup>77</sup> *In Metaph.* 3, l. 8, §433: “Non enim genus ponitur in definitione differentiae, quia differentia non participat genus, ut dicitur in quarto Topicorum.” See ARISTOTLE, *Topica* Δ.2, 122b20–24, just quoted.

<sup>78</sup> *In Metaph.* 3, l. 8, §433: “Nec etiam differentia ponitur in definitione generis.”

<sup>79</sup> *In Metaph.* 3, l. 8, §433: “ergo nullo modo per se genus praedicatur de differentia. Praedicatur tamen de eo quod habet differentiam, idest de specie, quae habet differentiam in actu.”

<sup>80</sup> *In Metaph.* 4, l. 1, §535 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003a33): “Dicit ergo [Philosophus] primo, quod ens sive quod est, dicitur multipliciter.”

<sup>81</sup> *In Metaph.* 4, l. 1, §536 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003a33–34): “dicit [Philosophus] quod ens etsi dicatur multipliciter, non tamen dicitur aequivoce, sed per respectum ad unum; non quidem ad unum quod sit solum ratione unum, sed quod est unum sicut una quaedam natura. Et hoc patet in exemplis infra positis.”

<sup>82</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b5–6): “Et sicut est de praedictis, ita etiam et ens multipliciter dicitur. Sed tamen omne ens dicitur per respectum ad unum primum. Sed hoc primum non est finis vel efficiens sicut in praemissis exemplis, sed subiectum.”

<sup>83</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b6–7): “Alia enim dicuntur entia vel esse, quia per se habent esse sicut substantiae, quae principaliter et prius entia dicuntur.”

<sup>84</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b7): “Alia vero quia sunt passiones sive proprietates substantiae, sicut per se accidentia uniuscuiusque substantiae.”

3. Some (others) are said (to be) *beings* (*entia*) because they are a way toward substance (*via ad substantiam* = ὁδὸς εἰς οὐσίαν), as generations and motions.<sup>85</sup>

4. Others are said (to be) *beings* because they are corruptions (*corruptiones* = φθοραί) of substance, for corruption is a way toward non-being, just as generation is a way toward substance.<sup>86</sup>

5. Since corruption is terminated at a privation, just as generation (is terminated) at a form, also privations (*privationes* = στερήσεις) of substantial forms are themselves fittingly (*convenienter*) are said (to be) *beings* (*esse dicuntur*; or, are said to be).<sup>87</sup>

6. Again, qualities or accidents (*qualitates vel accidentia* = ποιότητες) are said (to be) *beings* (*dicuntur entia*) because they are active or generative of a substance (*activa vel generativa substantiae* = ἢ ποιητικὰ ἢ γεννητικὰ οὐσίας) or of those (beings) which are said in respect of substance according to any of the aforesaid relations (*eorum quae <secundum aliquam habitudinem praedictarum> ad substantiam dicuntur* = τῶν πρὸς τὴν οὐσίαν λεγομένων), or according to any other (relation).<sup>88</sup>

7. Also, negations (*negationes* = ἀποφάσεις) of those that have a relation to substance, or of substances themselves, are said (to be) *beings*.<sup>89</sup> Whence we say that non-being *is* non-being, which would not be said if *to be* would not in some mode belong to negation.

### 30.15. Reduction to Four Modes of Being

The aforesaid modes of being can be reduced to four:<sup>90</sup>

1. **Negation** and **privation** (►42.1), which is the weakest (mode), is only in reason (*in ratione*).<sup>91</sup> We say that this is in reason because reason busies itself with them as though they were some (kind) of beings while it affirms and negates something of them.

<sup>85</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b7): “Quaedam autem dicuntur entia, quia sunt via ad substantiam, sicut generationes et motus.”

<sup>86</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b7–8): “Alia autem entia dicuntur, quia sunt corruptiones substantiae. Corruptio enim est via ad non esse, sicut generatio via ad substantiam.”

<sup>87</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b8): “Et quia corruptio terminatur ad privationem, sicut generatio ad formam, convenienter ipsae etiam privationes formarum substantialium esse dicuntur.”

<sup>88</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b8–9): “Et iterum qualitates vel accidentia quaedam dicuntur entia, quia sunt activa vel generativa substantiae, vel eorum quae secundum aliquam habitudinem praedictarum ad substantiam dicuntur, vel secundum quamcumque aliam.”

<sup>89</sup> *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b9–10): “Item negationes eorum quae ad substantiam habitudinem habent, vel etiam ipsius substantiae esse dicuntur. Unde dicimus quod non ens est non ens. Quod non diceretur nisi negationi aliquo modo esse competeret.”

<sup>90</sup> *In Metaph.* 4, l. 1, §540: “Sciendum tamen quod praedicti modi essendi ad quatuor possunt reduci.”

<sup>91</sup> *In Metaph.* 4, l. 1, §540: “Nam unum eorum quod est debilissimum, est tantum in ratione, scilicet negatio et privatio, quam dicimus in ratione esse, quia ratio de eis negociatur quasi de quibusdam entibus, dum de eis affirmat vel negat aliquid.”

2. According as **generation, corruption, and motion** are said (to be) *beings*.<sup>92</sup> These have something mixed of privation and negation, for motion (*motus*) is an imperfect act (*actus imperfectus*). This (mode) is proximate in weakness to the first.

3. (According as), for example, qualities, quantities, and properties of substance (are said to be beings).<sup>93</sup> Although this mode has nothing mixed of non-being, it has, however, a weak being because (such beings are) **not by themselves but in another**.

4. That which has an (act of) being (*esse*) in nature without mixture of privation and has a firm and solid (act of) being, as existing **by itself**: for example, substances.<sup>94</sup> This fourth genus is the most perfect.

To this (fourth genus) the others are referred as to a first and principal (mode of being), for qualities and quantities are said (to be) *beings* (*dicuntur esse*; or, are said to be) insofar as they are in a substance (*inquantum insunt substantiae*); motions and generations, insofar as they tend toward a substance or toward something of the aforesaid (e.g., toward some accident); privations and negations, insofar as they remove something of the aforesaid three (modes of being).<sup>95</sup>

### 30.16. The Parts of Common Being

**Common being** is divided:

1. Into **act** and **potency** (► 31).<sup>96</sup> This division is as a mean between the equivocal and the univocal. It does not distinguish the genera of beings, for potency and act are found

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<sup>92</sup> *In Metaph.* 4, l. 1, §541: “Aliud autem huic proximum in debilitate est, secundum quod generatio et corruptio et motus entia dicuntur. Habent enim aliquod admixtum de privatione et negatione. Nam motus est actus imperfectus, ut dicitur tertio Physicorum.”

<sup>93</sup> *In Metaph.* 4, l. 1, §542: “Tertium autem dicitur quod nihil habet de non ente admixtum, habet tamen esse debile, quia non per se, sed in alio, sicut sunt qualitates, quantitates et substantiae proprietates.”

<sup>94</sup> *In Metaph.* 4, l. 1, §543: “Quartum autem genus est quod est perfectissimum, quod scilicet habet esse in natura absque admixtione privationis, et habet esse firmum et solidum, quasi per se existens, sicut sunt substantiae.”

<sup>95</sup> *In Metaph.* 4, l. 1, §543: “Et ad hoc sicut ad primum et principale omnia alia referuntur. Nam qualitates et quantitates dicuntur esse, inquantum insunt substantiae; motus et generationes, inquantum tendunt ad substantiam vel ad aliquid praedictorum; privationes autem et negationes, inquantum remouent aliquid trium praedictorum.”

<sup>96</sup> *In Physic.* 3, l. 1, n. 6 (cf. ARISTOTLE, *Physica* Γ.1, 200b26–27): “ens dividitur per potentiam et actum. Et haec quidem divisio non distinguit genera entium: nam potentia et actus inveniuntur in quolibet genere.” *Ibid.*, l. 2, n. 3: “unumquodque genus dividitur per potentiam et actum.” cf. ARISTOTLE, *Physica* Γ.1, 201a9–11: “διηρημένον δὲ καθ’ ἕκαστον γένος τοῦ μὲν ἐντελεχείᾳ τοῦ δὲ δυνάμει.” *In Sent.* 2, d. 42 q. 1 a. 3 co.: “ens dividitur [...] in ens actu et in ens potentia: et haec divisio est quasi media inter aequivocum et univocum.” *ScG* 2, 56 n. 10: “Forma et materia in eodem genere continentur: omne enim genus per actum et potentiam dividitur.” *Ibid.* 3, 7 n. 8: “Ens per actum et potentiam dividitur.” *In Metaph.* 3, l. 3, §361: “ens dividitur [...] per actum et potentiam.” *De potentia*, q. 3 a. 8 ad 12: “substantia dividitur per potentiam et actum, sicut et quodlibet aliud genus.” *Q. d. de anima*, a. 12 co.: “unumquodque genus dividitur per potentiam et actum.” *De sub. sep.*, c. 8, 17–18: “genus substantiae, sicut et alia genera, dividitur per potentiam et actum.”

in whatever genus, including substance. Thus, (substantial) form and matter are contained in the same genus (i.e., *substance*), for every genus is divided into act and potency.

2. Into the ten (highest) **genera, predicaments, categories** (► 33), i.e., substance and the nine genera of accidents: quantity, quality, etc.<sup>97</sup>

3. (Into) **one** and **many** (► 38).<sup>98</sup> One and many are accidents by themselves (i.e., properties, affections) of *being* insofar as it is *being*, and are among the first differences of *being*.

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<sup>97</sup> *In Physic.* 3, l. 1, n. 6 (cf. ARISTOTLE, *Physica* Γ.1, 200b27–28): “Secunda divisio est prout ens dividitur secundum decem genera: quorum unum est *hoc aliquid*, idest substantia, aliud *quantum* vel *quale*, aut aliquod aliorum praedicamentorum.” *In Metaph.* 8, l. 1, §1682: “ens commune [...] dividitur per substantiam et novem genera accidentium.” *In Sent.* 2, d. 42 q. 1 a. 3 co.: “ens dividitur in substantiam et accidens.”

<sup>98</sup> *In Sent.* 1, d. 24 q. 1 a. 4 co.: “unum et multa dividunt ens commune.” *ScG* 1, 54 n. 3: “Per se autem accidentia entis, in quantum est ens, sunt unum et multa, ut probatur in IV *Metaph.*” *STh* I, q. 30 a. 3 co.: “ens dividitur per unum et multa.” *In Metaph.* 3, l. 3, §361: “ens dividitur per unum et multa.” *In Sent.* 1, d. 24 q. 1 a. 3 co.: “unum, et multa sunt de primis differentiis entis, secundum quod ens dividitur in unum et multa et in actum et in potentiam.”



## 31. Potency

*In order to clarify the division of being into act and potency, we treat first of potency.*

### 31.1. Act and Potency Follow Upon Common Being

As ARISTOTLE says, in one mode, *being* is divided insofar as it is said (to be a) substance, quantity or quality, which is to divide *being* into the ten categories (► 33); and in another mode, insofar as it is divided into potency (*per potentiam* < κατὰ δύναμιν) and act ([*per*] *actum* < κατὰ... ἐντελέχειαν) or operation ([*per*] *operationem* < κατὰ τὸ ἔργον), from which the name *act* (*actus*; ► 32) has been derived.<sup>1</sup>

The principal intention of metaphysics is (to treat) of potency and act insofar as they follow upon common being, for potency and act are found not only in mobile (things), but in many others.<sup>2</sup> However, it is necessary to determine first about mobile things, of which *potency* is most properly (*maxime proprie* = μάλιστα κυρίως) said, even if it is not the present intention, because through this we arrive at other potencies.

### 31.2. The First Potency in the Order of Cognition

The name **potency** (*potentia* = δύναμις; in Arabic, *quwwah* قوة and its synonyms) was first imposed to signify *the power of man* (*potestas hominis*), insofar as we say that some men are powerful (*potentes*), as AVICENNA says; and then it was transferred to natural things.<sup>3</sup>

That seems to be powerful (*potens*, capable, able) among men who can do of others what he wants without impediment; and his potency is diminished insofar as he can be impeded.<sup>4</sup> The potency of some natural—or even voluntary—agent is impeded insofar as it can be affected by something (*inquantum potest pati ab aliquo*).

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<sup>1</sup> *In Metaph.* 9, l. 1, §1769 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1045b32–35): “ens dividitur uno modo secundum quod dicitur quid, scilicet substantia, aut quantitas, aut qualitas, quod est dividere ens per decem praedicamenta: alio modo secundum quod dividitur per potentiam et actum vel operationem, a qua derivatum est nomen actus.”

<sup>2</sup> *In Metaph.* 9, l. 1, §1770 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1045b35–1046a2): “[oportet determinare] primo de potentia quae maxime dicitur proprie, non tamen utile est ad praesentem intentionem. Potentia enim et actus, ut plurimum, dicuntur in his quae sunt in motu, quia motus est actus entis in potentia.” Ibid., §1772: “licet potentia quae est in rebus mobilibus maxime proprie dicatur, non tamen hoc solum dicitur potentia, ut dictum est. Et utilis est ad praesentem intentionem, non quasi de ea principaliter intendatur, sed quia per eam in alias potentias devenimus.” Ibid., §1770: “principalis intentio huius doctrinae non est de potentia et actu secundum quod sunt in rebus mobilibus solum, sed secundum quod sequuntur ens commune.”

<sup>3</sup> *In Sent.* 1, d. 42 q. 1 a. 1 co.: “nomen potentiae primo impositum fuit ad significandum potestatem hominis, prout dicimus aliquos homines esse potentes, ut Avicenna dicit, et deinde etiam translatum fuit ad res naturales.” AVICENNA attributes this to animals first. Cf. AVICENNA, *The Metaphysics of The Healing*, 130, 9–11: “إن لفظة القوة وما يرادفها قد وضعت أول الشيء للمعنى في الحيوان، الذي يمكنه بها أن تصدر عنه أفعال شاقة من...” *Liber de philosophia prima*, 4.2, 193.72–75.

<sup>4</sup> *In Sent.* 1, d. 42 q. 1 a. 1 co.: “Videtur autem in hominibus esse potens qui potest facere quod vult de aliis sine impedimento; et secundum quod impedi potest, sic minuitur potentia ejus. Impeditur autem potentia alicujus vel naturalis agentis vel etiam voluntarii, inquantum potest pati ab aliquo.”

Thus, *not being able of being affected* (*non posse pati*) belongs to the *ratio* of *potency* according to its first imposition.<sup>5</sup> Whence, also that which cannot be affected, even if it can do nothing, is said (to be) potent (or capable, able): for example, (that) is said (to be) *hard* which has the potency of not being cut up.

*Potency* is said from *act* (► 32).<sup>6</sup> And *act* is twofold: namely, first (*act*), which is a form; and second (*act*), which is an operation. And just as it seems from the common understanding of men (that) the name *act* was first attributed to the operation, for in this way almost all understand *act*, from thence it was secondly transferred to form insofar as form is the principle and end of operation.

Whence, likewise, *potency* is twofold:<sup>7</sup> (1) an active one, to which an *act* responds, which is the operation; and to this the name *potency* seems to have been attributed first; (2) the passive *potency* to which the first *act* responds, which is form, to which likewise the name *potency* seems to have been secondarily devolved. And since something is affected only by reason of a passive *potency*, so, too, something acts only by reason of the first *act*, which is the form, for the name *act* derives to it first from *action*, as has been said.

Hence, to be the first *potency* does not benefit matter in respect of the principal signification of *potency*, because *potency* was first imposed to signify the principle of action.<sup>8</sup> However, it was secondly transferred to this: that also that which receives the action of an agent would be said to have a *potency*; and this is the passive *potency*, so that just as *action* or *operation*—in which the active *potency* is completed—responds to *active potency*, so, too, that which responds to *passive potency* as (its) perfection and complement would be said (to be its) *act*. Therefrom, every form is said (to be an) *act*—even separated forms themselves.

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<sup>5</sup> *In Sent.* 1, d. 42 q. 1 a. 1 co.: “Unde de ratione potentiae, quantum ad primam impositionem sui, est non posse pati. Unde etiam illud quod non potest pati, etsi nihil possit agere, dicimus potens; sicut dicitur durum quod habet potentiam ut non secetur.”

<sup>6</sup> *De potentia*, q. 1 a. 1 co.: “potentia dicitur ab actu: actus autem est duplex: scilicet primus, qui est forma; et secundus, qui est operatio: et sicut videtur ex communi hominum intellectu, nomen actus primo fuit attributum operationi: sic enim quasi omnes intelligunt actum; secundo autem exinde fuit translatum ad formam, in quantum forma est principium operationis et finis.”

<sup>7</sup> *De potentia*, q. 1 a. 1 co.: “Unde et similiter duplex est potentia: una activa cui respondet actus, qui est operatio; et huic primo nomen potentiae videtur fuisse attributum: alia est potentia passiva, cui respondet actus primus, qui est forma, ad quam similiter videtur secundo nomen potentiae devolutum. Sicut autem nihil patitur nisi ratione potentiae passivae, ita nihil agit nisi ratione actus primi, qui est forma. Dictum est enim, quod ad ipsum primo nomen actus ex actione devenit.”

<sup>8</sup> *In Sent.* 1, d. 42 q. 1 a. 1 ad 1: “esse primam potentiam non convenit materiae secundum principalem significationem potentiae: quia, ut dictum est, in corp. art., potentia primo imposita est ad significandum principium actionis; sed secundo translatum est ad hoc ut illud etiam quod recipit actionem agentis, potentiam habere dicatur; et haec est potentia passiva; ut sicut potentiae activae respondet operatio vel actio, in qua completur potentia activa; ita etiam illud quod respondet potentiae passivae, quasi perfectio et complementum, actus dicatur. Et propter hoc omnis forma actus dicitur, etiam ipsae formae separatae.”



### 31.3. Modes of Potency or Power

ARISTOTLE posits four modes in which the name **potency** or **power** (*potentia vel potestas* = δύναμις) is said:<sup>9</sup>

**1. Active potency** (► 31.4): the principle of motion and of (per)mutation (i.e., change) in another insofar as it is another (*principium motus et mutationis [sive permutationis] in alio inquantum est aliud* = ἡ... ἀρχὴ κινήσεως ἢ μεταβολῆς ἢ ἐν ἑτέρῳ ἢ ἢ ἕτερον), which is the ratio of active potency.<sup>10</sup>

**2. Passive potency** (► 31.5): the principle of motion or of mutation from another insofar as it is another (*principium motus vel mutationis ab altero inquantum est aliud* = [ἡ ἀρχὴ κινήσεως ἢ μεταβολῆς] ἡ... ὑφ' ἑτέρου ἢ ἢ ἕτερον).<sup>11</sup> And this is the passive potency, according to which the patient (i.e., that which undergoes a motion or change) is affected by something (*patiens aliquid patitur* = τὸ πάσχον πάσχει τι).

**3. The principle of producing** something, not in any mode but **well** (*principium faciendi aliquid <non quocumque modo, sed> bene* = ἡ [ἀρχὴ] τοῦ καλῶς τοῦτ' ἐπιτελεῖν; ► 31.6) or according to that which man disposes (*aut secundum praevoluntatem, idest secundum quod homo disponit* = ἢ κατὰ προαίρεσιν).<sup>12</sup>

**4. All habits, forms or dispositions** (*habitus sive formae vel dispositiones* = ἕξεις) whereby (*quibus* = καθ' ὅς) some (things) are said (to be) or are rendered altogether (*omnino* = ὅλως) **incapable** of being affected (*impassibilia* = ἀπαθη), or of being set in motion (*immobilia* <ἀμετάβλητα), or not easily (*non de facili* = μὴ ῥαδίως) capable of being set in motion (*mobilia* = εὐμετακίνητα), **for worse** (*in peius* = ἐπὶ τὸ χεῖρον; ► 31.7).<sup>13</sup>

<sup>9</sup> *In Metaph.* 5, l. 14, §954 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a15–32): “distinguit [Philosophus] hoc nomen potentia vel potestas. [...] ostendit quot modis dicitur potentia. [...] distinguit hoc nomen, potentia. [...] ponit modos potentiae.” Ibid., §955: “Ponit ergo in prima parte quatuor modos potentiae vel potestatis.”

<sup>10</sup> *In Metaph.* 5, l. 14, §955 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a15–16): “Quorum primus est, quod potentia dicitur principium motus et mutationis in alio inquantum est aliud.” Ibid. §976 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1020a4–6): “Patet igitur, quod propria definitio potentiae primo modo dictae est principium permutationis in alio inquantum est aliud, quod est ratio potentiae activae.”

<sup>11</sup> *In Metaph.* 5, l. 14, §956 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a20–21): “Secundum modum ponit [Philosophus...] Dicit, quod quodam alio modo dicitur potestas principium motus vel mutationis ab altero inquantum est aliud. Et haec est potentia passiva, secundum quam patiens aliquid patitur.”

<sup>12</sup> *In Metaph.* 5, l. 14, §959 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a23–24): “Tertium modum ponit [Philosophus...] Dicit, quod alia potestas dicitur, quae est principium faciendi aliquid non quocumque modo, sed bene, aut secundum «praevoluntatem,» idest secundum quod homo disponit. Quando enim aliqui progrediuntur vel loquuntur, sed non bene, aut non secundum quod volunt, dicuntur non posse loqui aut progredi. Et similiter est in pati. Dicitur enim aliquid posse pati illud quod bene potest pati. Sicut dicuntur aliqua ligna combustibilia, quia de facili comburuntur, et incombustibilia, quae non possunt de facili comburi.”

<sup>13</sup> *In Metaph.* 5, l. 14, §960 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a26–28): “Quartum modum ponit [Philosophus...] Dicit, quod etiam potestates dicuntur omnes habitus sive formae vel dispositiones, quibus aliqua dicuntur vel redduntur omnino impassibilia, vel immobilia, aut non de facili mobilia in peius.”

### 31.4. Active Potency

There is some principle of motion or mutation in that which is mutated: namely, matter itself; or some formal principle from which motion arises (*ad quod consequitur motus*), as downward and upward motion arises from the form of the heavy and of the light.<sup>14</sup>

However, such a principle cannot be said (to be an) *active potency*, to which that motion pertains, for everything that is in motion is set in motion by another (*omne quod movetur ab alio movetur*).<sup>15</sup> Nor does something set itself in motion—except through parts, insofar as one of its parts sets another in motion.

Therefore, potency, insofar as it is *the principle of motion in that in which it is*, is not comprehended under active potency but rather under passive potency.<sup>16</sup> Thus, heaviness in a heavy element is not a principle in such a way that (a heavy element) should set (something else) in motion, but rather in such a way that (a heavy element) would (itself) be set in motion.

*Potency conveys (importat) the ratio of principle of action.*<sup>17</sup> Whence, whatever might be that which is a principle of acting (*principium agendi*) is said (to be a) *potency*, such as heat and coldness.

Therefore, an active potency of motion must be in (something) other than that which is set in motion, as the building power is not in that which is built but rather in the builder.<sup>18</sup>

The medicinal art, on the other hand, although it is an active potency, for the physician cures through it, can nonetheless be in something that is healed not insofar as it is healed but by accident, insofar as the physician and that which is healed happens to be the same.<sup>19</sup>

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<sup>14</sup> *In Metaph.* 5, l. 14, §955: “Est enim quoddam principium motus vel mutationis in eo quod mutatur, ipsa scilicet materia: vel aliquod principium formale, ad quod consequitur motus, sicut ad formam gravis vel levis sequitur motus sursum aut deorsum.”

<sup>15</sup> *In Metaph.* 5, l. 14, §955: “Sed huiusmodi principium non potest dici de potentia activa, ad quam pertinet motus ille. Omne enim quod movetur ab alio movetur. Neque aliquid movet seipsum nisi per partes, inquantum una pars eius movet aliam, ut probatur in octavo Physicorum.”

<sup>16</sup> *In Metaph.* 5, l. 14, §955: “Potentia igitur, secundum quod est principium motus in eo in quo est, non comprehenditur sub potentia activa, sed magis sub passiva. Gravitatis enim in terra non est principium ut moveat, sed magis ut moveatur.”

<sup>17</sup> *In Sent.* 1, d. 42 q. 1 a. 1 ad 2: “potentia importat, ut dictum est, in Resp. ad primum, rationem principii actionis; unde quidquid sit illud quod est principium agendi, potentia dicitur, sicut calor et frigus, et huiusmodi.”

<sup>18</sup> *In Metaph.* 5, l. 14, §955 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a16–17): “Potentia igitur activa motus oportet quod sit in alio ab eo quod movetur, sicut aedificativa potestas non est in aedificato, sed magis in aedificante.”

<sup>19</sup> *In Metaph.* 5, l. 14, §955 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a17–18): “Ars autem medicinalis, quamvis sit potentia activa, quia per eam medicus curat, contingit tamen quod sit in aliquo sanato, non inquantum est sanatum, sed per accidens, inquantum accidit eidem esse medicum et sanatum.”

In this mode, therefore, a power is—universally speaking—said in one mode (to be) *the principle of mutation or of motion in another insofar as it is another*.<sup>20</sup>

### 31.5. Passive Potency

Just as every agent acts on something other than itself (*omne agens, in aliud a se agit*), and every mover sets in motion something other than itself (*omne movens, aliud a se movet*), so every patient is affected by another (*omne patiens, ab alio patitur*) and everything that is set in motion is set in motion by another (*omne motum, ab alio movetur*).<sup>21</sup> Thus, that principle by which it befits something to be moved or to be affected is said (to be a) *passive potency* (*potentia passiva*).

However, to be **capable of being affected** (< δύνατον... παθεῖν) by another is said in two modes:<sup>22</sup> **(a)** sometimes, something is said to be capable of being affected by whatever it can undergo, whether it is good or bad; **(b)** sometimes, on the other hand, something is said to be capable of being affected not because it can be affected by something bad, but because it can be affected by something (that is) most excellent: for example, we do not say that someone is powerful if he can be overcome; but we say that he is powerful if he can be taught or be assisted. This is so because to be capable of being affected by some defect is sometimes attributed to impotence; and not to be capable of being affected by the same is attributed to potency.

### 31.6. The Principle of Acting or of Being Affected Well

When some (persons) walk or speak, but not well or not as they will, they are said not to be able to walk or to speak.<sup>23</sup> And it is likewise in being affected, for something is said to

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<sup>20</sup> *In Metaph.* 5, l. 14, §955 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a19–20): “Sic igitur universaliter loquendo, potestas dicitur uno modo principium mutationis aut motus in alio, in quantum est aliud.”

<sup>21</sup> *In Metaph.* 5, l. 14, §956 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a20–21): “Sicut enim omne agens et movens, aliud a se movet, et in aliud a se agit; ita omne patiens, ab alio patitur: et omne motum, ab alio movetur. Illud enim principium, per quod alicui competit ut moveatur vel patiat ab alio, dicitur potentia passiva.”

<sup>22</sup> *In Metaph.* 5, l. 14, §957 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a21–23): “Posse autem pati ab alio dicitur dupliciter. Aliquando quidem, quicquid sit illud, quod aliquid potest pati, dicimus ipsum esse possibile ad illud patiendum, sive sit bonum, sive malum. Aliquando vero non dicitur aliquid potens ex eo quod potest pati aliquod malum, sed ex hoc quod potest pati aliquod excellentius. Sicut, si aliquis potest vinci, non dicimus potentem; sed si aliquis potest doceri vel adiuvari, dicimus eum potentem. Et hoc ideo, quia posse pati aliquem defectum quandoque attribuitur impotentiae; et posse non pati idem, attribuitur potentiae.” St. Thomas consigns an alternative reading that concerns only those things that are affected by something that is contrary to its nature. *Ibid.*, §958: “Alia tamen litera habet, aliquando autem non secundum omnem passionem, sed utique in contrarium. Quod quidem sic debet intelligi. Improperie enim dicitur pati, quicquid recipit aliquam perfectionem ab aliquo, sicut intelligere dicitur quoddam pati. Proprie autem pati dicitur quod recipit aliquid cum sui transmutatione ab eo quod est ei naturale. Unde et talis passio dicitur esse abiiciens a substantia. Hoc autem non potest fieri nisi per aliquod contrarium. Unde, quando aliquid patitur, secundum quod est contrarium suae naturae vel conditioni, proprie pati dicitur. Secundum quod etiam aegritudines passiones dicuntur. Quando vero aliquis recipit id quod est ei conveniens secundum suam naturam, magis dicitur perfici quam pati.”

<sup>23</sup> *In Metaph.* 5, l. 14, §959 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a24–26): “Quando enim aliqui progrediuntur vel loquuntur, sed non bene, aut non secundum quod volunt, dicuntur non posse loqui aut

be capable of being affected which can be affected well. For example, some (pieces of) wood are said (to be) *combustible* because they are easily combustible; and (those are said to be) *incombustible* which cannot easily be burned.

### 31.7. Impassibility, Resistance

That (some things) should be changed for the worse, as when they are broken into pieces, bent, crumbled, or are in any way corrupted, is not in bodies by some potency.<sup>24</sup> Rather, (this is in bodies) by some impotency and (through) a defect of some principle that cannot resist that which corrupts (it), for something is corrupted only because that which corrupts (it) overcomes it, which indeed happens due to the weakness of its own virtue.

(This resistance to corruption) happens to those (things) that cannot be affected by such defects or (are) hardly or gradually (capable of being affected)—that is, are slowly or moderately affected—because of (their own, proper) potency and because they have some perfection such that they *are not overcome by contraries*.<sup>25</sup>

### 31.8. Active and Passive Potencies Compared

As ARISTOTLE says, the potency of producing and of being affected is in some mode one potency, and in some mode (it is) not (one potency).<sup>26</sup>

It is one potency if the order of one to the other is considered, for one is said by respect to the other.<sup>27</sup> Thus, something can be said to have a potency of being affected (either) because it has by itself the potency to be affected or because it has the potency that another should be affected by it. And in the latter mode, the active potency is the same as

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progredi. Et «similiter est in pati.» Dicitur enim aliquid posse pati illud quod bene potest pati. Sicut dicuntur aliqua ligna combustibilia, quia de facili comburuntur, et incombustibilia, quae non possunt de facili comburi.”

<sup>24</sup> *In Metaph.* 5, l. 14, §960 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a28–30): “Quod enim in peius mutantur, sicut quod frangantur, vel curventur, vel conterantur, vel qualitercumque corrumpantur, non inest corporibus per aliquam potentiam, sed magis per impotentiam et defectum alicuius principii, quod corrumpenti resistere non potest. Nunquam enim corrumpitur aliquid nisi propter victoriam corrumpentis supra ipsum. Quod quidem contingit ex debilitate propriae virtutis.”

<sup>25</sup> *In Metaph.* 5, l. 14, §960 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a30–32): “Illis vero, quae non possunt tales defectus pati, «aut vix aut paulatim,» idest tarde vel modicum patiuntur, accidit eis propter potentiam, et in eo quod habent «aliquo modo posse,» idest cum quadam perfectione, ut non superentur a contrariis.” St. Thomas adds an example from the *Categories*, *ibid.*: “Et per hunc modum dicitur in Praedicamentis, quod durum vel sanativum significat potentiam naturalem non patiendi a corrumpentibus. Molle autem et aegrotativum impotentiam.”

<sup>26</sup> *In Metaph.* 9, l. 1, §1781 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a19–28): “Ex praedictis quamdam veritatem circa praedictas potentias manifestat [Philosophus]; et dicit, quod potentia faciendi et patiendi est quodammodo una potentia, et quodammodo non.”

<sup>27</sup> *In Metaph.* 9, l. 1, §1781 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a19–21): “Una quidem est, si consideretur ordo unius ad aliam; una enim dicitur per respectum ad alteram. Potest enim dici aliquid habens potentiam patiendi, quia ipsum habet per se potentiam ut patiatur, vel eo quod habet potentiam ut aliud patiatur ab ipso. Et hoc secundo modo potentia activa est idem cum passiva: ex eo enim quod aliquid habet potentiam activam, habet potentiam ut patiatur aliud ab ipso.”

the passive, for something has the potency that another should be affected by it because it has an active potency.

On the other hand, if these two potencies—namely, active and passive—should be considered according to the subject in which they are, then the active potency is other than the passive (potency), for the passive (potency) is in the patient, since the patient is affected due to some principle that exists in it.<sup>28</sup> And in this mode, (this potency) is matter, for passive potency is nothing other than the principle of being affected by another.

For example, to be burned is some (kind of) being affected.<sup>29</sup> And the material principle due to which something is apt to be burned is that which makes it combustible (lit., *pingue vel crassum*). Whence, the potency itself is in the combustible (thing) as passive.

Likewise, that which yields to the thing that touches in such a way that it should receive some impression—e.g., as wax or something of this sort—is as such impressionable (*frangibile*).<sup>30</sup>

It is likewise in other (things) that are affected insofar as there is in them some principle of being affected, which is said (to be a) *passive potency*, while the active (potency) is in the agent, as heat is in the heater, and the building art is in the builder.<sup>31</sup>

### 31.9. Nothing is Affected by Itself

Since the active and the passive potency are in diverse (subjects), it is evident that nothing is affected by itself insofar as something is naturally apt to act or to be acted upon.<sup>32</sup>

However, something can be affected by itself by accident, as a physician heals himself not (insofar as (he is) a physician but (insofar as (he is) sick).<sup>33</sup> Hence, something is not

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<sup>28</sup> *In Metaph.* 9, l. 1, §1782 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a22–24): “Si autem considerentur hae duae potentiae, activa scilicet et passiva, secundum subiectum, in quibus sunt, sic est alia potentia activa et alia passiva. Potentia enim passiva est in patiente, quia patiens patitur propter aliquod principium in ipso existens, et huiusmodi est materia. Potentia autem passiva nihil aliud est quam principium patiendi ab alio.”

<sup>29</sup> *In Metaph.* 9, l. 1, §1782 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a24–25): “Sicut comburi quoddam pati est; et principium materiale propter quod aliquid est aptum combustioni, est pingue vel crassum. Unde ipsa potentia est in combustibili quasi passiva.”

<sup>30</sup> *In Metaph.* 9, l. 1, §1782 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a25): “Et similiter illud quod sic cedit tangenti ut impressionem quamdam recipiat, sicut cera vel aliquid huiusmodi, in quantum tale est frangibile.”

<sup>31</sup> *In Metaph.* 9, l. 1, §1782 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a25–28): “Et similiter est in aliis, quae patiuntur, secundum quod in eis est principium quoddam patiendi, quod dicitur potentia passiva. Potentia vero activa est in agente, ut calor in calefactivo, et ars aedificativa in aedificante.”

<sup>32</sup> *In Metaph.* 9, l. 1, §1783 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a28–29): “Et quia potentia activa et passiva in diversis sunt, manifestum est quod nihil patitur a seipso, in quantum aliquid est aptum natum agere vel pati.”

<sup>33</sup> *In Metaph.* 9, l. 1, §1783: “Per accidens autem aliquid pati contingit a seipso; sicut medicus sanat seipsum, non ut medicum, sed sicut infirmum. Ideo autem non patitur aliquid a seipso, quia per se

affected by itself because, speaking by itself, one of the aforesaid principles—and not the other—is in something one and the same: the principle of being acted upon is not in that in which the principle of acting is, except by accident, as has been said.

### 31.10. Reduction to Active Potency

As ARISTOTLE says, *potency* (*potentia* = ἡ δύναμις) and *to be able* (*posse* = τὸ δύνασθαι) are said in multiple (modes). This multiplicity is a multiplicity of equivocation in respect of some modes; but in respect of some (others, it is a multiplicity) of analogy.<sup>34</sup> Thus, some are said to be possible or impossible because they have some principle in themselves; and this, according to some modes, insofar as all are said (to be) powerful (*potentiae*, i.e., capable, able) not equivocally but analogically. Some (others), however, are said (to be) possible (*possibilia*) or powerful (*potentia*) not due to some principle that they would have in themselves; and in these, *potency* is said equivocally.

As ARISTOTLE says, potencies are reduced to one species (< πρὸς τὸ αὐτὸ εἶδος), for whichever of them is some principle (< πᾶσαι ἀρχαί τινές εἰσι), and all potencies so said are reduced to some principle (< πρὸς πρώτην μίαν) from which all others are said.<sup>35</sup> And this is the active principle, which is the principle of transmutations (< ἀρχὴ μεταβολῆς) in another insofar as it is another (< ἐν ἄλλω ἢ ἢ ἄλλο).

ARISTOTLE says this (i.e., ἐν ἄλλω ἢ ἢ ἄλλο, *in another insofar as it is another*) because it is possible for an active principle to simultaneously be in the mobile or affected (thing) itself (*in ipso mobili vel passo*), as when something moves itself, for it is not the mover and the (thing) moved (*movens et motum*), (or) the agent and the patient (*agens et patiens*), according to the same.<sup>36</sup> Whence, he says that the principle that is said (to be an) *active potency* is the principle of transmutation in another insofar as it is another, since even if

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loquendo, alicui uni et eidem inest unum dictorum principiorum et non aliud. Cui enim inest principium agendi, non inest principium patiendi, nisi secundum accidens, ut dictum est.”

<sup>34</sup> *In Metaph.* 9, l. 1, §1773 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a4–7): “Dicit ergo [Philosophus] primo, quod determinatum est in aliis, scilicet quinto huius, quod multipliciter dicitur potentia et posse. Sed ista multiplicitas quantum ad quosdam modos est multiplicitas aequivocationis, sed quantum ad quosdam analogiae. Quaedam enim dicuntur possibilia vel impossibilia, eo quod habent aliquod principium in seipsis; et hoc secundum quosdam modos, secundum quos omnes dicuntur potentiae non aequivoce, sed analogice. Aliqua vero dicuntur possibilia vel potentia, non propter aliquod principium quod in seipsis habeant; et in illis dicitur potentia aequivoce.”

<sup>35</sup> *In Metaph.* 9, l. 1, §1776 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a9–11): “considerandum est de potentiis, quae reducuntur ad unam speciem, quia quaelibet earum est principium quoddam, et omnes potentiae sic dictae reducuntur ad aliquod principium ex quo omnes aliae dicuntur. Et hoc est principium activum, quod est principium transmutationis in alio in quantum est aliud.”

<sup>36</sup> *In Metaph.* 9, l. 1, §1776: “Et hoc dicit [Philosophus], quia possibile est quod principium activum simul sit in ipso mobili vel passo, sicut cum aliquid movet seipsum; non tamen secundum idem est movens et motum, agens et patiens. Et ideo dicitur quod principium quod dicitur potentia activa, est principium transmutationis in alio in quantum est aliud; quia etsi contingat principium activum esse in eodem cum passo, non tamen secundum quod est idem, sed secundum quod est aliud.”

the active principle should be in the same (subject) as the affected (subject), (it is) not, however, (in it) insofar as it is the same but insofar as it is another.

It is evident that other potencies are reduced to that principle which is said (to be the) *active potency*, for that is said in another mode (to be a) passive potency (< τοῦ παθεῖν... δύναμις) which is *the principle (by) which something is set in motion by another insofar as it is another* (< ἀρχὴ μεταβολῆς παθητικῆς ὑπ' ἄλλου ἢ ἢ ἄλλο). And ARISTOTLE says this because, even if the same (subject) should be affected by itself, (it would) not (be affected), however, according to the same but according to another. This potency is reduced to the first active potency because the affection (*passio*) is caused by an agent (*ab agente causatur*). Therefrom, also passive potency is reduced to active (potency).<sup>37</sup>

In another mode, the habit of impassibility (*habitus impassibilitatis* = ἐξίς ἀπαθείας) is said (to be a) *potency*: that is, some disposition from which something has its not being capable of suffering a transmutation into the worse (*in deterius* = ἐπὶ τὸ χεῖρον).<sup>38</sup> This is what cannot be affected by corruption (< φθορᾶς) from another insofar as it is another: namely, from a principle of transmutation (< ὑπ' ἀρχῆς μεταβλητικῆς) that is an active principle.

It is manifest that either of these modes is said by comparison to something that exists in us in respect of an affection (*ad passionem*), in which one is said (to be a) *potency* due to a principle from which something is capable of not being affected, while in the other (it is said to be a potency) due to a principle from which something can be affected.<sup>39</sup> Whence, since affection depends on action, the definition of the first potency—to wit, the active—must be posited in the definition of one and of the other of those modes. And these two are reduced to the first—namely, to the active potency—as to a prior.

Again, in another mode, (some things) are said (to be) *potencies* not only due to an order in respect of producing and being affected (*solum per ordinem ad facere et pati* < ἢ τοῦ

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<sup>37</sup> *In Metaph.* 9, l. 1, §1777 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a11–13): “Et quod ad illud principium quod dicitur potentia activa, reducuntur aliae potentiae, manifestum est. Nam alio modo dicitur potentia passiva, quae est principium quod aliquid moveatur ab alio, in quantum est aliud. Et hoc dicit [Philosophus], quia etsi idem patiat a seipso, non tamen secundum idem, sed secundum aliud. Haec autem potentia reducitur ad primam potentiam activam, quia passio ab agente causatur. Et propter hoc etiam potentia passiva reducitur ad activam.”

<sup>38</sup> *In Metaph.* 9, l. 1, §1778 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a13–15): “Alio modo dicitur potentia quidam habitus impassibilitatis «eius quae est in deterius,» id est dispositio quaedam ex qua aliquid habet quod non possit pati transmutationem in deterius, et hoc est quod non possit pati corruptionem ab alio «in quantum est aliud,» scilicet a principio transmutationis quod est principium activum.”

<sup>39</sup> *In Metaph.* 9, l. 1, §1779 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a15–16): “Manifestum est autem quod uterque istorum modorum dicitur per comparisonem alicuius existentis in nobis ad passionem. In quorum uno dicitur potentia propter principium ex quo aliquis potest non pati; in alio autem propter principium ex quo quis potest pati. Unde, cum passio ab actione dependeat, oportet quod in definitione utriusque illorum modorum ponatur definitio «potentiae primae,» scilicet activae. Et ita istae duae reducuntur ad primam, scilicet ad potentiam activam sicut ad priorem.”

μόνον ποιῆσαι ἢ τοῦ παθεῖν), but due to an order in respect of that which is well (*ad hoc quod est bene* < τοῦ καλῶς) in one and in the other.<sup>40</sup>

For example, we say that someone is capable of walking not because he should be able to walk in whatever mode but because he would walk well.<sup>41</sup> And conversely, we say of one who limps that he cannot walk.

Likewise, we say (that) wood (is) *combustible* because it can easily be burned, while we say (that) green wood, which cannot easily be burned, (is) *incombustible*.<sup>42</sup>

Whence, it is manifest that the *ratios* of the first potencies, which are said to act (►31.4) or to be acted upon (►31.5) simply (*simpliciter*), are included in the definition of those potencies that are said in respect of acting or being acted upon well, as *acting* (*agere*) is included in *acting well* (*bene agere*); and *being affected* (*pati*) is included in *being affected well* (*bene pati*).<sup>43</sup>

Whence, it is manifest that all these modes of potencies are reduced to one first: namely, to the active potency.<sup>44</sup> And hence, it is evident that the multiplicity (of *potency*) is not according to equivocation but according to analogy (i.e., it is not a multiplicity caused by a division according to *things signified* but by a division according to *multiple modes* of signifying, in which one is prior to, and is contained in the *ratio* of, the others; ►20.12).

### 31.11. Possible, Capable

As ARISTOTLE says, **possible, capable** (*possibile... et potens* = δυνατόν) is said in as many modes as *potency* is said.<sup>45</sup> Thus, he posits two modes of *possible* that correspond to the aforesaid modes of *potency* (to wit, according to active potency, ►31.12; and according to passive potency, ►31.13).<sup>46</sup>

<sup>40</sup> *In Metaph.* 9, l. 1, §1780 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a16–19): “Iterum alio modo dicuntur potentiae non solum per ordinem ad facere et pati, sed per ordinem ad hoc quod est bene in utroque.”

<sup>41</sup> *In Metaph.* 9, l. 1, §1780: “sicut dicimus aliquem potentem ambulare, non quod possit ambulare quoquo modo, sed eo quod possit bene ambulare. Et e converso dicimus esse de claudicante, quod non possit ambulare.”

<sup>42</sup> *In Metaph.* 9, l. 1, §1780: “Similiter dicimus ligna combustibilia eo quod comburi possint de facili. Ligna vero viridia, quae non de facili comburuntur, dicimus incombustibilia.”

<sup>43</sup> *In Metaph.* 9, l. 1, §1780: “Unde manifestum est quod in definitione harum potentiarum, quae dicuntur respectu bene agere vel pati, includuntur rationes primarum potentiarum, quae dicebantur simpliciter agere et pati: sicut in bene agere includitur agere; et pati, in eo quod est bene pati.”

<sup>44</sup> *In Metaph.* 9, l. 1, §1780: “Unde manifestum est, quod omnes isti modi potentiarum reducuntur ad unum primum, scilicet ad potentiam activam. Et inde patet quod haec multiplicitas non est secundum aequivocationem, sed secundum analogiam.”

<sup>45</sup> *In Metaph.* 5, l. 14, §961 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a32–33): “Dicit ergo [Philosophus], quod, cum potentia tot modis dicatur, possibile etiam et potens pluribus modis dicitur.”

<sup>46</sup> *In Metaph.* 5, l. 14, §961 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a32–b15): “Ponit [Philosophus] modos possibilis correspondentes praedictis modis potestatis.”



### 31.12. Possible, Capable According to Active Potency

To the first mode of potency (i.e., active potency; ►31.4) respond two modes of the possible, for something is said (to be) *capable to act* (*potens agere*) according to an active potency in two (modes):<sup>47</sup>

**1. Because it acts by itself immediately:** that which has in itself the active principle (of motion or) of mutation (*quod habet [motus] principium <activum> [aut] mutationis* = τὸ ἔχον κινήσεως ἀρχὴν ἢ μεταβολῆς) in itself.<sup>48</sup>

For example, that which causes another to be still (*stativum vel sistitivum, idest id quod facit aliud stare* = τὸ στατικόν), is said to be potent (*potens* = δυνατόν) to stop something else, diverse from itself (*aliquid aliud diversum ab eo < aliquid in altero aut in quantum alterum* = ἐν ἑτέρῳ ἢ ἢ ἕτερον).<sup>49</sup>

**2. Because it acts by means of another,** to which it communicates its potency, as a king acts through a governor: when it does not operate immediately, but *another has from it such a power* (*aliud habet ab eo talem potestatem* < ἐὰν ἔχη τι αὐτοῦ ἄλλο δύναμιν τοιαύτην), so that it could immediately act.<sup>50</sup>

### 31.13. Possible, Capable According to Passive Potency

According to the mode that responds to passive potency (►31.5), that is said (to be) **possible** or **capable** which can be mutated into something, whatever that may be (*quod potest mutari in aliquid, quicquid sit illud* = ἐὰν ἔχη μεταβάλλειν ἐφ' ὅτιοῦν): namely, whether it could be mutated into the worse or into the better (*in peius, sive in melius* = εἴτ' ἐπὶ τὸ χεῖρον εἴτ' ἐπὶ τὸ βέλτιον).<sup>51</sup>

According to this, something is said (to be) *corruptible* (*corruptibile* = φθειρόμενον) because it can be corrupted (*potest corrumpi* < δυνατόν εἶναι φθειρεσθαι), which is to

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<sup>47</sup> *In Metaph.* 5, l. 14, §961: “Primo autem modo potestatis respondent duo modi possibilis. Secundum potestatem enim activam aliquid dicitur potens agere dupliciter. Uno modo, quia ipse per seipsum agit immediate. Alio modo, quia agit mediante altero, cui potentiam suam communicat, sicut rex agit per ballivum.”

<sup>48</sup> *In Metaph.* 5, l. 14, §961 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a33–34): “Uno quidem modo, quod habet principium activum mutationis in seipso.”

<sup>49</sup> *In Metaph.* 5, l. 14, §961 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a34–35): “sicut stativum vel sistitivum, idest id quod facit aliud stare, dicitur esse potens ad sistendum aliquid aliud diversum ab eo. Alio vero modo, quando ipse non immediate operatur, sed aliud habet ab eo talem potestatem, ut possit immediate agere.”

<sup>50</sup> *In Metaph.* 5, l. 14, §961 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019a35–b1): “Alio vero modo, quando ipse non immediate operatur, sed aliud habet ab eo talem potestatem, ut possit immediate agere.”

<sup>51</sup> *In Metaph.* 5, l. 14, §962 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b1–3): “Secundo ponit [Philosophus] secundum modum respondentem secundo modo potentiae, idest potentiae passivae; dicens, quod alio modo a praedicto dicitur possibile sive potens, quod potest mutari in aliquid, quicquid sit illud; scilicet sive possit mutari in peius, sive in melius.”

mutate into the worse; or *in corruptible* (*non corruptibile*) because it would be impossible for it to be corrupted.<sup>52</sup>

That which can be affected must have in itself some disposition (*dispositio* = διάθεσις), called *passive potency*, that would be the cause and principle of such an affection.<sup>53</sup>

However, the principle of affections can be in something passible (*inesse alicui passibili*, i.e., in something that is capable of being affected) in two modes:<sup>54</sup>

**1. Because it has something** (*quod habet aliquid* = τῷ ἔχειν τι).<sup>55</sup> For example, it is possible for man to be affected by illness because of the abundance of some inordinate fluid.

**2. Because it is deprived** (*quod privatur* = τῷ ἐστερηθῆναι) **of something** that can be incompatible with (*posset repugnare*) the affection.<sup>56</sup> For example, man would be said (to be) *capable of being affected by illness* (*potens infirmari*) due to the subtraction of strength and natural virtue.

Indeed, the following two must be (found) in anything that is capable of being affected (*in quolibet potente pati*), for something is affected only:<sup>57</sup> (¶1) if there is in it a subject that is receptive of a disposition or form that is induced by the affection; and (¶2) if there is in the patient a weakness of virtue to resist the action of the agent.

### 31.14. Reduction to Habit

The above two modes of the principle of being affected (► 31.13) can be reduced to one, since privation can be signified as a habit.<sup>58</sup> In this way, it would follow that to be deprived

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<sup>52</sup> *In Metaph.* 5, l. 14, §962 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b3–4): “Et secundum hoc, aliquid dicitur corruptibile, quia potest corrumpi, quod est in peius mutari: vel non corruptibile, quia potest non corrumpi, si sit impossibile illud ipsum corrumpi.”

<sup>53</sup> *In Metaph.* 5, l. 14, §963 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b4–5): “Oportet autem illud, quod est possibile ad aliquid patiendum, habere in se quamdam dispositionem, quae sit causa et principium talis passionis; et illud principium vocatur potentia passiva.”

<sup>54</sup> *In Metaph.* 5, l. 14, §963: “Principium autem passionis potest inesse alicui passibili dupliciter.”

<sup>55</sup> *In Metaph.* 5, l. 14, §963 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b5–6): “Uno modo per hoc, quod habet aliquid; sicut homo est possibilis pati infirmitatem propter abundantiam alicuius inordinati humoris in ipso.”

<sup>56</sup> *In Metaph.* 5, l. 14, §963 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b6–7): “Alio vero modo est aliquid potens pati per hoc, quod privatur aliquo, quod posset repugnare passioni; sicut si homo dicatur potens infirmari propter subtractionem fortitudinis et virtutis naturalis.”

<sup>57</sup> *In Metaph.* 5, l. 14, §963: “Et haec duo oportet esse in quolibet potente pati. Nunquam enim aliquid pateretur, nisi esset in eo subiectum, quod esset receptivum dispositionis, vel formae, quae per passionem inducitur; et nisi esset debilitas virtutis in patiente ad resistendum actioni agentis.”

<sup>58</sup> *In Metaph.* 5, l. 14, §963 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b6–7): “Et haec duo oportet esse in quolibet potente pati. Nunquam enim aliquid pateretur, nisi esset in eo subiectum, quod esset receptivum dispositionis, vel formae, quae per passionem inducitur; et nisi esset debilitas virtutis in patiente ad resistendum actioni agentis.”

would be *to have a privation*. And in this way, either mode will (consist) in *having* something.

That privation can be signified as a habit (*habitus*, i.e., possession insofar as *possession* signifies *the act of possessing*) and as something had (*aliquid habitum*, i.e., a possession insofar as *possession* signifies *that which is possessed*) happens because *being* (*ens* = τὸ ὄν) is said equivocally (*aequivoce dicitur* = ὁμωνύμως... λεγόμενον), and according to one mode, both privation and negation can be signified as a habit.<sup>59</sup> Hence, we can universally say that it would be possible for something to be affected because it has in itself some habit and some principle of affection, since *to be deprived* would also be *to have something*, if there should be a privation.

### 31.15. Other Modes of the Possible, Capable

(ARISTOTLE adds two more modes according to which something is said to be *possible* or *capable*.)

3. *Insofar as it does not have the power or principle of being corrupted by another insofar as it is another.*<sup>60</sup> That is, something is said to be potent or vigorous because it cannot be overcome from the exterior in order to be corrupted.

This mode corresponds to the fourth mode of *potency*, according as *potency* was said to be in something that cannot be corrupted or to be mutated into the worse (► 31.7).<sup>61</sup>

4. *Only insofar as something happens to come to be or not to come to be—or also, because it happens to come to be well.*<sup>62</sup> This is according to the aforesaid modes that pertain to acting and to being affected. Thus, just as the potent is said to act because it can act well and easily or because it can act simply, likewise, the potent (can) be affected and corrupted because it can easily be affected by this.

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<sup>59</sup> *In Metaph.* 5, l. 14, §964 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b8–10): “Quod autem privatio possit significari ut habitus, et ut aliquid habitum, ex hoc contingit, quod ens aequivoce dicitur. Et secundum unum modum et privatio et negatio dicitur ens, ut habitum est in principio quarti [§§564ss]. Et sic sequitur quod etiam negatio et privatio possunt significari ut habitus. Et ideo possumus universaliter dicere, quod aliquid possibile sit pati propter hoc quod habet in se quemdam habitum et quoddam principium passionis; cum etiam privari sit habere aliquid, si contingat privationem habere.”

<sup>60</sup> *In Metaph.* 5, l. 14, §965 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b10–11): “*Tertium modum* ponit [Philosophus] hic [...]. Dicit ergo, quod alio modo dicitur possibile vel potens, in quantum non habet potestatem vel principium aliquod ad hoc quod corrumpatur. Et hoc dico ab alio in quantum est aliud; quia secundum hoc aliquid dicitur potens et vigorosum, quod ab exteriori vinci non potest, ut corrumpatur.”

<sup>61</sup> *In Metaph.* 5, l. 14, §965: “et respondet quarto modo potentiae, secundum quod potentia dicebatur inesse alicui, quod non potest corrumpi, vel in peius mutari.”

<sup>62</sup> *In Metaph.* 5, l. 14, §966 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b11–13): “*Quartum modum* ponit [Philosophus...]. Dicit ergo, quod secundum praedictos modos, qui pertinent ad agendum vel patiendum, potest dici aliquid potens vel ex eo solum, quod aliquid accidit fieri vel non fieri, vel ex eo quod accidit etiam bene fieri. Sicut etiam dicitur potens agere, quia potest bene et faciliter agere, vel quia potest agere simpliciter. Et similiter potens pati et corrumpi, quia de facili hoc pati potest.”

This mode responds to the third mode of *potency*, according as *potency* was said in respect of acting or being affected well (► 31.6).<sup>63</sup>

This mode of power is found also in inanimate things such as musical instruments, for some lyre is said to be capable of sounding because it sounds well, while (it is said of) another (that it) cannot sound because it does not sound well.<sup>64</sup>

### 31.16. Impotence and Impossibility

Impotence (*impotentia* = ἀδυναμία), since it is contrary to the aforesaid potency, and the impossible (*impossibile* = ἀδύνατον), which is said according to such an impotence, is the privation of the aforesaid potency.<sup>65</sup> ARISTOTLE says this to differentiate (*impotence*) from *impossible*, which signifies some mode of falsity, and is not said according to some impotence, just as *possible* is not said according to some potency.

Since privation and habit (i.e., possession) are of the same and according to the same, it is necessary for potency and impotence to be of the same and according to the same.<sup>66</sup> Hence, impotence is said in as many modes as its opposite, *potency*.

### 31.17. Impotence

As ARISTOTLE says, the common *ratio* of **impotence** (*impotentia* = ἀδυναμία) is *the privation of potency* (*privatio potentiae* = στέρησις δυνάμεως).<sup>67</sup>

However, two (things) are required for the *ratio* of *privation*:<sup>68</sup>

1. The removal of the habit (i.e., possession) of the opposite (*remotio habitus oppositi*).<sup>69</sup> And potency is that which is opposed to impotence; whence, since potency is some

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<sup>63</sup> *In Metaph.* 5, l. 14, §966: “respondet tertio modo potentiae, secundum quem dicebatur potentia ad bene agendum vel patiendum.”

<sup>64</sup> *In Metaph.* 5, l. 14, §966 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b13–15): “Et iste modus potestatis etiam invenitur in rebus inanimatis ut in organis, idest in lyra et musicis instrumentis. Dicitur enim quod aliqua lyra potest sonare, quia bene sonat; alia non potest sonare, quia non bene sonat.”

<sup>65</sup> *In Metaph.* 9, l. 1, §1784 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a29–31): “*Determinat* [Philosophus] *de impotentia*; dicens, quod impotentia, quia est contraria dictae potentiae, et impossibile, quod dicitur secundum huiusmodi impotentiam, est privatio praedictae potentiae. Hoc autem dicit ad differentiam impossibilis, quod significat aliquem modum falsitatis, quod non dicitur secundum aliquam impotentiam sicut nec possibile secundum aliquam potentiam.”

<sup>66</sup> *In Metaph.* 9, l. 1, §1784: “Quia enim privatio et habitus sunt eiusdem et secundum idem, necesse est quod potentia et impotentia sint eiusdem et secundum idem. Et ideo quot modis dicitur potentia, tot modis dicitur impotentia sibi opposita.”

<sup>67</sup> *In Metaph.* 5, l. 14, §967 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b15–16): “ostendit [Philosophus] communem rationem huius nominis impotentia. [...] Dicit ergo primo, quod impotentia est privatio potentiae.”

<sup>68</sup> *In Metaph.* 5, l. 14, §967: “Ad rationem autem privationis duo requiruntur.”

<sup>69</sup> *In Metaph.* 5, l. 14, §967: “quorum primum est remotio habitus oppositi. Id autem, quod opponitur impotentiae, est potentia. Unde, cum potentia sit quoddam principium, impotentia erit sublatio quaedam talis principii, qualis dicta est esse potentia.”

principle, impotence will be some annulling (*sublatio*) of such a principle as potency has been said to be.

2. Privation properly said is about a determinate subject and a determinate time (►42.7); and it is improperly taken without the determination of a subject or of a time.<sup>70</sup> Thus, only that is properly said (to be) *blind* which is naturally apt to have vision, and when it is naturally (apt) to have vision.

Said in this mode, *impotence* conveys (*dicit*) the removal of potency either: **(a)** *universally* (*omnino, idest universaliter = ὁλως*): namely, such that every removal of potency would be said (to be an) *impotence*, whether (the subject) is naturally apt to have it or not; or it conveys the removal (of potency) in that which is naturally apt to have it, whenever; or **(b)** only *when it is naturally apt to have it*.<sup>71</sup>

Thus, *impotence* is not likewise taken when we say that a child cannot beget and when (we say the same of someone who) simultaneously (is) a (grown) man and a eunuch.<sup>72</sup> Indeed, a child is said (to be) *impotent to beget* because the subject is (naturally) apt to beget, but not at that time. On the other hand, a eunuch man is said (to be) *impotent to beget* because he should be (naturally) apt (to beget) at that time but cannot (beget) because he lacks the active principle of generation. Whence, the *ratio* of *privation* is maximally preserved here.

On the other hand, a mule or a stone is said (to be) *impotent to beget* because it cannot (beget), nor does it have the (natural) aptitude in the existing subject.<sup>73</sup>

### 31.18. The Modes of Impotence

ARISTOTLE shows in how many modes *impotence* is said through the opposite to the modes of *potency*.<sup>74</sup> For just as potency is twofold—namely, active and passive, and

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<sup>70</sup> *In Metaph.* 5, l. 14, §967: “Secundum quod requiritur, est quod privatio proprie dicta sit circa determinatum subiectum et determinatum tempus. Improperie autem sumitur absque determinatione subiecti et temporis. Non enim caecum proprie dicitur nisi quod est aptum natum habere visum, et quando est natum habere visum.”

<sup>71</sup> *In Metaph.* 5, l. 14, §968 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b16–18): “Impotentia autem sic dicta dicit remotionem potentiae, «aut omnino,» idest universaliter, ut scilicet omnis remotio potentiae impotentia dicatur, sive sit aptum natum habere, sive non: aut dicitur remotio in eo quod est aptum natum habere quandocumque, aut solum tunc quando aptum natum est habere.”

<sup>72</sup> *In Metaph.* 5, l. 14, §968 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b16–19): “Non enim similiter accipitur impotentia, cum dicimus puerum non posse generare, et cum virum et eunuchum simul. Puer enim dicitur impotens generare, quia subiectum est aptum ad generandum, non tamen pro illo tempore. Vir autem eunuchus dicitur impotens ad generandum, quia pro illo tempore esset quidem aptus, non tamen potest, quia caret principiis activis generationis. Unde hic magis salvatur ratio privationis.”

<sup>73</sup> *In Metaph.* 5, l. 14, §968: “Mulus autem vel lapis dicitur impotens ad generandum, quia non potest nec etiam habet aptitudinem in subiecto existentem.”

<sup>74</sup> *In Metaph.* 5, l. 14, §969 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b19–21): “Dat intelligere [Philosophus] *impotentiae modos* per oppositum ad modos potentiae. Sicut enim potentia est duplex, scilicet activa et

again, each of them (is a potency) to act or to be affected *simply* or to act or to be affected *well*—so, too, there is an opposite impotence according to either.<sup>75</sup>

Thus, there is an active potency to set (something) in motion simply (< μόνον κινητικῆ) or well (< καλῶς κινητικῆ); and a passive potency to being set in motion simply or well.

### 31.19. Impossible

As ARISTOTLE shows, **impossible** (*impossibile* = ἀδύνατον) is said in multiple modes.<sup>76</sup>

1. Insofar as some impossible (things) have the aforesaid impotence that is **opposed to potency**.<sup>77</sup> And such a mode is divided into four (modes), as (is) impotence too.

2. Due to an **incompatibility** (*repugnantia*) of the terms **in a proposition**, rather than due to the privation of some potency.<sup>78</sup>

Since *to be able* (*posse*) is said in order to being (*in ordine ad esse*), just as not only that which is in the nature of things is said (to be a) *being* (*ens*), but (also what is) according to the composition of a proposition (► 30.5), insofar as there is in it the true and the false, so, too, *possible* and *impossible* is said not only due to the potency or impotency of the thing, but due to the truth or the falseness of composition or division in propositions.<sup>79</sup>

Whence, that is said (to be) **impossible** *whose contrary is of necessity true* (*cuius contrarium est verum de necessitate* = οὐ τὸ ἐναντίον ἐξ ἀνάγκης ἀληθές).<sup>80</sup>

For example, that the diameter of the square should be commensurable with its side is impossible because such (a thing) is false whose contrary—(in this case), that it is not

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passiva: et iterum utraque aut ad agendum et patiendum simpliciter, aut ad bene agendum et patiendum; ita secundum utramque potentiam est impotentia opposita. Et «solum mobili et bene mobili» idest potentiae activae, quae est ad movendum simpliciter, vel bene movendum: et potentiae passivae, quae est ad moveri simpliciter, vel bene moveri.”

<sup>75</sup> In *Metaph.* 5, l. 14, §967 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b15–19): “ostendit [Philosophus] quot modis dicitur impotentia. [...] ostendit quot modis dicatur [...]”

<sup>76</sup> In *Metaph.* 5, l. 14, §970 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b21–35): “Ostendit [Philosophus] quot modis dicitur impossibile [...]. Primo distinguit modos impossibilis.”

<sup>77</sup> In *Metaph.* 5, l. 14, §970 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b21–22): “Primo dicit [Philosophus], quod uno modo dicuntur aliqua impossibilia secundum quod habent impotentiam praedictam, quae opponitur potentiae. Et huiusmodi modus in quatuor dividitur, sicut et impotentia.”

<sup>78</sup> In *Metaph.* 5, l. 14, §971 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b22–27): “ponit [Philosophus] alium modum, quo dicuntur aliqua impossibilia, non propter privationem alicuius potentiae, sed propter repugnantiam terminorum in propositionibus.”

<sup>79</sup> In *Metaph.* 5, l. 14, §971 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b22–24): “Cum enim posse dicatur in ordine ad esse, sicut ens dicitur non solum quod est in rerum natura, sed secundum compositionem propositionis, prout est in ea verum vel falsum; ita possibile et impossibile dicitur non solum propter potentiam vel impotentiam rei: sed propter veritatem et falsitatem compositionis vel divisionis in propositionibus.”

<sup>80</sup> In *Metaph.* 5, l. 14, §971 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b23–24): “Unde impossibile dicitur, cuius contrarium est verum de necessitate.”

commensurable—is not only true but also necessary.<sup>81</sup> Therefore, to be commensurable is false of necessity—and this is the impossible (in this mode).

### 31.20. To Be Able and Not to Be Able

*To be able (posse)* conveys (*importat*) a mean respect between *potent* and *possible*, just as *to know* (conveys a mean respect) between *knower* and *knowable*.<sup>82</sup>

Hence, something can be negated *to be able* (in two modes).<sup>83</sup>

1. From the part of the potent.
2. From the part of the possible.

### 31.21. The Impossible by Itself

From the part of the possible itself, the *impossible by itself (impossibile per se)* is that which cannot in any mode have the *ratio* of *possible*.<sup>84</sup>

Indeed, every potency is toward being (*ad esse*) or toward non-being (*ad non esse*), as the potency that is toward corrupting.<sup>85</sup> Whence, that cannot be possible which cannot have the *ratio* of *being* or of *non-being*.

Hence, simultaneously being (*esse*) and not being (*non esse*) is impossible in itself, for that which is a being (*ens*) and a non-being (*non ens*) is neither a being nor a non-being, which lacks the *ratio* of *possible*.<sup>86</sup>

Thus, something is impossible in itself if the contrary of the predicate is in the definition of the subject: for example, a non-rational man; or a triangle that does not have three lines, for whoever posits a triangle posits that it has three lines, and this is to simultaneously have and not have three (lines).<sup>87</sup>

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<sup>81</sup> *In Metaph.* 5, l. 14, §971 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b24–27): “ut diametrum quadrati esse commensurabilem eius lateri, est impossibile, quia hoc tale est falsum, cuius contrarium non solum est verum, sed etiam necessarium, quod quidem est non commensurabilem esse. Et propter hoc esse commensurabilem est falsum de necessitate, et hoc est impossibile.”

<sup>82</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “posse importat respectum medium inter potentem et possibile, sicut scire inter scientem et scibile.”

<sup>83</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “et ideo aliquid posse potest negari ex parte potentis, et aliquid ex parte possibilis.”

<sup>84</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “ex parte ipsius possibilis, quod nullo modo rationem possibilis habere potest: et hoc dicimus impossibile esse per se. Et cuiusmodi sit hoc, investigandum est.”

<sup>85</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “Sciendum igitur, quod omnis potentia vel est ad esse vel ad non esse, sicut potentia quae est ad corrumpendum. Unde quidquid non potest habere rationem entis vel non entis, illud non potest esse possibile.”

<sup>86</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “et ideo hoc quod est idem simul esse et non esse, est in se impossibile: quia quod est ens et non ens, neque est ens neque non ens.”

<sup>87</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “nullum eorum possit in quibus contrarium praedicati est in definitione subjecti, ut quod faciat hoc, scilicet hominem non esse rationalem, vel triangulum non habere tres lineas.”

From this, it moreover follows that something is impossible in itself if opposites should simultaneously be in the same (subject), for in the definition of one contrary is the privation of the other, and negation is in the definition of privation as the prior is in the posterior.<sup>88</sup>

### 31.22. Possible

The **possible** (*possibile* = δυνατόν) that is the contrary of the impossible in the second mode (► 31.19) is *that whose contrary is not of necessity false* (*cuius contrarium non est de necessitate falsum* < ὅταν μὴ ἀναγκαῖον ᾖ τὸ ἐναντίον ψευδὸς εἶναι).<sup>89</sup>

Thus, (in this mode) that is said to be in potency (*in potentia* < δυνατόν) which, if posited to be in act, nothing impossible follows (*quod si ponatur esse actu, nihil impossibile sequitur* < *hoc cui si extiterit actus cuius dicitur habere potentiam, nichil erit impossibile* = τοῦτο ὧν ἐὰν ὑπάρξη ἢ ἐνέργεια οὐ λέγεται ἔχειν τὴν δύναμιν, οὐθὲν ἔσται ἀδύνατον).<sup>90</sup>

For example, something impossible does not happen if one should say that it is possible for someone to be seated if he is posited to be seated, because not to be seated—which is its opposite—is not of necessity false.<sup>91</sup> (It is) likewise (the case) of being set in motion or setting (something else) in motion, and other such (possible things).

Therefrom, it is evident that this mode of the **possible** is divided into three modes:<sup>92</sup>

**1. That which is false but not of necessity** (*quod falsum est, sed non ex necessitate* < τὸ μὴ ἐξ ἀνάγκης ψευδὸς σημαίνει).<sup>93</sup> For example, that a man should be seated when he is not seated, since its opposite is not of necessity true.

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In hoc ipso enim quod ponitur triangulus, ponitur tres lineas habere: unde hoc est simul habere tres et non habere.”

<sup>88</sup> *In Sent.* 1, d. 42 q. 2 a. 2 co.: “Et ex hoc ulterius sequitur quod non possit facere esse aliqua opposita simul in eodem; quia in definitione unius contrarii est privatio alterius, et in definitione privationis est negatio, sicut prius est in posteriori.”

<sup>89</sup> *In Metaph.* 5, l. 14, §972 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b27–29): “Manifestat [Philosophus] quid sit possibile oppositum impossibili secundo modo dicto. Impossibile enim opponitur possibili secundo modo dicto, sicut dictum est. Dicit ergo, quod possibile contrarium huic secundo impossibili est, cuius contrarium non est de necessitate falsum.”

<sup>90</sup> *In Metaph.* 9, l. 3, §1804 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a24–26): “Ostendit [Philosophus] quid sit esse in potentia, et quid esse in actu. Et primo quid sit esse in potentia, dicens, quod id dicitur esse in potentia, quod si ponatur esse actu, nihil impossibile sequitur.”

<sup>91</sup> *In Metaph.* 9, l. 3, §1804 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a26–29): “Ut si dicatur, aliquem possibile est sedere, si ponatur ipsum sedere non accidit aliquid impossibile. Et similiter de moveri et movere, et de aliis huiusmodi.” *In Metaph.* 5, l. 14, §972 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b29–30): “sicut sedere hominem est possibile, quia non sedere, quod est eius oppositum, non est de necessitate falsum.”

<sup>92</sup> *In Metaph.* 5, l. 14, §973 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b30–33): “Ex quo patet, quod ille modus possibilis in tres modos dividitur.”

<sup>93</sup> *In Metaph.* 5, l. 14, §973 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b30–32): “Dicitur enim uno modo possibile quod falsum est, sed non ex necessitate: sicut hominem sedere dum non sedet, quia eius oppositum non est verum ex necessitate.”



**2. That which is true but not of necessity** (*quod est verum, sed non de necessitate < τὸ ἀληθὲς εἶναι*), since its opposite is not of necessity false.<sup>94</sup> For example, (it is possible) for Socrates to be seated while he is seated.

**3. That which is proximate to being true, even if it is not true** (*quia licet non sit verum, tamen contingit in proximo verum esse < τὸ ἐνδεχόμενον ἀληθὲς εἶναι*).<sup>95</sup>

However, just as the impossible taken in the second mode (i.e., due to an incompatibility of the terms in a proposition; ►31.19, ¶2) is not said according to some impotence, so, too, these modes of the possible are not said according to some potency, but according to likeness, or according to the mode of the true and the false.<sup>96</sup>

### 31.23. Reduction of the Possible and the Impossible to Active Potency

ARISTOTLE reduces all the modes of the possible and the impossible into one first (mode). He says that (those things that) are said (to be) possible according to potency (*secundum potentiam* = κατὰ δύναμιν) are all said in respect to one first potency (*per respectum ad unam primam potentiam* < πρὸς τὴν πρώτην [μίαν]), which is the first active potency: that is, the principle of mutation in another insofar as it is another (►31.4), for all others are said (to be) *possible* in respect of this potency.<sup>97</sup>

Thus, something is said (to be) *possible* because something else has an active potency to (affect) it, according to which it is said (to be) *possible* according to passive potency.<sup>98</sup>

Some (other things) are said (to be) *possible* in that something else does not have such a potency in it.<sup>99</sup> For example, those are said (to be) *powerful* (*potentia*) which cannot be corrupted by external agents.

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<sup>94</sup> *In Metaph.* 5, l. 14, §973 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b32): “Alio modo dicitur possibile quod est verum, sed non de necessitate, quia eius oppositum non est falsum de necessitate, sicut Socratem sedere dum sedet.”

<sup>95</sup> *In Metaph.* 5, l. 14, §973 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b32–33): “Tertio modo dicitur possibile, quia licet non sit verum, tamen contingit in proximo verum esse.”

<sup>96</sup> *In Metaph.* 5, l. 14, §974: “Sicut autem impossibile secundo modo acceptum non dicitur secundum aliquam impotentiam, ita et modi possibilis ultimo positi, non dicuntur secundum aliquam potentiam, sed secundum similitudinem, vel secundum modum veri et falsi.”

<sup>97</sup> *In Metaph.* 5, l. 14, §975 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b35–1020a2): “*Reducit omnes modos possibilis et impossibilis ad unum primum*: et dicit, quod possible, quae dicuntur secundum potentiam, omnia dicuntur per respectum ad unam primam potentiam, quae est prima potentia activa, de qua supra dictum est, quod est principium mutationis in alio in quantum est aliud. Nam omnia alia possible dicuntur per respectum ad istam potentiam.”

<sup>98</sup> *In Metaph.* 5, l. 14, §975 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1020a2–3): “Aliquid enim dicitur possibile per hoc, quod aliquid aliud habet potentiam activam in ipsum, secundum quod dicitur possibile secundum potentiam passivam.”

<sup>99</sup> *In Metaph.* 5, l. 14, §975 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1020a6): “Quaedam vero dicuntur possible in non habendo aliquid aliud talem potentiam in ipsa: sicut quae dicuntur potentia, quia non possunt corrumpi ab exterioribus agentibus.”

Some (other things) are said (to be) *powerful (potentia)* because they have a potency to act or to be affected well or easily.<sup>100</sup>

And just as all possible (things) that are said according to some potency are reduced to one first potency, so all impossible (things), which are said according to some impotency, are reduced to one first impotency, which is the opposite of the first potency.<sup>101</sup>

Therefore, it is evident that the proper definition of *potency* said in the first mode (*propria definitio potentiae primo modo dictae* < ὁ κύριος ὅρος τῆς πρώτης δυνάμεως) is *the principle of permutation in another insofar as it is another (principium permutationis in alio in quantum est aliud* < ἀρχὴ μεταβλητικὴ ἐν ἄλλῳ ἢ ἢ ἄλλο), which is the *ratio* of **active potency**.

### 31.24. *Potency Metaphorically Taken*

In some things, *potency* is not said due to some principle (that is) had (in them), but due to some likeness.<sup>102</sup> For example, as ARISTOTLE shows, *potency (potentia = δύναμις, i.e., power)* is said in geometry according to a metaphor (*metaphorice, secundum metaphoram = κατὰ μεταφοράν*).

Thus, it is said (in geometry) that the *potency (potentia)* of some line is its square; and it is said that a line is capable (of producing) its square (*potest in suum quadratum*), for a square is produced from a line—which is the root of the square—drawn into itself.<sup>103</sup> Hence, in geometry, the square of a line is said (to be the) *potency* of the line due to this likeness: just as that which is in act is produced from that which is in potency, so from drawing some line into itself results its square (*ex ductu alicuius lineae in seipsam, resultat quadratum ipsius*; i.e., since geometers imagine that a moved line produces a surface; and, should it be evenly moved along the same length, it would produce a square).

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<sup>100</sup> *In Metaph.* 5, l. 14, §975 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1020a3–4): “Quaedam vero potentia «in sic habendo,» idest in hoc quod habent potentiam, ut bene aut faciliter agant vel patientur.”

<sup>101</sup> *In Metaph.* 5, l. 14, §976 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1020a4): “Et sicut omnia possibile, quae dicuntur secundum aliquam potentiam, reducuntur ad unam primam potentiam; ita omnia impossibile, quae dicuntur secundum aliquam impotentiam, reducuntur ad unam primam impotentiam, quae est opposita primae potentiae.”

<sup>102</sup> *In Metaph.* 9, l. 1, §1774 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a7–8): “Dicit ergo [Philosophus] quod de modis potentiae illi praetermittendi sunt ad praesens, secundum quod potentia dicitur aequivoce. In quibusdam enim dicitur potentia non propter aliquod principium habitum, sed propter similitudinem quamdam, sicut in geometricis.” *In Metaph.* 5, l. 14, §974 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b33–34): “Ostendit [Philosophus] quomodo potentia sumatur metaphorice; et dicit, in geometria dicitur potentia secundum metaphoram.”

<sup>103</sup> *In Metaph.* 9, l. 1, §1774: “Dicitur enim potentia alicuius lineae esse quadratum eius; et dicitur quod linea potest in suum quadratum. [...] Ex linea etiam, quae est radix quadrati, ducta in seipsam fit quadratum.” *In Metaph.* 5, l. 14, §974 (cf. ARISTOTLE, *Metaphysica* Δ.12, 1019b34–35): “Potentia enim lineae in geometria dicitur quadratum lineae per hanc similitudinem: quia sicut ex eo quod est in potentia fit illud quod est in actu, ita ex ductu alicuius lineae in seipsam, resultat quadratum ipsius.”

In a like mode, it can be said in (respect of) numbers that three is capable (of producing) nine (*ternarius potest in novenarium*), which is its square, because it produces (*facit*) nine due to its being drawn into itself (*eo quod ex ductu eius in seipsum; novenarius consurgit ex ductu ternarii in seipsum*), for thrice three produces nine.<sup>104</sup>

Whence, the root of a square has some likeness with the matter from which a thing comes to be (*ex qua fit res; ► 14.8*). Therefrom, due to some likeness, (some quantity) is said (to be) capable (of producing) a square (*potens in quadratum*), just as matter (is said to be) capable (of producing) a thing (*potens in rem*).<sup>105</sup>

Likewise, in logical (things), we say that some (things) are possible or impossible not because of some potency but because—in some mode—they are or are not, for (those things) are said (to be) **possible** (*possibilia*) whose opposites can be true (*quorum opposita contingit esse vera; ► 31.22*, second mode); and **impossible** (*impossibilia*), whose opposites cannot be true (*quorum opposita non contingit esse vera; ► 31.19*).<sup>106</sup> This diversity is due to the habitude of the predicate to the subject, which (predicate) is sometimes incompatible with the subject (*repugnans subiecto*), as in impossible (things), but sometimes not, as in possible (things).

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<sup>104</sup> *In Metaph.* 9, l. 1, §1774: “Et simili modo potest dici in numeris, quod ternarius potest in novenarium quod est quadratum eius, eo quod ex ductu eius in seipsum facit novenarium. Ter enim tria novem faciunt. [...] Et similiter est in numeris.” <sup>104</sup> *In Metaph.* 5, l. 14, §974: “Sicut si diceremus, quod ternarius potest in novenarium, quia novenarius consurgit ex ductu ternarii in seipsum. Nam ter tria sunt novem.”

<sup>105</sup> *In Metaph.* 9, l. 1, §1774: “Unde radix quadrati habet aliquam similitudinem cum materia, ex qua fit res. Et propter hoc per quamdam similitudinem dicitur potens in quadratum, sicut dicitur materia potens in rem.”

<sup>106</sup> *In Metaph.* 9, l. 1, §1775 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a8–9): “Similiter in logicis dicimus aliqua esse possibile et impossibile, non propter aliquam potentiam, sed eo quod aliquo modo sunt aut non sunt. Possibilia enim dicuntur, quorum opposita contingit esse vera. Impossibilia vero, quorum opposita non contingit esse vera. Et haec diversitas est propter habitudinem praedicati ad subiectum, quod quandoque est repugnans subiecto, sicut in impossibilibus; quandoque vero non, sicut in possibilibus.”



## 32. Act

*Having determined what potency is, we turn our attention to its correlative act.*

### 32.1. Act Cannot Be Defined

ARISTOTLE responds to the tacit question of showing through definition what *act* is by saying that *act* is among the first, simple (principles); and one must not seek a definition of everything, for the first, simple (principles) cannot be defined, since one ought not to proceed infinitely in definitions.<sup>1</sup> Whence, *act* cannot be defined. However, it is possible to manifest what we want to say—that is, what *act* is—by induction through examples in singular (things).

### 32.2. Manifesting Act by Induction

As ARISTOTLE says, **act** (*actus* = ἐνέργεια) is when the thing is (*quando res est < existere rem* = τὸ ὑπάρχειν τὸ πρᾶγμα) but not such as it is when it is in potency (*nec tamen ita est sicut quando est in potentia < non ita sicut dicimus potentia* = μὴ οὕτως ὥσπερ λέγομεν δυνάμει).<sup>2</sup>

Thus, before wood is carved, we say that the image of Mercury is in wood in potency and not in act; but if it has been carved, then the image of Mercury is said to be in act in wood.<sup>3</sup>

Likewise, in a whole continuum, its part (is in potency), for a part—for example, a half—is in potency insofar as it is possible for that part to be removed from the whole through the division of the whole; but once the whole has been divided, that part will already be in act.<sup>4</sup>

Likewise, one who (scientifically) knows (*sciens*) and is not exploring (*non speculans*), is capable of considering (even though he should be) without (actual) consideration, while *to explore* or *to consider* is *to be* in act.<sup>5</sup>

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<sup>1</sup> *In Metaph.* 9, l. 5, §1826 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a35–37): “Respondet [Philosophus] quaestioni tacitae. Posset enim aliquis quaerere ab eo, ut ostenderet quid sit actus per definitionem. Sed ipse respondet dicens, quod inducendo in singularibus per exempla manifestari potest illud quod volumus dicere, scilicet quid est actus, «et non oportet cuiuslibet rei quaerere terminum,» idest definitionem. Nam prima simplicia definiri non possunt, cum non sit in definitionibus abire in infinitum. Actus autem est de primis simplicibus; unde definiri non potest.”

<sup>2</sup> *In Metaph.* 9, l. 5, §1825 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a30–32): “Primo [Philosophus] ostendit quid est actus; dicens, quod actus est, quando res est, nec tamen ita est sicut quando est in potentia.”

<sup>3</sup> *In Metaph.* 9, l. 5, §1825 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a32–33): “Dicimus enim in ligno esse imaginem Mercurii potentia, et non actu, antequam lignum sculpatur; sed si sculptum fuit, tunc dicitur esse in actu imago Mercurii in ligno.”

<sup>4</sup> *In Metaph.* 9, l. 5, §1825 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a33): “Et similiter in aliquo toto continuo pars eius. Pars enim, puta medietas, est in potentia, in quantum possibile est ut pars illa auferatur a toto per divisionem totius; sed diviso toto, iam erit pars illa in actu.”

<sup>5</sup> *In Metaph.* 9, l. 5, §1825 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a34–35): “Et similiter sciens et non speculans, est potens considerare sine consideratione; sed hoc scilicet speculari sive considerare, est esse in actu.”

### 32.3. The Analogy of Act

What *act* is can be seen through the proportion of some two (things) to each other (< τὸ ἀνάλογον συνορᾶν).<sup>6</sup>

For example, (we can induce what *act* is) if we take the proportion of the builder (which is in act) to the buildable (which is in potency); of the one who is awake (which is in act) to the one who is asleep (which is in potency); of the one who sees (which is in act) to the one who has his eyes closed although he has a seeing power (which is in potency); of that which is formed through art (which is in act) from formless matter (which is in potency); and of that which is prepared or elaborated (which is in act) to that which is not prepared or elaborated (which is in potency).<sup>7</sup>

Of those (things) that differ in this way, one part will be act and the other (will be) potency (< ταύτης δὲ τῆς διαφορᾶς θατέρω μορίῳ ἔστω ἡ ἐνέργεια ἀφωρισμένη θατέρω δὲ τὸ δυνατόν).<sup>8</sup> And so, proportionately, from particular examples, we can come to know what *act* is and (what) *potency* (is).

### 32.4. Modes of the Analogy of Act

ARISTOTLE shows that *act* is said diversely and posits two diversities:<sup>9</sup>

1. An act or an operation is said (to be an) *act*.<sup>10</sup> However, not all (things) are said to be in act (*actu* = ἐνεργεῖα) likewise (*similiter* = ὁμοίως) but diversely. And this diversity can be considered according to diverse proportions (< τῷ ἀνάλογον):

(a) As *a* is in *b*, so *c* is in *d* (*sicut hoc est in hoc, ita hoc in hoc* < ὡς τοῦτο ἐν τούτῳ... τὸ δ' ἐν τῷδε).<sup>11</sup> For example, just as sight is *in* the eye, so hearing is *in* the ear.

<sup>6</sup> *In Metaph.* 9, l. 5, §1827 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a37): “per proportionem aliquorum duorum adinvicem, potest videri quid est actus.”

<sup>7</sup> *In Metaph.* 9, l. 5, §1827 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048a37–b4): “Ut si accipiamus proportionem aedificantis ad aedificabile, et vigilantis ad dormientem, et eius qui videt ad eum qui habet clausos oculos cum habeat potentiam visivam, et eius «quod segregatur a materia,» idest per operationem artis vel naturae formatur, et ita a materia informi segregatur [ad illud quod non est segregatum a materia informi]; et similiter per separationem eius quod est praeparatum, ad illud quod non est praeparatum, sive quod est elaboratum ad id quod non est elaboratum.” Text in braces added following a footnote in the edition used.

<sup>8</sup> *In Metaph.* 9, l. 5, §1827 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b4–6): “quorumlibet sic differentium altera pars erit actus, et altera potentia. Et ita proportionaliter ex particularibus exemplis possumus venire ad cognoscendum quid sit actus et potentia.”

<sup>9</sup> *In Metaph.* 9, l. 5, §1828 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b6–17): “Ostendit [Philosophus], quod diversimode dicatur actus. Et ponit duas diversitates.”

<sup>10</sup> *In Metaph.* 9, l. 5, §1828 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b6–7): “quarum prima [diversitas] est, quod actus dicitur vel actus, vel operatio. Ad hanc diversitatem actus insinuandam dicit primo, quod non omnia dicimus similiter esse actu, sed hoc diversimode. Et haec diversitas considerari potest per diversas proportionem.”

<sup>11</sup> *In Metaph.* 9, l. 5, §1828 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b7–8): “Potest enim sic accipi proportio, ut dicamus, quod sicut hoc est in hoc, ita hoc in hoc. Utpote visus sicut est in oculo, ita auditus in aure.”

Thus, just as motion (*motus*) is the act of the mobile itself (*actus ipsius mobilis*) insofar as it is a mobile (*inquantum mobile est*), so being (*esse*) is the act of the existent (*actus existentis*) insofar as it is a being (*inquantum ens est*; ► 32.7).<sup>12</sup>

The comparison of *form to matter* is taken by this mode of proportion, for form is said to be *in matter* (< ὡς οὐσία πρὸς τινα ὕλην; ► 14.8).<sup>13</sup>

**(b)** As *a* is **to** *b*, so *c* is **to** *d* (*sicut habet se hoc ad hoc, ita hoc ad hoc* < ὡς τοῦτο... πρὸς τοῦτο, τὸ δ[ἐ] πρὸς τόδε).<sup>14</sup> For example, as (the power of) sight is *to* (the act of) seeing, so (is the power of) hearing *to* (the act of) hearing (*sicut se habet visus ad videndum, ita auditus ad audiendum*).

The comparison of *motion to motive potency*, or of any *operation to operative power* is taken by this mode of proportion (< ὡς κίνησις πρὸς δύναμιν).<sup>15</sup>

**2.** The infinite (*infinitum* = τὸ ἄπειρον), the void (*inane sive vacuum* = τὸ κενόν), and other (things) that are of such a mode are said to be in potency and in act diversely from many other beings.<sup>16</sup>

For example, that which sees (*videns*), that which walks (*vadens*), and that which is visible (*visibile* = τὸ ὁρώμενον, are said to be in potency and in act diversely), for sometimes it befits (*convenit*) such (a thing) to be simply (*simpliciter* = ἀπλῶς) in potency only or in act only, as that which is visible (is) in act only when it is seen (< ὅτι ὁρᾶται); and in potency, only when it can be seen (< ὅτι ὁρᾶσθαι δυνατόν) and is not seen.<sup>17</sup>

On the other hand, the infinite is not said (to be) *in potency* in such a way that it would sometimes be separated in act only.<sup>18</sup> Rather, act and potency are distinguished in *ratio*

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<sup>12</sup> *In Sent.* 1, d. 19 q. 2 a. 2 co.: “Sicut autem motus est actus ipsius mobilis inquantum mobile est; ita esse est actus existentis, inquantum ens est.”

<sup>13</sup> *In Metaph.* 9, l. 5, §1828 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b9): “Et per hunc modum proportionis accipitur comparatio substantiae, idest formae, ad materiam; nam forma in materia dicitur esse.”

<sup>14</sup> *In Metaph.* 9, l. 5, §1829 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b7–8): “Alius modus proportionis est, ut dicamus quod sicut habet se hoc ad hoc, ita hoc ad hoc; puta sicut se habet visus ad videndum, ita auditus ad audiendum.”

<sup>15</sup> *In Metaph.* 9, l. 5, §1829 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b8): “Et per hunc modum proportionis accipitur comparatio motus ad potentiam motivam, vel cuiuscumque operationis ad potentiam operativam.”

<sup>16</sup> *In Metaph.* 9, l. 5, §1830 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b9–11): “Ponit [Philosophus] aliam diversitatem actus; dicens, quod infinitum, et inane sive vacuum, et quaecumque huiusmodi sunt, aliter dicuntur esse in potentia et actu, quam multa alia entia.”

<sup>17</sup> *In Metaph.* 9, l. 5, §1830 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b11–14): “Utputa videns, et vadens, et visibile. Huiusmodi enim convenit aliquando simpliciter esse vel in potentia tantum, vel in actu tantum; sicut visibile in actu tantum, quando videtur, et in potentia tantum, quando potest videri et non videtur.”

<sup>18</sup> *In Metaph.* 9, l. 5, §1831 (cf. ARISTOTLE, *Metaphysica* Θ.6, 1048b14–17): “Sed infinitum non ita dicitur in potentia, ut quandoque sit separatum in actu tantum. Sed actus et potentia distinguuntur ratione et cognitione in infinito. Puta in infinito secundum divisionem dicitur esse actus cum potentia simul, eo quod

and in cognition in the infinite. For example, in the infinite according to division, there is said to simultaneously be act with potency, since it never lacks the potency of dividing, for when it is divided in act, there is still an ulterior divisible in potency. And act is never separated from potency—namely, in such a way that the whole should sometimes be divided in act and would not be further divisible in potency.

### 32.5. The First Act in the Order of Cognition

The name **act** (*actus* = ἐνέργεια), which is posited to signify entelechy (*entelechia* = ἐντελέχεια) and perfection (*perfectio*)—that is, *form* and other such (things) as are any operations—comes (< ἐλήλυθε), as (far as) the origin of the appellation (is concerned), above all (*maxime* = μάλιστα), from motions (*ex motibus* = ἐκ τῶν κινήσεων).<sup>19</sup>

Indeed, since names are signs of intelligible conceptions, we first impose names upon those (things) that we understand first, even if they should be posterior according to the order of nature.<sup>20</sup> And, among other acts, motion, which sensibly appears to us (► 8.10), is maximally known (*notus*, or, knowable) and apparent to us (< δοκεῖ... ἡ ἐνέργεια μάλιστα ἢ κίνησις εἶναι). Hence, the name *act* was first imposed to it, and has been derived from motion into other things.

Because of this, *to be set in motion* (*moveri*) is not attributed to in-existent (things), even though some other predicates are attributed to in-existent (things).<sup>21</sup>

Thus, we say that non-beings are understandable or suitable for being opined (*intelligibilia vel opinabilia* = διανοητά), or even desirable (*concupiscibilia* = ἐπιθυμητά).<sup>22</sup> Indeed, something befits even *being* and *non-being* by analogy, since non-being itself is analogically said (to be a) *being* (► 30.14).<sup>23</sup>

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nunquam deficit potentia dividendi: quando enim dividitur in actu, adhuc est ulterius divisibile in potentia. Nunquam autem separatur actus a potentia, ut scilicet quandoque sit totum divisum in actu, et non sit ulterius divisibile in potentia.”

<sup>19</sup> *In Metaph.* 9, l. 3, §1805 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a30–31): “Ostendit [Philosophus] quid sit esse in actu; et dicit, quod hoc nomen actus, quod ponitur ad significandum entelechiam et perfectionem, scilicet formam, et alia huiusmodi, sicut sunt quaecumque operationes, veniunt maxime ex motibus quantum ad originem vocabuli.”

<sup>20</sup> *In Metaph.* 9, l. 3, §1805 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a32): “Cum enim nomina sint signa intelligibilium conceptionum, illis primo imponimus nomina, quae primo intelligimus, licet sint posteriora secundum ordinem naturae. Inter alios autem actus, maxime est nobis notus et apprensus motus, qui sensibiliter a nobis videtur. Et ideo ei primo impositum fuit nomen actus, et a motu ad alia derivatum est.”

<sup>21</sup> *In Metaph.* 9, l. 3, §1806 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a32–34): “Et propter hoc moveri non attribuitur non existentibus; licet quaedam alia praedicata non existentibus attribuantur.”

<sup>22</sup> *In Metaph.* 9, l. 3, §1806 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a34): “Dicimus enim non entia esse intelligibilia vel opinabilia, aut etiam concupiscibilia.”

<sup>23</sup> *De veritate*, q. 2 a. 11 ad 5: “etiam enti et non enti aliquid secundum analogiam convenit, quia ipsum non ens, ens dicitur analogice, ut patet in IV Metaphysic.” *In Metaph.* 4, l. 1, §539 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b9–10): “dicimus quod non ens est non ens. Quod non diceretur nisi negationi aliquo modo esse competeret.”



However, we do not say that (inexistent things) are set in motion (*mota* = κινούμενα), because *to be set in motion* signifies to be *in act* (*actu* = ἐνεργεία), which is evidently false (of non-beings).<sup>24</sup> Thus, even though some non-beings are in potency, they are not, however, said to be (*non dicuntur esse*; or, they are not said [to be] *beings*) because they are not in act.

### 32.6. Division of *Being* into *Act* and *Potency*

ARISTOTLE posits the distinction of *being* (► 30) into *act* and *potency* saying that *being* and *to be* (*ens et esse* < τὸ εἶναι... καὶ τὸ ὄν) signify (*significant* = σημαίνει) something that may be said or uttered (*dicibile vel effabile* = ῥητόν) **in potency** (*in potentia* = δυνάμει) and **in act** (*in actu* = ἐντελεχεία).<sup>25</sup>

We should note that some (things) *can be* even if they are not, while others *are*.<sup>26</sup> Those (things) that can be are said to be *in potency* (*potentia*), while that which already is, is said to be *in act* (*actu*).

Being (*ens*) in potency is as a mean between pure non-being and being in act.<sup>27</sup> Those (things) that naturally come to be (*naturaliter fiunt*), do not come to be from non-being simply, but from being in potency. Whence, it is not necessary for those that come to be, to preexist in act.

In all the terms that signify the ten categories (i.e., *substance, quantity, quality, etc.*), something is said (to be) *in act* and something (is said to be) *in potency*.<sup>28</sup> Therefrom, each category is divided by act and potency, for any one genus is divided by act and potency, which are among the first differences of *being*.

<sup>24</sup> *In Metaph.* 9, l. 3, §1806 (cf. ARISTOTLE, *Metaphysica* Θ.3, 1047a35–b2): “sed non dicimus ea esse mota. Quia, cum moveri significet esse actu, sequeretur quod non entia actu essent actu; quod patet esse falsum. Etsi enim quaedam non entia sint in potentia, tamen ideo non dicuntur esse, quia non sunt in actu.”

<sup>25</sup> *In Metaph.* 5, l. 9, §897 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a35–b1): “ponit [Philosophus] distinctionem entis per actum et potentiam; dicens, quod ens et esse significant aliquid dicibile vel effabile in potentia, vel dicibile in actu.”

<sup>26</sup> *De prin. nat.* §1, 1–8: “Nota quod quoddam potest esse licet non sit, quoddam uero est. Illud quod potest esse dicitur esse potentia, illud quod iam est dicitur esse actu.”

<sup>27</sup> *In Physic.* 1, l. 9, n. 3: “Ens enim in potentia est quasi medium inter purum non ens et ens in actu. Quae igitur naturaliter fiunt, non fiunt ex simpliciter non ente, sed ex ente in potentia; non autem ex ente in actu [...]. Unde quae fiunt non oportet praeexistere actu, [...] sed potentia tantum.”

<sup>28</sup> *In Metaph.* 5, l. 9, §897 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017b1–3): “In omnibus enim praedictis terminis, quae significant decem praedicamenta, aliquid dicitur in actu, et aliquid in potentia. Et ex hoc accidit, quod unumquodque praedicamentum per actum et potentiam dividitur.” *In Physic.* 3, l. 1, n. 6 (cf. ARISTOTLE, *Physica* Γ.1, 200b26–27): “ens dividitur per potentiam et actum. Et haec quidem divisio non distinguit genera entium: nam potentia et actus inveniuntur in quolibet genere.” *Ibid.*, l. 2, n. 3: “unumquodque genus dividitur per potentiam et actum. Potentia autem et actus, cum sint de primis differentiis entis, naturaliter priora sunt motu: et his utitur Philosophus ad definiendum motum.” Cf. ARISTOTLE, *Physica* Γ.1, 201a9–10: “διηρημένου δὲ καθ’ ἕκαστον γένους τοῦ μὲν ἐντελεχείᾳ τοῦ δὲ δυνάμει.”

And just as in the things that are outside the soul something is said (to be) in act and something (is said to be) *in potency*, so in the acts of the soul and (in) privations, which are things of *ratio* (or of reason, *res rationis*) only.<sup>29</sup>

Thus, someone is said *to (scientifically) know (scire)* because he can use (*potest uti*) science (*scientia*) and because he uses (it).<sup>30</sup> Likewise, (something is said to be) *at rest (quiescens = ἡρεμοῦν)* because (the act of) resting (*quiescere < ἡρεμία*) is in (*inest = ὑπάρχει*) it already and because it can rest (*quiescere = ἡρεμεῖν*).

This is so not only in accidents, but also in substances.<sup>31</sup> Thus, we say that the image of Mercury is in stone in potency. And a half line is said to be in potency in a line, for whichever part of a continuum is potentially in the whole—which line is posited among substances according to the opinion of those who posit mathematical things to be substances, which (opinion) ARISTOTLE rejects. Also, a grain is said to be in potency when it is not yet perfect, as when it is unripe.

### 32.7. Being and Its Act of Being

The perfections of all (things) pertain to the perfection of being, for all things are perfect insofar as they have (an act of) being (*esse*) in some mode.<sup>32</sup>

Thus, the (act of) being taken universally (*in universali acceptum*) can extend to infinite (things).<sup>33</sup>

The (act of) being of man is terminated at the species of man, since it is received in the nature of the human species.<sup>34</sup> And this is likewise (the case) concerning the (act of) being of a horse or whatever creature.

However, since two (principles) ought to be considered in a thing—namely, the nature or quiddity of the thing, and its (act of) being (*esse*)—, in all univocal (things) the community

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<sup>29</sup> *In Metaph.* 5, l. 9, §897: “Et sicut in rebus, quae extra animam sunt, dicitur aliquid in actu et aliquid in potentia, ita in actibus animae et privationibus, quae sunt res rationis tantum.”

<sup>30</sup> *In Metaph.* 5, l. 9, §897 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017b3–6): “Dicitur enim aliquis scire, quia potest uti scientia, et quia utitur: similiter quiescens, quia iam inest ei quiescere, et quia potest quiescere.”

<sup>31</sup> *In Metaph.* 5, l. 9, §897 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017b6–8): “Et non solum hoc est in accidentibus, sed etiam in substantiis. Etenim Mercurium, idest imaginem Mercurii dicimus esse in lapide in potentia, et medium lineae dicitur esse in linea in potentia. Quaelibet enim pars continui est potentialiter in toto. Linea vero inter substantias ponitur secundum opinionem ponentium mathematica esse substantias, quam nondum reprobaverat [Philosophus]. Frumentum etiam quando nondum est perfectum, sicut quando est in herba, dicitur esse in potentia.”

<sup>32</sup> *STh* I, q. 4 a. 2 co.: “Omnium autem perfectiones pertinent ad perfectionem essendi, secundum hoc enim aliqua perfecta sunt, quod aliquo modo esse habent.”

<sup>33</sup> *De potentia*, q. 1 a. 2 co.: “esse in universali acceptum ad infinita se potest extendere.”

<sup>34</sup> *De potentia*, q. 1 a. 2 co.: “Esse enim hominis terminatum est ad hominis speciem, quia est receptum in natura speciei humanae; et simile est de esse equi, vel cuiuslibet creaturae.”

must be according to the *ratio* of the nature (*secundum rationem naturae*), and not according to being (*non secundum esse*), because one (act of) being is only in one thing.<sup>35</sup>

Whence, the habit (i.e., possession) of humanity (*habitus humanitatis*) is not in two human beings according to the same (act of) being (*secundum idem esse*).<sup>36</sup> And whenever the form signified by the name is the (act of) being itself, it cannot befit it (*convenire*) univocally—on account of which, also, *being* (*ens*) is not univocally predicated.

### 32.8. Composition of Act and Potency

The composition of act and potency is in more (things) than the composition of form and matter.<sup>37</sup> Whence, *matter* and *form* divide *natural substance*, while *potency* and *act* divide *common being*. And because of this, whatever (properties) follow upon potency and act as such (*inquantum huiusmodi*)—for example, *to receive* and *to be received* (►26), and *to perfect* and *to be perfected* (►23)—are common to material substances and created immaterial (substances). On the other hand, whatever (affections) are proper to matter and form as such—for example, *to be generated* and *to be corrupted*, and other such—these are proper to material substances, and in no mode befit created immaterial substances.

Hence, in substances composed from matter and form, there is a twofold composition of act and potency:<sup>38</sup>

1. The composition of substance itself, which is composed from matter and form.

That which is the act (*actus* = ἐντελέχεια) of something is the *ratio* and form (*ratio et forma* < λόγος; ►9.5) of that which is in potency (*eius quod est in potencia* = τοῦ δυνάμει ὄντος).<sup>39</sup>

<sup>35</sup> *In Sent.* 1, d. 35 q. 1 a. 4 co.: “cum in re duo sit considerare: scilicet naturam vel quidditatem rei, et esse suum, oportet quod in omnibus univocis sit communitas secundum rationem naturae, et non secundum esse; quia unum esse non est nisi in una re.”

<sup>36</sup> *In Sent.* 1, d. 35 q. 1 a. 4 co.: “unde habitus humanitatis non est secundum idem esse in duobus hominibus: et ideo quandocumque forma significata per nomen est ipsum esse, non potest univoce convenire, propter quod etiam ens non univoce praedicatur.”

<sup>37</sup> *ScG* 2, 54 n. 10: “compositio actus et potentiae est in plus quam compositio formae et materiae. Unde materia et forma dividunt substantiam naturalem: potentia autem et actus dividunt ens commune. Et propter hoc quaecumque quidem consequuntur potentiam et actum inquantum huiusmodi, sunt communia substantiis materialibus et immaterialibus creatis: sicut recipere et recipi, perficere et perfici. Quaecumque vero sunt propria materiae et formae inquantum huiusmodi, sicut generari et corrumpi et alia huiusmodi, haec sunt propria substantiarum materialium, et nullo modo conveniunt substantiis immaterialibus creatis.”

<sup>38</sup> *ScG* 2, 54 n. 9: “In substantiis autem compositis ex materia et forma est duplex compositio actus et potentiae: prima quidem ipsius substantiae, quae componitur ex materia et forma; secunda vero ex ipsa substantia iam composita et esse, quae etiam potest dici ex quod est et esse; vel ex quod est et quo est.”

<sup>39</sup> *In De anima* 2, c. 7, 182–183 (cf. ARISTOTLE, *De anima* B.4, 415b14–15): “id quod est actus alicuius est ratio et forma eius quod est in potencia.”

2. The composition from the substance itself already composed and (the act of) being (*esse*), which can also be said (to be a composition) from *that which is (quod est)* and (the act of) *being (esse)*; or from *that which is* and *whereby it is (quo est)*.

However, (the act of) being (*esse*) itself is compared to the form itself as act (to potency).<sup>40</sup> Wherefrom, in composites from matter and form, form is said to be the principle of being (*principium essendi*), because it is the complement of substance, whose act is being itself, just as the transparent is to air the principle of shining because it makes it the proper subject of light (► 15.24).

### 32.9. Substantial vs. Accidental Act and Potency of Being

The (formal act of) being (*esse*) of any one thing is divided into two (modes): the essential or substantial being of the thing (*esse essentialia rei, sive substantiale*), which is *being simply (esse simpliciter)*, as *being a man*; and accidental being (*esse accidentale*), which is *being something (esse aliquid)*: for example, *being white* (► 15).<sup>41</sup>

Something is in potency in relation to one and the other (act of) being (i.e., substantial and accidental).<sup>42</sup> For example, something is in potency of being a man, as the sperm and (the ovum), and something is in potency of being white, as man.

Both what is in potency in relation to substantial being and that which is in potency to accidental being can be said (to be) *matter*, as the sperm (in respect) of man, and man (in respect) of whiteness.<sup>43</sup>

However, they differ in this: that the matter that is in potency to substantial being is said (to be) *matter from which (materia ex qua)*, while that which is in potency to accidental being is said to be *matter in which (materia in qua; ► 14.8)*,<sup>44</sup> for accident is compared to subject as act to potency.<sup>45</sup>

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<sup>40</sup> ScG 2, 54 n. 5: “ad ipsam etiam formam comparatur ipsum esse ut actus. Per hoc enim in compositis ex materia et forma dicitur forma esse principium essendi, quia est complementum substantiae, cuius actus est ipsum esse: sicut diaphanum est aeri principium lucendi quia facit eum proprium subiectum luminis.”

<sup>41</sup> *De prin. nat.* §1, 1–8: “duplex est esse, scilicet esse essentialia rei sive substantiale, ut hominem esse, et hoc est esse simpliciter; est autem aliud esse accidentale, ut hominem esse album, et hoc est esse aliquid.” ScG 2, 26 n. 2: “esse hoc [sc., esse formale uniuscuiusque rei] dividitur per esse substantiae et esse accidentis.”

<sup>42</sup> *De prin. nat.* §1, 9–12: “Ad utrumque esse est aliquid in potentia: aliquid enim est in potentia ut sit homo, ut sperma et sanguis menstruus, aliquid est in potentia ut sit album, ut homo.” St. Thomas, based on the natural science of antiquity, refers to the menstrual blood instead of the ovum.

<sup>43</sup> *De prin. nat.* §1, 12–16: “Tam illud quod est in potentia ad esse substantiale quam illud quod est in potentia ad esse accidentale potest dici materia, sicut sperma hominis et homo albedinis.”

<sup>44</sup> *De prin. nat.* §1, 16–19: “sed in hoc differt quia materia que est in potentia ad esse substantiale dicitur materia ex qua, que autem est in potentia ad esse accidentale dicitur materia in qua.”

<sup>45</sup> *De potentia*, q. 7 a. 4 co.: “accidens comparatur ad subiectum sicut actus ad potentiam.”

Just as everything that is in potency can be said (to be) *matter*, so everything from which something has (its act of) being (*esse*) can be said (to be a) *form*, whichever (act of) being that may be, whether substantial or accidental.<sup>46</sup>

For example, a man (can be said to be matter) when he is in potency of becoming white in act by whiteness, and sperm (can be said to be matter) because it is in potency of becoming a man in act by the soul.<sup>47</sup>

And since the form makes (something) to in act, hence the form is said to be an act: that which makes (something) be substantial in act is (said to be) a substantial form, while that which makes (something) be accidental in act is said to be an accidental form.<sup>48</sup>

### 32.10. Act is Better Than Potency in Good Things

Divided into potency and act, *being* is more common than *perfect being*, for *being in potency* is *being according to something (secundum quid)* and imperfect.<sup>49</sup>

In good (things), act is better than potency.<sup>50</sup> This is manifest because that which is in potency is the same that exists in potency in respect to contraries.

For example, that which can convalesce can (also) fall ill and is simultaneously in potency to one and to the other.<sup>51</sup> And this is so because the potency of one and of the other—of convalescing and of being afflicted, of resting and of moving—is the same, as is also that of other opposites.

One contrary preexists in the other according to potency, for the cold is in potency in the hot, but not in act, for nothing is made from nothing.<sup>52</sup>

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<sup>46</sup> *De prin. nat.* §1, 36–39: “Sicut autem omne quod est in potentia potest dici materia, ita omne a quo aliquid habet esse, quodcumque esse sit, siue substantiale siue accidentale, potest dici forma.”

<sup>47</sup> *De prin. nat.* §1, 39–42: “sicut homo cum sit potentia albus fit actu albus per albedinem, et sperma cum sit potentia homo fit actu homo per animam.”

<sup>48</sup> *De prin. nat.* §1, 42–46: “Et quia forma facit esse in actu, ideo forma dicitur esse actus; quod autem facit actu esse substantiale est forma substantialis, et quod facit actu esse accidentale dicitur forma accidentalis.”

<sup>49</sup> *In Metaph.* 5, l. 9, §889: “dividit [Philosophus] ens per potentiam et actum: et ens sic divisum est communius quam ens perfectum. Nam ens in potentia, est ens secundum quid tantum et imperfectum.”

<sup>50</sup> *In Metaph.* 9, l. 10, §1883 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a4–6): “Postquam comparavit Philosophus actum et potentiam secundum prius et posterius, hic comparat ea secundum bonum et malum; et circa hoc duo facit. Primo dicit quod in bonis, actus est melior potentia. Quod quidem manifestum est ex hoc, quod id quod est potentia, est idem in potentia existens ad contraria.”

<sup>51</sup> *In Metaph.* 9, l. 10, §1883 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a6–10): “Sicut quod potest convalescere, hoc potest infirmari, et simul est in potentia ad utrumque. Et hoc ideo quia eadem est potentia utriusque, convalescendi et laborandi, et quiescendi et movendi et aliorum huiusmodi oppositorum.”

<sup>52</sup> *In Physic.* 1, l. 9, n. 4: “Dicebat enim [Antiqui] quod contraria fiunt ex alterutris: videmus enim ex calido fieri frigidum et e converso. Et ex hoc concludebat quod, cum ex nihilo nihil fiat, quod unum contrariorum praeexistit in altero. Quod quidem est verum secundum potentiam, nam frigidum est potentia in calido:

Moreover, that which is in act reduces something of its genus from potency into act.<sup>53</sup>

In this way, it is evident that something (i.e., the proper subject) is simultaneously capable of contraries, even if contraries cannot simultaneously be in act.<sup>54</sup> Therefore, of contraries separated one from the other, one is good, as the healthy, while the other is bad, as the ill, for in contraries, one is as deficient, which pertains to the bad.

Hence, that which is good in act is only good, while potency is likewise had in respect of one and of the other: namely, *according to something (secundum quid)*, which is *being in potency (esse in potentia)*; but it has neither simply (*simpliciter*), which is being in act (*esse in actu*).<sup>55</sup> It remains, therefore, that act is better than potency, since that which is simply and purely good is better than that which is good according to something and conjoined to the bad.

### 32.11. Act is Worse Than Potency in Bad Things

As ARISTOTLE shows, on the contrary, in bad (things), act is worse than potency, for that which is bad simply (*simpliciter*), and is not related to the bad according to something (*secundum quid*), is worse than that which is bad according to something and which is had (in respect) to the bad and to the good.<sup>56</sup> Whence, since potency (in respect) to the bad does not yet have the bad except according to something, it remains that the bad act is worse than the potency (in respect) to the bad; and the same is (in respect) to the good, for the potency that is (in respect) to contraries is the same.

ARISTOTLE concludes from the aforesaid that the bad is not some nature apart from (*praeter*) other things that are good according to nature,<sup>57</sup> for the bad itself is posterior to

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non autem actu, ut Anaxagoras aestimabat, propter hoc quod nesciebat accipere esse in potentia, quod est esse medium inter purum non esse et esse actu.”

<sup>53</sup> *Q. d. de anima*, a. 20 ad 11: “id quod est in actu, reducit aliquid sui generis de potentia in actum.”

<sup>54</sup> *In Metaph.* 9, l. 10, §1883 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a10–14): “Et ita patet quod aliquid simul potest contraria, licet contraria non possint simul esse actu. Contrariorum igitur utrumque seorsum, est hoc quidem bonum, ut sanum, aliud vero malum, ut infirmum. Nam semper in contrariis unum est ut deficiens, quod ad malum pertinet.”

<sup>55</sup> *In Metaph.* 9, l. 10, §1884 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a14–15): “Sic igitur quod est bonum in actu, est tantum bonum. Sed potentia se habet similiter «ad utrumque,» scilicet secundum quid; quod est esse in potentia. Habet autem neutrum simpliciter, quod est esse in actu. Relinquitur igitur quod actus est melior potentia; quia quod est simpliciter et pure bonum, est melius eo quod est secundum quid bonum, et coniunctum malo.”

<sup>56</sup> *In Metaph.* 9, l. 10, §1885 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a15–17): “Ostendit [Philosophus] quod e contrario *in malis est actus peior potentia*: et circa hoc tria facit. Primo *ostendit propositum ex ratione supra inducta*; quia id quod est simpliciter malum, et non secundum quid se habens ad malum, est peius eo quod est secundum quid malum, et quod se habet ad malum et ad bonum. Unde, cum potentia ad malum nondum habeat malum nisi secundum quid (et eadem est ad bonum, nam idem est potentia quod est ad contraria), relinquitur quod actus malus est peior potentia ad malum.”

<sup>57</sup> *In Metaph.* 9, l. 10, §1886 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a17–19): “*Concludit* [Philosophus] *ex dictis quod ipsum malum non est quaedam natura praeter res alias, quae secundum naturam sunt bonae.*”

potency according to (the order of) nature, since it is worse and more removed (*elongatum*) from the perfection of nature. Whence, since potency cannot be (something) other apart from a thing, much less (can) the bad itself (be something apart from a thing).

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Nam ipsum malum secundum naturam est posterius quam potentia, quia est peius et magis elongatum a perfectione naturae. Unde, cum potentia non possit esse alia praeter res, multo minus ipsum malum.”





## 33. The Categories

We examine here the division of being into the ten highest genera (also called categories or predicaments), and how substance is the first being among them.

### 33.1. Analogical Division into Categories

*Being* is divided into ten categories not univocally, as a genus (is divided) into species, but according to a diverse mode of being (*secundum diversum modum essendi*; ► 13.6).<sup>1</sup>

However, the modes of being are proportional to the modes of predicating, for those (predicates) are said to be by themselves (*secundum se*) which signify whatever figures of predication—and by predicating something of something else, we say that *this is that*.<sup>2</sup> Indeed, in any one mode of predicating, *to be* (*esse*) must signify the same. For example, when we say, “man is an animal,” *is* signifies *substance*; and when we say, “a man is white,” (*is*) signifies *quality*; and so on, such that, of those that are predicated, some signify *the what* (*quid* < τὰ τί ἐστι σημαίνει), i.e., the substance; others, *the how* (*quale* < τὰ ποιόν, i.e., quality); others *the how much* (*quantum* < τὰ ποσόν, i.e., quantity); and likewise of the others (i.e., τὰ πρός τι, τὰ ποιεῖν ἢ πάσχειν, τὰ πού, τὰ ποτέ...)<sup>3</sup>

<sup>1</sup> *In Physic.* 3, l. 5, n. 15: “ens dividitur in decem praedicamenta non univoce, sicut genus in species, sed secundum diversum modum essendi.”

<sup>2</sup> *In Physic.* 3, l. 5, n. 15: “Modi autem essendi proportionales sunt modis praedicandi. Praedicando enim aliquid de aliquo altero, dicimus hoc esse illud.”

<sup>3</sup> *In Metaph.* 5, l. 9, §889 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a22–27): “Dicit ergo [Philosophus] primo, quod illa dicuntur esse secundum se, quaecumque significant figuras praedicationis.” Ibid., §890: “Quia igitur eorum quae praedicantur, quaedam significant quid, idest substantiam, quaedam quale, quaedam quantum, et sic de aliis; oportet quod unicuique modo praedicandi, esse significet idem; ut cum dicitur homo est animal, esse significat substantiam. Cum autem dicitur, homo est albus, significat qualitatem, et sic de aliis.” As St. Thomas explains, ARISTOTLE removes a possible objection, according to which someone could believe that those predications in which the verb “is” is not apposed would not pertain to the predication of being, as when one says, “the man walks.” Thus, he says that in all such predications something is signified to be, for any verb is resolved in the verb *to be* and a participle. For example, it differs in nothing to say, “a man is convalescent” and “a man convalesces.” Whence, it is evident that being is said in as many modes as predication is made. Ibid., §893 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a27–30): “Quia vero quaedam praedicantur, in quibus manifeste non apponitur hoc verbum est, ne credatur quod illae praedicationes non pertineant ad praedicationem entis, ut cum dicitur, homo ambulat, ideo consequenter hoc removet, dicens quod in omnibus huiusmodi praedicationibus significatur aliquid esse. Verbum enim quodlibet resolvitur in hoc verbum est, et participium. Nihil enim differt dicere, homo convalescens est, et homo convalescit, et sic de aliis. Unde patet quod quot modis praedicatio fit, tot modis ens dicitur.” St. Thomas also refutes AVICENNA, who says that those predicates that are in the genus of accident—for example, when we say *white* and *musical*—principally signify substance; and posteriorly, accident, for *white*, as ARISTOTLE says in his *Categories*, signifies quality only, and the name *white* signifies a subject from the consequent (*ex consequenti*) insofar as it signifies *whiteness* by the mode of an accident. Whence, from the consequent, it must include a subject in its *ratio*, for the “to be” of an accident is “to be in.” Hence, although whiteness signifies an accident, (it does) not (signify an accident) by the mode of an accident, but by the mode of a substance. Whence, in no mode does it co-signify a subject, for if it should signify a subject, then accidental predicates would not be posited by ARISTOTLE under *being by itself* but under *being by accident*, since the whole that *white man* is, is a being according to accident. Ibid., §894: “Nec est verum quod Avicenna dicit, quod praedicata, quae sunt in generibus accidentis, principaliter significant substantiam, et per posterius accidens, sicut hoc quod dico album et musicum. Nam album ut in praedicamentis dicitur, solam qualitatem significat. Hoc autem nomen album significat subiectum ex consequenti, in quantum significat albedinem per modum

Therefore, *being* must be contracted to diverse genera according to a diverse mode of predicating that follows upon a diverse mode of being, for in as many modes as some being is predicated, in that many modes is it signified to be.<sup>4</sup> Therefrom, the ten genera into which *being* is first divided are said to be ten **predicaments** (*praedicamenta* = κατηγορίαι, i.e., categories) because they are distinguished following the diverse modes of predicating.

Now every predication is made in three modes, for a predicate can be related to a subject in three modes:<sup>5</sup>

1. When the predicate is **what the subject is** (*id quod est subiectum*) because that which is predicated of the subject pertains to its essence (► 33.2).<sup>6</sup>
2. When the predicate is taken insofar as it is **in the subject** (*inest subiecto*) because that which is predicated of the subject is not of its essence but inheres it (► 33.3).<sup>7</sup>
3. When the predicate is taken from that which is **outside the subject** (*extra subiectum*) because something extrinsic is predicated of it by denomination (► 33.4).<sup>8</sup>

### 33.2. When the Predicate is the Subject

In this mode, the predicate is what the subject is because that which is predicated of the subject pertains to its essence.<sup>9</sup> According to this, the category of **substance** is taken, for

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accidentis. Unde oportet, quod ex consequenti includat in sui ratione subiectum. Nam accidentis esse est inesse. Albedo enim etsi significet accidens, non tamen per modum accidentis, sed per modum substantiae. Unde nullo modo consignificat subiectum. Si enim principaliter significaret subiectum, tunc praedicata accidentalialia non ponerentur a philosopho sub ente secundum se, sed sub ente secundum accidens. Nam hoc totum, quod est homo albus, est ens secundum accidens.”

<sup>4</sup> *In Metaph.* 5, l. 9, §890 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a23–24): “Unde oportet, quod ens contrahatur ad diversa genera secundum diversum modum praedicandi, qui consequitur diversum modum essendi; quia quoties ens dicitur, idest quot modis aliquid praedicatur, toties esse significatur, idest tot modis significatur aliquid esse. Et propter hoc ea in quae dividitur ens primo, dicuntur esse praedicamenta, quia distinguuntur secundum diversum modum praedicandi.” *In Physic.* 3, l. 5, n. 15: “unde et decem genera entis dicuntur decem praedicamenta.”

<sup>5</sup> *In Metaph.* 5, l. 9, §891: “Sciendum enim est quod praedicatum ad subiectum tripliciter se potest habere.” *In Physic.* 3, l. 5, n. 15: “Tripliciter autem fit omnis praedicatio.”

<sup>6</sup> *In Metaph.* 5, l. 9, §891: “Uno modo cum est id quod est subiectum.” *In Physic.* 3, l. 5, n. 15: “Unus quidem modus est, quando de aliquo subiecto praedicatur id quod pertinet ad essentiam eius.”

<sup>7</sup> *In Metaph.* 5, l. 9, §891: “Secundo modo ut praedicatum sumatur secundum quod inest subiecto.” *In Physic.* 3, l. 5, n. 15: “Alius autem modus est quo praedicatur de aliquo id quod non est de essentia eius, tamen inhaeret ei.”

<sup>8</sup> *In Metaph.* 5, l. 9, §891: “Tertio modo ut praedicatum sumatur ab eo quod est extra subiectum.” *In Physic.* 3, l. 5, n. 15: “Tertius autem modus praedicandi est, quando aliquid extrinsecum de aliquo praedicatur per modum alicuius denominationis.”

<sup>9</sup> *In Metaph.* 5, l. 9, §891: “Uno modo [praedicandi] cum [praedicatum] est id quod est subiectum, ut cum dico, Socrates est animal. Nam Socrates est id quod est animal. Et hoc praedicatum dicitur significare substantiam primam, quae est substantia particularis, de qua omnia praedicantur.” *In Physic.* 3, l. 5, n. 15: “Unus quidem modus est, quando de aliquo subiecto praedicatur id quod pertinet ad essentiam eius, ut cum dico Socrates est homo, vel homo est animal; et secundum hoc accipitur praedicamentum substantiae.”

this predicate is said to signify first substance (► 15.2), which is the particular substance of which all (predicates) are predicated: for example, when we say, “Socrates is an animal,” for Socrates is that which is animal, or “man is an animal,” (for man is also that).

### 33.3. When the Predicate Inheres in the Subject

In this mode, the predicate is taken insofar as it is in the subject because that which is predicated of the subject is not of its essence but inheres it (*inhaeret ei*).<sup>10</sup> This predicate is in (the subject) either:

1. **By itself and absolutely** (*per se et absolute*), whether:

(a) As *following upon matter*; and in this way, it is (the category) **quantity** (*quantitas* = ποσόν), for quantity properly follows upon matter.<sup>11</sup>

(b) As *following upon form*; and in this way, it is (the category) **quality** (*qualitas* = ποιόν).<sup>12</sup> Whence, also, qualities are founded upon quantity, as color (is founded) on surface, and figure (is founded) on lines or on surfaces.

2. **Not absolutely** (*non absolute*), but **in respect to another** (*in respectu ad aliud, per respectum ad alterum*), and in this way, it is the category **relation** (*relatio, ad aliquid* = πρὸς τι).<sup>13</sup> Thus, when we say, “the man is a father,” what is predicated of the man is not something absolute, but a respect that is in it (*ei inest*) to something (*ad aliquid*) extrinsic.

### 33.4. When the Predicate is Outside the Subject

The third mode of predication occurs when something extrinsic is predicated of something by mode of some denomination, for in this way are extrinsic accidents predicated of substances.<sup>14</sup> Indeed, we do not say that *man is whiteness*, but that *man is white*.

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<sup>10</sup> *In Metaph.* 5, l. 9, §892: “Secundo modo ut praedicatum sumatur secundum quod inest subiecto: quod quidem praedicatum, vel inest ei per se et absolute [...] vel inest ei non absolute, sed in respectu ad aliud.” *In Physic.* 3, l. 5, n. 15: “Alius autem modus est quo praedicatur de aliquo id quod non est de essentia eius, tamen inhaeret ei.”

<sup>11</sup> *In Metaph.* 5, l. 9, §892 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a26): “ut consequens materiam, et sic est quantitas.” *In Physic.* 3, l. 5, n. 15: “Quod quidem vel se habet ex parte materiae subiecti, et secundum hoc est praedicamentum quantitatis (nam quantitas proprie consequitur materiam: unde et Plato posuit magnum ex parte materiae).”

<sup>12</sup> *In Metaph.* 5, l. 9, §892 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a25): “vel ut consequens formam, et sic est qualitas.” *In Physic.* 3, l. 5, n. 15: “aut consequitur formam, et sic est praedicamentum qualitatis (unde et qualitates fundantur super quantitatem, sicut color in superficie, et figura in lineis vel in superficiebus).”

<sup>13</sup> *In Metaph.* 5, l. 9, §892 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a26): “quod quidem praedicatum [...] inest ei non absolute, sed in respectu ad aliud, et sic est ad aliquid.” *In Physic.* 3, l. 5, n. 15: “Quod quidem [...] se habet per respectum ad alterum, et sic est praedicamentum relationis (cum enim dico homo est pater, non praedicatur de homine aliquid absolutum, sed respectus qui ei inest ad aliquid extrinsecum).”

<sup>14</sup> *In Physic.* 3, l. 5, n. 15: “Tertius autem modus praedicandi est, quando aliquid extrinsecum de aliquo praedicatur per modum alicuius denominationis: sic enim et accidentia extrinseca de substantiis praedicantur; non tamen dicimus quod homo sit albedo, sed quod homo sit albus.”

To be denominated from something extrinsic is found:<sup>15</sup>

**1. Commonly**, in some mode, in everything.<sup>16</sup> Since something caused is denominated and measured from something external, something is found to be commonly denominated from something extrinsic either:

(a) According to the *ratio* of **cause** (► 33.5; 9).

(b) According to the *ratio* of **measure** (► 33.6; 28).

**2. Specially**, in some mode, in those (things) that pertain only to men (► 33.7).

### 33.5. Common Extrinsic Denomination According to the *Ratio* of Cause

Since the genera of causes are four (► 9.2), and two of them are parts of the essence—namely, matter and form (► 15.8)—, the predication that can be made according to these two pertains to the category of substance: for example, if we say that *man is rational* (i.e., according to its form), and that *man is corporeal* (i.e., according to its matter; ► 14.17).<sup>17</sup>

The final cause, in turn, does not cause something apart from the agent, for the end has the *ratio* of cause (only) insofar as it moves the agent (► 9.8).<sup>18</sup>

Therefore, the agent cause alone remains (as that) from which something can be denominated as from an external (cause).<sup>19</sup> And in this mode, that from which the category is taken would be *according to something in a subject* of which it is predicated.

**1.** Insofar as something is denominated *from the agent cause*, (this) is the category of **affection** (*passio, pati* = πάσχειν), for to be affected is nothing other than *to receive (suscipere) something* from an agent.<sup>20</sup> And this is *according to the terminus*, for an affection is terminated in the affected subject (*in subiectum patiens terminatur*).

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<sup>15</sup> *In Physic.* 3, l. 5, n. 15: “Denominari autem ab aliquo extrinseco invenitur quidem quodammodo communiter in omnibus, et aliquo modo specialiter in iis quae ad homines pertinent tantum.”

<sup>16</sup> *In Physic.* 3, l. 5, n. 15: “Communiter autem invenitur aliquid denominari ab aliquo extrinseco, vel secundum rationem causae, vel secundum rationem mensurae; denominatur enim aliquid causatum et mensuratum ab aliquo exteriori.”

<sup>17</sup> *In Physic.* 3, l. 5, n. 15: “Cum autem quatuor sint genera causarum, duo ex his sunt partes essentiae, scilicet materia et forma: unde praedicatio quae posset fieri secundum haec duo, pertinet ad praedicamentum substantiae, utpote si dicamus quod homo est rationalis, et homo est corporeus.”

<sup>18</sup> *In Physic.* 3, l. 5, n. 15: “Remanet igitur sola causa agens a qua potest denominari aliquid sicut ab exteriori.”

<sup>19</sup> *In Physic.* 3, l. 5, n. 15: “Causa autem finalis non causat seorsum aliquid ab agente: intantum enim finis habet rationem causae, in quantum movet agentem. Remanet igitur sola causa agens a qua potest denominari aliquid sicut ab exteriori.” *In Metaph.* 5, l. 9, §892: “Alio modo ut id a quo sumitur praedicamentum, secundum aliquid sit in subiecto, de quo praedicatur.”

<sup>20</sup> *In Physic.* 3, l. 5, n. 15: “Sic igitur secundum quod aliquid denominatur a causa agente, est praedicamentum passionis, nam pati nihil est aliud quam suscipere aliquid ab agente.” *In Metaph.* 5, l.

2. Conversely, insofar as the agent cause is denominated *from the effect*, (this) is the category of **action** (*actio, agere* = ποιεῖν), for action is an act in another *from an agent*.<sup>21</sup> And this is *according to the principle*, for the principle of action (*actionis principium*) is in a subject (i.e., in the agent).

### 33.6. Common Extrinsic Denomination According to the *Ratio of Measure*

A measure is either intrinsic or extrinsic (► 28.7).<sup>22</sup> Intrinsic (measures are), for example, the longitude, latitude, and profundity of each (corporeal) thing. Something is denominated from these as from an intrinsic inherent (► 33.3); whence, it pertains to the category of *quantity* (► 34).

On the other hand, external measures are *time* and *place*.<sup>23</sup> Therefore, the category is:

1. **When** (*quando* = ποτέ), insofar as something is denominated from *time*.
2. **Where** (*ubi* = πού), insofar as (something) is denominated from *place*.
3. **Situation** (*situs* = τὸ κεῖσθαι; not the *site* that is a difference of quantity; ► 34.19), also insofar as (something) is denominated from *place*, but which adds an *order of the parts in a place* over *where*.<sup>24</sup> This (order) was not necessary to be added from the part of time, since *an order of parts in time* is conveyed in the *ratio* of *time*, for **time** is *the number of motion according to prior and posterior* (*numerus motus secundum prius et posterius*).

### 33.7. Special Extrinsic Denomination

There is something special in men.<sup>25</sup> In other animals, nature gave sufficiently those (parts) that pertain to the conservation of life, such as horns for their defense, a tough and

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9, §892 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a26): “Si vero secundum terminum, sic praedicabitur ut in pati. Nam passio in subiectum patiens terminatur.” Cf. *In De anima* 2, c. 26, 164–167.

<sup>21</sup> *In Physic.* 3, l. 5, n. 15: “secundum autem quod e converso denominatur causa agens ab effectu, est praedicamentum actionis, nam actio est actus ab agente in aliud.” *In Metaph.* 5, l. 9, §892 (cf. ARISTOTLE, *Metaphysica* Δ.7, 1017a26): “Et si quidem secundum principium, sic praedicatur ut agere. Nam actionis principium in subiecto est.”

<sup>22</sup> *In Physic.* 3, l. 5, n. 15: “Mensura autem quaedam est extrinseca et quaedam intrinseca. Intrinseca quidem sicut propria longitudo uniuscuiusque et latitudo et profunditas: ab his ergo denominatur aliquid sicut ab intrinseco inhaerente; unde pertinet ad praedicamentum quantitatis.”

<sup>23</sup> *In Physic.* 3, l. 5, n. 15: “Exteriores autem mensurae sunt tempus et locus: secundum igitur quod aliquid denominatur a tempore, est praedicamentum quando; secundum autem quod denominatur a loco, est praedicamentum ubi et situs, quod addit supra ubi ordinem partium in loco. [...] Sic igitur aliquid dicitur esse quando vel ubi per denominationem a tempore vel a loco.” *In Metaph.* 5, l. 9, §892: “Tertio modo ut praedicatum sumatur ab eo quod est extra subiectum [...]. Si autem sit mensura eius, cum mensura extrinseca sit vel tempus vel locus, sumitur praedicamentum vel ex parte temporis, et sic erit quando: vel ex loco, et sic erit ubi, non considerato ordine partium in loco, quo considerato erit situs.” Cf. ARISTOTLE, *Categoriae* 4, 2a2–3; 9, 11b9–10.

<sup>24</sup> *In Physic.* 3, l. 5, n. 15: “Hoc autem non erat necessarium addi ex parte temporis, cum ordo partium in tempore in ratione temporis importetur: est enim tempus numerus motus secundum prius et posterius.”

<sup>25</sup> *In Physic.* 3, l. 5, n. 15: “Est autem aliquid speciale in hominibus. In aliis enim animalibus natura dedit sufficienter ea quae ad conservationem vitae pertinent, ut cornua ad defendendum, corium grossum et

wooly hide as a covering, and claws or the like for proceeding without harm. And since such animals are said (to be) armed, dressed, or shod, they are not denominated from something extrinsic in some mode, but from some of their parts. Hence, these refer in them to the category of substance: for example, if it should be said that man is endowed with hands or feet.

Such (parts), however, could not be given to man by nature both because they would not befit the subtlety of its complexion and because of the multiform operations that befit man insofar as it has reason, to which some determinate instruments could not be adapted by nature.<sup>26</sup> Instead of all (these), however, there is in man reason, by which he prepares exterior (things) for himself which are intrinsic to other animals. Whence, when man is said (to be) armed, dressed, or shod, (this) is denominated from something extrinsic that has neither the *ratio* of *cause* nor (the *ratio*) of *measure*.

And hence, there is a special category, called **habitus** (*habitus* = τὸ ἔχειν), as when we say, “Socrates is shod” or “[Socrates is] clothed.”<sup>27</sup>

However, it ought to be considered that this category is also attributed to other animals not insofar as they are considered in their nature, but insofar as they come to be used by men, as when we say that a horse is caparisoned, saddled, or armed.<sup>28</sup>

### 33.8. Being Simply vs. According to Something

**Being simply** (*simpliciter ens*) can be understood in two modes:<sup>29</sup>

1. As **substance**, insofar as it signifies *that which is first among all the categories of being* (► 33.10).<sup>30</sup>

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pilosum ad tegendum, ungulas vel aliquid huiusmodi ad incedendum sine laesione. Et sic cum talia animalia dicuntur armata vel vestita vel calceata, quodammodo non denominantur ab aliquo extrinseco, sed ab aliquibus suis partibus. Unde hoc refertur in his ad praedicamentum substantiae: ut puta si diceretur quod homo est manuatus vel pedatus.”

<sup>26</sup> *In Physic.* 3, l. 5, n. 15: “Sed huiusmodi non poterant dari homini a natura, tum quia non conveniebant subtilitati complexionis eius, tum propter multiformitatem operum quae conveniunt homini in quantum habet rationem, quibus aliqua determinata instrumenta accommodari non poterant a natura: sed loco omnium inest homini ratio, qua exteriora sibi praeparat loco horum quae aliis animalibus intrinseca sunt. Unde cum homo dicitur armatus vel vestitus vel calceatus, denominatur ab aliquo extrinseco, quod non habet rationem neque causae, neque mensurae.”

<sup>27</sup> *In Physic.* 3, l. 5, n. 15: “unde est speciale praedicamentum, et dicitur habitus.” *In Metaph.* 5, l. 9, §892: “Tertio modo ut praedicatum sumatur ab eo quod est extra subiectum: et hoc dupliciter. Uno modo ut sit omnino extra subiectum: quod quidem si non sit mensura subiecti, praedicatur per modum habitus, ut cum dicitur, Socrates est calceatus vel vestitus.” Cf. ARISTOTLE, *Categoriae* 15, 15b17.

<sup>28</sup> *In Physic.* 3, l. 5, n. 15: “Sed attendendum est quod etiam aliis animalibus hoc praedicamentum attribuitur, non secundum quod in sua natura considerantur, sed secundum quod in hominis usum veniunt; ut si dicamus equum phaleratum vel sellatum seu armatum.”

<sup>29</sup> *In De gen.* 1, l. 6 n. 5: “*simpliciter ens* potest intelligi dupliciter.”

<sup>30</sup> *In De gen.* 1, l. 6 n. 5: “uno modo ut significat id quod est primum inter omnia praedicamenta entis, prout scilicet simpliciter ens dicitur de substantia.”

(In this mode), **being simply** is *that which has (an act of) being (quod habet esse)*, while **being according to something** (is) *that which is in another*.<sup>31</sup>

Only individuals in the genus of substance are perfect in themselves, for accidents only have (an act of) being (*esse*) that depends upon substance.<sup>32</sup> However, any accident adds some (act of) being to substance itself (e.g., being white, being large, etc.).

2. As **universal being** itself (*ipsum ens universale*), which comprehends all categories (i.e., as an equivalent of *common being*; ► 30.2).<sup>33</sup>

Thus, for example, by *non-being simply* one can understand either (1) *that which is not a substance*; or (2) *that which in no mode is a being*.<sup>34</sup>

### 33.9. Knowing the Nature of Being Through Substance

ARISTOTLE shows through (the following) reason that he who intends to treat of being must treat (somehow) of substance alone: that which is first among beings as *being (ens) simply (simpliciter)* and not *according to something (secundum quid)* sufficiently demonstrates the nature of being; and substance is of such a mode; therefore, it suffices (in order) to know the nature of being (in order) to determine (the truth) concerning substance (► 33.17).<sup>35</sup> In order to do this, he shows: **(1)** that substance is the first being (► 33.10); **(2)** how (substance) is said (to be) *first* (► 33.13).

### 33.10. Substance is the First Being

As has been said, *being (ens = τὸ ὄν)* is said in multiple modes (*dicitur multipliciter = λέγεται πολλαχῶς*),<sup>36</sup> for some *being*—namely, *substance*—signifies *what (something) is*

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<sup>31</sup> *STh* I-II, q. 26 a. 4 co.: “ens simpliciter est quod habet esse, ens autem secundum quid quod est in alio.”

<sup>32</sup> *In Sent.* 1, d. 3 q. 2 a. 3 co.: “perfecta sunt in se [...] tantum individua in genere substantiae. Accidentia autem non habent esse, nisi dependens a substantia [...]. Tamen, cum secundum quodlibet accidens addatur aliquod esse ipsi substantiae [...]”

<sup>33</sup> *In De gen.* 1, l. 6 n. 5: “alio modo secundum quod simpliciter ens dicitur ipsum ens universale, quod omnia praedicamenta comprehendit.”

<sup>34</sup> *In De gen.* 1, l. 6 n. 5: “Et hoc modo *simpliciter non ens* potest dici vel quod non est substantia, vel quod nullo modo est ens.”

<sup>35</sup> *In Metaph.* 7, l. 1, §1246 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a10–15): “Primo ostendit [Philosophus] quod intendens tractare de ente, de sola substantia debet tractare *per rationem*. [...] Intendit ergo in prima parte talem rationem ponere. Illud quod est primum inter entia quasi ens simpliciter et non secundum quid, sufficienter demonstrat naturam entis: sed substantia est huiusmodi; ergo sufficit ad cognoscendum naturam entis determinare de substantia. Circa hoc autem duo facit. Primo ostendit, quod *substantia sit primum ens*. Secundo ostendit quomodo dicatur primum [...]”

<sup>36</sup> *In Metaph.* 7, l. 1, §1247 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a10–13): “Primo *proponit* [Philosophus] *intantum* quod ens dicitur multipliciter, ut dictum est in quinto libro, in quo diviserat quoties dicuntur huiusmodi nomina, quia quoddam ens significat «quid est et hoc aliquid,» idest substantiam; ut per quid, intelligatur essentia substantiae, per hoc aliquid suppositum, ad quae duo omnes modi substantiae reducuntur, ut in quinto est habitum. Illud vero significat qualitatem vel quantitatem, aut aliquid aliorum praedicamentorum.”

(*quid est* = τί ἐστὶ)—that is, the essence of a substance—and *this something* (*hoc aliquid* = τόδε τι)—that is, the suppositum—, to which two (modes) all the modes of *substance* are reduced (► 15.2), while (some other *being*) signifies *quality*, *quantity*, or something of the other categories.

Now, since *being* is said in as many modes, it is evident that among all beings the first is *what (something) is*—that is, the *being* that signifies *substance*.<sup>37</sup>

ARISTOTLE proves this using the following reason: that which is by itself (*per se*) and simply (*simpliciter*) in any one genus, is prior to that which is by another (*per aliud*) and according to something (*secundum quid*); and substance is *being simply and by itself*, while all genera other than substance are beings *according to something* and *by substance*; therefore, substance is the first among beings.<sup>38</sup>

(In other words, by *being* we ought to understand a *genus in common*, insofar as it is a whole that embraces and contains many *beings* in its commonality; ► 27.1.<sup>39</sup> Evidently, *being* is not a genus *properly* said, as though—in *being*—the same essence would be predicated of many beings; ► 30.11. Consequently, the division of *common being* is by analogy, for the nature of *being* is not equally participated by all beings; ► 27.2. Necessarily, therefore, *being* is predicated according to a perfect *ratio* only of one of the beings into which *common being* is divided—namely, *substance*—, while it is predicated of the other beings imperfectly and according to something [*secundum quid*]. Indeed), that which is maximally and most truly in any genus is the cause of those that are after it in that genus, as ARISTOTLE says (► 27.4; footnote 27).<sup>40</sup> Therefore, substance, which is first in the genus of *being* (*primum in genere entis*), (and) most truly and maximally has an

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<sup>37</sup> *In Metaph.* 7, l. 1, §1247 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a13–15): “Et cum ens tot modis dicatur, palam est quod inter omnia entia, primum est quod quid est, idest ens quod significat substantiam.”

<sup>38</sup> *In Metaph.* 7, l. 1, §1248 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a15–b2): “Probat [Philosophus] propositum; et utitur tali ratione. Quod est per se et simpliciter in unoquoque genere, est prius eo quod est per aliud et secundum quid. Sed substantia est ens simpliciter et per seipsam: omnia autem alia genera a substantia sunt entia secundum quid et per substantiam: ergo substantia est prima inter alia entia.”

<sup>39</sup> We find in other places the same *genus of being* used explicitly by St. Thomas in other works. For example, *In Sent.* 1, d. 13 q. 1 a. 4 ad 2: “negatio termini infiniti non est negatio in aliquo genere determinato, sed tantum **in genere entis**; et ideo potest dici de omni ente cui non convenit affirmatio: sed negatio quae negat in aliquo genere determinato [sc., *privatio*], non potest dici extra illud genus.” *De veritate*, q. 27 a. 4 ad 4: “sacramenta non operantur ad gratiam per virtutem propriae formae: sic enim operarentur ut per se agentia; sed operantur per virtutem principalis agentis, scilicet Dei, in eis existentem. Quae quidem virtus non habet esse completum in natura, sed est quid incompletum **in genere entis**; quod patet ex hoc quod instrumentum movet in quantum movetur.” Emphasis is ours.

<sup>40</sup> *De ente*, c. 6, 50–58: “quia illud quod dicitur maxime et verissime in quolibet genere est causa eorum que sunt post in illo genere, sicut ignis qui est in fine caliditatis est causa caloris in rebus calidis, ut in II Methaphysice dicitur: ideo substantia que est primum in genere entis, verissime et maxime essentiam habens, oportet quod sit causa accidentium que secundo et quasi secundum quid rationem entis participant.”



essence (►18), must be the cause of accidents, which participate in the *ratio* of *being* secondarily (*secundario*) and as according to something (*quasi secundum quid*).

ARISTOTLE manifests the minor (premise, namely, that substance is *being simply and by itself*, while all genera other than substance are beings according to something and by substance) in two (ways):<sup>41</sup> (1) from the mode of speaking or predicating (►33.11); (2) through some sign (concerning accidents abstractly signified; ►33.12).

### 33.11. Substance is the First Being in Predication

As ARISTOTLE says, it is evident that substance is the first of beings from this: that when we say of some qualitative being (*de aliquo quale*) *what* it is, we say that it is either *good* or *bad*, for this signifies *quality*, which is other than *substance* or *quantity*.<sup>42</sup> On the other hand, *tri-cubit* signifies *quantity*, and *man* signifies *substance*. Hence, when we say *how* (*quale*) something is, we do not say that it is *tri-cubit* or that it is a *man*. But when we say of something *what* it is, we do not say that it is *white* or *hot*, which signify *quality*; nor (do we say) *tri-cubit*, which signifies *quantity*; but *man*, or *god*, which signify *substance*.

Whence, it is evident that those (predicates) that signify *substance* convey (*dicunt*) *what* something is absolutely (*absolute*), while those that predicate *quality* do not convey *what* absolutely is that of which it is predicated, but *how* (*quale quid*).<sup>43</sup> It is (had) likewise in *quantity* and in the other genera.

Whence, it is evident that substance itself is said by reason of itself (*ratione suiipsius*), since those (predicates) that signify *substance* absolutely, signify *what* this is.<sup>44</sup> On the other hand, the other (genera) are said (to be) *beings* not because they themselves should

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<sup>41</sup> *In Metaph.* 7, l. 1, §1249 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a15–20): “Minorem autem dupliciter manifestat [Philosophus]. Primo ex ipso modo loquendi sive praedicandi.” Ibid., §1252 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a20–30): “Probat idem per quoddam signum.”

<sup>42</sup> *In Metaph.* 7, l. 1, §1249 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a15–18): “Minorem [...] manifestat [Philosophus...] dicens, quod ex hoc palam est quod substantia sit primum entium, quia quando dicimus de aliquo quale quid sit, dicimus ipsum esse aut bonum aut malum. Haec enim significant qualitatem, quae aliud est a substantia et quantitate. Tricubitus autem significat quantitatem, et homo significat substantiam. Et ideo quando dicimus quale est aliquid, non dicimus ipsum esse tricubitus neque hominem. Sed quando dicimus quid est de aliquo, non dicimus ipsum esse album, nec calidum, quae significant qualitatem; nec tricubitus, quod significat quantitatem; sed hominem aut Deum, quae significant substantiam.”

<sup>43</sup> *In Metaph.* 7, l. 1, §1250 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a18–20): “Ex quo patet quod illa quae significant substantiam, dicunt quid est aliquid absolute. Quae autem praedicant qualitatem, non dicunt quid est illud de quo praedicatur absolute, sed quale quid. Et simile est in quantitate, et aliis generibus.”

<sup>44</sup> *In Metaph.* 7, l. 1, §1251 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a18–20): “Et ex hoc patet quod ipsa substantia dicitur ens ratione suiipsius, quia absolute significantia substantiam significant quid est hoc. Alia vero dicuntur entia, non quia ipsa habeant secundum se aliquam quidditatem, quasi secundum se entia, cum non ita dicant absolute quid: sed eo quod «sunt talis entis,» id est eo quod habent aliquam habitudinem ad substantiam quae est per se ens; quia non significant quidditatem; in quantum scilicet quaedam sunt qualitates talis entis, scilicet substantiae, et quaedam quantitates, et aliae passiones, vel aliquid aliud tale, quod significatur per alia genera.”

have some quiddity according to themselves, as (though they were) beings according to themselves, since they would not convey something absolutely in this way, but because they have some habitude (i.e., relation) to substance, which is being by itself, since they do not signify quiddity: to wit, insofar as some are qualities of such a being—namely, substance—, and some (are) quantities, and other affections, or some other such thing that is signified by the other genera.

Therefore, *being* is said diversely, according to prior and posterior (*secundum prius et posterius*), of the ten genera of the categories, as **quantity** is said from its being *the measure of substance*; **quality**, insofar as it is *the disposition of substance*; and so on.<sup>45</sup>

### 33.12. The Case of Accidents Abstractly Signified

As ARISTOTLE says, since other beings are beings only insofar as they are referred to substance, a doubt could arise concerning other beings signified in abstract, when they do not signify with some habitude to substance, whether they should be beings or non-beings: namely, whether *to walk* (*vadere* = τὸ βαδίζειν), *to heal* (*sanare* = τὸ ὑγιαίνειν), *to be seated* (*sedere* = τὸ καθῆσθαι), and each one of these (predicates) that are signified abstractly should be a being or a non-being.<sup>46</sup> And this is (what happens) likewise in other such (predicates) that are signified in abstract, whether they should signify by the mode of action, as the aforesaid, or not, such as *whiteness* (*albedo*) and *blackness* (*nigredo*).

Therefore, accidents signified abstractly (*in abstracto*) seem to be non-beings, since none of them is naturally apt (*aptum natum*) to be according to itself (*secundum se esse*).<sup>47</sup> Quite on the contrary, however, the (act of) being (*esse*) of any of them is *to be in another* (*alteri inesse*), and it is not possible for any of them to be separated from substance.

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<sup>45</sup> *De ente*, c. 6, 133–138: “ens diuersimode secundum prius et posterius dicitur de decem generibus predicamentorum, sicut dicitur quantitas ex eo quod est mensura substantie et qualitas secundum quod est dispositio substantie, et sic de aliis, secundum Philosophum in IX Methaphisice.” This refers us to ARISTOTLE, *Metaphysica* Θ.1, 1045b27–32: “Περὶ μὲν οὖν τοῦ πρώτως ὄντος καὶ πρὸς ὃ πάσαι αἱ ἄλλαι κατηγορίαι τοῦ ὄντος ἀναφέρονται εἴρηται, περὶ τῆς οὐσίας. κατὰ γὰρ τὸν τῆς οὐσίας λόγον λέγεται τᾶλλα ὄντα, τὸ τε ποσὸν καὶ τὸ ποιὸν καὶ τᾶλλα τὰ οὕτως λεγόμενα: πάντα γὰρ ἔξει τὸν τῆς οὐσίας λόγον, ὡσπερ εἴπομεν ἐν τοῖς πρώτοις λόγοις.” Cf. *ibid.* Γ.2, 1003a33–b10.

<sup>46</sup> *In Metaph.* 7, l. 1, §1252 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a20–22): “Probat [Philosophus] idem *per quoddam signum*. Quia enim alia entia non sunt entia nisi secundum quod referuntur ad substantiam, ideo potest esse dubitatio de aliis entibus in abstracto significatis, quando non significant cum aliqua habitudine ad substantiam: utrum sint entia vel non entia, scilicet utrum vadere, sanare et sedere et unumquodque istorum in abstracto significatorum sit ens aut non ens. Et similiter est in aliis talibus, quae in abstracto significantur; sive significantur per modum actionis, ut praedicta, sive non, ut albedo sive nigredo.”

<sup>47</sup> *In Metaph.* 7, l. 1, §1253 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a23–25): “Pro tanto autem videntur accidentia in abstracto significata esse non entia, quia nihil ipsorum est aptum natum secundum se esse; immo cuiuslibet eorum esse est alteri inesse, et non est possibile aliquid eorum separari a substantia; et ideo quando significantur in abstracto quasi sint secundum se entia et a substantia separata, videtur quod sint non entia. Licet modus significandi vocum non consequatur immediate modum essendi rerum, sed mediante modo intelligendi; quia intellectus sunt similitudines rerum, voces autem intellectuum, ut dicitur in primo Perihermenias.” The reference is to ARISTOTLE, *De interpretatione* 1, 16a3–8.

Hence, when they are signified abstractly as though they should be beings by themselves (*secundum se entia*) and separated from substance, they seem to be non-beings. However, the mode of signifying that belongs to voices does not immediately follow upon the mode of being of things; rather, (they signify) by means of the mode of understanding, since understandings are the likenesses of things, and voices (are the likenesses) of understandings, as ARISTOTLE says.

Even though the mode of being of accidents should not be such that they would be by themselves but only that they would be in (a subject, *ut insint*), however, the intellect can understand them by themselves, since it is naturally apt (*natus*) to divide those that are conjoined according to nature.<sup>48</sup> And hence, abstract names of accidents signify beings that certainly inhere (substances), even though they should not signify them by the mode of inherent (things). On the other hand, *non-beings* would be signified by such names if (accidents) should not be in a thing (*in re*, i.e., if they should not *really* inhere).

And since these (accidents) signified abstractly seem (to be) non-beings, the concrete names of accidents seem more to be beings, for *the walker* (*vadens* = τὸ βαδίζον), *the sitting* (*sedens* = τὸ καθήμενον), and *the healing* (*sanans* = τὸ ὑγιαίνον) seem more to be something among beings, since something is determined for them as a subject by the signification itself of the names, insofar as they are signified in concretion (in respect) to a subject—and this subject is a substance.<sup>49</sup>

Hence, any one of such names that signify an accident concretely (*in concreto*) seem to convey (*importare*) the category of substance: not indeed in such a way that the category of substance should be a part of the signification of such names, for *white* signifies only quality, as ARISTOTLE says; but insofar as names of such a mode signify accidents as inhering a substance (*ut inhaerentia substantiae*).<sup>50</sup> Thus, *the good* or *the sitting* is not said without substance, for they signify a concrete accident of a substance.

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<sup>48</sup> *In Metaph.* 7, l. 1, §1254: “Licet autem modus essendi accidentium non sit ut per se sint, sed solum ut insint, intellectus tamen potest ea per se intelligere, cum sit natus dividere ea quae secundum naturam coniuncta sunt. Et ideo nomina abstracta accidentium significant entia quae quidem inhaerent, licet non significant ea per modum inhaerentium. Essent autem significata per huiusmodi nomina non entia, si non inessent in re.”

<sup>49</sup> *In Metaph.* 7, l. 1, §1255 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a23–25): “Et quia ista in abstracto significata videntur non entia, magis videntur entia nomina accidentium concreta. Magis autem videtur «aliquid entium esse vadens et sedens et sanans» quia determinatur eis aliquod subiectum per ipsam nominis significationem, in quantum significantur in concretionem ad subiectum. Hoc autem subiectum est substantia.”

<sup>50</sup> *In Metaph.* 7, l. 1, §1255 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a25–29): “Et ideo unumquodque talium nominum, quae significant accidens in concreto, «apparet in tali categoria,» idest videtur importare praedicamentum substantiae; non ita quod praedicamentum substantiae sit pars significationis talium nominum (album enim, ut in praedicamentis dicitur, solam qualitatem significat); sed in quantum huiusmodi nomina significant accidentia ut inhaerentia substantiae. Bonum autem aut sedens non dicitur «sine hoc,» idest sine substantia. Significat enim accidens concretum substantiae.”

And since accidents do not seem (to be) beings insofar as they are signified according to themselves but only insofar as they are signified in concretion (in reference) to substance, it is evident that each of the other beings are beings on account of (*propter*) substance.<sup>51</sup>

And from this, it is further apparent that substance is the first being (*primum ens* = τὸ πρῶτως ὄν); and being simply (*ens simpliciter* = ὄν ἀπλῶς) and not being according to something («*non ens <secundum> aliquid*,» *idest secundum quid* = οὐ τὶ ὄν), as happens in accidents, for *to be white* is not *to be* simply but (to be) *according to something* (*secundum quid*).<sup>52</sup>

This is evident because when the white begins to be, we do not say that it *begins to be* simply but that it *begins to be white*.<sup>53</sup> Yet, when Socrates begins to be a man, it is said simply that he *begins to be*. Whence, it is evident that *to be a man* signifies *to be* simply, while *to be white* signifies *to be* according to something.

### 33.13. Modes in Which Substance Is First

ARISTOTLE shows how substance is said to be first; and since *first* is said in multiple modes (► 8.12), substance is first among all beings in three modes: namely, according to time (► 33.14), according to definition (► 33.15), and according to cognition (► 33.16).<sup>54</sup>

### 33.14. First According to Time

That (substance) should be first in time (in respect) of the other (categories) is proven from this: that none of the other categories is separable (*separabile* = χωριστόν) from substance, and (that) substance alone is separable from the others, for no accident is found without substance, but some substance is found with an accident.<sup>55</sup> And thus, it is

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<sup>51</sup> *In Metaph.* 7, l. 1, §1256 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a29–30): “Et quia accidentia non videntur entia prout secundum se significantur, sed solum prout significantur in concrezione ad substantiam, palam est quod singula aliorum entium sunt entia propter substantiam.”

<sup>52</sup> *In Metaph.* 7, l. 1, §1256 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a30–31): “Et ex hoc ulterius apparet, quod substantia est «primum ens, et ens simpliciter, et non ens secundum aliquid,» idest secundum quid, sicut est in accidentibus. Esse enim album non est simpliciter esse, sed secundum quid. Quod ex hoc patet, quia cum incipit esse albus, non dicimus quod incipiat esse simpliciter, sed quia incipiat esse albus. Cum enim Socrates incipit esse homo, dicitur simpliciter quod incipit esse. Unde patet quod esse hominem significat esse simpliciter. Esse autem album significat esse secundum quid.”

<sup>53</sup> *In Metaph.* 7, l. 1, §1256: “Quod ex hoc patet, quia cum incipit esse albus, non dicimus quod incipiat esse simpliciter, sed quia incipiat esse albus. Cum enim Socrates incipit esse homo, dicitur simpliciter quod incipit esse. Unde patet quod esse hominem significat esse simpliciter. Esse autem album significat esse secundum quid.”

<sup>54</sup> *In Metaph.* 7, l. 1, §1257 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a31–33): “Ostendit [Philosophus] quomodo substantia dicatur primum; et dicit quod cum hoc quod dico primum dicatur multis modis, ut in quinto est habitum, tribus modis substantia est prima inter omnia entia: scilicet secundum cognitionem, et secundum definitionem et secundum tempus.”

<sup>55</sup> *In Metaph.* 7, l. 1, §1257 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a33–34): “Et quod sit prima tempore aliis, ex hoc probatur, quod nullum aliorum praedicamentorum est separabile a substantia, sola autem substantia est separabilis ab aliis: nullum enim accidens invenitur sine substantia, sed aliqua substantia

evident that (it is) not (the case that) whenever there is a substance there is an accident, but on the contrary. Therefore, substance is prior in time.

### 33.15. First According to Definition

That substance should be first also according to definition is evident because the definition of substance must be posited in the definition of any accident: just as *nose* is posited in the definition of *snub* (► 15.19; 17.5; 17.8; 18.4), so in the definition of any accident is posited its proper subject.<sup>56</sup> Hence, just as *animal* is prior to *man* in definition because the definition of *animal* is posited in the definition of *man*, so *substance* is prior to *accidents* in definition for the same reason (► 14.1).

Thus, all other categories of being (*praedicamenta entis*) refer to substance as to a first being.<sup>57</sup> This is evident because all accidents have the *ratio* of *substance*, for the proper subject must be posited in the definition of any accident, as *nose* is posited in the definition of *snub*.

### 33.16. First According to Cognition

That substance should be prior also in the order of cognition is evident, for that is first according to cognition which is more known (*notum*, or knowable) and manifests the thing more; and any one thing is more known when its substance is known than when its quantity or (its) quality is known.<sup>58</sup> Thus, we reckon (*putamus*) that we maximally know singulars when it is known *what* man or fire is, rather than when we know *how* it is, *how much* (it is), *where* (it is), or (what it is) according to some other category.

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invenitur sine accidente. Et sic patet, quod non quodcumque est substantia, est accidens, sed e contrario: et propter hoc substantia est prior tempore.”

<sup>56</sup> *In Metaph.* 7, l. 1, §1258 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a34–36): “Et quod etiam sit prima secundum definitionem, patet, quia in definitione cuiuslibet accidentium oportet ponere definitionem substantiae. Sicut enim in definitione simi ponitur nasus, ita in definitione cuiuslibet accidentis ponitur proprium eius subiectum; et ideo sicut animal est prius definitione quam homo, quia definitio animalis ponitur in definitione hominis, eadem ratione substantia est prior definitione accidentibus.”

<sup>57</sup> *In Metaph.* 9, l. 1, §1768: “Dicit ergo [Philosophus] primo, quod in praemissis dictum est de ente primo, ad quod omnia alia praedicamenta entis referuntur, scilicet de substantia. Et quod ad substantiam omnia alia referantur sicut ad ens primum, manifestat, quia omnia alia entia, scilicet qualitas, quantitas et huiusmodi dicuntur secundum rationem substantiae. Dicitur enim quantitas ex hoc quod est mensura substantiae, et qualitas ex hoc quod est quaedam dispositio substantiae; similiter in aliis. Et hoc patet ex hoc, quod omnia accidentia habent rationem substantiae, quia in definitione cuiuslibet accidentis oportet ponere proprium subiectum, sicut in definitione simi ponitur nasus.” Cf. ARISTOTLE, *Metaphysica* Θ.1, 1045b27–32: “Περὶ μὲν οὖν τοῦ πρώτως ὄντος καὶ πρὸς ὃ πᾶσαι αἱ ἄλλαι κατηγορίαι τοῦ ὄντος ἀναφέρονται εἴρηται, περὶ τῆς οὐσίας. κατὰ γὰρ τὸν τῆς οὐσίας λόγον λέγεται τᾶλλα ὄντα, τό τε ποσὸν καὶ τὸ ποιὸν καὶ τᾶλλα τὰ οὕτω λεγόμενα· πάντα γὰρ ἔξει τὸν τῆς οὐσίας λόγον, ὥσπερ εἵπομεν ἐν τοῖς πρώτοις λόγοις.”

<sup>58</sup> *In Metaph.* 7, l. 1, §1259 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028a36–b1): “Quod etiam sit prior ordine cognitionis, patet. Illud enim est primum secundum cognitionem, quod est magis notum et magis manifestat rem. Res autem unaquaeque magis noscitur, quando scitur eius substantia, quam quando scitur eius quantitas aut qualitas. Tunc enim putamus nos maxime scire singula, quando noscitur quid est homo aut ignis, magis quam quando cognoscimus quale est aut quantum, aut ubi, aut secundum aliquod aliud praedicamentum.”

Wherefore, concerning those (things) themselves that are in the categories of accidents, we know the singular (categories) when we know of each (of those things themselves that are in the categories) *what* it is.<sup>59</sup> For example, when we know *what* the qualified thing itself is (*quando scimus quid est ipsum quale*), we know *quality* (*scimus qualitatem*); and when we know *what* the quantum itself is (*quando scimus quid est ipsum quantum*), we know *quantity* (*scimus quantitatem*). For, just as the other categories only have (their act of) being (*esse*) because they are in a substance (*insunt substantiae*), so, too, they only have (their act of) being known (*cognosci*) insofar as they participate (in) something of the mode of cognition of substance—which is to know *what* (something) is.

### 33.17. Substance and Other Philosophers

ARISTOTLE shows that one ought to treat of substance alone also through the custom of other philosophers, for what is asked and questioned among philosophers then and now is *what* being is—and this is nothing other than to ask and to question *what the substance of things is*.<sup>60</sup>

Thus, some, as Parmenides and Melissus, said that this being—to wit, substance—is one and immobile.<sup>61</sup> Or mobile, as the ancient natural (philosophers) used to posit only one material principle of things, for they reckoned that only matter is substance. And in this way, it is evident that, since they should have posited one being on account of one material principle, by *one being* they would have understood *one substance*. On the other hand, some posited more beings than one—namely, those who posited multiple material principles, and consequently multiple substances of things. Of which some posited them (to be) finite, as Empedocles the four elements, while others (posited them to be) infinite, as Anaxagoras (posited) infinite like parts, and Democritus (posited) infinite indivisible bodies.

<sup>59</sup> *In Metaph.* 7, l. 1, §1259 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028b1–2): “Quare etiam de ipsis, quae sunt in praedicamentis accidentium, tunc scimus singula, quando de unoquoque scimus quid est. Sicut quando scimus quid est ipsum quale, scimus qualitatem, et quando scimus quid est ipsum quantum, scimus quantitatem. Sicut enim alia praedicamenta non habent esse nisi per hoc quod insunt substantiae, ita non habent cognosci nisi in quantum participant aliquid de modo cognitionis substantiae, quae est cognoscere quid est.”

<sup>60</sup> *In Metaph.* 7, l. 1, §1260 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028b2–4): “Ostendit [Philosophus] idem, scilicet quod de substantia sola est agendum, *ex consuetudine aliorum philosophorum*: dicens, quod cum sit quaesitum et semper dubitatum apud philosophos «et olim» quantum ad praeteritum, «et nunc» quantum ad praesens, quid est ens: hoc nihil aliud est quaerere et dubitare, quam quid est substantia rerum.”

<sup>61</sup> *In Metaph.* 7, l. 1, §1261 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028b4–6): “«Hoc enim ens,» scilicet substantiam, quidam dixerunt esse unum vel immobile, sicut Parmenides et Melissus, vel mobile, sicut antiqui naturales ponentes unum tantum materiale principium rerum. Solam autem materiam putabant ens esse substantiam. Et sic patet, quod cum ponerent unum ens propter unum materiale principium, per unum ens intelligebant unam substantiam. Quidam vero posuerunt plura entia quam unum, qui scilicet posuerunt plura principia materialia, et per consequens plures rerum substantias. Quorum quidam posuerunt ea finita, ut Empedocles quatuor elementa; quidam vero infinita, ut Anaxagoras infinitas partes consimiles, et Democritus infinita indivisibilia corpora.”

Thus, if other philosophers who treated of beings considered only substances, so must we theorize of substance *what* it should be.<sup>62</sup> And we say this *maximally* (*maxime* = μάλιστα) because we principally intend of this; and *first* (*primo* = πρῶτον) because through it others are known; and *alone* (*solum* = μόνον) because (the act of) determining (the truth) concerning substance alone causes all other (things) to be known (*de omnibus aliis notitiam facit*). And thus, in some mode, (metaphysics) determines (the truth) concerning substance (so to say, *alone*); and in some mode, not alone; and this is what ARISTOTLE signifies when he says, “as we might say” (*ut est dicere* = ὡς εἰπεῖν) or “so to say” (*ut [s]i ita dicatur*), which we are accustomed to say of those that are not true in every particular.

### 33.18. Impartible vs. Simple

*Simple* and *impartible* are the same in subject but differ in *ratio*; for something is said (to be) **impartible** by the privation of division: to wit, because (something) is *not divisible into many*.<sup>63</sup> And something is said (to be) **simple** by the privation of composition: to wit, because (something) is *not composed from many*.

### 33.19. Substance by Itself is Impartible

PROCLUS proves that substance standing by itself is indivisible thus: If the being that subsists by itself (*authypostatōn ens, id est per se subsistens* = αὐθυπόστατον ὄν) be partible (*partibile* = μεριστόν), it will constitute itself (as) partible, it will be reverted whole upon itself, and everything will be in everything itself; but this is impossible; therefore, the subsistent is impartible.<sup>64</sup>

<sup>62</sup> *In Metaph.* 7, l. 1, §1262 (cf. ARISTOTLE, *Metaphysica* Z.1, 1028b6–7): “Et ideo si alii philosophi tractantes de entibus attendebant ad solas substantias, et nobis etiam speculandum est «de sic ente,» id est de substantia quid ipsa sit. Et hoc inquam maxime, quia de hac principaliter intendimus. Et primo, quia per eam alia cognoscuntur «et solum, ut est dicere» quia de substantia sola determinando, de omnibus aliis notitiam facit. Et ita quodam modo solum de substantia determinat, et quodam modo non solum. Hoc autem significat cum dicit «ut est dicere» vel ut ita dicatur, quod consuevimus dicere de his quae non usquequaque sunt vera.” St. Thomas relays two renderings of ὡς εἰπεῖν here, where the first one, *ut est dicere*, is that of William of MOERBEKE, while *ut si ita dicatur* belongs to the *Traslatio Media*.

<sup>63</sup> *In De causis*, l. 7: “simplex et impartibile est idem subiecto, differunt autem ratione: nam impartibile dicitur aliquid per privationem divisionis, quia scilicet non est in multa divisibile; simplex autem dicitur aliquid per privationem compositionis, quia scilicet non est ex multis compositum.”

<sup>64</sup> *In De causis*, l. 7: “Primo ergo probatur quod substantia per se stans sit indivisibilis, secundo quod sit simplex. Primum autem melius probatur in libro Procli quam hic. Est enim haec eius probatio. *Si enim, inquit, partibile est, authypostatōn ens, id est per se subsistens, instituet partibile seipsum, et totum ipsum vertetur ad seipsum, et omne in omni seipso erit. Hoc autem impossibile. Impartibile ergo authypostatōn.*” Cf. PROCLUS, *The Elements of Theology*, 46.30–32: “Πάν τὸ αὐθυπόστατον ἀμερές ἐστὶ καὶ ἀπλοῦν. εἰ γὰρ μεριστόν, αὐθυπόστατον ὄν, ὑποστήσει μεριστόν ἑαυτό, καὶ ὅλον αὐτὸ στραφήσεται πρὸς ἑαυτὸ καὶ πᾶν ἐν παντὶ ἑαυτῷ ἔσται. τοῦτο δὲ ἀδύνατον. ἀμερές ἄρα τὸ αὐθυπόστατον.” St. Thomas shows that this proof is better than the one provided in the *Book of Causes*, which proceeds thus: That which befits something by itself befits any part of it, if it is partible. Therefore, if something should be partible standing by itself, any part of it would have to stand by itself, and in this way, it would not rest upon another to constitute the whole. However, as St. Thomas says, this proof is not efficacious for this purpose, since it is not necessary for anything that by itself befits some whole to befit its singular parts, for there is some whole of similar parts, such as air and water, and some (whole) of dissimilar (parts), as an animal and a house. *Ibid.*, “In hoc autem libro probatur sic. Illud quod convenit alicui per seipsum, convenit cuilibet parti eius, si sit partibile. Si igitur aliquid partibile sit stans per seipsum, oportebit quod quaelibet pars

To make this evident, one ought to consider that, here, something is taken (as) *standing by itself* (*stans per seipsum*) not by reason of the part—to wit, such that one part of it should stand through another as happens in material substances—but by reason of the whole—to wit, such that the whole would stand whole by itself.<sup>65</sup> Now any one thing is turned to that whereby it stands as an effect (is turned) to (its) cause; and it must be in it as in its foundation.

Therefore, if something partible should stand by itself, it would be necessary for any part of it to stand through whatever (other part) and whatever (part) would be founded in whatever (other part), which is impossible; since, in this way, it would follow that one and the same part of it would simultaneously be a cause and an effect in respect of the same, which is impossible.<sup>66</sup>

### 33.20. Substance by Itself is Simple

That that, which stands by itself should be simple—that is, not composed from many—is proven through a twofold reason:<sup>67</sup>

1. In every composite from multiple parts, it is necessary to posit some order of parts: to wit, such that one part of it should be better and another viler, for many (things) come into the constitution of one in some order, just as, also, a multitude proceeds from one in some order.<sup>68</sup>

Whence, we see that in the composition of natural bodies, form is standing prior to matter.<sup>69</sup> In the composition of a compound body, one element dominates (the others). In the composition of the parts of an animal, one limb is more principal than another. And in

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eius stet per seipsam, et ita non innitetur alteri ad constitutionem totius. Haec autem probatio non est adeo efficax, quia non est necessarium quod quidquid per se convenit alicui toti conveniat singulis partibus eius. Est enim quoddam totum similitium partium ut aer et aqua, et quoddam dissimilium ut animal et domus.”

<sup>65</sup> *In De causis*, l. 7: “Ad cuius evidentiam considerandum est quod hic accipitur esse aliquid stans per seipsum non ratione partis, ut scilicet una pars eius stet per aliam sicut accidit in substantiis materialibus, sed ratione totius, ut scilicet totum stet per se totum. Unumquodque autem convertitur ad id per quod stat sicut effectus ad causam, et oportet quod sit in eo sicut in suo fundamento.”

<sup>66</sup> *In De causis*, l. 7: “Si ergo aliquid partibile sit stans per seipsum, oportebit quod quaelibet pars eius stet per quamlibet et quaelibet fundetur in qualibet; quod est impossibile, quia sic sequeretur quod una et eadem pars eius esset causa et effectus simul respectu eiusdem, quod est impossibile.”

<sup>67</sup> *In De causis*, l. 7: “Quod autem id quod est stans per seipsum sit simplex, id est non compositum ex multis, probatur duplici ratione.”

<sup>68</sup> *In De causis*, l. 7: “In omni composito ex pluribus partibus necesse est ponere quemdam partium ordinem, ut scilicet una pars eius sit melior et alia vilior. Multa enim ad unum constituendum ordine quodam perveniunt sicut et ab uno multitudo ordine quodam progreditur.”

<sup>69</sup> *In De causis*, l. 7: “Unde videmus quod in compositione corporis naturalis forma est praestantior materia et in compositione corporis mixti unum elementum dominatur et in compositione partium animalis unum membrum est principalius alio et in partibus alicuius continui una pars magis accedit ad punctum, quod est principium magnitudinis, quam alia.”



the parts of some continuum, one part approaches more than another the point that is the principle of magnitude (i.e., above all if we imagine magnitudes to be produced by motion).

Therefore, if something composed from multiple parts should be standing by itself, any part of it would have to be standing through whichever part, and in this way, the better (part) would depend upon the viler part, and conversely.<sup>70</sup>

2. Everything that is standing by itself is sufficient to itself in its being (*est sibi sufficiens in suo esse*), not having need for another for its (own) subsistence; by which is not excluded the dependence on an agent cause but on a formal and material cause that furnishes the subsistence.<sup>71</sup>

However, every composite from parts is not sufficient to itself: rather, it needs for its subsistence the parts from which it is composed, which are had in the habitude of a material cause (in respect) to the whole.<sup>72</sup>

Therefore, no composite from parts is standing by itself.<sup>73</sup> Hence, every substance that stands by itself is simple.

### 33.21. Substance as Essence

The name *substance* does not signify the (act of) being by itself (*per se esse*) only, for the (act of) being cannot by itself be a genus.<sup>74</sup> Rather, it signifies an essence to which such (an act of) being befits—namely, (the act of) *being by itself* (*per se esse*). This (act of) being, however, is not its essence itself.

### 33.22. The *Ratio of Accident* vs. the *Ratio of a Genus of Accident*

In anyone of the nine (accidental) categories, two (*ratios*) are found:<sup>75</sup>

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<sup>70</sup> *In De causis*, l. 7: “Si ergo aliquid compositum ex pluribus partibus sit stans per seipsum, oportebit quod quaelibet pars eius sit stans ex qualibet et ita pars *melior* dependebit *ex parte viliori* et e converso.”

<sup>71</sup> *In De causis*, l. 7: “Secunda ratio est quia omne quod est stans per seipsum, est sibi sufficiens in suo esse, non indigens alio ad sui subsistentiam; per quod non excluditur dependentia a causa agente sed a causa formali et materiali subsistentiam praestante.”

<sup>72</sup> *In De causis*, l. 7: “Omne autem compositum ex partibus *non est sibi sufficiens*, sed *indiget* ad sui subsistentiam *partibus ex quibus componitur*, quae se habent in habitudine causae materialis ad totum.”

<sup>73</sup> *In De causis*, l. 7: “Ergo nullum compositum ex partibus est per se stans. *Omnis igitur substantia per se stans est simplex*.” As St. Thomas explains, Proclus posits this reason differently, *ibid*: “Sciendum tamen est quod haec secunda ratio distincte ponitur in libro Procli, sed in hoc libro inducitur per modum conclusionis.” Cf. PROCLUS, *The Elements of Theology*, 46.33–48.4: “ἀλλὰ μήν καὶ ἀπλοῦν. εἰ γὰρ σύνθετον, τὸ μὲν χεῖρον ἔσται ἐν αὐτῷ, τὸ δὲ βέλτιον, καὶ τὸ τε βέλτιον ἐκ τοῦ χείρονος ἔσται καὶ τὸ χεῖρον ἐκ τοῦ βελτίονος, εἴπερ ὅλον ἀφ’ ὅλου ἑαυτοῦ πρόεισιν· ἔτι δὲ οὐκ αὐτάρκες, προσδεῖς ὄν τῶν ἑαυτοῦ στοιχείων, ἐξ ὧν ὑφέστηκεν. ἀπλοῦν ἄρα ἐστὶ πᾶν ὅπερ ἂν αὐθυπόστατον ᾖ.”

<sup>74</sup> *STh I*, q. 3 a. 5 ad 1: “substantiae nomen non significat hoc solum quod est per se esse, quia hoc quod est esse, non potest per se esse genus, ut ostensum est. Sed significat essentiam cui competit sic esse, id est per se esse, quod tamen esse non est ipsa eius essentia.”

<sup>75</sup> *In Sent.* 1, d. 8 q. 4 a. 3 co.: “in unoquoque novem praedicamentorum duo invenio; scilicet rationem accidentis et rationem propriam illius generis, sicut quantitatis vel qualitatis.”

## 1. The *ratio* of *accident*.

The *ratio* of *accident* contains imperfection, for the (act of) being of an accident (*esse accidentis*) is to be in (a subject, *inesse*) and to depend on (a subject, *dependere*); and consequently (*per consequens*), to cause composition with the subject (*compositionem facere cum subjecto*; i.e., when speaking of intrinsic accidents; ►33.10).<sup>76</sup>

## 2. The proper *ratio* of the genus, such as (the *ratio*) of *quantity* or of *quality*.

If we consider the proper *ratio* of any genus, any of the other genera apart from relation (*ad aliquid*) conveys (*importat*) an imperfection.<sup>77</sup> Thus, quantity has (its) proper *ratio* in comparison to the subject, for **quantity** is *the measure of substance*; and **quality**, *the disposition of substance*; and so on of all the others.

On the other hand, if we should consider their species, then some (of them) convey (*important*) something of perfection—as science or virtue (which are species quality)—according to the completive differences (i.e., the genus itself conveys some imperfection, but when the genus is divided, some perfections are found in the formal differences, and then one species is more perfect than another).<sup>78</sup>

Yet, relation (*ad aliquid*), even according to the *ratio* of the genus, does not convey some dependence (in relation) to the subject: on the contrary, it is referred to something external (*refertur ad aliquid extra*).<sup>79</sup>

### 33.23. Categories That Are Not Determined to a Natural Genus

Among the accidents, only *quantity* (►34), *quality* (►36), and *relation* (*ad aliquid*; ►37) are not determined to some genus of natural things—unlike the other (accidents), as is evident, above all, of *acting* (*agere*) and *being acted upon* (*pati*), and of *where* (*ubi*) and *when* (*quando*).<sup>80</sup>

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<sup>76</sup> *In Sent.* 1, d. 8 q. 4 a. 3 co.: “Ratio autem accidentis imperfectionem continet: quia esse accidentis est inesse et dependere, et compositionem facere cum subjecto per consequens.”

<sup>77</sup> *In Sent.* 1, d. 8 q. 4 a. 3 co.: “Si autem consideremus propriam rationem cujuslibet generis, quodlibet aliorum generum, praeter ad aliquid, importat imperfectionem; quantitas enim habet propriam rationem in comparatione ad subjectum; est enim quantitas mensura substantiae, qualitas dispositio substantiae, et sic patet in omnibus aliis.”

<sup>78</sup> *In Sent.* 1, d. 8 q. 4 a. 3 co.: “Si autem consideremus species ipsarum, tunc aliqua secundum differentias completivas important aliquid perfectionis, ut scientia, virtus et hujusmodi.”

<sup>79</sup> *In Sent.* 1, d. 8 q. 4 a. 3 co.: “Ad aliquid autem, etiam secundum rationem generis, non importat aliquam dependentiam ad subjectum; immo refertur ad aliquid extra.”

<sup>80</sup> *In Metaph.* 5, l. 15, §977 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a7–10): “Quoniam ens non solum dividitur in potentiam et actum, sed etiam in decem praedicamenta, postquam Philosophus distinxit hoc nomen potentia, hic incipit distinguere nomina, quae significant praedicamenta. Et primo nomen quantitatis. Secundo nomen qualitatis [...]. Tertio distinguit modos ad aliquid [...]. Alia vero praedicamenta praetermittit, quia sunt determinata ad aliquod genus rerum naturalium; ut patet praecipue de agere et pati, et de ubi et quando.”

It ought to be known, too, that *disposition*, *habit*, and *affection* signify a genus of category only according to one mode of signification.<sup>81</sup> Hence, ARISTOTLE (elsewhere) does not posit them with the other parts of *being*—namely, *quantity*, *quality*, and *relation*—, for, in them, either all or many modes pertain to genera of categories signified by those names.

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<sup>81</sup> *In Metaph.* 5, l. 20, §1069: “Sciendum est autem, quod quia haec tria, scilicet dispositio, habitus, et passio, non significant genus praedicamenti, nisi secundum unum modum significationis, ut ex praehabitis patet, ideo non posuit [Philosophus] ea cum aliis partibus entis, scilicet quantitate, qualitate et ad aliquid. In illis enim vel omnes vel plures modi ad genera praedicamenti, significata per illa nomina, pertinebant.”



## 34. Quantity

*Here, we seek to clarify what quantity—the genus—is.*

### 34.1. Quantity, Quantum

ARISTOTLE posits the *ratio* of **quantity** saying that, that is said (to be a) **quantum** (*quantum* = ποσόν) *which is divisible into those (parts) that are in[trinsic] (quod est divisibile in ea quae insunt = τὸ διαιρετὸν εἰς ἐνυπάρχοντα).*<sup>1</sup>

This (i.e., that the quantum is divisible into intrinsic parts) is certainly said to differentiate (the division of the quantum) from the division of compound (bodies), for a compound body (*corpus mixtum*) is resolved into elements that are not in the compound in act but only in virtue (*virtute*).<sup>2</sup> Whence, (in compound bodies) there is not only division of quantity but there must (also) be some alteration by which the compound is resolved into elements.

ARISTOTLE immediately adds that *one and the other* (of the two parts into which the quantum is divisible), *or each* (of them, if they should be more than two), *is naturally apt to be something one (utrumque aut singulum, est natum esse unum aliquid = ὧν ἑκάτερον ἢ ἕκαστον ἔν τι [...] πέφυκεν εἶναι):* that is, (any part into which the quantum is divisible is naturally apt to be) *something demonstrated (aliquid demonstratum < καὶ τόδε τι).*<sup>3</sup>

ARISTOTLE says this to remove the division into essential parts, which are matter and form (► 13.10), for neither of them is naturally apt to be something *one* by itself.<sup>4</sup>

### 34.2. The First Two Species of Quantity: Multitude and Magnitude

ARISTOTLE posits the species of *quantity*, among which there are two first:<sup>5</sup> namely, **multitude** or **plurality** (*multitudo sive pluralitas* = πλῆθος; ► 34.3), and **magnitude** (*magnitudo* = μέγεθος; ► 34.14) or **measure** (*mensura* = مقدار *miqdār*; ► 7.3).<sup>6</sup>

<sup>1</sup> *In Metaph.* 5, l. 15, §977 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a7): “Primo ponit [Philosophus] *rationem quantitatis*; dicens, quod quantum dicitur quod est divisibile in ea quae insunt.”

<sup>2</sup> *In Metaph.* 5, l. 15, §977: “Quod quidem dicitur ad differentiam divisionis mixtorum. Nam corpus mixtum resolvitur in elementa, quae non sunt actu in mixto, sed virtute tantum. Unde non est ibi tantum divisio quantitatis; sed oportet quod adsit aliqua alteratio, per quam mixtum resolvitur in elementa.”

<sup>3</sup> *In Metaph.* 5, l. 15, §977 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a7–8): “Et iterum addit [Philosophus], quod *utrumque aut singulum, est natum esse «unum aliquid,» hoc est aliquid demonstratum.*”

<sup>4</sup> *In Metaph.* 5, l. 15, §977: “Et hoc dicit [Philosophus] ad removendum divisionem in partes essentielles, quae sunt materia et forma. Nam neutrum eorum aptum natum est esse unum aliquid per se.”

<sup>5</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a8–14): “Ponit [Philosophus] *species quantitatis*; inter quas primae sunt duae; scilicet multitudo sive pluralitas, et magnitudo sive mensura.”

<sup>6</sup> We take *mensura* to originate in مقدار *miqdār* through the *Traslatio Anonyma* (xxiii), using the convention in AVICENNA, *Liber de philosophia prima*, 3.4, 122.73–75; 79–86: “Quantitates continuae sunt mensurae continuorum; sed corpus quod est quantum, est mensura continui quod est corpus ex intentione formae. [...] Igitur est accidens sine dubio, sed est de accidentibus quae pendent ex materia et ex re quae est in materia: haec enim mensura non separatur a materia nisi in aestimatione; nec separatur a forma quae est materiae, eo quod ipsa est mensura rei quae recipit dimensiones huiusmodi. Nec est possibile ut ipsa

Each has the *ratio* of *quantum* insofar as multitude is numerable (*numerabilis* = ἀριθμητόν) and magnitude is measurable (*mensurabilis* = μετρητόν), for proper mensuration pertains to quantity (►28.1).<sup>7</sup>

### 34.3. Multitude and Number

Multitude is defined (by ARISTOTLE) thus: **multitude** is *that (quantity) which is divisible according to potency into non-continuous parts (quod est divisibile secundum potentiam in <partes> non continuas* = τὸ διαιρετὸν δυνάμει εἰς μὴ συνεχῆ).<sup>8</sup>

When a plurality or multitude is finite (*finita* = πεπερασμένον), it is said (to be a) **number** (*numerus* = ἀριθμός).<sup>9</sup> Hence, if a multitude should be infinite it would not be a number, for that which is infinite cannot be numbered.

### 34.4. Simple Number vs. Numbered Number

As ARISTOTLE says, that by which we judge something (to be) more or less is its number (*id quo aliquid iudicamus plus et minus, est numerus eius* < τὸ πλεῖον καὶ ἔλαττον κρίνομεν ἀριθμῶ).<sup>10</sup> However, *number* is said in two modes (►16.7):

**1. Number simply** (*numerus simpliciter*), **simple** or **absolute number** (*numerus simplex vel absolutus*): *that by which we number (quo numeramus* = ὃ ἀριθμοῦμεν), that is, number itself absolutely taken.<sup>11</sup> For example, *two, three, and four*.

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sit sine hac re, sicut tempus non potest esse nisi per continuum quod est spatium, quia haec mensura est continuum in quantum mensuratur totiens vel totiens per hoc et non finitur mensuratio in aestimatione in infinitum." Cf. *ibid.*, 1.2, 10.92–95. Cf. AVICENNA, *The Metaphysics of The Healing*, 84.14–15; 17–85.3: "وأما الكميات المتصلة فهي مقادير المتصلات، أما الجسم الذي هو الكم فهو مقدار المتصل الذي هو الجسم بمعنى الصورة [...]". وهذا المقدار قد بان أنه في مادة، وأنه يزيد وينقص والجوهر باق، فهو عرض لا محالة، ولكنه من الأعراف التي تتعلق بالمادة وبشيء في المادة، لأن هذا المقدار لا يفارق المادة إلا بالتهوم، ولا يفارق الصورة التي للمادة، لأنه مقدار الشيء المتصل الذي يقبل أبعاد كذا، وهذا لا يمكن أن يكون بلا هذا الشيء المتصل كما أن الزمان لا يكون إلا بالمتصل الذي هو المسافة وهذا المقدار هو كون المتصل [وكذا] in the source. Cf. *ibid.*, 8.10–12. AVERROES uses *‘izām* or *‘uzm*, instead of *miqdār* (which, to him, is the *measure* of *عظم*), because he follows ASṬĀT. See AVERROES, *tafsir ma ba’d at-ṭabī’at*, Text 18, Book V, Tome VI, 594.4–5: "ويقال كثرة كمية الذي يعد وعظم كمية إذا كانت تسمح بمقدار ما" (cf. *ibid.*, Tome I, CXXIX).

<sup>7</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a8–10): "Utrumque autem eorum habet rationem quanti, in quantum multitudo numerabilis est et magnitudo est mensurabilis. Mensuratio enim propria pertinet ad quantitatem."

<sup>8</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a10–11): "Definitur autem multitudo sic. Multitudo est, quod est divisibile secundum potentiam in partes non continuas."

<sup>9</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a13): "Uterius autem, quando pluralitas vel multitudo est finita, dicitur numerus. [...] Si enim esset multitudo infinita, non esset numerus; quia quod infinitum est, numerari non potest."

<sup>10</sup> *In Physic.* 4, l. 17, n. 11 (cf. ARISTOTLE, *Physica* Δ.11, 219b4; 6–7): "Id enim quo aliquid iudicamus plus et minus, est numerus eius. [...] dicit [Philosophus] quod numerus dicitur dupliciter." *In Sent.* 1, d. 19 q. 2 a. 1 co.: "[tempus] est numerus numeratus, et non numerus simpliciter. Sicut enim dicimus quod duo canes est numerus numeratus, et duo est numerus simpliciter." *STh* I, q. 10 a. 6 co.: "numerus est duplex."

<sup>11</sup> *In Physic.* 4, l. 17, n. 11 (cf. ARISTOTLE, *Physica* Δ.11, 219b7): "Alio modo dicitur numerus quo numeramus, id est ipse numerus absolute acceptus, ut duo, tria, quatuor." *STh* I, q. 30 a. 1 ad 4: "numerus simplex vel absolutus, ut duo et tria et quatuor."

The number that is absolute (i.e., abstracted) from the things numbered is only in (our) understanding (*in intellectu*).<sup>12</sup>

**2. Numbered number** (*numerus numeratus*): that which is numbered in act (*id quod numeratur <actu>* = τὸ ἀριθμούμενον) or that which is numerable (*quod est numerabile* = τὸ ἀριθμητόν), which is the number that is in the things numbered (*numerus qui est in rebus numeratis*), the number of some numbered thing (*numerus alicuius rei numeratae*), number applied to numbered things (*numerus applicatus rebus numeratis*).<sup>13</sup> For example, when we say, two dogs, two men, two horses, ten men or ten horses.<sup>14</sup>

The number that exists in the numbered (thing) is not the same for all (things): rather, (there is a) diverse (number) of diverse (things; ► 34.6; 26.4).<sup>15</sup>

If we take *number* insofar as it is in the things numbered, thus, in created things, *one* is a part of *two*, and *two* (is a part) of *four*. For example, *one man* (is a part) of *two (men)*, and *two (men)* is a part of *three (men)*.<sup>16</sup>

### 34.5. In a Number

Some (things) are said to be **in a number** in two modes:<sup>17</sup>

**1.** As a **part** [of a number is in a number] (*sicut pars [numeri]* = ὡς μέρος ἀριθμοῦ), as *two* is in *four*; or as its **proper affection** (*sicut propria passio eius* < πάθος), as *even* and *odd*, or whatever (other proper accident) is (an affection) of number itself.<sup>18</sup>

Thus, the unit is in a number as a part (of any number; ► 3),<sup>19</sup> while *even* and *odd* are in number as affections of number (*numeri passiones*, i.e., proper accidents of number

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<sup>12</sup> *STh* I, q. 10 a. 6 co.: “non enim numerus absolutus a rebus numeratis est nisi in intellectu.”

<sup>13</sup> *In Physic.* 4, l. 17, n. 11 (cf. ARISTOTLE, *Physica* Δ.11, 219b6–7): “Uno modo id quod numeratur actu, vel quod est numerabile [...]; qui dicitur numerus numeratus, quia est numerus applicatus rebus numeratis.” *STh* I, q. 10 a. 6 co.: “numerus qui est in rebus numeratis.” *In Physic.* 4, l. 19, n. 4 (cf. ARISTOTLE, *Physica* Δ.12, 220b9): “numerus alicuius rei numeratae.”

<sup>14</sup> *In Physic.* 4, l. 17, n. 11: “ut puta cum dicimus decem homines aut decem equos.” *STh* I, q. 10 a. 6 co.: “ut duo homines et duo equi.”

<sup>15</sup> *STh* I, q. 10 a. 6 co.: “Numerus autem in numerato existens non est idem omnium, sed diversus diversorum.”

<sup>16</sup> *STh* I, q. 10 a. 6 co.: “Si autem accipiamus numerum prout est in rebus numeratis, sic in rebus quidem creatis, unum est pars duorum, et duo trium, ut unus homo duorum, et duo trium.”

<sup>17</sup> *In Physic.* 4, l. 20, n. 3 (cf. ARISTOTLE, *Physica* Δ.12, 221a11–13): “dicuntur aliqua esse in numero. Quod etiam dicitur dupliciter.”

<sup>18</sup> *In Physic.* 4, l. 20, n. 3 (cf. ARISTOTLE, *Physica* Δ.12, 221a12): “in numero enim est aliquid sicut pars, sicut binarius est in quaternario; et aliquid est sicut propria passio eius, ut par et impar, vel quidquid aliud est ipsius numeri.”

<sup>19</sup> *In Physic.* 4, l. 20, n. 3 (cf. ARISTOTLE, *Physica* Δ.12, 221a13–16): “quia tempus est numerus, utroque modo contingit aliquid esse in tempore. Nam nunc et prius et posterius et quaecumque sunt huiusmodi, hoc modo sunt in tempore, sicut sunt in numero unitas, quae est pars, et par et impar, quae sunt numeri passiones, et superfluum et perfectum.” St. Thomas immediately discusses perfect and superfluous

insofar as it is number), as are also *superfluous* and *perfect* (numbers), just like the now (which is the continuation of time and its terminus),<sup>20</sup> and the prior and the posterior (which are affections of time), are in time.

2. Not because it is something of number but because number is of it (*numerus est eius*) as **of (that which is) numbered** (*ut numerati*).<sup>21</sup> For example, men are said to be *in such or such a number*.

### 34.6. Identity in Number

If there are seven horses and seven dogs, they do not differ according to number: rather, they differ according to the species of the things numbered.<sup>22</sup>

Hence, seven dogs and seven horses are the same number.<sup>23</sup> ARISTOTLE shows in what mode this should be true. He says that this can be rightly (< ὀρθῶς) said if the number of some diverse things is equal. For example, if both sheep and dogs should be ten, the number of sheep and of dogs would be the same.

However, it cannot be said that *to be ten* should be the same of dogs and of sheep (< δεκάς δὲ οὐχ ἡ αὐτὴ οὐδὲ δέκα τὰ αὐτά), for *ten* are not *ten dogs* and *ten sheep* in the same way.<sup>24</sup> This is so because, with addition of unity or identity, a genus can be

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numbers because the translation he is reading has *superfluous et par* for τὸ περιττὸν καὶ ἄρτιον (the odd and [the] even), where ἄρτιον (even) can moreover be understood as *perfect*. Thus, (that) number is said (to be) **superfluous** whose measuring parts exceed the whole: for example, (the number) 12 is measured by the unit, (the number) two, (the number) four, and (the number) six, which simultaneously joined give rise to (the number) 12. (In turn, that) number is said to be **perfect** which consists of parts that measure it: for example, the number six is measured by the unit, (the number) two, and (the number) three, which joined simultaneously constitute (the number) six (►3). Ibid.: “Numerus autem superfluous dicitur, cuius partes mesurantes ipsum excedunt totum; sicut duodenarius, qui mesuratur unitate, binario, ternario, quaternario et senario, quae simul iuncta consurgunt in sexdecim. Dicitur autem numerus perfectus, qui constat ex partibus mesurantibus ipsum; sicut numerus senarius, quem mesurant unitas, binarius et ternarius, quae simul iuncta constituunt senarium.”

<sup>20</sup> *In Physic.* 4, l. 13, n. 2: “nunc continuat tempus praeteritum futuro, in quantum est terminus temporis, principium quidem futuri, finis autem praeteriti: licet hoc non sit sic manifestum in nunc, sicut in puncto. Nam punctum stans est; et ideo potest bis accipi, semel ut principium et semel ut finis: quod non accidit in nunc.” Cf. ARISTOTLE, *Physica* Δ.13, 222a10–13: “Τὸ δὲ νῦν ἐστὶν συνέχεια χρόνου, ὡς περ ἐλέχθη· συνέχει γὰρ τὸν χρόνον τὸν παρεληλυθότα καὶ ἐσόμενον, καὶ πέρας χρόνου ἐστὶν· ἐστὶ γὰρ τοῦ μὲν ἀρχή, τοῦ δὲ τελευτή. ἀλλὰ τοῦτ’ οὐχ ὡς περ ἐπὶ τῆς στιγμῆς μενούσης φανερόν.”

<sup>21</sup> *In Physic.* 4, l. 20, n. 3 (cf. ARISTOTLE, *Physica* Δ.12, 221a11–13): “alio vero modo dicitur aliquid esse in numero, non quia ipsum est aliquid numeri, sed quia numerus est eius ut numerati, sicut homines dicuntur esse in tali vel tali numero.”

<sup>22</sup> *In Physic.* 4, l. 23, n. 9 (cf. ARISTOTLE, *Physica* Δ.15, 223b4–6): “Si enim sunt septem equi et septem canes, non differunt secundum numerum, sed differunt secundum speciem rerum numeratarum.”

<sup>23</sup> *In Physic.* 4, l. 23, n. 13 (cf. ARISTOTLE, *Physica* Δ.15, 224a2–3): “manifestat [Philosophus] quoddam, quod supra dixerat, qualiter sit intelligendum. Dixerat enim quod idem est numerus septem canum et septem equorum. Quomodo ergo hoc sit verum ostendit: et dicit quod recte potest dici, si aequalis est numerus aliquarum rerum diversarum, puta ovium et canum, quod idem sit numerus utrorumque, ut puta si tam oves quam canes sint decem.”

<sup>24</sup> *In Physic.* 4, l. 23, n. 13 (cf. ARISTOTLE, *Physica* Δ.15, 224a3–4): “Sed non potest dici quod hoc ipsum quod est esse decem, sit idem canum et ovium: non enim eadem decem sunt decem canes et decem oves. Et hoc ideo, quia genus potest cum additione unitatis vel identitatis praedicari de pluribus individuis



predicated of multiple individuals existing in one species; and likewise, a remote genus (can be predicated with addition of unity or identity) of multiple species existing under one proximate genus. However, with addition of unity or identity, neither can a species be predicated of individuals nor (can) a proximate genus (be predicated) of diverse species.

ARISTOTLE posits (the following) example.<sup>25</sup> There are two species of triangle: namely, the equilateral—i.e., having three equal sides—and the scalene—i.e., having three unequal sides (►4.4). Now *figure* is the genus of *triangle* (►4.3). Therefore, we cannot say that *equilateral* and *scalene* should be *the same triangle*, since one and the other is contained under *triangle*, which is a species of *figure*.

ARISTOTLE assigns the reason for this: since *same* and *diverse* are opposed, we can say (that) there (is) *identity* where a difference is not found; but we cannot say (that there is) *identity* where a difference is found.<sup>26</sup> Now it is manifest that *equilateral* and *scalene* differ one from the other according to that difference which is properly divisive of *triangle*—and this is so because there are diverse species of triangle.

On the other hand, *equilateral* and *scalene* do not differ according to a difference of *figure*: rather, they are contained under one and the same difference that is divisive of *figure*.<sup>27</sup> This is evident thus: if we should divide *figure* into its species, which are constituted by differences, it would be found that *circle* and *triangle* will be diverse (*alia erit circulus, et alia triangulus*), and so (too) the other species of *figure*. On the other hand, if we should divide *triangle*, we would find that *equilateral* and *scalene* are among its diverse species (*alia species eius est aequilaterus, et alia gradatus*). Therefore, it is manifest that *equilateral* and *scalene* are *one figure* because they are contained under a species of

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existentibus in una specie, et similiter genus remotum de pluribus speciebus existentibus sub uno genere propinquo; neque tamen species de individuis, neque genus propinquum de speciebus diversis potest praedicari cum additione unitatis vel identitatis.”

<sup>25</sup> In *Physic.* 4, l. 23, n. 13 (cf. ARISTOTLE, *Physica* Δ.15, 224a4–6): “Et huius consequenter ponit exemplum. Sunt enim duae species trianguli, scilicet *aequilaterus*, idest habens tria latera aequalia, et *gradatus*, idest habens tria latera inaequalia; figura autem est genus trianguli. Non ergo possumus dicere quod aequilaterus et gradatus sit idem triangulus; sed possumus dicere quod sunt eadem figura, quia utrumque continetur sub triangulo, qui est una species figurae.”

<sup>26</sup> In *Physic.* 4, l. 23, n. 13 (cf. ARISTOTLE, *Physica* Δ.15, 224a6–8): “Et huius assignat rationem: quia cum idem et diversum seu differens opponantur, ibi possumus identitatem dicere, ubi differentia non invenitur; sed non possumus dicere identitatem, ubi invenitur differentia. Manifestum est autem quod aequilaterus et gradatus differunt ad invicem *differentia trianguli*, idest quae est proprie trianguli divisiva; et hoc ideo quia sunt diversae species trianguli.”

<sup>27</sup> In *Physic.* 4, l. 23, n. 13 (cf. ARISTOTLE, *Physica* Δ.15, 224a8–12): “Sed aequilaterus et gradatus non differunt secundum differentiam figurae, sed sub una et eadem differentia divisiva figurae continentur. Et hoc sic patet. Si enim dividamus figuram in suas species, quae per differentias constituuntur, inveniatur quod alia erit circulus, et alia triangulus, et sic de aliis speciebus figurae; sed si dividamus triangulum, inveniemus quod alia species eius est aequilaterus, et alia gradatus. Manifestum est igitur quod aequilaterus et gradatus sunt una figura, quia continentur sub una specie figurae, quae est triangulus: sed non sunt unus triangulus, quia sunt diversae trianguli species.”

*figure*, which is (the species) *triangle*. However, they are not *one triangle* because they are diverse species of *triangle*.

Likewise, number is divided into diverse species, one of which is *ten*.<sup>28</sup> Therefore, all (things) that are *ten* are said to have *one number* because they do not differ from each other according to the species of number, since they are contained under one species of number. However, it cannot be said that they (i.e., things that are *ten*) are *the same ten*, because those to which the number ten is applied differ, since some of them are dogs and some (others) are horses.

Thus, although *ten* or *three* should be the same on account of the unity of (numerical) species, however, on account of the diversity that is according to number from the part of matter, it is not *the same ten* or (*the same*) *three*.<sup>29</sup>

### 34.7. Number and Its Units

A number is composed from units.<sup>30</sup>

Multiple (things) come together to constitute one (thing) only on account of some cause, which can be taken (to be) either extrinsic, as some agent that unites [them] (*coniungit*), or intrinsic, as some uniting link (*vinculum uniens*); or, if some (things) are united by themselves, one (of them) must be as potency, and the other as act.<sup>31</sup> However, in units, none of these can be said (to be) the cause whereby a number will be something congregated (*congregatum* < *comprehensum* < συλλαμβανόμενος) from multiple units.

### 34.8. The *One* that is the Principle of Number: The Unit

The proper *ratio* of *one* insofar as it is the principle of number is *to be a measure*.<sup>32</sup> This is not the same as the *one* that is convertible with *being* (► 30.9; 38.1), whose *ratio* of *one* consists in *non-division* alone, while the *ratio* of this *one* consists in *mensuration*.

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<sup>28</sup> *In Physic.* 4, l. 23, n. 13 (cf. ARISTOTLE, *Physica* Δ.15, 224a12–15): “Et similiter est in proposito. Numerus enim dividitur in diversas species, quarum una est decem. Omnia ergo quae sunt decem, dicuntur habere unum numerum; quia non differunt ad invicem secundum speciem numeri, cum contineantur sub una numeri specie. Sed non potest dici quod sint eadem decem; quia ea quibus applicatur numerus denarius, differunt, cum quaedam horum sint canes et quaedam equi.”

<sup>29</sup> *In Physic.* 4, l. 23, n. 13: “licet sit idem denarius vel ternarius propter unitatem speciei, non tamen est idem denarius vel ternarius propter diversitatem quae est secundum numerum ex parte materiae.”

<sup>30</sup> *STh* I, q. 11 a. 1 ad 1: “numerus componitur ex unitatibus.”

<sup>31</sup> *In Metaph.* 1, l. 16, §251 (cf. ARISTOTLE, *Metaphysica* A.9, 991b31–992a2): “Multa non conveniunt ad unum constituendum, nisi propter aliquam causam, quae potest accipi vel extrinseca, sicut aliquod agens quod coniungit, vel intrinseca, sicut aliquod vinculum uniens. Vel si aliqua uniuntur per seipsa, oportet ut unum sit ut potentia, et aliud ut actus. Nullum autem horum potest dici in unitatibus «quare numerus» idest ex qua causa numerus erit quoddam «comprehensum,» idest congregatum ex pluribus unitatibus: quasi dicat: non erit hoc assignare.”

<sup>32</sup> *In Metaph.* 5, l. 8, §875: “Sciendum est autem quod esse mensuram est propria ratio unius secundum quod est principium numeri. Hoc autem non est idem cum uno quod convertitur cum ente, ut in quarto dictum est. Ratio enim illius unius in sola indivisione consistit: huiusmodi autem unius in mensuratione.”

Hence, the *one* that is the principle of number—i.e., of discrete quantity—adds over *substance* the *ratio of measure*, which is the proper affection of quantity, and it (i.e., the *ratio of measure*) is found first in the unit.<sup>33</sup>

The *one* that is the principle of number necessarily says something positively in that to which it is attributed—i.e., it signifies some nature added to *substance*—because, since number is constituted from units, a number can only be a thing (*res*) if the unit is a thing; otherwise, number could not be posited as a species in the genus of quantity, which is a (proper) accident added over *substance*.<sup>34</sup>

#### 34.9. The Metaphysical *One* vs. the Mathematical *One*

We must understand, according to the opinion of ARISTOTLE and AVERROES, that the *one* that is convertible with *being* does not add over *being* something, but only the negation of division.<sup>35</sup> And thus, this mode of *one* both *posits* something insofar as it includes *one* in its understanding, and is said *by removal* in respect to that which it adds to *being*.

On the other hand, the *one* that is the principle of number, which adds over *being* something of the genus of *measure*, and likewise the number of which it is the principle, are found in things having dimensions (► 35), because such a number is caused from the division of a continuum; and this number—caused from the division of a continuum—is the subject of arithmetic, even according to AVICENNA.<sup>36</sup>

Hence, the *one* that is convertible with *being* is something metaphysical, which does not depend on matter according to being (*secundum esse*).<sup>37</sup> On the other hand, the *one* that is the principle of number belongs to the genus of mathematical things, which have being (*esse*) in matter but are abstracted from matter according to *ratio* (*secundum rationem*).

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<sup>33</sup> *In Metaph.* 4, l. 2, §560: “Unum vero quod est principium numeri addit supra substantiam, rationem mensurae, quae est propria passio quantitatis, et primo invenitur in unitate.”

<sup>34</sup> *Quodlibet* 10, q. 1 a. 1 co.: “unum quod est principium numeri, de necessitate aliquid positive dicit in eo cui attribuitur; quia, cum ex unitatibus numerus constituatur, nisi unitas res aliqua esset, numerus res esse non posset, et sic non posset poni in aliquo genere tamquam species.” *In Metaph.* 4, l. 2, §557: “Unum autem quod est principium numeri necesse est significare quamdam naturam additam substantiae: alioquin cum numerus ex unitatibus constituatur, non esset numerus species quantitatis, quae est accidens substantiae superadditum.”

<sup>35</sup> *Quodlibet* 10, q. 1 a. 1 co.: “intelligendum est secundum opinionem Aristotelis et Commentatoris eius, quod unum quod convertitur cum ente, non superaddit enti rem aliquam, sed solum negationem divisionis; et sic huiusmodi unum, et ponit aliquid in quantum in suo intellectu includit ens, et dicitur remotive quantum ad id quod superaddit enti.”

<sup>36</sup> *Quodlibet* 10, q. 1 a. 1 co.: “Unum vero quod est principium numeri, quod superaddit enti aliquid de genere mensurae, et similiter numerus cuius est principium, inveniuntur in rebus habentibus dimensionem; quia talis numerus causatur ex divisione continui; et hic numerus, scilicet ex divisione continui causatus, est subiectum arithmeticae, etiam secundum Avicennam.”

<sup>37</sup> *STh* I, q. 11 a. 3 ad 2: “Unum enim quod est principium numeri, est de genere mathematicorum; quae habent esse in materia, sed sunt secundum rationem a materia abstracta. Unum vero quod convertitur cum ente, est quoddam metaphysicum, quod secundum esse non dependet a materia.”

If the *one* that is convertible with *being* should be the same as the *one* that is the principle of number, also the *one* that is convertible with *being* would have to add over *being* something that pertains to the genus of *measure*.<sup>38</sup> And this is what AVICENNA concedes: that the *one* that is convertible with *being* should add over *being* something that pertains to the genus of *measure*. But this is impossible.

Since the *one* that is convertible with being is said of whatever thing, also that thing which is added over *being* would have to be *one*; and this (added thing) would be (*one*) either by some added unit, and then there would be an infinite process; or (it would be *one*) by its own essence, and if so, we must stand in the former (position): namely, that *being* itself is said (to be) *one* by essence, and not by some added thing.<sup>39</sup>

#### 34.10. Unit and Number Are Not Only in the Mind

If the unit that is the principle of number should be said according to the *ratio* of *privation*, then it—and the number of which it is the principle—would be something only in the mind; whence, it could not be a species in some genus.<sup>40</sup>

However, if something is in a determinate genus, it does not follow that it is in all beings.<sup>41</sup> Whence, the *one* that is determined to a special genus of being—namely, to the genus of *discrete quantity*—is not convertible with universal *being*. Therefore, if *one* is a proper accident by itself of being, it must be caused from the principles of being insofar as it is being, as any proper accident (is caused) from the principles of its subject. But no being is sufficiently understood to be particularly caused from the common principles of being

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<sup>38</sup> *Quodlibet* 10, q. 1 a. 1 co.: “Si ergo unum quod convertitur cum ente, sit idem quod unum quod est principium numeri, oportet quod etiam unum quod convertitur cum ente, aliquid positive superaddat enti. Et hoc concedit Avicenna: unde vult, quod unum quod convertitur cum ente, addat supra ens aliquid quod ad genus mensurae pertineat. Sed hoc non potest esse.”

<sup>39</sup> *Quodlibet* 10, q. 1 a. 1 co.: “cum unum quod convertitur cum ente, de qualibet re dicatur, oportet quod etiam illa res quam addit supra ens, sit una; et sic vel erit una per aliquam unitatem additam, et ita erit processus in infinitum; vel erit una per essentiam suam: quod si est, standum est in primo, ut scilicet ens ipsum dicatur unum per essentiam, non per aliquam rem additam.” *STh* I, q. 11 a. 1 ad 1: “quaelibet res est una per suam substantiam. Si enim per aliquid aliud esset una quaelibet res, cum illud iterum sit unum, si esset iterum unum per aliquid aliud, esset abire in infinitum. Unde [...] dicendum est quod unum quod convertitur cum ente, non addit aliquam rem supra ens, sed unum quod est principium numeri, addit aliquid supra ens, ad genus quantitatis pertinens.”

<sup>40</sup> *In Sent.* 1, d. 24 q. 1 a. 3 co.: “si unitas quae est principium numeri, dicatur secundum rationem privationis, tunc non erit aliquid nisi in anima; ita etiam nec numerus cuius est principium, unde non posset esse species in aliquo genere.”

<sup>41</sup> *In Metaph.* 4, l. 2, §560: “Unum igitur quod est principium numeri, aliud est ab eo quod cum ente convertitur.” *Ibid.*, §559 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b32–33): “De uno autem non videtur esse verum, quod sit idem quod convertitur cum ente, et quod est principium numeri. Nihil enim quod est in determinato genere videtur consequi omnia entia. Unde unum quod determinatur ad speciale genus entis, scilicet ad genus quantitatis discretas, non videtur posse cum ente universali converti. Si enim unum est proprium et per se accidens entis, oportet quod ex principiis causetur entis in quantum ens, sicut quodlibet accidens proprium ex principiis sui subiecti. Ex principiis autem communibus entis in quantum est ens, non intelligitur causari aliquod particulariter ens sufficienter. Unde non potest esse quod ens aliquod determinati generis et speciei sit accidens omnis entis.”

insofar as it is being. Hence, it is impossible that some being of a determinate genus and species be an accident of all beings.

#### 34.11. Opposition of *One* to *Many*

The *one* that is the principle of number is caused from the division of matter or of a continuum and is found only in material things.<sup>42</sup> Since number is caused from the division of a continuum, the *one* that is the principle of number is said by privation or negation of the division that is according to continuous quantity. Hence, the privation of this *one* is a multitude because number comes to be through the division of the continuum.

Therefore, *one* is opposed to *many*—but diversely.<sup>43</sup> The *one* that is the principle of number is opposed to the multitude that is a number as *the measure to that which is measured*, for *one* has the *ratio* of *first measure*, and **number** is a *multitude measured by one*. On the other hand, the *one* that is convertible with *being* is opposed to multitude—by the mode of privation—as *the undivided to the divided*.

#### 34.12. Opposition of *Unit* to *Number*

Since the **one** that is the principle of number adds the *ratio* of *measure* over the being that is said (to be) *one*, (the unit) can be considered in two modes:<sup>44</sup>

1. **According to that which it is.** And in this way, it will be considered in two modes:<sup>45</sup>

**(a) With precision** (*cum praecisione*): namely, *that which is only a unit (quod est tantum unitas)*.<sup>46</sup> In this way, it will have a disparate opposition of measure (in respect) to diverse numbers (*ad alios numeros*), for any number, according to the quiddity of its species, has

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<sup>42</sup> *In Sent.* 2, d. 3 q. 1 a. 3 ad 1: “unum quod est principium numeri, qui est discreta quantitas, causatus [est] ex divisione materiae vel continui: et talis non est nisi in materialibus.” *In Metaph.* 4, l. 2, §560: “Et [unum quod est principium numeri] dicitur per privationem vel negationem divisionis, quae est secundum quantitatem continuum. Nam numerus ex divisione continui causatur.” *De potentia*, q. 3 a. 16 ad 3: “unum [...] quod est principium numeri [...] supra rationem entis addit mensurationem; et huius unius multitudo est privatio, quia numerus fit per divisionem continui.”

<sup>43</sup> *STh I*, q. 11 a. 2 co.: “unum opponitur multis, sed diversimode. Nam unum quod est principium numeri, opponitur multitudini quae est numerus, ut mensura mensurato, unum enim habet rationem primae mensurae, et numerus est multitudo mensurata per unum, ut patet ex X Metaphys. Unum vero quod convertitur cum ente, opponitur multitudini per modum privationis, ut indivisum diviso.”

<sup>44</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “Loquendo de uno quod est principium numeri [...], ponit aliquid additum supra ens quod dicitur unum, scilicet rationem mensurae: unde hoc unum potest dupliciter considerari: aut secundum id quod est; aut secundum id quod consequitur ad intellectum ejus.”

<sup>45</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “Si primo modo, tunc dupliciter: quia vel considerabitur ipsum unum cum praecisione [...]. Vel sine praecisione, et sic unitas nullam oppositionem habet ad numerum, sed est constituens ipsum.”

<sup>46</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “considerabitur ipsum unum cum praecisione, scilicet quod est tantum unitas; et sic habebit disparatam oppositionem mensurae ad alios numeros (quilibet enim numerus, secundum quidditatem suae speciei, habet specialem rationem mensurae, sicut species oppositae sunt disparatae) et talis oppositio reducitur ad contrarietatem, sicut principium: quia species disparatae distinguuntur differentiis contrariis, quibus primo dividitur genus, ut probatur 10 Metaph.”

some special *ratio of measure*, just as opposite species are disparate (e.g., *one* measures every number, for it is *one half* of *two*, and *one third* of *three*; but *two* measures only even numbers; hence, each has its own special *ratio of measure*). Such an opposition is reduced to contrariety as a principle, for disparate species are distinguished by the different contraries whereby the genus is first divided.

**(b) Without precision** (*sine praecisione*, i.e., that which is a unit but not essentially alone). In this mode, the unit has no opposition to number: rather, it is its constituent.<sup>47</sup>

**2. According to that which follows upon its understanding.**<sup>48</sup> In this way, (the unit) is opposed to numerical multitude relatively, as a principle (is opposed) to that which is from the principle (*sicut principium ad principiatum*); as the point (is opposed) to the line (of which it is the principle); as part (is opposed) to whole; and, more properly, as a measure (is opposed) to that which is measured (*sicut mensura ad mensuratum*; ► 37.10).

### 34.13. The Virtue of the Unit

As (pseudo-)DIONYSIUS says, *number uniformly preexists in the unit*, since the unit is virtually all numbers, as BOETHIUS says in (his) *Arithmetic*.<sup>49</sup> DIONYSIUS says *uniformly* (< ἐνοειδῶς) because everything that is in another is in it by the mode of that in which it is (► 26.3); whence, number exists in the unit by the mode of the unit. He also says that *the unit has in itself all numbers*, since all the properties of all numbers are found in the unit in some mode, for—whether we should take square or cubic numbers, or whatever other figures of numbers—in whatever disposition of numbers, the first unit is found.

Moreover, it ought to be considered that every number is *one* in the unit itself, but the more it recedes from the unit (i.e., the farther it is from the principle of number), the more it is divided (*distinguitur*) and (the more) it is turned (*deducitur*) into a multitude.<sup>50</sup>

<sup>47</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “sine praecisione, et sic unitas nullam oppositionem habet ad numerum, sed est constituens ipsum.”

<sup>48</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “Si secundo modo, sic opponitur multitudini numerali relative, sicut principium ad principiatum, sicut punctus ad lineam, et sicut pars ad totum et magis proprie sicut mensura ad mensuratum.”

<sup>49</sup> *In De div. nom.*, 5 l. 1: “dicit [Dionysius] quod *numerus uniformiter praeexistit in unitate*, quia unitas virtute est omnis numerus, ut Boetius dicit in *Arithmetica*. Dicit autem: *uniformiter*, quia omne quod est in altero, est in eo per modum eius in quo est; unde numerus in unitate est existens in ea per modum unitatis et hoc est quod dicit: *uniformiter*. Iterum dicit: *unitas habet in seipsa omnem numerum*, quia omnes proprietates omnium numerorum aliquo modo inveniuntur in unitate: sive enim accipiam numeros quadratos sive cubicos sive quascumque alias figuras numerorum, in qualibet dispositione numerorum, invenitur unitas prima.” Cf. Pseudo-DIONYSIUS Areopagita, *De Divinis Nominibus*, ed. Beate Regina SUCHLA, *Corpus Dionysiacum* (Berlin, New York: De Gruyter, 1990), V.6, 184.21–185.3: “ἐν μονάδι πᾶς ἀριθμὸς ἐνοειδῶς προϋφέστηκε, καὶ ἔχει πάντα ἀριθμὸν ἢ μονὰς ἐν ἑαυτῇ μοναχῶς, καὶ πᾶς ἀριθμὸς ἦνται μὲν ἐν τῇ μονάδι, καθ’ ὅσον δὲ τῆς μονάδος πρόεισι, κατὰ τοσοῦτον διακρίνεται καὶ πληθύνεται.” Cf. BOETHIUS, *De institutione arithmetica*, l.7, 16.

<sup>50</sup> *In De div. nom.*, 5 l. 1: “Et iterum, considerandum est quod omnis numerus in ipsa unitate est unus, sed quanto magis recedit ab unitate, tanto magis distinguitur et in multitudinem deducitur.”

Indeed, the unit constitutes diverse species of numbers by addition and subtraction, in which the *ratio* of *great* and *small* consists.<sup>51</sup>

Also, the unit is virtually (*virtute*) even and odd.<sup>52</sup> All differences of number virtually befit (*conveniunt*) the unit, for any differences of number are resolved in the unit. Whence, in the order of odd (numbers), the unit is found first. Likewise, (the unit is found first) in the order of even (numbers), of square (numbers), and of perfect numbers. And so, too, (this is true) of the other differences of number, for, although the unit is not in act some number, it is nonetheless all numbers virtually.

#### 34.14. Magnitude and its Species

**Magnitude** is *that (quantity) which is divisible [according to potency] into continuous parts (quod est divisibile in <partes> continuas = τὸ [διαίρετὸν δυνάμει] εἰς συνεχῆ)*.<sup>53</sup>

This happens in three (modes), according to which there are three species of magnitude:<sup>54</sup>

**1. Longitude** (*longitudo* = μήκος, i.e., length), if (a magnitude) is divisible into continuous parts only according to one dimension.<sup>55</sup>

A *finite longitude* is said (to be a) **line** (*linea* = γραμμή).<sup>56</sup> Hence, if the longitude should be infinite it would not be a line, for (that which is infinite cannot be measured, and) a line is a measurable longitude. Therefrom, *point* is posited in the *ratio* of *line* (when it is said) that *its extremities (or termini) are two points* (► 4).<sup>57</sup>

**2. Latitude** (*latitudo* = πλάτος, i.e., width), if (a magnitude is divisible into continuous parts) in two (dimensions).<sup>58</sup>

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<sup>51</sup> *In Metaph.* 1, l. 10, §159: “Unitas enim diversas numerorum species constituit per additionem et subtractionem, in quibus consistit ratio magni et parvi.”

<sup>52</sup> *In Metaph.* 1, l. 7, §126 (cf. ARISTOTLE, *Metaphysica* A.5, 986a19–20): “Unitas enim et par est virtute et impar. Omnes enim differentiae numeri unitati conveniunt in virtute, quia quaecumque differentiae numeri in unitate resolvuntur. Unde in ordine imparium primum invenitur unitas. Et similiter in ordine parium et quadratorum et perfectorum numerorum, et sic de aliis numeri differentis: quia unitas licet non sit actu aliquis numerus, est tamen omnis numerus virtute.”

<sup>53</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a11): “Magnitudo autem quod est divisibile in partes continuas.”

<sup>54</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a11–12): “Quod quidem contingit tripliciter: et secundum hoc sunt tres species magnitudinis.”

<sup>55</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a11–12): “Nam, si sit divisibile secundum unam tantum dimensionem in partes continuas, erit longitudo.”

<sup>56</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a13–14): “Longitudo autem finita, dicitur linea. [...] Similiter, si esset longitudo infinita, non esset linea [sc., quia quod infinitum est, mensurari non potest]. Linea enim est longitudo mensurabilis. Et propter hoc in ratione lineae ponitur, quod eius extremitates sunt duo puncta.”

<sup>57</sup> Cf. EUCLID, *Opera Omnia*, vol. 1, 2.3: “Γραμμῆς δὲ πέρατα σημεῖα.” HEIBERG’s version (ibid., 3): “Lineae autem extrema puncta [sunt].”

<sup>58</sup> *In Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a12): “Si autem in duas, latitudo.”

A *finite latitude* (is said to be a) **surface** (*superficies* = ἐπιφάνεια).<sup>59</sup> (Hence, if the latitude should be infinite it would not be a surface, for a surface is a measurable latitude. Therefrom, *line* is posited in the *ratio* of *surface* when it is said that *its extremities* [or *termini*] are lines; ►4).<sup>60</sup>

**3. Profundity** (*profunditas* = βάθος; i.e., depth or height), if (the magnitude is divisible into continuous parts) in three (dimensions).<sup>61</sup>

A *finite profundity* (is said to be a) **body** (*corpus* = σῶμα; in EUCLID, **solid**, *solidum* = στερεόν; ►2.2).<sup>62</sup> (Hence, if the profundity should be infinite it would not be a body, for a body is a measurable profundity. Therefrom, *surface* is posited in the *ratio* of *body* when it is said that *its extremity* [or *terminus*] is a surface; ►4).<sup>63</sup>

### 34.15. The Straight Line as the Measure of Every Distance

We measure every distance by a straight line (< ἀεὶ... ἕκαστον ἀπέχειν τὴν εὐθείαν τίθεμεν).<sup>64</sup> The reason for this is that every measure must be certain, determinate, and minimal (*minima*; ►28.2).<sup>65</sup> Between two points, the measure of a straight line is certain and determinate because there can only be one; and it is the least (*minima*) of all the lines that are between two points. Infinite curved lines can be described between two points, all of which are greater than the straight line described between the same two points.

Whence, the distance that is between two points is measured by a straight line and not by the curved line of a semicircle or of any other portion of the circle, or of a greater or lesser circle.<sup>66</sup>

<sup>59</sup> In *Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a14): “Latitudo finita, [dicitur superficies].” Correcting the source according to footnote (1) in the edition used: “*Sic in edit., sed certo erronee. Sic lege:* «latitudo finita, dicitur superficies, profunditas finita, corpus».”

<sup>60</sup> In *Metaph.* 5, l. 15, §978: “Simile est de superficie [sc., si esset latitudo infinita, non esset superficies. Superficies enim est latitudo mensurabilis. Et propter hoc in ratione superficiei ponitur, quod eius extremitates sunt lineae].” Cf. EUCLID, *Opera Omnia*, vol. 1, 2.8: “Ἐπιφανείας δὲ πέρατα γραμμαί.” HEIBERG’s version (ibid., 3): “Superficiei autem extrema lineae [sunt].”

<sup>61</sup> In *Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a12): “Si autem in tres, profunditas.”

<sup>62</sup> In *Metaph.* 5, l. 15, §978 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a14): “[profunditas finita, dicitur] corpus.” Correcting the source according to footnote (1) in the edition used, as just noted.

<sup>63</sup> In *Metaph.* 5, l. 15, §978: “Simile est de [...] corpore [sc., si esset profunditas infinita, non esset corpus. Corpus enim est profunditas mensurabilis. Et propter hoc in ratione corporis ponitur, quod eius extremitates sunt superficies].” Cf. EUCLID, *Opera Omnia*, vol. 4, 2.4: “Στερεοῦ δὲ πέρας ἐπιφάνεια.” HEIBERG’s version (ibid., 3): “Terminus autem solidis superficies est.”

<sup>64</sup> In *De caelo* 1, l. 8 n. 8 (cf. ARISTOTLE, *De caelo* A.4, 271a13): “omnem distantiam mensuramus per lineam rectam.”

<sup>65</sup> In *De caelo* 1, l. 8 n. 8: “Cuius ratio est, quia omnis mensura debet esse certa et determinata et minima: inter duo autem puncta mensura lineae rectae est certa et determinata, quia non potest esse nisi una; et est minima omnium linearum quae sunt inter duo puncta. Lineae vero curvae inter duo puncta describi possunt infinitae, quae omnes sunt maiores linea recta inter eadem puncta descripta.”

<sup>66</sup> In *De caelo* 1, l. 8 n. 8: “Unde distantia quae est inter duo puncta, mensuratur per lineam rectam, et non per lineam curvam semicirculi, seu cuiuslibet alterius portionis circuli, aut maioris aut minoris circuli.”



### 34.16. Order of Nature among Magnitudes

The line is first among continuous quantities.<sup>67</sup> Surface is prior in (the order of) nature to body, since a surface can be without a body, but a body cannot be without a surface. And the same can be said of the other (magnitudes). Hence, *body* is defined by *surface*, *surface* by *line*, *line* by *point*; and *point* (is defined) by *unit*, for they (i.e., the Platonists) say that a **point** is *a unit having position*.

### 34.17. The Point

Between the unit and the point there is no difference except that the point has a position, for the **point** (*punctum* = ἡ στιγμή) is *a unit having position* (*unitas positionem habens* = μονάς... θέσιν ἔχουσα).<sup>68</sup>

Platonists posited that numbers are the forms of magnitudes.<sup>69</sup> Thus, they said that a point is nothing other than a unit that has a position, (but) in such a way that *position* would be as material; and *unit*, as formal. Likewise, they posited that *two* is the form of the line, such that the line is nothing other than *two in longitude* (*dualitas in longitudine* = δυὰς ἐν μήκει).

### 34.18. Comparison of Point to Line

A point can be compared to a line in two modes:<sup>70</sup>

1. As **comprehended within the line** (*sicut intra lineam comprehensum*), whether it is in the beginning of the line, in the middle or in the end.<sup>71</sup>

A point that exists within a line cannot be (*adesse*) in all the parts of the line: rather, it is necessary for diverse points to be designated (*signari*) in diverse parts of the line.<sup>72</sup>

2. As **existing outside the line** (*ut extra lineam existens*).<sup>73</sup>

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<sup>67</sup> *In Metaph.* 1, l. 16, §254: “linea est prima inter quantitates continuas.” Ibid. 3, l. 13, §505 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a4–8): “superficies natura prior est corpore, quia superficies potest esse sine corpore non autem corpus sine superficie [...]. Et idem potest argui de omnibus aliis per ordinem.” Ibid., §504 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a4–6): “corpus definitur per superficiem, et superficies per lineam, et linea per punctum, et punctus per unitatem, quia dicunt quod punctus est unitas positionem habens.”

<sup>68</sup> *In De anima* 1, c. 11, 56–59 (cf. ARISTOTLE, *De anima* A.1, 409a6): “inter unitatem autem et punctum nulla differentia est nisi quod punctus habet positionem: est enim punctum unitas positionem habens.”

<sup>69</sup> *In Metaph.* 8, l. 3, §§1706 (cf. ARISTOTLE, *Metaphysica* H.3, 1043a33–34): “Platonici posuerunt numeros esse formas magnitudinum. Dicebant enim quod punctus nihil aliud est quam unitas positionem habens; ita quod positio sit quasi materiale unitas ut formale. Et similiter ponebant, quod dualitas erat forma lineae, ita quod linea nihil aliud est quam dualitas in longitudine.”

<sup>70</sup> *De rat. Fidei*, c. 10 co.: “Punctum autem dupliciter ad lineam comparari potest.”

<sup>71</sup> *De rat. Fidei*, c. 10 co.: “uno quidem modo sicut intra lineam comprehensum, sive sit in principio lineae, sive in medio, sive in fine.”

<sup>72</sup> *De rat. Fidei*, c. 10 co.: “Punctum igitur intra lineam existens non potest omnibus lineae partibus adesse, sed in diversis partibus lineae necesse est diversa puncta signari.”

<sup>73</sup> *De rat. Fidei*, c. 10 co.: “alio modo ut extra lineam existens.”

Nothing prevents a point that is outside a line from having a regard to (*respicere*) all the parts of the line equally.<sup>74</sup> This is evident in the circle, whose center, since it is indivisible, has a regard to all the parts of the circumference equally, and all (of them) are present to it in some mode (*sibi sunt quodammodo praesentes*), even if one of them should not be present to the other.

### 34.19. Site and Position

One part of a line is divided from another because it has a diverse **site** (*situs*), which is as *a formal difference of continuous quantity having position (quasi formalis differentia quantitatis continuae positionem habentis)*.<sup>75</sup>

Likewise, the (numerical) diversity of lines is caused from a diverse site (*ex diverso situ*), just like the diversity of colors is caused from the diverse disposition of the recipient of sunlight.<sup>76</sup> Hence, two magnitudes of equal quantity can only differ according to site (*secundum situm*), for it is possible to imagine that *this* line is other than *that* (line) equal to it (in length) only insofar as we imagine one of them in one site and the other in another (site). Whence, if two magnitudes should be posited simultaneously (in respect of site), it does not seem that they could differ.

### 34.20. Terminus and Division

The point is the terminus of the line, as the line (is the terminus) of the surface, and the surface (is the terminus) of the body (►4).<sup>77</sup> Every extremity is in that of which it is the extremity, as the point (is the extremity of the line, and is) in the line.

The **division of a continuum** (*divisio continui*) is only *a terminus common to two parts (terminus communis duabus partibus)*.<sup>78</sup> Hence, no divisible (thing) is its division whereby it is divided (*nullum divisibile est sua divisio qua dividitur < ἡ διαίρεσις οὐ καθ' αὐτό*).

<sup>74</sup> *De rat. Fidei*, c. 10 co.: “punctum vero quod extra lineam est, nihil prohibet aequaliter omnes lineae partes respicere; ut apparet in circulo, cuius centrum cum sit indivisibile, aequaliter respicit omnes circumferentiae partes, et omnes sibi sunt quodammodo praesentes, quamvis una earum alteri non sit praesens.”

<sup>75</sup> *In De Trin.*, q. 4 a. 1 co., 78–81: “diuiditur enim una pars lineae ab alia per hoc quod habet diuersum situm, qui est quasi formalis differentia quantitatis continuae positionem habentis.”

<sup>76</sup> *STh I*, q. 14 a. 6 co.: “Non enim diversitas colorum causatur ex luce solum, sed ex diversa dispositione diaphani recipientis, et similiter diversitas linearum ex diverso situ.” *In Physic.* 4, l. 13, n. 1: “Duae autem magnitudines aequalis quantitatis non possunt differre, nisi secundum situm. Non enim potest imaginari quod haec linea sit alia ab illa sibi aequali, nisi inquantum imaginamur utramque in alio et alio situ. Unde si ponantur duae magnitudines simul, non videtur quod possint differre.”

<sup>77</sup> *In Metaph.* 1, l. 16, §257: “cum punctus sit terminus lineae, sicut linea superficiei, et superficies corporis [...]” *Ibid.* 3, l. 13, §507: “punctus est terminus lineae, linea superficiei, et superficies corporis.” *In Physic.* 6, l. 5, n. 6: “omne autem extremum est in eo cuius est extremum, sicut punctum in linea.”

<sup>78</sup> *In Physic.* 6, l. 5, n. 6 (cf. ARISTOTLE, *Physica* Z.3, 234a15–16): “Nullum enim divisibile est sua divisio qua dividitur: ipsa autem divisio temporis est nunc. Nihil enim est aliud divisio continui quam terminus communis duabus partibus.”

### 34.21. Sections, Divisions, and Termini Are Not Principles as Inseparable Subjects

Some (philosophers) posited lines and those that follow upon them—namely, surfaces—to be principles because they posited that bodies are composed from surfaces and (that) surfaces (are composed) from lines.<sup>79</sup>

However, it is manifest that such (sections or divisions of magnitudes) are not substances separable and existing by themselves, since they are some sections (*decisiones* = τομαί) and divisions (*divisiones* = διαιρέσεις): indeed, lines (are sections and divisions) of surfaces; surfaces, of bodies; and points, of lines.<sup>80</sup>

Moreover, they are also the termini (*termini* = πέρατα) of the same (magnitudes): namely, points (are the termini) of lines, and so on, for the point that is in the extremity of a line is the terminus of the line.<sup>81</sup> That which is signified (*significatur*, i.e., designated) in act under a line is a section of the line. And it is likewise (the case) concerning the line (in respect) to the surface and concerning the surface (in respect) to the body.

It is manifest that termini and sections are existents in others as in (their) subjects.<sup>82</sup> Whence, they cannot be separable. And in this way, lines and surfaces are not principles.

### 34.22. A Line Cannot Be Altogether Divided in Act

Since a point cannot be contiguous to a point, consequently, it is impossible for a line to be altogether divided in act.<sup>83</sup> And in this way, even though it befits a line to be everywhere divisible in some mode—to wit, in potency—, however, it does not befit it (to be divided) in some (other) mode—to wit, in act.

When (a line) is posited to be everywhere divided in act, that there should be a point everywhere seems to be posited consequently, since a point in act is nothing other than a division in act of a line. And if there is a point in act everywhere in a line, it is necessary

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<sup>79</sup> *In Metaph.* 11, l. 2, §2185 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b12–13): “Quidam enim posuerunt «lineas et habita,» idest consequenter se habentia ad eas, scilicet superficies, esse principia, quia ponebant corpora componi ex superficiebus et superficies ex lineis.”

<sup>80</sup> *In Metaph.* 11, l. 2, §2185 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b13–14): “Sed manifestum est, quod huiusmodi non sunt substantiae separabiles et per se existentes, quia sunt quaedam decisiones et divisiones, lineae quidem superficieum, superficies corporum, puncta vero linearum.”

<sup>81</sup> *In Metaph.* 11, l. 2, §2185 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b15–16): “Et sunt etiam termini eorumdem: puncta, scilicet linearum, et sic de aliis. Punctum enim quod est in extremitate lineae, est terminus lineae. Quod autem significatur actu infra lineam, est decisio lineae. Et similiter est de linea ad superficiem, et de superficie ad corpus.”

<sup>82</sup> *In Metaph.* 11, l. 2, §2185 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b16–17): “Manifestum est autem, quod termini et decisiones sunt existentia in aliis sicut in subiectis. Unde non possunt esse separabilia. Et sic lineae et superficies non sunt principia.”

<sup>83</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a2–4): “Quia enim punctus non potest esse puncto contiguus, per consequens non potest esse quod linea sit omnino divisa in actu: et ita esse divisibile ubique, licet aliquo modo conveniat magnitudinibus, scilicet in potentia, tamen quodam modo non convenit eis, scilicet in actu.”

for a magnitude to be divided into points, since nothing else is found in a magnitude; or that it be divided into nothing, since there will be nothing left other than the division if there is a point—which is a division—everywhere.<sup>84</sup>

Hence, it follows that a magnitude is (constituted) either from points (< ἢ ἐκ στιγμῶν) or from contacts (< ἢ ἐξ ἀφῶν) of parts of a line or divisions of a line, which comes to the same, for according to the aforesaid, (this) posits that, if the line should simultaneously be altogether divided, that which exists everywhere in the line would be a point or a contact or a division.<sup>85</sup>

However, this cannot be (so), for it would follow that only one point would be everywhere (*ubique* = πάντη), that is, in whichever part of the line; and that all the points of the line would contain no more of a site than anyone of them, for they cannot be had consequently such that one point should be after another; nor (can it be the case) that they should touch only according to extremes (*secundum ultima*) and (that they) should be separate according to other (parts), because, since they should be indivisible, they are conjoined according to the whole: hence, all the points conjoined in this way are only one.<sup>86</sup> And hence, it is not possible that there should be a point everywhere in a line.

If the line should be divisible according to its mean, and a point should be contiguous to a point, it could also be divided according to the contiguous point, if it should be altogether divisible.<sup>87</sup> But this is impossible, for a point is not contiguous—or consequently had (in respect)—to a point, nor (is) any sign (contiguous or consequently related) to a sign. And this point in act is nothing other than an actual division (< διάρρησις) of the line, or a composition (< σύνθεσις) or contact of the parts of the line.

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<sup>84</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a4–6): “Quia quando ponitur *ubique* esse divisa in actu, videtur poni ex consequenti quod *ubique* sit punctus, cum punctus in actu nihil aliud sit quam divisio in actu lineae. Si autem punctus est *ubique* in actu in linea, necesse est quod magnitudo dividatur in puncta, cum nihil aliud in magnitudine inveniatur: vel etiam, secundum aliam litteram, quod dividatur in nihil, quia nihil erit residuum praeter divisionem, si *ubique* sit punctum, quod est divisio.”

<sup>85</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a6–7): “Et ideo sequitur quod magnitudo vel sit ex punctis, vel ex tactibus partium lineae, sive divisionibus lineae (quod in idem redit): ponitur enim secundum praedicta, quod hoc quod existit *ubique* in linea, sit punctus, vel tactus, aut divisio, si linea sit simul omnino divisa.”

<sup>86</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a7–9): “Sed hoc non potest esse: quia sequeretur quod solum unus punctus esset *ubique*, idest in qualibet parte lineae; et quod omnes puncti lineae non plus continerent de situ quam unusquisque eorum; immo quod non essent plures quam unus, vel plures divisiones quam una. Non enim possunt se habere consequenter, ita quod punctus unus sit post alium, neque quod se tangant secundum ultima tantum, et secundum alia secernantur; quia, cum sint indivisibiles, secundum totum coniunguntur: et ideo omnes puncti sic coniuncti non sunt nisi unus. Et ideo non est possibile quod punctus sit *ubique* in linea.”

<sup>87</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a10–12): “Quia si linea esset divisibilis secundum medium sui, et punctus esset contiguus puncto, posset etiam dividi secundum contiguum punctum, si esset omnino divisibilis: sed hoc est impossibile, quia non est contiguum vel *habitu*, idest consequenter se habens, punctum puncto, vel quodcumque signum signo. Hoc autem punctum in actu nihil aliud est quam actualis divisio lineae, aut *compositio* sive tactus partium lineae.”

### 34.23. No Line is Composed from Points, Contacts or Divisions

Some posited that the line is composed from points.<sup>88</sup> Which can be posited in two modes:

1. **From moved points** (*ex punctis motis* < κινούμεναι), as some said that a moved point constitutes a line; a moved line constitutes a surface; and a moved surface, a body.<sup>89</sup>
2. From non-moved points (< ἀκίνητοι), as **from parts** (*ex partibus*).<sup>90</sup>

Whichever way a magnitude should be composed from points, in one mode or in the other, one would have to assign *where* the points *would be* (< ποῦ ἔσονται... αἱ στιγμαί): that is, what site (*situs*) they would have in the magnitude, for one ought to assign (this) concerning each of the parts from which a magnitude is composed.<sup>91</sup>

However, this cannot be assigned, since a point in a magnitude seems to be nothing other than as some contact (*tactus* = ἀφή) of a continuous line, or a division of a line already divided.<sup>92</sup> But a contact is always one (contact) of some two parts of a magnitude that have a determinate site (*habentes determinatum situm*) in the magnitude; (and this would be) as though that which is a part of a magnitude having a determinate site between its parts would be something other than the contact and division itself, and consequently (would be something) other than a point.

Therefore, it does not seem possible that a magnitude should be divided into points, contacts or divisions.<sup>93</sup>

And if someone should posit whatever body or whatever quantity to be altogether divisible, this difficulty would arise.<sup>94</sup>

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<sup>88</sup> *In De gen.* 1, l. 4 n. 7: “quidam posuerunt lineam componi ex punctis. Et potest poni dupliciter.”

<sup>89</sup> *In De gen.* 1, l. 4 n. 7 (cf. ARISTOTLE, *De generatione* A.2, 316b6): “uno modo ex punctis motis, sicut quidam dixerunt quod punctus motus constituit lineam, et linea mota constituit superficiem, et superficies mota corpus.”

<sup>90</sup> *In De gen.* 1, l. 4 n. 7 (cf. ARISTOTLE, *De generatione* A.2, 316b5–6): “alio modo potest poni quod ex punctis etiam non motis constituatur magnitudo, sicut ex partibus.”

<sup>91</sup> *In De gen.* 1, l. 4 n. 7 (cf. ARISTOTLE, *De generatione* A.2, 316b5–9): “Utrolibet autem modo magnitudo componatur ex punctis, oportebit assignare *ubi sint* puncta, idest quem situm habeant in magnitudine: est enim assignare de singulis partibus ex quibus componitur magnitudo.”

<sup>92</sup> *In De gen.* 1, l. 4 n. 7 (cf. ARISTOTLE, *De generatione* A.2, 316b6–8): “Sed hoc non potest assignari. Quia punctus non videtur esse aliud in magnitudine, quam ut quidam tactus lineae continuae, vel divisio partium lineae iam divisae. Tactus autem semper est unus quorundam duorum, quae scilicet sunt partes magnitudinis habentes determinatum situm in magnitudine: quasi illud quod est pars magnitudinis habens determinatum situm inter partes eius, sit aliquid praeter ipsum tactum et divisionem, et per consequens praeter punctum.”

<sup>93</sup> *In De gen.* 1, l. 4 n. 7: “Non ergo videtur esse possibile quod magnitudo dividatur in puncta vel tactus aut divisiones.”

<sup>94</sup> *In De gen.* 1, l. 4 n. 7 (cf. ARISTOTLE, *De generatione* A.2, 316b8–9): “Si ergo aliquis ponat quodcumque corpus, aut quantamcumque quantitatem, esse omnino divisibilem, continget hoc inconueniens quod nunc dictum est.”

### 34.24. It Is Impossible for a Body to Be Totally Divided

ARISTOTLE shows that it is impossible that a body should be totally divided because it will not be possible to give (an account of) what would remain after the division.<sup>95</sup> He says first that if a body should be posited to be altogether divided, one still ought to inquire what the remainder will be after the division.<sup>96</sup> Thus,

1. A **magnitude** does not remain.<sup>97</sup> Indeed, this is impossible, for it would follow that an undivided divisible would still remain, or that there should be some non-divisible magnitude. And it was said that a body was altogether divisible. Thus, that which remains after the division must in no mode be divisible, while it was supposed by the adversary that a magnitude should be altogether divisible.

2. If that which remains after division should be neither a body nor a magnitude, and nonetheless the division has been done according to the whole, as has been said, it remains that the division will be either from **points**, such that the body should finally be resolved into points, and consequently those from which the body is composed will be without magnitude, or it follows that that which is the remainder of the division should be **nothing** altogether.<sup>98</sup>

3. The latter is impossible.<sup>99</sup> Since any one (thing) is generated from those into which it is resolved, therefore, if it should be resolved into **nothing**, it would follow that it should also be generated from nothing. And that which is composed from nothing, is nothing. It would therefore follow that the body in question—and the whole universe too, for the same reason—should be nothing. Thus, whatever will be in the nature of things will be according to appearance and not according to existence.

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<sup>95</sup> *In De gen.* 1, l. 4 n. 4 (cf. ARISTOTLE, *De generatione* A.2, 316a24–34): “ostendit [Philosophus] esse impossibile quod corpus sit totaliter divisum, ex hoc quod non erit dare quid remaneat post divisionem. Primo ergo ostendit quod non erit dare quid remaneat ex divisione, quae est principalis pars.”

<sup>96</sup> *In De gen.* 1, l. 4 n. 4 (cf. ARISTOTLE, *De generatione* A.2, 316a23–24): “Dicit ergo [Philosophus] primo: Si corpus ponatur omnino esse divisum, quaerendum restat quid erit *reliquum*, idest quod remanet post divisionem: sicut videmus remanere in omni divisione ea in quae divisum resolvitur.”

<sup>97</sup> *In De gen.* 1, l. 4 n. 4 (cf. ARISTOTLE, *De generatione* A.2, 316a24–25): “Et primo ostendit quod non remaneat magnitudo. Hoc enim est impossibile: sequeretur enim quod adhuc remaneret divisibile non divisum, vel quod magnitudo esset aliquid non divisibile; dicebatur autem quod corpus erat omnino divisibile: et ita oportet quod id quod remanet post divisionem, nullo modo sit divisibile; cum tamen supponatur ab adversario quod magnitudo sit omnino divisibilis.”

<sup>98</sup> *In De gen.* 1, l. 4 n. 4 (cf. ARISTOTLE, *De generatione* A.2, 316a25–28): “Secundo concludit quod, si illud quod relinquitur post divisionem, neque sit corpus neque magnitudo, et tamen sit facta divisio secundum totum, sicut dictum est; relinquitur quod divisio erit aut ex punctis, ita quod corpus finaliter resolvitur in puncta, et per consequens ea ex quibus componitur corpus erunt sine magnitudine; aut sequitur quod id quod est residuum post divisionem, sit omnino nihil.”

<sup>99</sup> *In De gen.* 1, l. 4 n. 4 (cf. ARISTOTLE, *De generatione* A.2, 316a28–29): “Tertio ostendit hoc secundum esse impossibile. Quia, cum unumquodque generetur ex his in quae resolvitur, si ergo resolvitur in nihil, sequetur quod etiam generetur ex nihil. Quod autem componitur ex nihilo, nihil est. Sequetur ergo quod corpus de quo agitur, sit nihil; et etiam totum universum eadem ratione; sed quidquid erit in rerum natura, erit secundum apparentiam tantum, et non secundum existentiam.”

4. Resolution cannot be made into **points**.<sup>100</sup> It would likewise follow that there should be a body composed from points; and thus, it would further follow that the body itself would not be a quantum. For before the body should be divided, the points would also touch (each other): namely, insofar as the extremities of two lines simultaneously are; and from this there was a continuous magnitude, and all points simultaneously were, not yet distinct one from another, they did not make a greater whole, for a point is nothing other than some division of the parts of a line; and from this—that something is divided into two or more—is not caused a whole, neither greater neither less than it priorly would have been, for in this way, a small body, as a great (one), can be divided into two or more. And thus, it is evident that the points, that are nothing other than divisions, do not produce something greater. Whence, it remains that, if points should be composed one to another, they do not produce something greater.

Thus, it seems impossible that a body should be altogether divided, since that which should be the remainder of the division cannot be assigned.<sup>101</sup>

#### 34.25. Perfection of Magnitudes According to Divisibility

It is evident that every body has three dimensions: longitude, latitude, and profundity.<sup>102</sup> Moreover, all (the species of magnitude) seem to be some dimensions of the body: either according to latitude, as a surface; or according to profundity, as a body; or according to longitude, as a line.<sup>103</sup>

Therefore, since *all* (or *every*) and *perfect* is the same (► 23.1),<sup>104</sup> it follows that, among magnitudes, the body (*corpus* = τὸ σῶμα) alone is determined by three dimensions, and this has the ratio of *all* (or *every*; i.e., all the dimensions, or every dimension), for, since it

<sup>100</sup> *In De gen.* 1, l. 4 n. 4 (cf. ARISTOTLE, *De generatione* A.2, 316a29–34): “Quarto probatur primum praemissorum, scilicet quod non fiat resolutio in puncta. Quia similiter sequeretur quod sit corpus compositum ex punctis: et ita ulterius sequeretur quod non sit quantum ipsum corpus. Ante enim quam corpus divideretur, et puncta tangebant se, prout scilicet extrema duarum linearum sunt simul, et ex hoc erat una magnitudo continua, et simul erant omnia puncta, nondum distincta adinvicem, non faciebant totum maius: punctum enim nihil est aliud quam quaedam divisio partium lineae, ex hoc autem quod aliquid dividitur in duo vel plura, non efficitur totum nec maius nec minus quam prius fuerit: ita enim corpus parvum, sicut magnum, potest dividi in duo vel plura. Et sic patet quod puncta, quae nihil aliud sunt quam divisiones, non faciunt aliquid maius. Unde relinquitur quod, si puncta componantur adinvicem, non faciunt aliquid maius.”

<sup>101</sup> *In De gen.* 1, l. 4 n. 4: “Sic igitur videtur esse impossibile quod corpus sit omnino divisum: quia non potest assignari quid sit residuum divisionis, tanquam principalis pars corporis divisi.”

<sup>102</sup> *In De anima* 2, c. 23, 14–16: “manifestum est enim omne corpus tres dimensiones habere, scilicet longitudinem, latitudinem et profunditatem.”

<sup>103</sup> *In Metaph.* 3, l. 13, §508 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a18–20): “Omnia praedicta [sc., linea et superficies et corpus] videntur esse quaedam corporis dimensiones: vel secundum latitudinem, ut superficies: vel secundum profunditatem, ut corpus: vel secundum longitudinem, ut linea.”

<sup>104</sup> *In De caelo* 1, l. 2 n. 8 (cf. ARISTOTLE, *De caelo* A.1, 268a22–25): “Quia igitur *omne* et *perfectum* est idem, consequens est quod corpus sit perfectum inter magnitudines: quia solum corpus est determinatum tribus dimensionibus, et hoc habet rationem *omnis*, ut supra ostensum est: cum enim sit tribus modis divisibile, sequitur quod sit divisibile *omniquaque*, idest secundum omnem dimensionem.”

is divisible in three modes (i.e., in longitude, in latitude, and in profundity), it follows that it is divisible according to every dimension.

On the other hand, among the other magnitudes, something—namely, the surface—is divisible according to two dimensions; and another—i.e., the line—, according to one.<sup>105</sup>

Thus, just as magnitudes have a number of dimensions, so do they have division and continuity: namely, such that some magnitude—namely, the line—is continuous according to one mode; another—namely, the surface—is continuous in two modes; and the body is continuous according to all modes (*secundum omnem modum*, or *according to every mode*).<sup>106</sup> Whence, it is evident that the body is the perfect magnitude, as having all modes (or every mode) of continuity.

### 34.26. In What Mode the Point Is Divisible

A point that is the terminus of diverse lines is one and indivisible insofar as it is considered in itself.<sup>107</sup> If, on the other hand, the point is considered separately (*seorsum*) as it is the terminus of *this* line and separately as it is the terminus of *another* line, in this way it is in some mode divisible, since we use one point as two (i.e., as the termini of two lines that happen to be contiguous; ► 39.3).<sup>108</sup>

Hence, a point that is between two parts of a line can be taken as one or as two.<sup>109</sup> As one, indeed, insofar as it continues the parts of a line as a common terminus. As two, on the other hand, insofar as we use the point twice: namely, as the principle of one line, and as the end of the other.

### 34.27. Common vs. Applied Magnitude

We can speak of the nature of something in two (modes): either **(1)** according to the common *ratio*; or **(2)** insofar as (the same *ratio*) is applied to a proper matter (► 26.4). And nothing prevents something—that is not impeded *from the common ratio* of the thing—

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<sup>105</sup> *In De caelo* 1, l. 2 n. 8 (cf. ARISTOTLE, *De caelo* A.1, 268a25): “Sed inter alias magnitudines aliquid est divisibile secundum duas dimensiones, scilicet superficies; aliud autem secundum unam, scilicet linea.”

<sup>106</sup> *In De caelo* 1, l. 2 n. 8 (cf. ARISTOTLE, *De caelo* A.1, 268a25–28): “*Ut enim numerum adepta sunt*, idest sicut magnitudines habent numerum dimensionum, ita habent divisionem et continuitatem: ita scilicet quod aliqua magnitudo est continua secundum unum modum, scilicet linea; alia est continua duobus modis, scilicet superficies; corpus autem est continuum secundum omnem modum. Unde patet quod corpus est magnitudo perfecta, quasi habens omnem modum continuitatis.”

<sup>107</sup> *In De sensu* 1, c. 18, 153–155: “Punctum autem quod est terminus diuersarum linearum, secundum quod in se consideratur, est unum et indiuisibile.”

<sup>108</sup> *In De sensu* 1, c. 18, 158–162: “Si uero consideretur punctum seorsum ut est terminus huius lineae et seorsum ut est terminus alterius lineae, sic est quodam modo diuisibile, quia utimur uno puncto ut duobus.”

<sup>109</sup> *In De anima* 2, c. 27, 164–169 (cf. ARISTOTLE, *De anima* Γ.2, 427a9–11): “punctum enim quod est inter duas partes lineae potest accipi ut unum aut duo: ut unum quidem secundum quod continuat partes lineae ut communis terminus, ut duo autem secundum quod bis utimur puncto, scilicet ut principio unius lineae et ut fine alterius.”



from being impeded *from the application* (of the same *ratio*) to some *determinate matter*.<sup>110</sup>

Therefrom, it is not against the *ratio* of *magnitude* that whatever magnitude is divisible into smaller (magnitudes), although, applying (the *ratio* of) *magnitude* to a determinate nature, there is some least magnitude, for any nature requires a determinate magnitude and smallness (►23.7).<sup>111</sup>

Hence, at two points of diverse (natural) bodies not *one line* is terminated from one part, but *two (lines)*, for although two mathematical lines should be distinguishable only according to site, such that two such lines cannot be understood to simultaneously be, however, two natural (lines) are distinguished in the subject, such that, (if it is) posited that two bodies should simultaneously be, it follows that two lines, two points, and two surfaces would simultaneously be.<sup>112</sup>

Thus, it is impossible for two mathematical straight lines to be between (the same) two points, because no *ratio* of distinction can be understood in them other than from (their) site (*ex situ*).<sup>113</sup> And it is impossible for two natural lines to be between (the same) two points by nature; but it is possible by miracle, since another *ratio* of distinction remains in the two lines from the diversity of the bodies subjected (to continuous quantity), which is preserved through divine virtue even (if) the diversity of site (is) removed.

#### 34.28. No Indivisible Bodies

From what has been said, it is to be conceded that in sensible bodies there is found segregation (*segregatio* = διάκρισις) and congregation (*congregatio* = σύγκρισις). Not, however, (segregation) into indivisible bodies (< ἄτομα) or (congregation) from indivisibles

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<sup>110</sup> *In Physic.* 6, l. 3, n. 9: “de natura alicuius rei possumus loqui dupliciter: vel secundum rationem communem, vel secundum quod ad propriam materiam applicatur. Et nihil prohibet aliquid, quod non impeditur ex ratione communi rei, impediri ex applicatione ad aliquam materiam determinatam; sicut non impeditur ex ratione formae solis esse plures soles, sed ex hoc quod tota materia speciei sub uno sole continetur. Et similiter ex communi natura motus non prohibetur quin qualibet velocitate data, possit alia maior velocitas inveniri: sed impeditur ex determinatis virtutibus mobilium et moventium.”

<sup>111</sup> *In Physic.* 6, l. 3, n. 9: “Et similiter non est contra rationem magnitudinis, quod quaelibet magnitudo dividatur in minores: et ideo utitur in hoc libro, ut accipiat qualibet magnitudine data aliam minorem; licet applicando magnitudinem ad determinatam naturam, sit aliqua minima magnitudo; quia quaelibet natura requirit determinatam magnitudinem et parvitatem, ut etiam in primo dictum est.”

<sup>112</sup> *De potentia*, q. 1 a. 3 ad s.c. 8: “ad duo puncta diversorum corporum ex una parte, non terminabatur una linea, sed duae. Quamvis enim duae lineae mathematicae non sint distinguibiles nisi secundum situm, ita quod intelligi non potest duas lineas tales simul esse; tamen duae naturales distinguuntur in subiecto; ita quod, posito quod duo corpora sint simul, sequitur quod duae lineae sint simul, et duo puncta, et duae superficies.”

<sup>113</sup> *Quodlibet* 1, q. 10 a. 2 ad 2: “duas lineas rectas mathematicas esse infra [sic] duo puncta, est impossibile, quia in eis nulla alia ratio distinctionis potest intelligi nisi ex situ; sed duas lineas naturales esse intra duo puncta est impossibile quidem per naturam, sed possibile per miraculum: quia remanet alia ratio distinctionis in lineis duabus ex diversitate corporum subiectorum, quae conservatur virtute divina, etiam remota diversitate situs.”

(< ἐξ ἀτόμων), for many impossible (consequences) would follow.<sup>114</sup> Nor in such a way that an actual division of a line would come to be (*fiat* < γενέσθαι) everywhere, for this would happen if a point should be contiguous to a point, which is impossible.

Rather, the segregation of bodies is *into* some smaller and lesser (bodies, εἰς μικρὰ καὶ ἐλάττω), while congregation is *from* some smaller and lesser (bodies, εἰ ἐξ ἐλαττόνων), but not from minimal (bodies), which would have to be indivisible.<sup>115</sup>

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<sup>114</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a12–16): “Unde concedendum est quod in corporibus sensibilibus invenitur congregatio et segregatio: non tamen in indivisibilia corpora, aut ex indivisibilibus (multa enim impossibilia sequerentur, ut in III *de Caelo* dictum est): neque ita quod divisio actualis lineae fiat ubique (hoc enim contingeret, si punctus esset contiguus puncto, quod est impossibile, ut ex dictis patet).”

<sup>115</sup> *In De gen.* 1, l. 5 n. 6 (cf. ARISTOTLE, *De generatione* A.2, 317a16–17): “sed segregatio corporum est in aliqua parva et minora, congregatio vero est ex aliquibus parvis et minoribus; non autem ex minimis, quae oportet esse indivisibilia.”

## 35. Dimensive Quantity

Here, we investigate the being of quantity and its properties, as opposed to its formal ratio. In order to determine this, we must first distinguish the modes of the quantum.

### 35.1. Modes of the Quantum

ARISTOTLE distinguishes (two) modes of the quantum:<sup>1</sup>

1. The **quantum by itself** (*quantum per se* < τὰ... καθ' αὐτὰ ποσά), as the line (► 35.2).
2. The **quantum by accident** (*quantum per accidens* < τὰ... κατὰ συμβεβηκός [ποσά]), as the musical (► 35.3).

### 35.2. The Quantum by Itself

ARISTOTLE distinguishes the quantum by itself, which is twofold:<sup>2</sup>

1. Some (quanta by themselves) are **signified by the mode of a substance and of a subject** (*significantur per modum substantiae et subiecti* < *secundum substantiam sunt* = τὰ... κατ' οὐσίαν ἐστίν).<sup>3</sup>

For example, *line*, *surface*, and *number*, for whichever of these is substantially a quantum, since *quantity* is posited in the definition of any of them (< ἐν γὰρ τῷ λόγῳ τῷ τί ἐστι λέγοντι τὸ ποσόν τι ὑπάρχει).<sup>4</sup> Thus, a **line** is a *finite continuous quantity divisible according to longitude*; and (the case) is likewise concerning the other (quanta substantially signified).

2. Some pertain to the genus of quantity by themselves, but are **signified by the mode of a habit** (*habitus* < ἔξεις) **or of an affection** (*passio* < πάθη) of such a substance: namely, of a line, which is substantially a quantity, or of other like (*similium*) quantities.<sup>5</sup>

For example, *many* (*multum* = πολύ) and *few* (*paucum* = ὀλίγον) are signified as affections of number; *long* (*productum* = μακρόν) and *short* (*breve* = βραχύ), as affections of line;

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<sup>1</sup> *In Metaph.* 5, l. 15, §979 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a14–17): “distinguit [Philosophus] quantum in id quod est quantum per se, sicut linea, et in id quod est quantum per accidens, sicut musicum.”

<sup>2</sup> *In Metaph.* 5, l. 15, §980 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a17–26): “Distinguit [Philosophus] quantum per se; quod quidem duplex est.”

<sup>3</sup> *In Metaph.* 5, l. 15, §980 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a17–18): “Quaedam enim significantur per modum substantiae et subiecti.”

<sup>4</sup> *In Metaph.* 5, l. 15, §980 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a18–19): “sicut linea, vel superficies, vel numerus. Quodlibet enim istorum substantialiter est quantum, quia in definitione cuiuslibet ponitur quantitas. Nam linea est quantitas continua secundum longitudinem divisibilis, finita: et similiter est de aliis.”

<sup>5</sup> *In Metaph.* 5, l. 15, §981 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a19–20): “Quaedam vero per se pertinent ad genus quantitatis, et significantur per modum habitus vel passionis talis substantiae, scilicet lineae, quae est substantialiter quantitas, vel aliarum similium quantitatum.”

*broad* (*latum* = πλατύ) and *narrow* (*strictum* = στενόν), as affections of surface; and *deep* or *high* (*profundum... sive altum* = βαθύ) and *shallow* or *low* (*humile* = ταπεινόν), as affections of body.<sup>6</sup>

Likewise, *heavy* (*grave* = βαρύ) and *light* (*leve* = κοῦφον), (are signified by the mode of affections of quanta by themselves) according to the opinion of those who said that the cause of heaviness in bodies is a (great) multitude of surfaces or of atoms, while the cause of lightness (is) a fewness of the same.<sup>7</sup> However, according to the truth (of the matter), *heavy* and *light* do not pertain to quantity but to quality (► 36), as ARISTOTLE posits.

And (this is) likewise (the case) concerning other such (quanta that are signified by the mode of affections of some species of quantum by itself).<sup>8</sup>

However, there are also some (other quanta) that are affections of whatever continuous quantity in common (*communiter*).<sup>9</sup>

For example, *great* (*magnum* = τὸ μέγα) and *small* (*parvum* = τὸ μικρόν), *greater* (*maius* = μείζον) and *smaller* (*minus* = ἔλαττον), whether they are said according to themselves (*sive haec dicantur secundum se* < καὶ καθ' αὐτὰ... λεγόμενα)—that is, absolutely—or they that are said (in respect) to each other (*sive dicantur ad invicem* < καὶ πρὸς ἄλληλα λεγόμενα), as something is said to be great and small respectively.<sup>10</sup>

These names that signify affections of quantity by itself are transferred (*transferuntur* = μεταφέρονται) also to (things) other than quantities.<sup>11</sup> Thus, whiteness—and other such (things)—is said (to be) great or small (► 22).

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<sup>6</sup> *In Metaph.* 5, l. 15, §981 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a20–22): “sicut multum et paucum significantur ut passiones numeri: et productum et breve, ut passiones lineae: et latum et strictum, ut passiones superficiei: et profundum et humile sive altum, ut passiones corporis.”

<sup>7</sup> *In Metaph.* 5, l. 15, §981 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a22): “et similiter grave et leve, secundum opinionem illorum, qui dicebant multitudinem superficierum vel atomorum esse causam gravitatis in corporibus, paucitatem vero eorumdem, causam levitatis. Sed secundum veritatem grave et leve non pertinent ad quantitatem, sed ad qualitatem, ut infra ponet.”

<sup>8</sup> *In Metaph.* 5, l. 15, §981 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a22): “Et similiter est de aliis talibus.”

<sup>9</sup> *In Metaph.* 5, l. 15, §982 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a23–25): “Quaedam etiam sunt, quae communiter cuiuslibet quantitatis continuae passiones sunt.”

<sup>10</sup> *In Metaph.* 5, l. 15, §982 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a23–25): “sicut magnum et parvum, maius et minus; sive haec dicantur secundum se, idest absolute, sive dicantur ad invicem, sicut aliquid dicitur magnum et parvum respective, sicut in Praedicamentis habetur.” Cf. ARISTOTLE, *Categoriae* 6, 5b14–22: “εἰ μὴ ἄρα τὸ πολὺ τῷ ὀλίγῳ φαίη τις εἶναι ἐναντίον ἢ τὸ μέγα τῷ μικρῷ. τούτων δὲ οὐδὲν ἐστὶ ποσὸν ἀλλὰ τῶν πρὸς τι· οὐδὲν γὰρ αὐτὸ καθ' αὐτὸ μέγα λέγεται ἢ μικρόν, ἀλλὰ πρὸς ἕτερον ἀναφέρεσθαι, οἷον ὄρος μὲν μικρὸν λέγεται, κέγχρος δὲ μεγάλη τῷ τὴν μὲν τῶν ὁμογενῶν μείζονα εἶναι, τὸ δὲ ἔλαττον τῶν ὁμογενῶν. οὐκοῦν πρὸς ἕτερον ἢ ἀναφορά, ἐπεὶ εἶγε καθ' αὐτὸ μικρὸν ἢ μέγα ἐλέγετο, οὐκ ἂν ποτε τὸ μὲν ὄρος μικρὸν ἐλέγετο, ἢ δὲ κέγχρος μεγάλη.”

<sup>11</sup> *In Metaph.* 5, l. 15, §982 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a25–26): “Ista autem nomina, quae significant passiones quantitatis per se, transferuntur etiam ad alia quam ad quantitates. Dicitur enim albedo magna et parva, et alia huiusmodi.”

### 35.3. The Quantum by Accident

According to ARISTOTLE, some (things) are said (to be) *quanta by accident* either:<sup>12</sup>

1. Only because they are **accidents of some quantum** (*ex hoc solo, quod sunt accidentia alicuius quanti*).<sup>13</sup> For example, the white and the musical (are said to be *quanta by accident*) because they are accidents of some subject that is a quantum.

2. Not by reason of the subject in which they are but because they are **divided according to quantity upon the division of some quantity** (*dividuntur secundum quantitatem ad divisionem alicuius quantitatis*).<sup>14</sup> For example, *motion* and *time* are said (to be) some (kind of) *quanta* and *continua* because those of which they are (affections, πᾶθη) are divisible, and they themselves are divided upon their division. Thus, time is divisible and continuous on account of (*propter*) motion; and motion (is divisible and continuous) on account of magnitude: not indeed on account of the magnitude of that which is moved but on account of the magnitude over which something is moved, for (local) motion is a quantum because that magnitude is a quantum.

Whence, these (i.e., those that are *quanta* because they follow upon a quantum) cannot only be said (to be) quantities *by accident* (► 35.3) but rather **posteriorly** (*per posterius*), insofar as they receive (*sortiuntur*) the division of quantity from something prior.<sup>15</sup>

### 35.4. Ratio of Measure vs. Being of Quantity

1. ARISTOTLE posits **time** to be a quantity *by itself* in the *Categories*; in the *Metaphysics*, however, he posits it to be a quantity *by accident*.<sup>16</sup> This is so because in the *Categories*

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<sup>12</sup> *In Metaph.* 5, l. 15, §984 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a26–32): “Distinguit [Philosophus] *modos quantitatis per accidens*: et ponit duos modos quantitatis per accidens: quorum unus est secundum quod aliqua dicuntur *quanta per accidens ex hoc solo, quod sunt accidentia alicuius quanti*. [...] Alio modo dicuntur aliqua *quanta per accidens* [...] eo quod dividuntur secundum quantitatem ad divisionem alicuius quantitatis.”

<sup>13</sup> *In Metaph.* 5, l. 15, §984 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a27–28): “quorum unus [modus quantitatis per accidens] est secundum quod aliqua dicuntur *quanta per accidens ex hoc solo, quod sunt accidentia alicuius quanti, sicut album et musicum per hoc quod sunt accidentia alicuius subiecti, quod est quantum.*”

<sup>14</sup> *In Metaph.* 5, l. 15, §985 (cf. ARISTOTLE, *Metaphysica* Δ.13, 1020a28–32): “Alio modo dicuntur aliqua *quanta per accidens non ratione subiecti, in quo sunt, sed eo quod dividuntur secundum quantitatem ad divisionem alicuius quantitatis; sicut motus et tempus, quae dicuntur quaedam quanta et continua, propterea quod ea, quorum sunt, sunt divisibilia, et ipsa dividuntur ad divisionem eorum; sicut motus et tempus, quae dicuntur quaedam quanta et continua, propterea quod ea, quorum sunt, sunt divisibilia, et ipsa dividuntur ad divisionem eorum. Tempus enim est divisibile et continuum propter motum; motus autem propter magnitudinem; non quidem propter magnitudinem eius quod movetur, sed propter magnitudinem eius in quo aliquid movetur. Ex eo enim quod illa magnitudo est quanta, et motus est quantus. Et propter hoc quod motus est quantus, sequitur tempus esse quantum.*”

<sup>15</sup> *In Metaph.* 5, l. 15, §985: “Unde haec non solum per accidens quantitates dici possunt, sed magis per posterius, in quantum quantitatis divisionem ab aliquo priori sortiuntur.”

<sup>16</sup> *In Metaph.* 5, l. 15, §986: “Sciendum est autem, quod Philosophus in Praedicamentis posuit tempus quantitatem per se, cum hic ponat ipsum quantitatem per accidens; quia ibi distinxit species quantitatis secundum diversas rationes mensurae. Aliam enim rationem mensurae habet tempus, quod est mensura

he distinguishes the species of quantity according to the diverse *ratios* of *measure* (which is what *formally* constitutes a species of quantity; ►21). Thus, time, which is an *extrinsic* measure, has a *ratio* of *measure* other than *magnitude*, which is an *intrinsic* measure (►28.7; 33.6). Indeed, the instant, and the time of particular motions, is not an intrinsic measure, as the point and the line of bodies, but only extrinsic, just as place (is an extrinsic measure) of bodies. Hence, it is posited in the *Categories* as another species of quantity.

In his *Metaphysics* ARISTOTLE considers the species of quantity, instead, in respect of the being itself of the quantity (*quantum ad ipsum esse quantitatis*; i.e., in respect of the *esse* it has in its subject; ►26.4).<sup>17</sup> Hence, in the *Metaphysics* he does not posit that those (quanta) that have a being of quantity only from another—as (do) motion and time—are species of quantity but quantities *by accident* (►35.3).

2. In turn, **motion** does not have a *ratio* of *measure* other than *time* and *magnitude* (i.e., because time is the measure of motion; and ultimately, time and motion have their *ratio* of *measure* from the same: namely, from *magnitude*); and hence, it is not posited (as) a species of quantity in either the *Categories* or the *Metaphysics*.<sup>18</sup>

3. Finally, **place** is posited in the *Categories* (as) a species of quantity, and not in the *Metaphysics*, because it has another *ratio* of *measure* (i.e., place is an *extrinsic measure of bodies*) but not another being of quantity (i.e., because it is the figure of a container).<sup>19</sup>

Indeed, **place** (*locus* = τόπος) is *the first, immobile terminus of a container (terminus immobilis continentis primum = τὸ τοῦ περιέχοντος πέρας ἀκίνητον πρῶτον)*, where *first* (*primum* = πρῶτον) designates the proper place, as opposed to the common place.<sup>20</sup> And place and figure (*forma* = ἡ μορφή, τὸ εἶδος) seem to be the same because figure *contains*, which seems to be proper of place (►29.1, ¶8).<sup>21</sup> Moreover, the extremities of the

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extrinseca, et magnitudo, quae est mensura intrinseca. Et ideo ponitur ibi ut alia species quantitatis." Cf. ARISTOTLE, *Categoriae* 6, 4b20–25: "Τοῦ δὲ ποσοῦ τὸ μὲν ἐστὶ διωρισμένον, τὸ δὲ συνεχές, καὶ τὸ μὲν ἐκ θέσιν ἐχόντων πρὸς ἀλλήλα τῶν ἐν αὐτοῖς μορίων συνέστηκε, τὸ δὲ οὐκ ἐξ ἐχόντων θέσιν. ἔστι δὲ διωρισμένον μὲν οἶον ἀριθμὸς καὶ λόγος, συνεχές δὲ οἶον γραμμὴ, ἐπιφάνεια, σῶμα, ἔτι δὲ παρὰ ταῦτα χρόνος καὶ τόπος." *STh* III, q. 75 a. 7 ad 1: "instans et tempus particularibus motibus non est mensura intrinseca, sicut linea et punctus corporibus, sed solum extrinseca, sicut corporibus locus."

<sup>17</sup> *In Metaph.* 5, l. 15, §986: "Hic autem considerat species quantitatis quantum ad ipsum esse quantitatis. Et ideo illa, quae non habent esse quantitatis nisi ex alio, non ponit hic species quantitatis, sed quantitates per accidens, ut motum et tempus."

<sup>18</sup> *In Metaph.* 5, l. 15, §986: "Motus autem non habet aliam rationem mensurae quam tempus et magnitudo. Et ideo nec hic nec ibi ponitur quantitatis species."

<sup>19</sup> *In Metaph.* 5, l. 15, §986: "Locus autem ponitur ibi species quantitatis, non hic, quia habet aliam rationem mensurae, sed non aliud esse quantitatis."

<sup>20</sup> *In Physic.* 4, l. 6, n. 16 (cf. ARISTOTLE, *Physica* Δ.4, 212a20–21): "concludit [Philosophus] ex praemissis definitionem loci, scilicet quod locus est *terminus immobilis continentis primum*. Dicit autem *primum*, ut designet locum proprium, et excludat locum communem."

<sup>21</sup> *In Physic.* 4, l. 6, n. 4 (cf. ARISTOTLE, *Physica* Δ.4, 211b10–12): "ponit [Philosophus] quare forma videatur esse locus: quia scilicet forma continet; quod videtur esse proprium loci. Extrema vero corporis

containing body and of the contained (body) are simultaneous, since the container and the contained are contiguous to each other; and thus, the terminus of the container, which is the place, does not seem to be separated from the terminus of the contained body. And in this way, place does not seem to differ from figure.

However, place and figure are not the same.<sup>22</sup> They agree in that one and the other is some terminus: but not (the terminus) of one and the same (body), for a figure is the terminus of the body of which it is the figure, while a place is not the terminus of the body of which it is the place but (the terminus) of the body that contains it; and although the termini of the container and of the contained are simultaneous, they are not, however, the same. (Whence, the being of *place* as a quantum is identified with the container's figure.)

### 35.5. Dimensive Quantity

It is necessary for that which is by itself to be the cause in every genus (►26.11).<sup>23</sup> And distinction according to site (*secundum situm*) befits (*convenit*) first and by itself (*primo et per se*) **dimensive quantity**, which is defined to be a *quantity having position* (*quantitas positionem habens*). Whence, parts in a subject have a distinction according to position from their being subjected to dimension.

Just as the distinction of diverse parts of one body is according to the diverse parts of one place by dimensions, so (too), on account of dimensions, diverse bodies are distinguished according to diverse places, for *actual division* of corporeal matter brings about (*facit*) two bodies, while *potential divisibility* (brings about) two parts of one body.<sup>24</sup>

Thus, it cannot be said that a cubical wooden body cannot simultaneously be with another sensible body on account of matter (alone), for a place is owed to a body by reason of matter only insofar as matter is contained under dimensions.<sup>25</sup> Whence, that two bodies

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continentis et contenti sunt simul, cum continens et contentum sint contigua ad invicem: et sic terminus continens, qui est locus, non videtur separatus esse a termino corporis contenti; et sic videtur locus non differre a forma.”

<sup>22</sup> *In Physic.* 4, l. 6, n. 5 (cf. ARISTOTLE, *Physica* Δ.4, 211b12–14): “ostendit [Philosophus] quod forma non sit locus. Quia quamvis locus et forma in hoc convenient, quod utrumque eorum est quidam terminus, non tamen unius et eiusdem; sed forma est terminus corporis cuius est forma, locus autem non est terminus corporis cuius est locus, sed corporis continentis ipsum; et licet sint simul termini continentis et contenti, non tamen sunt idem.”

<sup>23</sup> *Quodlibet* 1, q. 10 a. 1 co.: “necesse est enim ut id quod est per se, sit causa in unoquoque genere. Distinctio autem secundum situm primo et per se convenit quantitati dimensionis, quae definitur esse quantitas positionem habens; unde et partes in subiecto ex hoc ipso distinctionem habent secundum situm, quod sunt subiectae dimensionis.”

<sup>24</sup> *Quodlibet* 1, q. 10 a. 1 co.: “et sicut est distinctio diversarum partium unius corporis secundum diversas partes unius loci per dimensiones, ita propter dimensiones diversa corpora distinguuntur secundum diversa loca. Duo enim corpora facit actualis divisio materiae corporalis; duas autem partes unius corporis divisibilitas potentialis.”

<sup>25</sup> *In Physic.* 4, l. 13, n. 1: “Non enim potest dici quod simul cum corpore cubico ligneo non possit esse simul aliud corpus sensibile, propter materiam: quia corpori non debetur locus ratione materiae, nisi

cannot be simultaneously (in a place) is not from the part of matter or of sensible affections (i.e., color, heat, etc.) but only from the *ratio* of *dimensions*, in which there can be diversity only according to site (*secundum situm*) if (the bodies) should be equal, as has been said.

### 35.6. Proximity of Quantity to Substance and Priority in Respect of Other Accidents

Only in the genus of quantity are some (things) signified as subjects (and) others as affections (► 35.2).<sup>26</sup> The reason for this is that quantity is the accident most proximate to substance. Whence, some (thinkers even) believe that quantities—namely, number, line, surface, and body—are substances, for only quantity—after substance—has a division into proper parts. Thus, whiteness (for example) is divided—and consequently is understood to be individuated—only through a subject (i.e., a subject that is a quantum).

It is manifest that quantity inheres in substance immediately; and sensible qualities—such as white and black, hot and cold—are founded on quantity.<sup>27</sup> Now (if) the posterior (is) removed, the prior remains; whence, (if) sensible qualities (are) removed according to understanding (*secundum intellectum*), continuous quantity still remains in understanding. Therefore, there are some forms that require matter under a determinate disposition of sensible qualities, and such are all the natural forms; and hence natural (things) concern sensible matter.

On the other hand, there are some forms that do not require matter under a determinate disposition of sensible qualities but require matter under an existing quantity.<sup>28</sup> For example, the triangle, the square, and (things) of such a mode. These are said (to be) *mathematical* (things), and (to be) *abstract* from sensible matter but not from intelligible matter, insofar as continuous quantity—abstracted from sensible quality—remains in (our) understanding.

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secundum quod materia continetur sub dimensionibus. Unde quod duo corpora non possint esse simul, non est ex parte materiae vel passionum sensibilium, sed solum ex ratione dimensionum, in quibus non potest esse diversitas si sint aequales, nisi secundum situm, ut dictum est.”

<sup>26</sup> *In Metaph.* 5, l. 15, §983: “Sciendum autem est, quod quantitas inter alia accidentia propinquior est substantiae. Unde quidam quantitates esse substantias putant, scilicet lineam et numerum et superficiem et corpus. Nam sola quantitas habet divisionem in partes proprias post substantiam. Albedo enim non potest dividi, et per consequens nec intelligitur individua nisi per subiectum. Et inde est, quod in solo quantitatis genere aliqua significantur ut subiecta, alia ut passiones.”

<sup>27</sup> *In De anima* 3, c. 2, 98–108: “manifestum est enim quod quantitas immediate inheret substantiae; qualitates autem sensibiles in quantitate fundantur, ut album et nigrum, calidum et frigidum; remoto autem posteriori, remanet prius; unde, remotis qualitatibus sensibilibus secundum intellectum, adhuc remanet quantitas continua in intellectu; sunt ergo quaedam forme que requirunt materiam sub determinata dispositione sensibilium qualitatum, et huiusmodi sunt omnes forme naturales et ideo naturalia concernunt materiam sensibilem.”

<sup>28</sup> *In De anima* 3, c. 2, 108–116: “quedam uero forme sunt que non exigunt materiam sub determinata dispositione sensibilium qualitatum, tamen requirunt materiam sub quantitate existentem, sicut triangulus et quadratum et huiusmodi, et hec dicuntur mathematica et abstrahunt a materia sensibili, set non a materia intelligibili, in quantum in intellectu remanet continua quantitas abstracta a sensibili qualitate.”



Thus, it is manifest that quantity is in (*inest*) substance prior to sensible qualities.<sup>29</sup> Whence, quantities such as numbers and dimensions—and figures, which are the termini of (continuous) quantities (►4)—can be considered without sensible qualities, which (consideration) is to abstract them from sensible matter. However, (such quantities and figures) cannot be considered without the understanding of substance subjected to quantity, which is to abstract them from common intelligible matter.

Hence, quantity cannot be without substance; but substance can be without quantity, for substance is the first of the genera in time, in *ratio*, and in cognition (►33.13).<sup>30</sup> Thus, no corporeal substance is without quantity, but there can be a substance without a body.

The corporeal substance has (the property) that it should be the subject of accidents from (the part of) its matter, to which it belongs to underly another first.<sup>31</sup> And the first disposition of matter is quantity, for its division—and (its) non-division, and likewise, (its) unity and multitude, which are the first consequents of *being*—is considered according to it. Whence, all other accidents are founded in substance by means of quantity, and quantity is naturally prior to them. Hence, it does not encompass sensible matter in its *ratio*, even though it should encompass intelligible matter.

### 35.7. Dimensive Quantity, Site, Position, and Individuation

No accident except for quantity has from itself a proper *ratio* of *division*.<sup>32</sup> Whence, from themselves, dimensions have some *ratio* of *individuation* according to a determinate site (*secundum determinatum situm*), insofar as **site** (*situs*) is a *difference of quantity*.

Thus, dimensive quantity has this proper(ty) among the accidents: that it is individuated according to itself. This is so because **position**, which is *the order of parts in a whole*, is

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<sup>29</sup> *STh* I, q. 85 a. 1 ad 2: “Manifestum est autem quod quantitas prius inest substantiae quam qualitates sensibiles. Unde quantitates, ut numeri et dimensiones et figurae, quae sunt terminationes quantitatum, possunt considerari absque qualitatibus sensibilibus, quod est eas abstrahi a materia sensibili, non tamen possunt considerari sine intellectu substantiae quantitati subiectae, quod esset eas abstrahi a materia intelligibili communi.” *STh* III, q. 77 a. 2 ad 4: “quantitas mathematica non abstrahit a materia intelligibili, sed a materia sensibili, ut dicitur VII Metaphys.”

<sup>30</sup> *ScG* 2, 91 n. 6: “Substantia potest esse sine quantitate, licet quantitas sine substantia esse non possit: substantia enim aliorum generum prima est tempore, ratione et cognitione. Sed nulla substantia corporea est sine quantitate. Possunt igitur esse quaedam in genere substantiae omnino absque corpore.”

<sup>31</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 co.: “Sciendum autem, quod substantia corporalis habet quod sit subjectum accidentium ex materia sua, cui primo inest subijci alteri. Prima autem dispositio materiae est quantitas; quia secundum ipsam attenditur divisio ejus et indivisio, et ita unitas et multitudo, quae sunt prima consequentia ens; et propter hoc sunt dispositiones totius materiae, non hujus aut illius tantum. Unde omnia alia accidentia mediante quantitate in substantia fundantur, et quantitas est prior eis naturaliter; et ideo non claudit materiam sensibilem in ratione sua, quamvis claudat materiam intelligibilem, ut dicitur in 7 Metaph.”

<sup>32</sup> *In De Trin.*, q. 4 a. 2 ad 3, 260–265: “Nullum autem accidens habet ex se propriam rationem diuisionis nisi quantitas; unde dimensiones ex se ipsis habent quandam rationem indiuiduationis secundum determinatum situm, prout situs est differentia quantitatis.”

included in its *ratio*, for **(dimensive quantity)** is *quantity having position*.<sup>33</sup> Wherever a diversity of parts of the same species is understood, it is necessary for individuation to be understood.

Whence, multiple whitenesses can only be understood (to exist) insofar as they are in diverse subjects, while multiple lines can be apprehended even if they are considered in themselves, for diverse site (*situs*), which is by itself in a line (*per se lineae inest*), is sufficient for the plurality of lines.<sup>34</sup>

### 35.8. Individual

Two (*ratios*) belong to the *ratio* of **individual**:<sup>35</sup>

1. That it be a being in act either in itself or in another.<sup>36</sup>
2. That it be undivided in itself and divided by a last division from others that are or can be in the same species.<sup>37</sup>

### 35.9. Individuation of Other Accidents

*The first disposition of matter is divisive quantity*; whence, too, PLATO posited the first differences of matter (to be) great and small.<sup>38</sup> And since *the first subject is matter*, it follows that all other accidents are referred to a subject by means of divisive quantity, as also the first subject of color is said to be the surface, by reason of which some posited dimensions to be the substances of bodies, as ARISTOTLE says.

If the subject should be subtracted and accidents should remain according to the being (*esse*) that they priorly had, all accidents would remain founded over divisive quantity.<sup>39</sup>

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<sup>33</sup> ScG 4, 65 n. 5: "Habet autem et hoc proprium quantitas divisiva inter accidentia reliqua, quod ipsa secundum se individuatur. Quod ideo est, quia positio, quae est ordo partium in toto, in eius ratione includitur: est enim quantitas positionem habens. Ubi cumque autem intelligitur diversitas partium eiusdem speciei, necesse est intelligi individuationem: nam quae sunt unius speciei, non multiplicantur nisi secundum individuum."

<sup>34</sup> ScG 4, 65 n. 5: "et inde est quod non possunt apprehendi multae albedines nisi secundum quod sunt in diversis subiectis; possunt autem apprehendi multae lineae, etiam si secundum se considerentur: diversus enim situs, qui per se lineae inest, ad pluralitatem linearum sufficiens est."

<sup>35</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: "de ratione individui duo sunt."

<sup>36</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: "quod sit ens actu vel in se vel in alio."

<sup>37</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: "et quod sit divisum ab aliis quae sunt vel possunt esse in eadem specie, in se indivisum existens." *In De Trin.*, q. 4 a. 2 ad 3, 258–260: "de ratione individui est quod sit in se indivisum et ab aliis diuisione diuisum."

<sup>38</sup> *STh* III, q. 77 a. 2 co.: "prima dispositio materiae est quantitas divisiva, unde et Plato posuit primas differentias materiae magnum et parvum. Et quia primum subiectum est materia, consequens est quod omnia alia accidentia referantur ad subiectum mediante quantitate divisiva, sicut et primum subiectum coloris dicitur superficies esse, ratione cuius quidam posuerunt dimensiones esse substantias corporum, ut dicitur in III *Metaphys.*"

<sup>39</sup> *STh* III, q. 77 a. 2 co.: "Et quia, subtracto subiecto, remanent accidentia secundum esse quod prius habebant, consequens est quod omnia accidentia remanent fundata super quantitatem divisivam."

### 35.10. The First and the Secondary Principles of Individuation

1. The first principle of individuation is **matter**, by which the being (*esse*) in act of whatever form—whether substantial or accidental—is acquired.<sup>40</sup>

Matter is the principle of individuation of all inherent forms because such forms, of themselves (*quantum est de se*), are naturally apt to *be in another* as in a subject; from which, (if) some (one form) of them is received in a matter that is not in another, the same form already existing in this way cannot *be in another*.<sup>41</sup>

2. The secondary principle of individuation is **dimension**, since from it matter has that it should be divided.<sup>42</sup>

Thus, when ARISTOTLE says that (those) are one in number whose matter is one, (this) is to be understood of designated matter (*materia signata*), which underlies dimensions.<sup>43</sup> Otherwise, we would have to say that all generable and corruptible (bodies) are one in number, since their matter is one.

On the other hand, since dimensions are accidents, they cannot be the principle of unity of an individual substance: rather, matter, insofar as it underlies such dimensions, is understood to be the principle of such unity and multitude.<sup>44</sup>

Dimensive quantity is a principle of individuation because something is naturally apt to be in only one, for (this *one*) is undivided in itself and divided from all others; and the division of substance happens by reason of quantity, as ARISTOTLE says.<sup>45</sup>

Hence, dimensive quantity itself is some principle of individuation of such forms: to wit, insofar as forms (that are) diverse in number are in diverse parts of matter.<sup>46</sup> Whence,

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<sup>40</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: “primum individuationis principium est materia, qua acquiritur esse in actu cuiuslibet tali formae sive substantiali sive accidentali.”

<sup>41</sup> *STh* III, q. 77 a. 2 co.: “materia est individuationis principium omnibus formis inhaerentibus, quia, cum huiusmodi formae, quantum est de se, sint natae in aliquo esse sicut in subiecto, ex quo aliqua earum recipitur in materia, quae non est in alio, iam nec ipsa forma sic existens potest in alio esse.”

<sup>42</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: “et secundarium principium individuationis est dimensio, quia ex ipsa habet materia quod dividatur.”

<sup>43</sup> *In De Trin.*, q. 4 a. 2 ad 1, 247–252: “cum dicit Philosophus quod numero sunt unum quorum est materia una, intelligendum est de materia signata, quae subest dimensionibus; alias oporteret dicere quod omnia generabilia et corruptibilia sint unum numero, cum eorum sit materia una.”

<sup>44</sup> *In De Trin.*, q. 4 a. 2 ad 2, 253–257: “dimensiones cum sint accidentia, per se non possunt esse principium unitatis individuae substantiae, set materia prout talibus dimensionibus subest intelligitur esse principium talis unitatis et multitudinis.”

<sup>45</sup> *STh* III, q. 77 a. 2 co.: “individuationis principium est quantitas dimensiva. Ex hoc enim aliquid est natum esse in uno solo, quod illud est in se indivisum et divisum ab omnibus aliis. Divisio autem accidit substantiae ratione quantitatis, ut dicitur in I Physic.”

<sup>46</sup> *STh* III, q. 77 a. 2 co.: “Et ideo ipsa quantitas dimensiva est quoddam individuationis principium huiusmodi formis, in quantum scilicet diversae formae numero sunt in diversis partibus materiae. Unde ipsa quantitas dimensiva secundum se habet quandam individuationem, ita quod possumus imaginari

dimensional quantity itself has some individuation according to itself, in such a way that we can imagine multiple lines of the same species that differ in position, which falls in the *ratio* of *this quantity*, for it befits dimension that it should be a quantity having position. And hence, dimensional quantity can be the subject of other accidents rather than conversely.

Therefore, if quantity should have being (*esse*) in act without matter, it would have individuation by itself, since it would have by itself that division according to which matter is divided; and in this way, one part would differ from another not in species but in number, according to the order of parts that is considered in site; and likewise, one line would differ from another in number—as long as it should be received in a diverse site.<sup>47</sup>

### 35.11. Individuation of Subjects

Since the subject should be the principle of individuation of accidents, that which is posited to be the subject of some accidents must in some mode be the principle of individuation, for it belongs to the *ratio* of **individual** that *it cannot be in multiple* (things).<sup>48</sup> Which happens in two modes:

1. Because (a form) is not naturally apt to be in something; and in this mode, separate, immaterial substances, subsisting by themselves, are also individuals by themselves.<sup>49</sup>

Whence, in (things) lacking dimension, it is impossible for there to be some distinction except by form, which brings about (*facit*) a diversity of species.<sup>50</sup>

2. Because the substantial or accidental form is indeed naturally apt to be in something, but not in multiple (subjects), as *this* whiteness that is in *this* body.<sup>51</sup>

### 35.12. Individuation of Dimension

(From what has just been said), *dimension* has a twofold *ratio* of individuation:<sup>52</sup>

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plures lineas eiusdem speciei differentes positione, quae cadit in ratione quantitatis huius; convenit enim dimensioni quod sit quantitas positionem habens. Et ideo potius quantitas dimensioniva potest esse subiectum aliorum accidentium quam e converso.”

<sup>47</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: “Si ergo quantitas sine materia haberet esse actu, per se haberet individuationem, quia per se haberet divisionem illam secundum quam dividitur materia; et sic una pars differret ab alia non specie, sed numero, secundum ordinem qui attenditur in situ partium; et similiter una linea ab alia differret numero, dummodo acciperetur in diverso situ.”

<sup>48</sup> *STh III*, q. 77 a. 2 co.: “cum subiectum sit principium individuationis accidentium, oportet id quod ponitur aliquorum accidentium subiectum esse, aliquo modo esse individuationis principium. Est enim de ratione individui quod non possit in pluribus esse. Quod quidem contingit dupliciter.”

<sup>49</sup> *STh III*, q. 77 a. 2 co.: “Uno modo, quia non est natum in aliquo esse, et hoc modo formae immateriales separatae, per se subsistentes, sunt etiam per seipsas individuae.”

<sup>50</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 3: “unde in carentibus dimensione impossibile est aliquam esse distinctionem nisi per formam, quae facit diversitatem speciei.”

<sup>51</sup> *STh III*, q. 77 a. 2 co.: “Alio modo, ex eo quod forma substantialis vel accidentalis est quidem nata in aliquo esse, non tamen in pluribus, sicut haec albedo, quae est in hoc corpore.”

<sup>52</sup> *In De Trin.*, q. 4 a. 2 ad 3, 265–266: “Et sic dimensio habet duplicem rationem individuationis.”

1. **From the subject** (*ex subiecto*), as also any other accident (► 35.9).<sup>53</sup>

2. **From itself** (*ex se ipsa*), insofar as it has site, by reason of which—abstracting from sensible matter—we also imagine *this* line and *this* circle.<sup>54</sup>

Hence, it rightly befits matter to individuate all other forms from this.<sup>55</sup> that it underlies the form (to wit, the form of dimensive quantity) that has from itself the *ratio* of *individuation*, such that also terminated dimensions themselves, which are founded in an already complete subject, are—in some mode—individuated from matter individuated by the unterminated dimensions pre-understood in matter (► 35.16).

### 35.13. The Indivisible Cannot Be a Quantum

ARISTOTLE shows that not all (things) can be *one* as the indivisible is *one*, for that which is indivisible cannot be a quantum, since every quantity is divisible (► 34.1).<sup>56</sup>

Consequently, (the indivisible) cannot be (something) qualified (*quale*), such that (*quale*) is understood of the quality that is founded over quantity (i.e., figure, color, etc.; ► 35.9). And if it is not a quantum, it cannot be finite, as PARMENIDES says; nor (can it be) infinite, as MELISSUS says, for *finite* and *infinite* befit (*conveniunt*) *quantity*.<sup>57</sup>

### 35.14. A Thing Is Not Caused to Be a Quantum from Matter through Extension

While a **point** is indivisible as *the principle of quantity that has a determinate site*, matter is said to be indivisible by the negation of the whole genus of quantity.<sup>58</sup> Whence, a thing is not caused to be (*efficitur*) a quantum from matter—speaking of first matter—through extension—for extension is only of that which (already) was of some quantity—but through the reception of quantity.

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<sup>53</sup> *In De Trin.*, q. 4 a. 2 ad 3, 266–267: “unam ex subiecto sicut et quodlibet aliud accidens.”

<sup>54</sup> *In De Trin.*, q. 4 a. 2 ad 3, 267–270: “et aliam ex se ipsa, in quantum habet situm; ratione cuius etiam abstraendo a materia sensibili ymaginamur hanc lineam et hunc circulum.”

<sup>55</sup> *In De Trin.*, q. 4 a. 2 ad 3, 270–277: “Et ideo recte materie conuenit indiuiduare omnes alias formas, ex hoc quod subditur illi forme que ex se ipsa habet indiuiduationis rationem, ita quod etiam ipse dimensiones terminate, que fundantur in subiecto iam completo, indiuiduantur quodammodo ex materia indiuiduata per dimensiones interminatas preintellectas in materia.”

<sup>56</sup> *In Physic.* 1, l. 3, n. 4: “ostendit [Philosophus] quod omnia non possunt esse unum sicut indivisibile est unum: quia quod est indivisibile non potest esse quantum, cum omnis quantitas sit divisibilis.” Cf. ARISTOTLE, *Physica* A.3, 185b16: “ἀλλὰ μὴν εἰ ὡς ἀδιαίρετον, οὐθὲν ἔσται ποσὸν [...]”

<sup>57</sup> *In Physic.* 1, l. 3, n. 4: “et per consequens non potest esse quale, ut intelligatur de qualitate quae fundatur super quantitatem. Et si non est quantum, non potest esse finitum, sicut dixit Parmenides, neque infinitum, sicut dixit Melissus; quia terminus indivisibilis, utpote punctus, est finis et non finitus; quia finitum et infinitum conveniunt quantitati.” Cf. ARISTOTLE, *Physica* A.3, 185b16–19: “οὐδὲ ποιόν, οὐδὲ δὴ ἄπειρον τὸ ὄν, ὥσπερ Μέλισσός φησιν, οὐδὲ πεπερασμένον, ὥσπερ Παρμενίδης· τὸ γὰρ πέρας ἀδιαίρετον, οὐ τὸ πεπερασμένον.”

<sup>58</sup> *In Sent.* 2, d. 30 q. 2 a. 1 co.: “Materia enim dicitur indivisibilis per negationem totius generis quantitatis. Punctus autem est indivisibilis sicut quantitatis principium, situm determinatum habens. Unde ex materia res quanta efficitur, non per extensionem (loquendo de materia prima) cum extensio non sit nisi ejus quod alicujus quantitatis erat, sed per quantitatis susceptionem.”

### 35.15. Dimensive Quantity and the Division of Matter into Parts

It belongs to the *ratio* of *matter* to be *that which, of itself, lacks any form* (►9.3).<sup>59</sup> Whence, the division of matter can be understood only through quantitative dimensions before the reception of a form, which is multiplied following upon the division of matter. Whence, ARISTOTLE says that if quantity is removed, substance remains indivisible (►35.13). Yet, those (things) that are composed from matter subjected to dimensions are bodies, and (are) not merely (things) united to bodies.

Thus, it is impossible to understand diverse parts in matter unless dimensive quantity—at least indeterminate—is pre-understood (to exist) in matter, by which (dimensive quantity) it is divided, for (substance) remains indivisible (if) quantity (is) separated from substance, as ARISTOTLE says (►35.13).<sup>60</sup> And only a *corporeal form* is received in matter understood (to be) under quantity.

### 35.16. Undermined Dimensions Are to Quantity What Matter Is to Substance

As AVERROES says, undermined dimensions (*dimensiones interminatae*) must be understood (to exist) in the matter of generable and corruptible (bodies) before the advent of a substantial form; otherwise, the division of matter—such that there would be diverse substantial forms in diverse parts of matter—could not be understood.<sup>61</sup>

Such dimensions receive a terminated and complete being (*esse*) after the advent of a substantial form.<sup>62</sup> Yet, whatsoever is understood (to exist) in matter before the advent of a substantial form, this remains the same in number in the (body) generated (*in generato*) and in that from which it generates (*in eo ex quo generat*), for (if) the posterior (is) removed, the prior must remain; and those undermined dimensions are related to the genus of quantity as matter is related to substance.

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<sup>59</sup> *Q. d. de anima*, a. 7 co.: “Cum autem de ratione materiae sit quod de se careat omni forma, non poterit intelligi divisio materiae ante receptionem formae, quae secundum materiae divisionem multiplicatur, nisi per dimensiones quantitativas; unde Philosophus dicit in I Physic. subtracta quantitate, substantia remanet indivisibilis. Quae autem componuntur ex materia dimensionibus subiecta, sunt corpora, et non solum corpori unita.”

<sup>60</sup> *In Sent.* 2, d. 3 q. 1 a. 4 co.: “Sed impossibile est in materia intelligere diversas partes, nisi praeintelligatur in materia quantitas dimensiva ad minus interminata, per quam dividatur, ut dicit Commentator in libro *De substantia orbis*, et in 1 Physic., quia separata quantitate a substantia, remanet indivisibilis, ut in 1 Phys. Philosophus dicit. Sed nulla forma recipitur in materia sub quantitate intellecta, nisi forma corporalis.”

<sup>61</sup> *In Sent.* 4, d. 12 q. 1 a. 2 qc. 4 co.: “Sicut enim Commentator dicit in 1 Phys., et in Lib. de substantia orbis, in materia generabilium et corruptibilium oportet intelligere dimensiones interminatas ante adventum formae substantialis; alias non posset intelligi divisio materiae, ut in diversis partibus materiae diversae formae substantiales essent.”

<sup>62</sup> *In Sent.* 4, d. 12 q. 1 a. 2 qc. 4 co.: “Hujusmodi autem dimensiones post adventum formae substantialis accipiunt esse terminatum et completum. Quidquid autem intelligitur in materia ante adventum formae substantialis, hoc manet idem numero in generato et in eo ex quo generat; quia remoto posteriori oportet remanere prius; dimensiones autem illae interminatae se habent ad genus quantitatis sicut materia ad genus substantiae.”

Whence, just as matter—which is an incomplete being in the genus of substance—must be understood (*est accipere*; or, be received, taken, accepted) in any complete (thing) in that genus, so incomplete dimensions must be understood in complete dimensions.<sup>63</sup>

### 35.17. The First *Ratio* of Diversifying Individuals of One Species

Matter is a principle of diversity according to number only insofar as, divided into single parts,<sup>64</sup> (and) receiving (in them) a form of the same *ratio*, it constitutes multiple individuals of the same species. Matter, however, can only be divided (if) quantity (is) presupposed, which (if) removed, every substance remains indivisible (► 35.13).

Thus, the first *ratio* of diversifying those that are of one species is in virtue of quantity; which (*ratio*) befits quantity insofar as it has **site**—which is nothing other than *an order of parts*—in its *ratio* as a constitutive difference (i.e., because site is a difference according to position, and position is an order of parts).<sup>65</sup> Whence, also, (if) quantity (is) abstracted from sensible matter by the intellect, (things that are) of one species (but are) diverse according to number may still be imagined: for example, multiple (equal) equilateral triangles and multiple equal straight lines.

Hence, the principle of diversity of individuals of the same species is the division of matter according to quantity, for the form of *this* fire differs from the form of *that* fire only because it is in diverse parts into which matter is divided; nor (is this division) other than the division of quantity, without which substance is indivisible (► 35.13).<sup>66</sup> And whatever is received in a body is received in it according to the division of quantity.

### 35.18. Dimension as the First Root of Multiplication

Since only dimensionive quantity has of its *ratio* (that) whence the multiplication of individuals in the same species could happen, the first root of such multiplication seems to be from dimension, since even in the genus of *substance* multiplication comes to be according to

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<sup>63</sup> *In Sent.* 4, d. 12 q. 1 a. 2 qc. 4 co.: “Unde sicut in quolibet completo in genere substantiae est accipere materiam, quae est ens incompletum in genere illo; ita in dimensionibus completis [...] est accipere dimensiones incompletas.”

<sup>64</sup> *In De Trin.*, q. 5 a. 3 ad 3, 318–325: “materia non est principium diuersitatis secundum numerum nisi secundum quod in multas partes diuisa in singulis partibus formam recipiens, eiusdem rationis plura indiuidua eiusdem speciei constituit. Materia autem diuidi non potest nisi presupposita quantitate, qua remota omnis substantia indiuisibilis remanet.”

<sup>65</sup> *In De Trin.*, q. 5 a. 3 ad 3, 325–334: “Et sic prima ratio diuersificandi ea que sunt unius speciei, est penes quantitatem. Quod quidem quantitati competit in quantum in sui ratione situm quasi differentiam constitutiua[m] habet, qui nichil est aliud quam ordo partium; unde etiam abstracta quantitate a materia sensibili per intellectum, adhuc contingit ymaginari diuersa secundum numerum unius speciei, sicut plures triangulos equilateros, et plures lineas rectas equales.”

<sup>66</sup> *ScG* 2, 49 n. 4: “Principium diuersitatis indiuiduorum eiusdem speciei est divisio materiae secundum quantitatem: forma enim huius ignis a forma illius ignis non differt nisi per hoc quod est in diuersis partibus in quas materia dividitur; nec aliter quam divisione quantitatis, sine qua substantia est indiuisibilis. Quod autem recipitur in corpore, recipitur in eo secundum quantitatis divisionem.”

the division of matter, which (division) can only be understood insofar as matter is considered under dimensions, for (if) quantity (is) removed, substance is in all (dimensions) indivisible (► 35.13).<sup>67</sup>

### 35.19. Reception of Diverse Forms in Diverse Parts of Matter

One part of matter cannot simultaneously receive diverse, opposite, and disparate, forms. Therefore, the diverse forms according to which (matter) receives a diverse being (*diversum esse*) must be received in the diverse parts of the matter—of any whatsoever things—that is posited to differ according to being (*secundum esse*), if this matter is of the same order in one and in the other (thing), as the matter of generable and of corruptible (things) is one.<sup>68</sup>

Hence, whatever things are composed from matter and form must agree (*convenire*) in (the same) matter, for any matter taken by itself does not have in itself some *ratio* of *disposition*, since it lacks a form.<sup>69</sup> (If) the unity of matter (is) supposed, it is possible for one matter to receive contrary and disparate forms only according to diverse parts. And a diversity of parts cannot be understood in matter (if) division (is) not understood; nor (can) division (be understood if) dimension (is) not understood, for substance remains indivisible (if) quantity (is) removed (► 35.13). Whence, all (beings) that are composed from matter must be dimensioned. And hence, no incorporeal (thing) can be composed from matter.

Thus, any one thing that is composed from matter and form is a body, for diverse forms can be received in matter only according to diverse parts.<sup>70</sup> This diversity of parts can be

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<sup>67</sup> ScG 4, 65 n. 6: “Et quia sola quantitas dimensiva de sui ratione habet unde multiplicatio individuorum in eadem specie possit accidere, prima radix huiusmodi multiplicationis ex dimensione esse videtur: quia et in genere substantiae multiplicatio fit secundum divisionem materiae; quae nec intelligi posset nisi secundum quod materia sub dimensionibus consideratur; nam, remota quantitate, substantia omnis indivisibilis est, ut patet per Philosophum in I Physicorum.”

<sup>68</sup> *In Sent.* 2, d. 3 q. 1 a. 4 co.: “Quorumcumque materia secundum esse differre ponitur, oportet, si ista materia est ejusdem ordinis in utroque (sicut materia generabilium et corruptibilium est una) quod diversae formae secundum quas diversum esse accipit, recipiantur in diversis partibus materiae. Non enim una pars materiae, diversas formas oppositas et disparatas simul recipere potest.”

<sup>69</sup> *Quodlibet* 9, q. 4 a. 1 co.: “Quaecumque enim ex materia componuntur, oportet in materia convenire; eo quod quaelibet materia secundum se accepta, cum forma careat, non habet in se aliquam dispositionis rationem. Supposita autem unitate materiae, impossibile est quod una materia contrarias et disparatas formas recipiat, nisi secundum diversas partes [...]. Diversitas autem partium non potest intelligi in materia, non intellecta divisione: nec divisio, non intellecta dimensione: quia subtracta quantitate, substantia remanet indivisibilis, ut dicitur in I Physic. Unde oportet, omnia quae sunt composita ex materia, dimensionata esse; et ideo nullum incorporeum potest esse ex materia compositum.”

<sup>70</sup> ScG 2, 50 n. 2: “Unumquodque enim ex materia et forma compositum est corpus. Diversas enim formas materia non nisi secundum diversas partes recipere potest. Quae quidem diversitas partium esse in materia non potest nisi secundum quod per dimensiones in materia existentes una communis materia in plures dividitur: subtracta enim quantitate, substantia indivisibilis est.” *STh* I, q. 50 a. 2 co.: “Materiam autem dividi in partes non contingit nisi secundum quod intelligitur sub quantitate, qua remota, remanet substantia indivisibilis, ut dicitur in I Physic.”



in matter only insofar as *one common matter* is divided into many by the dimensions that exist in matter, for substance is indivisible (if) quantity (is) subtracted (► 35.13).

### 35.20. Reception of Forms in Compounds

It is impossible for matter to receive diverse forms of elements according to the same (part).<sup>71</sup> Therefore, if the substantial forms of the elements should be preserved in a compound body, they would have to be in diverse parts of matter. However, it is impossible for matter to receive diverse parts unless dimensive quantity is pre-understood in matter, for substance remains indivisible (if) quantity (is) removed (► 35.13). And the physical body is constituted from matter under existing quantity and an accrued substantial form. Therefore, diverse parts of matter receive the *ratio* of multiple bodies by the subsisting forms of the elements. However, it is impossible for multiple bodies to be simultaneously (in the same place). Therefore, the elements will not be in whatever part of the compound body. And in this way, there will not be a true compounding, except according to sense, as happens in the aggregation of insensible bodies due to (their) smallness.

### 35.21. Quantity and Form

The proper accidents of a genus or species follow upon whatever being (*esse*) of a genus or species.<sup>72</sup> Whence, when matter is already understood to be perfected according to the *ratio* of the genus *body*, dimensions—which are the proper accidents of this genus—can be understood in it. And thus, diverse elementary forms follow an intelligible order in matter according to its diverse parts.

Although first matter—insofar as it is considered in itself—has no quantity, it does not follow that it is in potency in respect of whatever imaginable quantity.<sup>73</sup> Indeed, the cause

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<sup>71</sup> *De mix. elem.*, 18–36: “Impossibile est enim materiam secundum idem diuersas formas elementorum suscipere; si igitur in corpore mixto forme substantiales elementorum saluentur, oportebit diuersis partibus materie eas inesse. Materie autem diuersas partes accipere est impossibile nisi preintellecta quantitate in materia, sublata enim quantitate substantia indiuisibilis permanet, ut patet in I Phisicorum; ex materia autem sub quantitate existente et forma substantiali adueniente corpus phisicum constituitur: diuerse igitur partes materie formis elementorum subsistentes plurium corporum rationem suscipiunt. Multa autem corpora impossibile est esse simul; non igitur in qualibet parte corporis mixti erunt quatuor elementa: et sic non erit uera mixtio sed secundum sensum, sicut accidit in aggregatione corporum insensibilium propter paruitem.” *STh* I, q. 76 a. 4 ad 4: “diuersae formae elementorum non possunt esse nisi in diuersis partibus materiae; ad quarum diuersitatem oportet intelligi dimensiones, sine quibus materia diuisibilis esse non potest. Materia autem dimensionum subiecta non inuenitur nisi in corpore. Diuersa autem corpora non possunt esse in eodem loco. Unde sequitur quod elementa sint in mixto distincta secundum situm. Et ita non erit uera mixtio, quae est secundum totum, sed mixtio ad sensum, quae est secundum minima iuxta se posita.”

<sup>72</sup> *De spirit. creat.*, a. 3 ad 18: “quodlibet esse generis vel speciei consequuntur propria accidentia illius generis vel speciei. Unde quando iam materia intelligitur perfecta secundum rationem huius generis quod est corpus, possunt in ea intelligi dimensiones, quae sunt propria accidentia huius generis: et sic consequuntur ordinem intelligibilem in materia, secundum diuersas eius partes, diuersae formae elementares.”

<sup>73</sup> *In Sent.* 2, d. 30 q. 2 a. 1 co.: “etsi prima materia, prout in se consideratur, nullam quantitatem habeat, non tamen sequitur quod sit in potentia respectu cujuslibet quantitatis imaginabilis. Cum enim quantitates

of those (accidents) that are in (a subject) is a subjected matter with a form, as ARISTOTLE says. Hence, the determinate quantities and all other accidents receive matter according to the requirement of the form.

Therefore, first matter is in potency only to a quantity that befits the natural form that can be in matter; but first matter is in potency only to those forms that are in the nature of things or that can be educed through natural principles. For if there should be some passive potency in matter to which no active potency in the nature of things would respond, that passive potency would be superfluous, as AVERROES says. And hence, first matter is not capable of receiving a quantity greater than the quantity of the world. Wherefrom, ARISTOTLE says that, naturally speaking, it is impossible for a magnitude to increase infinitely.

When we speak of the matter that exists in *this* thing, we already dismiss the consideration of matter in absolute, for that (part) of matter which is in *this* thing can only be taken insofar as it is divided from *that* part of matter that is in another thing.<sup>74</sup> However, division happens to matter only insofar as it is considered under—at least untermiated—dimensions (► 35.16), since substance would be indivisible if quantity should be removed, as ARISTOTLE says (► 35.13). Whence, the consideration of the matter of *this* thing is not the consideration of matter in absolute but of matter existing under dimension.

Whence, that which befits matter insofar as it is absolute and first need not befit the matter that exists in *this* thing insofar as it is taken as existing in *this* thing, since—from this—one would recede from the consideration of first matter.

Whence, the matter that is in *this* existent thing is not in potency to the whole quantity of the world, but up to something determinate that can be attained through loss of density.

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determinatae et omnia alia accidentia secundum exigentiam formae materiam recipiant, eo quod subjecta materia cum forma est causa eorum quae insunt, ut in 1 Physic. dicitur, oportet quod materia prima ad nullam quantitatem sit in potentia, nisi quae competat formae naturali, quae in materia esse potest. Materia vero prima non est in potentia ad alias formas nisi ad illas quae sunt in rerum natura, vel per principia naturalia educi possunt. Si enim esset aliqua potentia passiva in materia cui non responderet aliqua potentia activa in rerum natura, illa potentia passiva esset superflua, ut Commentator dicit: et ideo materia prima non est receptibilis majoris quantitatis quam quantitatis mundi: propter quod in 3 Phys. dicitur, quod non est possibile magnitudinem augeri in infinitum, loquendo naturaliter.”

<sup>74</sup> *In Sent.* 2, d. 30 q. 2 a. 1 co.: “quando loquimur de materia existente in hac re, jam dimittimus considerationem materiae absolute: non enim potest accipi illud materiae quod est in hac re, nisi secundum quod est divisum ab illa parte materiae quae est in re alia. Divisio autem non accidit materiae, nisi secundum quod consideratur sub dimensionibus saltem interminatis: quia remota quantitate, ut in 1 Physicor. dicitur, substantia erit indivisibile. Unde consideratio materiae hujus rei est consideratio non materiae absolute, sed materiae sub dimensione existentis. Unde non oportet ut quod convenit materiae in quantum est absoluta et prima, conveniat materiae existenti in hac re, prout accipitur ut in hac re existens: quia ex hoc ipso receditur a consideratione materiae primae. Unde materia quae est in hac re existens, non est in potentia ad totam quantitatem mundi, sed usque ad determinatum quid, quantum per rarefactionem potest consequi.”

### 35.22. The Principle of the Particular Mode of Existence of Substance

Three (things) are to be considered in a particular substance:<sup>75</sup>

1. **The nature** of the genus and of the species that exists in singulars.<sup>76</sup>
2. **The mode of existing** of such a nature, since the nature of the genus and of the species exists in a singular substance as proper to *this* individual, and not as common to many.<sup>77</sup>
3. **The principle** from which such a (particular) mode of existing is caused.<sup>78</sup>

Now just as the nature considered in itself is common, so (too) the mode of existing of the nature (is common), since the nature of man is found existing in things only individuated in something singular, for there is no man that is not *some* man—except according to the opinion of Plato, who posited universals (to be) separated.<sup>79</sup>

On the other hand, the principle of such a (particular) mode of existing, which is the principle of individuation, is not—indeed, cannot be—common to multiple (individuals): rather, it is *in this* other than (it is) *in that*, for *this singular* is individuated by *this matter*, and *that (singular)* is individuated by *that (matter)*.<sup>80</sup>

### 35.23. Properties of Individuating Principles

The **individuating principles** in created things have two (properties):<sup>81</sup>

1. They are the **principle of subsisting** (*principium subsistendi*), for a common nature subsists of itself (*de se*) only in singulars.<sup>82</sup>
2. The **supposita of a common nature are distinguished** one from another through the individuating principles.<sup>83</sup>

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<sup>75</sup> *De potentia*, q. 9 a. 2 ad 1: “in substantia particulari, est tria considerare.”

<sup>76</sup> *De potentia*, q. 9 a. 2 ad 1: “quorum unum est natura generis et speciei in singularibus existens.”

<sup>77</sup> *De potentia*, q. 9 a. 2 ad 1: “secundum est modus existendi talis naturae, quia in singulari substantia existit natura generis et speciei, ut propria huic individuo, et non ut multis communis.”

<sup>78</sup> *De potentia*, q. 9 a. 2 ad 1: “tertium est principium ex quo causatur talis modus existendi.”

<sup>79</sup> *De potentia*, q. 9 a. 2 ad 1: “Sicut autem natura in se considerata communis est, ita et modus existendi naturae; non enim invenitur natura hominis existens in rebus nisi aliquo singulari individuata: non enim est homo qui non sit aliquis homo, nisi secundum opinionem Platonis, qui ponebat universalia separata.”

<sup>80</sup> *De potentia*, q. 9 a. 2 ad 1: “Sed principium talis modi existendi quod est principium individuationis, non est commune; sed aliud est in isto, et aliud in illo; hoc enim singulare individuatur per hanc materiam, et illud per illam.” ScG 1, 42 n. 12: “illud enim quod est individuationis principium, non potest esse pluribus commune.”

<sup>81</sup> *De potentia*, q. 9 a. 5 ad 13: “in rebus creatis principia individuantia duo habent.”

<sup>82</sup> *De potentia*, q. 9 a. 5 ad 13: “quorum unum est quod sunt principium subsistendi (natura enim communis de se non subsistit nisi in singularibus).”

<sup>83</sup> *De potentia*, q. 9 a. 5 ad 13: “aliud est quod per principia individuantia supposita naturae communis ab invicem distinguuntur.”

### 35.24. Naming Individuals

Just as a name that signifies a nature—such as *man* or *animal*—is common and definable, so a name—such as *hypostasis* or *person*—that signifies a nature with such an (individual) mode of existing (is common and definable).<sup>84</sup>

The individual or particular reasonably receives a special name in the genus of substance, for substance is individuated by itself and from its proper principles, and not from an extraneous other, as an accident (is individuated) from a subject.<sup>85</sup>

On the other hand, that name—such as *Socrates* or *Plato*—that includes in its signification a determinate principle of individuation is neither common nor definable.<sup>86</sup>

### 35.25. Proportionality between Properties of Universal and Singular Essences

As the universal essence of some species is related to all the accidents by themselves of that species, so the singular essence (of some individual) is related to all the proper accidents of that singular, of which mode are all the accidents found in it, for they are made proper to it because they are individuated in it.<sup>87</sup>

### 35.26. One in Quantity: Act vs. Potency

(Beings) that are two in act cannot be one in act; but (beings) that are two in potency are one in act, as is evident in the parts of the continuum, for two halves of one line are in potency in the double line, which is one in act.<sup>88</sup>

This (is so) because act has the virtue of separating and dividing, for any *one* is divided from another by its own form.<sup>89</sup> Whence, in order for some (multiple things) to come to be

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<sup>84</sup> *De potentia*, q. 9 a. 2 ad 1: “Sicut ergo nomen quod significat naturam, est commune et definibile, — ut homo vel animal, — ita nomen quod significat naturam cum tali modo existendi, ut hypostasis vel persona. Illud vero nomen quod in sua significatione includit determinatum individuationis principium, non est commune nec definibile, ut Socrates et Plato.”

<sup>85</sup> *De potentia*, q. 9 a. 2 co.: “rationabiliter, individuum in genere substantiae speciale nomen sortitur: quia substantia ex propriis principiis individuat, — et non ex alio extraneo, — sicut accidens ex subiecto.” Ibid., a. 1 ad 8: “accidentia non individuatur nisi ex suis subiectis. Sola autem substantia per seipsam individuat, et per propria principia; et ideo convenienter in solo genere substantiae particulare habet proprium nomen.”

<sup>86</sup> *De potentia*, q. 9 a. 2 ad 1: “Illud vero nomen quod in sua significatione includit determinatum individuationis principium, non est commune nec definibile, ut Socrates et Plato.”

<sup>87</sup> *De veritate*, q. 2 a. 7 co., 64–70: “sicut se habet essentia universalis alicuius speciei ad omnia per se accidentia illius speciei, ita se habet essentia singularis ad omnia accidentia propria illius singularis, cuiusmodi sunt omnia accidentia in eo inventa: quia per hoc quod in ipso individuatur, efficiuntur ei propria.”

<sup>88</sup> *In Metaph.* 7, l. 13, §1588 (cf. ARISTOTLE, *Metaphysica* Z.13, 1039a3–7): “Duo enim, quae sunt in actu, nunquam sunt unum actu; sed duo, quae sunt in potentia, sunt unum actu, sicut patet in partibus continui. Duo enim dimidia unius lineae sunt in potentia in ipsa linea dupla, quae est una in actu.”

<sup>89</sup> *In Metaph.* 7, l. 13, §1588: “Et hoc ideo, quia actus habet virtutem separandi et dividendi. Unumquodque enim dividitur ab altero per propriam formam. Unde ad hoc quod aliqua fiant unum actu, oportet quod omnia concludantur sub una forma, et quod non habeant singula singulas formas, per quas sint actu.”

*one* in act, it is necessary for all (of them) to be comprised (*concludantur*) under one form, and not to have each (of them their) singular forms whereby they would be in act.

Wherefore, it is evident that if a particular substance is one, it will not be (constituted) from substances existing in it in act (► 35.20).<sup>90</sup>

And in this mode, according to ARISTOTLE,<sup>91</sup> DEMOCRITUS rightly says that it is impossible for *one* to come to be from *two*, and for *two* to come to be from *one*, for it ought to be understood that *two* (things) existing in act do not make *one*. However, not distinguishing between potency and act, (DEMOCRITUS) posited that substances were indivisible magnitudes; for he would that, just as in what is *one* there are not *many in act*, nor (should there be *many*) *in potency*. And in this way, whatever magnitude is indivisible.

Or, (if we understand ARISTOTLE) otherwise, DEMOCRITUS rightly says, (if) his position—whereby he posited that indivisible magnitudes are also the substances of things—(is) supposed, that in this way, (substances) are always in act, and one (substance) does not come to be from them.<sup>92</sup>

And just as it is in magnitudes, so is it in number, if number should be a composite of units, as some say; for it is necessary either that *two*—or whatever other number—should not be something *one*, or that the unit should not be in act in it.<sup>93</sup> And in this way, *two* will not be *two units* but *something composed from two units*. Otherwise, a number would not be (something) *one* by itself but by accident, as those (things that) are heaped together.

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<sup>90</sup> *In Metaph.* 7, l. 13, §1588 (cf. ARISTOTLE, *Metaphysica* Z.13, 1039a7–8): “Quare patet, quod si substantia particularis est una, non erit ex substantiis in ea existentibus actu.”

<sup>91</sup> *In Metaph.* 7, l. 13, §1589 (cf. ARISTOTLE, *Metaphysica* Z.13, 1039a8–11): “Et secundum hunc modum Democritus recte dicit, quod impossibile est unum fieri ex duobus, et ex uno fieri duo. Est enim intelligendum, quod duo in actu existentia, nunquam faciunt unum. Sed ipse non distinguens inter potentiam et actum, posuit magnitudines indivisibiles esse substantias. Voluit enim, quod sicut in eo quod est unum, non sunt multa in actu, ita nec in potentia. Et sic quaelibet magnitudo est indivisibilis.”

<sup>92</sup> *In Metaph.* 7, l. 13, §1589 (cf. ARISTOTLE, *Metaphysica* Z.13, 1039a8–11): “Vel aliter. Recte, inquam, dixit Democritus, supposita sua positione, qua ponebat magnitudines indivisibiles esse etiam rerum substantias, et sic esse semper in actu, et ita ex eis non fieri unum.”

<sup>93</sup> *In Metaph.* 7, l. 13, §1589 (cf. ARISTOTLE, *Metaphysica* Z.13, 1039a11–14): “Et sicut est in magnitudinibus, ita est in numero, si numerus est compositio unitatum, sicut a quibusdam dicitur. Oportet enim quod vel dualitas non sit unum quid, sive quicumque alius numerus; sive quod unitas non sit actu in ea. Et sic dualitas non erunt duae unitates, sed aliquid ex duabus unitatibus compositum. Aliter numerus non esset unum per se et vere, sed per accidens, sicut quae coacervantur.”



## 36. Quality

Here, we intend to clarify what quality—the real genus—is.

### 36.1. Metaphysical Modes of Quality

ARISTOTLE distinguishes (in his *Metaphysics*) four modes of **quality** (*qualitas* = ποιότης) or **the qualified** (*quale* = ποιόν):<sup>1</sup>

**1. The difference of a substance** (*differentia substantiae* = ἡ διαφορά τῆς οὐσίας): that is, the difference *whereby something substantially differs from another* (*per quam aliquid ab altero substantialiter differt*), which (quality) enters into the definition of a substance.<sup>2</sup>

On account of this, it is said that a difference is predicated in something qualified (*quale quid* = τι), as though the difference itself of a substance should be a quality.<sup>3</sup>

For example, if one should ask, “what sort of animal is man? [*quale animal est homo?*],” we answer that (it is a) *biped*; (if one should ask), “what sort of animal [is] a horse? [*quale animal equus?*],” we answer (that it is a) *quadruped*; (if one should ask), “what sort of figure is a circle? [*qualis figura est circulus?*],” we answer that (it is) *angle-less* (< ἄγώνιον), that is, without angle(s).<sup>4</sup> Thus, in one mode, the difference itself of a substance is said (to be a) *quality*.

ARISTOTLE omits this mode of quality in the *Categories* because it is not contained under the category of *quality*, of which he treats there.<sup>5</sup> In the *Metaphysics*, on the other hand, (he includes this mode because) he treats of the significations of the name *quality* (i.e., he is dividing *things* equivocally signified; ►20.12).

**2. Insofar as immobile and mathematical things** (*immobilia et mathematica* = τὰ ἀκίνητα καὶ τὰ μαθηματικά) are said (to be) *qualities*.<sup>6</sup>

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<sup>1</sup> *In Metaph.* 5, l. 16, §987 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020a33–b13): “distinguit [Philosophus] modos qualitatibus: [...] ponit quatuor modos qualitatis.” Ibid., §989: “modus qualitatis vel qualis.”

<sup>2</sup> *In Metaph.* 5, l. 16, §987 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020a33): “unus modus qualitatis est secundum quod qualitas dicitur «differentia substantiae,» id est differentia, per quam aliquid ab altero substantialiter differt, quae intrat in definitionem substantiae.”

<sup>3</sup> *In Metaph.* 5, l. 16, §987 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020a35–b1): “Et propter hoc dicitur, quod differentia praedicatur in quale quid. [...] ac si ipsa differentia substantiae qualitas sit.”

<sup>4</sup> *In Metaph.* 5, l. 16, §987 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020a34–b2): “Ut si quaeratur, quale animal est homo? Respondemus quod bipes: et quale animal equus? Respondemus quod quadrupes: et qualis figura est circulus? Respondemus quod «agonion,» id est sine angulo [...]. Uno igitur modo ipsa differentia substantiae qualitas dicitur.”

<sup>5</sup> *In Metaph.* 5, l. 16, §988: “Hunc autem modum qualitatis Aristoteles in Praedicamentis praetermisit, quia non continetur sub praedicamento qualitatis, de quo ibi agebat. Hic autem agit de significationibus huius nominis, qualitas.”

<sup>6</sup> *In Metaph.* 5, l. 16, §989 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b2–3): “alius modus qualitatis vel qualis est secundum quod immobilia et mathematica dicuntur qualia.”

Indeed, mathematical (things), which are numbers and magnitudes, abstract from motion; and we use the name *qualified* (*quale*) in either (of them), for we say that surfaces are qualified (*qualia*) insofar as they are square or triangular (► 36.5).<sup>7</sup>

This mode of quality is the fourth species posited in the *Categories* (i.e., *figure*, σχῆμα).<sup>8</sup>

**3. The affections of mobile substances** (*passiones substantiarum mobilium* = πάθη τῶν κινουμένων οὐσιῶν), too, according to which bodies are mutated through alteration (< καθ' ἃ λέγονται καὶ ἀλλοιοῦσθαι τὰ σώματα μεταβαλλόντων), are said (to be) *qualities*.<sup>9</sup>

For example, heat and coldness (lit. *calidum*, *frigidum* < *calor et frigiditas* = θερμότης καὶ ψυχρότης), and (other affections) of such a mode (< καὶ ὅσα τοιαῦτα; e.g., whiteness and blackness, heaviness and lightness: *albedo et nigredo, et gravitas et levitas* = λευκότης καὶ μελανία, καὶ βαρύτης καὶ κουφότης).<sup>10</sup>

This mode pertains to the third species of quality posited in the *Categories* (i.e., *passive qualities* and *affections*, παθητικαὶ ποιότητες καὶ πάθη).<sup>11</sup>

**4. Insofar as something is howsoever disposed** (*secundum quod aliquid disponitur... qualitercumque* < ὅλως) **by the good and the bad** (*per bonum et malum* < [κατὰ] τὸ κακὸν καὶ ἀγαθόν).<sup>12</sup>

For example, something is disposed by virtue and vice (*per virtutem et vitium* < κατ' ἀρετὴν καὶ κακίαν), by science and ignorance, by health and disease, and by other such (habits).<sup>13</sup>

This is the first species of quality posited in the *Categories* (i.e., *habit* and *disposition*, ἔξις καὶ διάθεσις).<sup>14</sup>

<sup>7</sup> *In Metaph.* 5, l. 16, §989: “Mathematica enim sunt numeri, et magnitudines; et in utrisque utimur nomine qualis. Dicimus enim superficies esse quales, in quantum sunt quadratae vel triangulares.”

<sup>8</sup> *In Metaph.* 5, l. 16, §992: “Hic autem modus qualitatis est quarta species in Praedicamentis posita.” Cf. ARISTOTLE, *Categoriae* 8, 10a11: “Τέταρτον δὲ γένος ποιότητος σχῆμα.”

<sup>9</sup> *In Metaph.* 5, l. 16, §993 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b8–9; 11–12): “Tertio [...] Dicit [Philosophus], quod etiam qualitates dicuntur passiones substantiarum mobilium, secundum quas corpora per alterationem mutantur.”

<sup>10</sup> *In Metaph.* 5, l. 16, §993 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b9–11): “ut calidum, frigidum, et huiusmodi.”

<sup>11</sup> *In Metaph.* 5, l. 16, §993: “hic modus pertinet ad tertiam speciem qualitatis in Praedicamentis positam.” Cf. ARISTOTLE, *Categoriae* 8, 9a28–29: “Τρίτον δὲ γένος ποιότητος παθητικαὶ ποιότητες καὶ πάθη.”

<sup>12</sup> *In Metaph.* 5, l. 16, §994 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b12–13): “Quartum [...] Dicit [Philosophus] quod qualitas sive quale dicitur quarto modo secundum quod aliquid disponitur [...] qualitercumque per bonum et malum.”

<sup>13</sup> *In Metaph.* 5, l. 16, §994 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b12): “aliquid disponitur per virtutem et vitium, vel [...] per scientiam et ignorantiam, sanitatem et aegritudinem, et huiusmodi.”

<sup>14</sup> *In Metaph.* 5, l. 16, §994: “Et haec est prima species qualitatis in Praedicamentis posita.” Cf. ARISTOTLE, *Categoriae* 8, 8b26–27: “ἔστι δὲ ἡ ποιότης τῶν πλεοναχῶς λεγομένων. ἐν μὲν οὖν εἶδος ποιότητος ἔξις καὶ διάθεσις λεγέσθωσαν.”



### 36.2. According to Being, Potency and Impotence Are Not Qualities

Among the modes of *quality* that ARISTOTLE posits (in the *Metaphysics*), he omits the second species of quality (namely, *potency* and *impotence*, ὅσα κατὰ δύναμιν φυσικὴν ἢ ἀδυναμίαν λέγεται, which are second in the enumeration of the *Categories*) because it is comprehended rather under *potency*, since it is signified only as a principle that resists affection (*ut principium passioni resistens*; ►31.7).<sup>15</sup> It is posited in the *Categories* among the species of quality on account of the mode of denomination; but according to the mode of being (*secundum modum essendi*), it is contained rather under *potency* (►31).

### 36.3. Reduction to Two Modes

ARISTOTLE reduces the four modes posited (in the *Metaphysics*) to two, saying that, in general (*ferè* = σχεδόν), something is said (to be) *qualified* (*quale* = ποιόν) in two modes, insofar as two of the four (aforesaid modes) are reduced to the other two:<sup>16</sup>

1. The most principal (*principalissimus* = τὸν κυριώτατον) is the first mode, according to which **the difference of substance** (*differentia substantiae* = ἡ τῆς οὐσίας διαφορά) is said (to be a) *quality* (*qualitas* = ποιότης), since through it (*per eum*; i.e., by this mode) something informed and qualified (*informatum et qualificatum*) is signified.<sup>17</sup>

To this mode is reduced the quality that is in numbers (►36.4) and in other mathematical (things) as to some part, for such qualities are—as it were—some substantial differences of mathematical (things), since they—rather than (*potius quam*) other accidents—are signified by the mode of substance (►35.2; 35.6).<sup>18</sup>

Such qualities are differences either of substances (that are) non-moved (*non motarum* = οὐ κινουμένων) or (of substances but) not insofar as they are moved (*non inquantum sunt motae* = οὐχ ἢ κινούμενα).<sup>19</sup> ARISTOTLE says this so as to show that it makes no difference

<sup>15</sup> *In Metaph.* 5, l. 16, §995: “Praetermittit autem [Philosophus] inter hos modos secundam qualitatis speciem, quia magis comprehenditur sub potentia, cum non significetur nisi ut principium passioni resistens; sed propter modum denominandi ponitur in Praedicamentis inter species qualitatis. Secundum autem modum essendi magis continetur sub potentia, sicut et supra posuit.” Cf. ARISTOTLE, *Categoriae* 8, 9a14–16: “Ἐτερον δὲ γένος ποιότητος καθ’ ὃ πυκτικούς ἢ δρομικούς ἢ ὑγιεινούς ἢ νοσώδεις λέγομεν, καὶ ἀπλῶς ὅσα κατὰ δύναμιν φυσικὴν ἢ ἀδυναμίαν λέγεται.”

<sup>16</sup> *In Metaph.* 5, l. 16, §996 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b13–14): “Reducit [Philosophus] quatuor positos modos ad duos; dicens, quod quale dicitur aliquid fere secundum duos modos, inquantum alii duo de quatuor reducuntur ad alios duos.”

<sup>17</sup> *In Metaph.* 5, l. 16, §996 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b14–15): “Horum autem unus principalissimus est primus modus, secundum quem differentia substantiae dicitur qualitas, quia per eum aliquid significatur informatum et qualificatum.”

<sup>18</sup> *In Metaph.* 5, l. 16, §997 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b15–16): “Et ad hunc modum reducitur qualitas, quae est in numeris, et in mathematicis aliis, sicut quaedam pars. Huiusmodi enim qualitates sunt quasi quaedam differentiae substantiales mathematicorum. Nam ipsa significantur per modum substantiae potius quam alia accidentia, ut in capitulo de quantitate dictum est.”

<sup>19</sup> *In Metaph.* 5, l. 16, §997 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b16–17): “Sunt autem huiusmodi qualitates differentiae substantiarum aut non motarum, aut non inquantum sunt motae: et hoc dicit

for the (present) purpose whether mathematical (things) should be substances existing by themselves (*per se existentes*) separated from motion (*a motu separatae*), as PLATO used to say, or they should be in substances (that are) mobile according to being (*secundum esse*) but separated according to *ratio* (*secundum rationem*). In the former mode, they would be qualities of non-moved (substances), while in the latter (mode they would be qualities) of moved (substances) but not insofar as they are moved.

2. The second principal mode is such as **the affections of moved (substances) insofar as they are moved** (*passiones motorum in quantum mota* = τὰ... πάθη τῶν κινουμένων ἢ κινούμενα) are said (to be) *qualities*; as are also **the differences of motions** (*differentiae motuum* = αἱ τῶν κινήσεων διαφοραί), which are said (to be) *differences of motions* because alterations (*alterationes*; i.e., continuous changes in the genus of *quality*) differ according to such qualities, as *to be heated* and *to be cooled* (*calefieri et infrigidari*, differ) according to the hot and the cold (*calidum et frigidum*).<sup>20</sup>

To this mode is reduced that mode according to which vice—and virtue—is said (to be a) *quality*, for this mode is as some part of that (mode), since virtue and vice reveal (*ostendunt*) some differences of motion and of act according to (what is) well and badly (done).<sup>21</sup> Thus, **virtue** is (*that*) *by which someone is well disposed (se habet bene) to act and to be acted upon (ad agendum et patiendum)*, while **vice** (*is that by which someone is disposed to act*) *according to what (is) badly (done)*. And (this) is likewise (the case) concerning the other habits, whether (they are) intellectual, as science, or (they are) corporeal, as health.

However, *good* and *bad* (lit. *bene et male* < *bonum et malum* = τὸ ἀγαθὸν καὶ τὸ κακόν) maximally pertain to quality in animated things (< ἐπὶ τῶν ἐμψύχων); and above all in those that have choice (< ἐπὶ τοῖς ἔχουσι προαίρεσιν).<sup>22</sup> This is so because *good* has the

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[Philosophus], ut ostendat quantum ad propositum non differre, utrum mathematica sint quaedam substantiae per se existentes secundum esse, ut dicebat Plato, a motu separatae; sive sint in substantiis mobilibus secundum esse, sed separatae secundum rationem. Primo enim modo essent qualitates non motorum. Secundo autem, motorum, sed non in quantum sunt mota.”

<sup>20</sup> *In Metaph.* 5, l. 16, §998 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b17–18): “Secundus modus principalis est, ut passiones motorum in quantum mota, et etiam differentiae motuum dicantur qualitates. Quae quidem dicuntur differentiae motuum, quia alterationes differunt secundum huiusmodi qualitates, sicut calefieri et infrigidari secundum calidum et frigidum.”

<sup>21</sup> *In Metaph.* 5, l. 16, §999 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b18–23): “Et ad hunc modum reducitur ille modus secundum quem vitium et virtus dicitur qualitas. Hic enim modus est quasi quaedam pars illius. Virtus enim et vitium ostendunt quasdam differentias motus et actus secundum bene et male. Nam virtus est, per quam se aliquis habet bene ad agendum et patiendum; vitium autem secundum quod male. Et simile est de aliis habitibus, sive intellectualibus, ut scientia, sive corporalibus, ut sanitas.”

<sup>22</sup> *In Metaph.* 5, l. 16, §1000 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b23–25): “Sed tamen bene et male maxime pertinet ad qualitatem in rebus animatis; et praecipue in habentibus «prohaeresim» idest electionem. Et hoc ideo, quia bonum habet rationem finis. Ea vero, quae agunt per electionem, agunt propter finem. Agere autem propter finem maxime competit rebus animatis.”

*ratio* of end; and those that act (*agunt*) by choice act for the sake of (*propter*) an end; and to act for the sake of an end maximally befits (*competit*) animated things.

Inanimate things act or are moved for the sake of an end not as knowing the end, nor as moving themselves (*se agentes*) towards an end.<sup>23</sup> Rather, they are directed by another that gave them a natural inclination, as the arrow is directed into an end by the archer.

Irrational animated (things) know indeed the end and desire it through animal appetite; and locally move themselves towards the end as though having a judgment concerning the end; but the appetite of the end and of those (means) that are for the sake of the end are determined for them from a natural inclination; whereby, they are more acted-upon (*acta*) than (they are) actors (*agentia*).<sup>24</sup> Whence, nor is there in them free judgment.

Rational (animals), in which alone there is choice (*electio*), know the end and the proportion of those (means) that are (leading) into the end itself.<sup>25</sup> And hence, just as they move themselves towards the end so (do they move themselves) also to desire the end, or (to desire) those (means) that are for the sake of the end; whereby, there is in them free choice.

#### 36.4. Qualified Numbers

(There are multiple modes in which) numbers are said (to be) *qualified* (*quales*):<sup>26</sup>

##### 1. Insofar as they are **composite** (*compositi* = σύνθετοι).<sup>27</sup>

Those numbers are said (to be) **composite** *which another number enumerates* (*quos aliquis alius numerus numerat*): that is, *which communicate in* (i.e., have in common) *some number that measures them* (*qui communicant in aliquo numero mensurante eos*; ► 3.3).<sup>28</sup> For example, the number *six* and (the number) *nine* are measured by (the

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<sup>23</sup> *In Metaph.* 5, l. 16, §1000: “Res enim inanimatae agunt vel moventur propter finem, non tamquam cognoscentes finem, neque tamquam se agentes ad finem; sed potius ab alio diriguntur, qui eis naturalem inclinationem dedit, sicut sagitta dirigitur in finem a sagittante.”

<sup>24</sup> *In Metaph.* 5, l. 16, §1000: “Res autem irrationales animatae cognoscunt quidem finem et appetunt ipsum appetitu animali, et movent seipsa localiter ad finem tamquam iudicium habentes de fine; sed appetitus finis, et eorum quae sunt propter finem, determinatur eis ex naturali inclinatione. Propter quod sunt magis acta quam agentia. Unde nec in eis est iudicium liberum.”

<sup>25</sup> *In Metaph.* 5, l. 16, §1000: “Rationalia vero in quibus solum est electio, cognoscunt finem, et proportionem eorum, quae sunt in finem ipsum. Et ideo sicut seipsa movent ad finem, ita etiam ad appetendum finem, vel ea quae sunt propter finem, ex quo est in eis electio libera.”

<sup>26</sup> *In Metaph.* 5, l. 16, §989: “numeri dicuntur quales.”

<sup>27</sup> *In Metaph.* 5, l. 16, §989 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b3–4): “inquantum sunt compositi.”

<sup>28</sup> *In Metaph.* 5, l. 16, §989: “Dicuntur autem numeri compositi, qui communicant in aliquo numero mensurante eos; sicut senarius numerus et novenarius mensurantur ternario, et non solum ad unitatem comparationem habent, sicut ad mensuram communem.” *In Metaph.* 1, l. 10, §165: “Numeri vero, quos aliquis alius numerus numerat, non dicuntur primi, sed compositi, sicut quaternarius, quem numerat dualitas; et universaliter omnis numerus par a dualitate numeratur.”

number) *three* and have a comparison—as a common measure—not only to the unit. Likewise, *four*, which *two* enumerates. And universally, every even number is enumerated by *two*.

On the other hand, those numbers are said (to be) **incomposite** or **first** (i.e., *prime*) which none (other number) enumerates (*quos nullus numerat*): that is, which another, common number does not measure, but only the unit (*quos non mensurat alius numerus communis, nisi sola unitas*).<sup>29</sup> For example, *three*, *five*, *seven*, *eleven*, etc. These (numbers) are immediately constituted by the unit alone.

## 2. In the likeness of (imitated, μίμημα) **surfaces** and solids or **bodies** (< στερεόν).<sup>30</sup>

(a) According to the imitation of a surface, insofar as a number is produced (*ducitur*) into a number (i.e., a number is multiplied by a number, thus obtaining its *product*), whether (it should be) the same (number) or another.<sup>31</sup>

For example, when one says, “three twice” ( $3 \times 2$ , whose product is six, a *rectangular* number), or “three thrice” ( $3 \times 3$ , whose product is nine, a *square* number).<sup>32</sup> And this is what ARISTOTLE calls “so much so many times” (*quoties quanti* = οἱ ποσάκις ποσοί). For one dimension—as it were—is designated in “three,” while a second—as it were—dimension (is designated) in “three twice” or “three thrice.”

(b) According to the imitation of a solid, when the product is double (*est duplex ductus*), whether of the same number into itself or of diverse numbers into one.<sup>33</sup>

For example, when one says, “thrice three thrice” ( $3 \times 3 \times 3$ , whose product is 27, a *cubic* number), or “twice three twice” ( $3 \times 2 \times 2$ ), or “four times three twice” ( $4 \times 3 \times 2$ ).<sup>34</sup> This is what ARISTOTLE calls “so many times so much so many times” (*quoties quot quanti* =

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<sup>29</sup> *In Metaph.* 5, l. 16, §989: “Numeri autem incompositi, vel primi in sua proportione dicuntur, quos non mensurat alius numerus communis, nisi sola unitas.” *In Metaph.* 1, l. 10, §165: “Dicuntur autem numeri primi, quos nullus numerat, sicut ternarius, quaternarius, septenarius, undenarius, et sic de aliis. Hi enim a sola unitate constituuntur immediate.”

<sup>30</sup> *In Metaph.* 5, l. 16, §990 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b4–5): “Dicuntur etiam numeri quales ad similitudinem superficiei et «solidi,» idest corporis.”

<sup>31</sup> *In Metaph.* 5, l. 16, §990 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b5): “Secundum quidem imitationem superficiei, in quantum numerus ducitur in numerum, vel eundem vel alium.”

<sup>32</sup> *In Metaph.* 5, l. 16, §990 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b5–6): “ut cum dicitur bis tria, vel ter tria. Et hoc est quod dicitur quoties quanti. Nam designatur quasi una dimensio in hoc quod dicitur tria, quasi vero secunda dimensio, hoc quod dicitur bis tria, vel etiam ter tria.”

<sup>33</sup> *In Metaph.* 5, l. 16, §991 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b5): “Ad imitationem vero solidi, quando est duplex ductus, vel eiusdem numeri in seipsum, vel diversorum numerorum in unum.”

<sup>34</sup> *In Metaph.* 5, l. 16, §991 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b6): “ut cum dicitur ter tria ter, vel bis tria bis, vel bis tria quater. Et hoc est quod dicitur «quoties quot quanti.» Sic enim considerantur in numero quasi tres dimensiones ad modum solidi.”

ποσάκις ποσάκις ποσοί). In this way, there are considered in a number as three dimensions, according to the mode of a solid.

**3.** (Simply or universally, ὁλως) **that which exists in the substance of a number other than the quantity itself** (*quod existit in substantia <numeri> praeter ipsam quantitatem = ὁ παρὰ τὸ ποσὸν ὑπάρχει ἐν τῇ οὐσίᾳ*), is said (to be) its *quality*.<sup>35</sup>

In the ordering of numbers (i.e., in the above imitation of surfaces or squares), something is considered according to the mode of substance: for example, *three*, or whichever number that is produced into another.<sup>36</sup> And something (is considered) according to the mode of quantity: for example, the product itself of one number into another or into itself.

Thus, when I say, “three twice,” *two* is signified by the mode of a *measuring quantity*, while *three* (is signified) by the mode of a substance.<sup>37</sup> Therefore, that which exists in the substance of the number other than the quantity itself, which is the substance of the number, is said (to be) *its quality*, as what is signified when *twice* or *thrice* is said.

Hence, the **substance of whatever number** (*substantia cuiuslibet <numeri> <οὐσία... ἐκάστου*) is said (to be) *the number itself produced simply, which is said once* (*ipse numerus simpliciter prolatus, quod semel dicitur < ὁ ἄπαξ*), as when I say, “three.”<sup>38</sup>

For example, the substance of *six* is what is said (to be) *six once* (< ἕξ γὰρ ἄπαξ ἕξ), (and) not what is said three twice or two thrice, (for) this pertains rather to its quality.<sup>39</sup>

On the other hand, the quantity according to which a number’s **quality** is considered, is said (to be) *the multiplication itself of the number into a number*.<sup>40</sup> Thus, to say that a number is a surface or a solid, whether square or cubic, signifies that it is qualified.

<sup>35</sup> *In Metaph.* 5, l. 16, §991 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b6–7): “Id [...] quod existit in substantia numeri praeter ipsam quantitatem [...] dicitur qualitas eius.”

<sup>36</sup> *In Metaph.* 5, l. 16, §991: “In hac autem numerorum ordinatione, aliquid consideratur per modum substantiae; sicut hoc quod dico tria, vel quicumque numerus qui in alium ducitur. Aliquid vero per modum quantitatis; sicut ipse ductus unius numeri in alterum, vel in se ipsum; ut cum dico bis tria, binarius significatur per modum quantitatis mensurantis, ternarius vero per modum substantiae.”

<sup>37</sup> *In Metaph.* 5, l. 16, §991: “ut cum dico bis tria, binarius significatur per modum quantitatis mensurantis, ternarius vero per modum substantiae. Id ergo, quod existit in substantia numeri praeter ipsam quantitatem, quae est numeri substantia, dicitur qualitas eius, ut hoc quod significatur per hoc quod dicitur bis vel ter.”

<sup>38</sup> *In Metaph.* 5, l. 16, §992 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b6–8): “Alia litera habet «secundum quantitatem»; et tunc substantia numeri dicitur ipse numerus simpliciter prolatus, ut quod dico tria. [...] Et huic concordat litera sequens, quae dicit, quod substantia cuiuslibet numeri est id quod semel dicitur.” We were unable to identify the translation that has *secundum quantitatem*.

<sup>39</sup> *In Metaph.* 5, l. 16, §992 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b8): “Sicut substantia senarii est quod dicitur semel sex, non quod dicitur bis tria, vel ter duo: sed hoc pertinet ad eius qualitatem.”

<sup>40</sup> *In Metaph.* 5, l. 16, §992 (cf. ARISTOTLE, *Metaphysica* Δ.14, 1020b6–8): “Quantitas autem secundum quam attenditur eius qualitas, dicitur ipsa multiplicatio numeri in numerum. [...] Dicere enim numerum esse superficiale vel solidum sive quadratum, sive cubicum, significat eum esse qualem.”

### 36.5. Figure

Among figures, there is not (to be found) some figure that should be other than (*praeter*) the triangle and all the other consequent species, in such a way—to wit—that it would be the common idea of all figures.<sup>41</sup>

Yet, although there should not be one figure separated in being beyond all figures—even according to the Platonist who posit that common species (are) separated—, nonetheless, there is found one common *ratio* (*ratio communis* = λόγος κοινός) that befits (*convenit* = ἐφαρμόσει) all figures and is not proper (*propria* = ἴδιος) to some (one) of them.<sup>42</sup>

Thus, **figure** (*figura* = σχῆμα) is *that which is comprehended by a terminus or by termini* (*quae termino vel terminis comprehenditur* < τὸ ὑπὸ τινος ἢ τινῶν ὄρων περιεχόμενον).<sup>43</sup> Hence, *figure* conveys (*importat*) the termination of a quantity.

### 36.6. Species of Figures

(The species of) figures are infinite, as (are) also (the species of) numbers, for they are multiplied according to the number of angles and lines, as is evident in the triangle and the square.<sup>44</sup>

Of quadrilateral figures, some have all angles right, and are called rectangles (*orthogonia*): that is, a surface of right angles.<sup>45</sup> Some, however, do not have right angles, and are called rhombi or rhomboids.

Of rectangles, one consists of all equal sides, and is called *square* (*quadratum*) or *tetragon*; another does not have all sides equal, but in it any two opposite sides are equal, and this mode of rectangle is called *oblong* (*altera parte longius*).<sup>46</sup>

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<sup>41</sup> *In De anima* 2, c. 5, 250–252 (cf. ARISTOTLE, *De anima* B.3, 414b21): “inter figuras non est aliqua figura que sit preter triangulum et alias species consequentes, utpote que sit ydea communis omnium figurarum.”

<sup>42</sup> *In De anima* 2, c. 5, 254–259 (cf. ARISTOTLE, *De anima* B.3, 414b22–24): “Set quamuis non sit una figura separata in esse preter omnes figuras, etiam secundum Platonicos qui ponunt species communes separatas, [et] tamen inuenitur una ratio communis, que conuenit omnibus figuris et non est propria alicuius earum.” Brackets in the original.

<sup>43</sup> Cf. EUCLID, *Opera Omnia*, v.1, 4.7–8: “Σχήμα ἐστὶ τὸ ὑπὸ τινος ἢ τινῶν ὄρων περιεχόμενον.” HEIBERG’s version (ibid., 5): “Figura est, quod aliquo uel aliquibus terminis comprehenditur.” *In De caelo* 1, l. 11 n. 1: “figura autem est quae termino vel terminis comprehenditur.” *In Physic.* 7, l. 5, n. 3: “figura importat terminationem quantitatis; est enim figura, quae termino vel terminis comprehenditur.”

<sup>44</sup> *In De sensu* 1, c. 10, 209–212: “figure sunt infinite, sicut et numeri (multiplicantur enim secundum numerum angulorum et linearum, ut patet in triangulo et quadrato).”

<sup>45</sup> *In De anima* 2, c. 3, 50–55: “sciendum est quod figurarum quadrilaterarum quedam habent omnes angulos rectos et uocantur orthogonia, id est superficies rectorum angulorum; quedam autem non habent angulos rectos et uocantur rombi uel romboydes.”

<sup>46</sup> *In De anima* 2, c. 3, 55–61: “Sciendum est autem quod orthogoniorum quoddam consistit ex omnibus lateribus equalibus et uocatur quadratum siue tetragonismus; quoddam autem non habet omnia latera equalia, in quo tamen quelibet duo latera sibi opposita sunt equalia, et uocatur huiusmodi orthogonium altera parte longius.”

Thus, a **square** is said (to be) *a figure that consists of four equal sides, whose four angles are right (figura constans ex quatuor lateribus aequalibus, cuius quatuor anguli sunt recti)*.<sup>47</sup> Such a figure arises (*provenit*) from the production of some line into itself (*ex ductu alicuius lineae in seipsam*). Whence, since it is caused from the unit itself, it pertains to odd number.

And an **oblong** (*figura altera parte longior*) is said (to be that figure) *whose angles are all right, and whose contrary sides are equal, but not all (its) sides are equal to all (figura... cuius omnes anguli sunt recti, et latera vicissim sibi opposita sunt aequalia, non tamen omnia latera sunt aequalia omnibus)*.<sup>48</sup> Whence, it is evident that, just as a square arises (*consurgit*) from the production of one line into itself, so an oblong (arises) by producing two lines into one (*ex ductu duarum linearum in unam*). And in this way, it pertains to the even number, the first (of) which is *two*.

In any surface of right angles, two straight lines that conclude a right angle are said to contain the whole surface because, since the two other sides are equal to them, each (being) opposite to it, it is necessary that one of the aforesaid lines that concludes a right angle measure the longitude of the surface of the rectangle, and the other one, the latitude.<sup>49</sup> Hence, the whole rectangular surface arises (*consurgit*) having one of them drawn into the other (*ex ductu unius earum in aliam*), as though we were to imagine that if one of them should be moved along the other, such a surface would arise.

In an oblong, since the two lines that contain it are unequal, if a mean proportion is taken between them, and is drawn into itself, a square equal to the oblong would be produced.<sup>50</sup>

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<sup>47</sup> *In Metaph.* 1, l. 8, §130: "Dicitur autem quadratum figura constans ex quatuor lateribus aequalibus, cuius quatuor anguli sunt recti; et provenit talis figura ex ductu alicuius lineae in seipsam. Unde cum ex ipsa unitate causetur, ad numerum imparum pertinet."

<sup>48</sup> *In Metaph.* 1, l. 8, §130: "Figura vero altera parte longior dicitur, cuius omnes anguli sunt recti, et latera vicissim sibi opposita sunt aequalia, non tamen omnia latera sunt aequalia omnibus. Unde patet quod sicut quadratum consurgit ex ductu unius lineae in seipsam, ita figura altera parte longior, ex ductu duarum linearum in unam. Et sic pertinet ad numerum parum, qui primus est dualitas."

<sup>49</sup> *In De anima* 2, c. 3, 61–72: "Item sciendum est quod in qualibet superficie rectorum angulorum due recte lineae que angulum concludunt dicuntur totam superficiem continere, quia, cum alia duo latera sint aequalia eis, unumquodque suo opposito, necesse est quod una predictarum linearum rectum angulum concludentium mensuret longitudinem superficiei rectangule et alia longitudinem [sic]; unde tota superficies rectangula consurgit ex ductu unius earum in aliam, ut, si ymaginemur quod una earum moueretur per aliam, consurgeret talis superficies." The critical edition has *longitudinem* instead, but *latitudinem* is demanded by the context.

<sup>50</sup> *In De anima* 2, c. 3, 72–87: "Item, sciendum est quod, cum in ortogonio quod est altera parte longius due lineae continentes ipsum sint inaequales, si accipiatur inter eas linea media in proportione et ducatur in se ipsam, fiet quadratum equale altera parte longiori. Et quia hoc demonstrationibus geometricis ostendere diffusum esset, sufficiat hoc ad presens manifestare in numeris: sit igitur ortogonium altera parte longius cuius maius latus sit novem palmorum, minus uero quatuor; accipiatur autem linea media in proportione inter ea, que scilicet sit sex palmorum; quadratum huius lineae erit equale predicto altera parte longiori; quod etiam in numeris patet: nam quater novem sunt triginta sex, similiter etiam sexies sex sunt triginta sex."

Since showing this through geometric demonstration would be extensive (*diffusum esset*), let it suffice at present to manifest (it) in numbers.<sup>51</sup> Thus, let there be an oblong whose greater side is nine spans; the lesser, four. Let there be taken a mean line in proportion between them: namely, of six spans. The square of such a line will be equal to the above-said oblong, which is evident in numbers, for  $4 \times 9 = 36$ ; and likewise,  $6 \times 6 = 36$ .

### 36.7. The Circle

An effect is maximally perfect when it returns into its principle.<sup>52</sup> Whence, too, the circle among all figures—and circular motion among all motions—is maximally perfect because, in them, there is a return to the principle (*ad principium reditur*). The circle is a perfect figure (also) in this mode: that it cannot not receive (something) added (► 23.1).

The circle has two proper(ies) among the other figures:<sup>53</sup> (1) it is more capacious than the others; (2) it is a uniform whole (*est totus uniformis*; cf. ἐνοειδής, *resembling, having the form of unity*),<sup>54</sup> without an angle.

The mean (< *in medio* = ἐν μέσῳ)—that is, the center (< *in centro*)—and the circumference (< *in circulo* = ἐν κύκλῳ) are the principles of the circular magnitude, for lines in a circular magnitude are produced from the center to the circumference (*a centro ad circumferentiam ducuntur*).<sup>55</sup> Whence, it is necessary that one of them be taken as the principle, and the other one as the terminus.

As (pseudo-)DIONYSIUS says,<sup>56</sup> the point that is in the middle of the circle is participated (in) by all the lines posited around—to wit, those that are produced from the center to the

<sup>51</sup> The geometrical demonstration is found in Proposition 17 of *Elements* 6. See EUCLID, *Opera Omnia*, vol. 2, 122.2–7: “Ἐάν τρεῖς εὐθεῖαι ἀνάλογον ὡσιν, τὸ ὑπὸ τῶν ἄκρων περιεχόμενον ὀρθογώνιον ἴσον ἐστὶ τῷ ἀπὸ τῆς μέσης τετραγώνῳ· κἂν τὸ ὑπὸ τῶν ἄκρων περιεχόμενον ὀρθογώνιον ἴσον ᾗ τῷ ἀπὸ τῆς μέσης τετραγώνῳ, αἱ τρεῖς εὐθεῖαι ἀνάλογον ἔσονται.”

<sup>52</sup> ScG 2, 46 n. 2: “Tunc enim effectus maxime perfectus est quando in suum redit principium: unde et circulus inter omnes figuras, et motus circularis inter omnes motus, est maxime perfectus, quia in eis ad principium reditur.” *In Sent.* 3, d. 2 q. 1 a. 1 qc. 1 co.: “per modum circuli, quae est figura perfecta ex eo quod additamentum non recipit.”

<sup>53</sup> *Super Ps.* 26, n. 6: “Circulus duo propria habet inter alias figuras. Unum, quia est capaciosior aliis. Aliud est quod est totus uniformis sine angulo.”

<sup>54</sup> LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἐνοειδής, ἑς.

<sup>55</sup> *In Physic.* 8, l. 23, n. 5 (cf. ARISTOTLE, *Physica* Θ.10, 267b6–7): “quia ostensum est quod primus motus est circularis, qui quidem motus competit magnitudini circulari, necesse est quod primum principium huius motus sit aut in medio, id est in centro, aut in circulo; quia ista sunt principia magnitudinis circularis. Lineae enim in magnitudine circulari a centro ad circumferentiam ducuntur: unde necesse est quod alterum horum accipiatur sicut principium, et alterum sicut terminus.”

<sup>56</sup> *In De div. nom.*, c. 2, l. 3: “Dicit [Dionysius] ergo quod [...] punctum quod est in medio circuli participatur ab omnibus lineis in circulo circumpositis quae scilicet protrahuntur a centro ad circumferentiam, in quantum quaelibet linea sortitur indivisibilitatem secundum latitudinem, ad similitudinem indivisibilitatis puncti, prout imaginamur punctum suo motu facere lineam et tamen punctum secundum situm distinctum est a longitudine lineae.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, II.5, 129.6–7: “σημεῖον ἐν μέσῳ κύκλου πρὸς πασῶν τῶν ἐν τῷ κύκλῳ περικειμένων εὐθειῶν.”



circumference—insofar as any line (among them) receives indivisibility according to latitude in the likeness of the indivisibility of the point, if we imagine that the point makes a line by its motion, and yet the point is distinct from the longitude of the line according to site (*secundum situm*).

As (pseudo-)DIONYSIUS says, all the lines that are produced towards the circumference exist in the center as in a common principle.<sup>57</sup> And this sign (*signum* = τὸ σημεῖον)—that is, the point that is said (to be the) *center*—has in itself uniformly (*uniformiter* = ἐνοειδῶς) all the lines conjoined both to each other and in the principle from which they proceeded; for just as they are produced from one into a multitude, so is their multitude terminated at the center as towards a terminus.

It ought to be considered, too, that the lines that are perfectly united in the center itself, the less they recede from the center the less distant they are from each other (while the more they are separated [from the center] the more [distant they are from each other], μάλλον δὲ ἀποστᾶσαι, μάλλον).<sup>58</sup> And speaking simply (*simpliciter* = ἀπλῶς), it ought to be said that the more they are proximate to the center, the more they are united in the center and to each other; but the more they are distant from the center, the more they are also distant from each other, as it is (true) also of a number, which the more it recedes from the unit the more it is multiplied.

### 36.8. Order in Figures

The species of numbers are related (*se habent*) consequently in a natural order.<sup>59</sup> Thus, the first (species) of them—namely, two (*dualitas*)—is the cause of all those that follow. And a like reason is (true) concerning figures, for their species are related consequently

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<sup>57</sup> *In De div. nom.*, c. 5, l. 1: “dicit [Dionysius] quod *in centro omnes lineae* quae deducuntur ad circumferentiam, simul existunt sicut in principio communi; et illud *signum*, idest punctum quod dicitur centrum, *habet in seipso uniformiter, omnes lineas* coniunctas et sibi *invicem et principio a quo processerunt*, quia sicut ab uno producuntur in multitudinem, ita eorum multitudo terminatur ad centrum, sicut ad terminum.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, V.6, 185.4–7: “Καὶ ἐν κέντρῳ πᾶσαι αἱ τοῦ κύκλου γραμμαὶ κατὰ μίαν ἔνωσιν συνυφεστήκασιν, καὶ πάσας ἔχει τὸ σημεῖον ἐν ἑαυτῷ τὰς εὐθείας ἐνοειδῶς ἡνωμένας πρὸς τε ἀλλήλας καὶ πρὸς τὴν μίαν ἀρχήν, ἀφ’ ἧς προήλθον, καὶ ἐν αὐτῷ μὲν τῷ κέντρῳ παντελῶς ἡγώνται.”

<sup>58</sup> *In De div. nom.*, c. 5, l. 1: “Et considerandum est quod *lineae quae in ipso centro uniuntur perfecte, parum* recedentes a centro, *parum* distant ab *invicem*; et hoc *simpliciter* dicendum est quod *in quantum sunt centro propinquiores, in tantum et ipsi centro et sibi invicem magis uniuntur*; quanto vero magis distant a centro, tanto etiam magis distant *a se invicem*, sicut etiam est de numero qui quanto magis recedit ab unitate, tanto magis multiplicatur.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, V.6, 185.7–11: “Βραχὺ δὲ αὐτοῦ διαστᾶσαι, βραχὺ καὶ διακρίνονται, μάλλον δὲ ἀποστᾶσαι, μάλλον. Καὶ ἀπλῶς, καθ’ ὅσον τῷ κέντρῳ πλησιαιτέραί εἰσι, κατὰ τοσοῦτον καὶ αὐτῷ καὶ ἀλλήλαις ἡγώνται, καί, καθ’ ὅσον αὐτοῦ, κατὰ τοσοῦτον καὶ ἀλλήλων διεστήκασιν.”

<sup>59</sup> *In De anima* 2, c. 5, 239–241: “numerorum species naturali ordine consequenter se habent et sic prima earum, scilicet dualitas, est causa omnium consequencium.” *Ibid.*, 243–247: “et similis ratio est de figuris: nam eius species consequenter se habent sicut et species numerorum, trigonum enim est ante tetragonum et tetragonum ante pentagonum.”

as the species of numbers. Thus, the triangle is before (i.e., prior to) the tetragon; and the tetragon (is) before the pentagon.

### 36.9. The First Figures

As ARISTOTLE says, of figures, it ought to be said universally that there is a first both in plane figures and in solid or corporeal figures.<sup>60</sup>

He proves this in reference to figured surfaces positing two reasons:<sup>61</sup>

1. Every plain figure is either rectilinear—as the triangle and the square—or is circular—as the circle itself—, since every rectilinear figure is contained by multiple lines and not by only one, for one straight line alone is extended to only one part, and it belongs to the *ratio* of figure that it should be terminated from every part.<sup>62</sup>

On the other hand, the circular figure is comprehended by only one line that is extended towards everywhere.<sup>63</sup> Now in any one genus, one is prior to many, and the simple is prior to the composite (πρότερον τῆ φύσει ἐν ἐκάστῳ γένει τὸ ἐν τῶν πολλῶν καὶ τὸ ἀπλοῦν τῶν συνθέτων). Whence, it remains that among figured surfaces, the circular is first.

2. That is said to be perfect outside of which nothing can be taken of those that can benefit it (τέλειόν ἐστιν οὐ μὴδὲν ἔξω τῶν αὐτοῦ λαβεῖν δυνατόν; ►23.1), as that man is said to be perfect who does not lack something that pertains to man.<sup>64</sup> Now we see that addition can always be made to a straight line, as far the nature of the line itself is concerned, even though something could perhaps not be added to it due to some other cause. And this is manifest if the straight line should be finite; whence, every finite straight line is imperfect. As to the infinite (line), it is manifest that it should be imperfect, for it lacks the end that it is naturally apt to have.

<sup>60</sup> *In De caelo* 2, l. 5 n. 2 (cf. ARISTOTLE, *De caelo* B.4, 286b11–13): “dicit [Philosophus] quod universaliter est dicendum de figuris quae sit prima earum, tam in figuris planis, idest in superficialibus, quam in solidis, idest in corporalibus figuris.”

<sup>61</sup> *In De caelo* 2, l. 5 n. 3 (cf. ARISTOTLE, *De caelo* B.4, 286b13–23): “probat [Philosophus] propositum: et primo quantum ad figuras superficiales [...]. Circa primum ponit duas rationes.”

<sup>62</sup> *In De caelo* 2, l. 5 n. 3 (cf. ARISTOTLE, *De caelo* B.4, 286b13–15): “quarum prima talis est. Omnis figura plana, idest superficialis, aut est rectilinea, sicut triangulus et quadratum, aut est circularis, sicut ipse circulus. Omnis autem rectilinea figura continetur a pluribus lineis et non ab una sola (una enim sola linea recta non porrigitur nisi ad unam partem, de ratione autem figurae est quod sit terminata ex omni parte).”

<sup>63</sup> *In De caelo* 2, l. 5 n. 3 (cf. ARISTOTLE, *De caelo* B.4, 286b15–18): “sed circularis figura comprehenditur ab una sola linea, quae undique porrigitur. In unoquoque autem genere unum est prius multitudine, et simplex est prius compositis. Unde relinquitur quod inter superficiales figuras circularis est prima.”

<sup>64</sup> *In De caelo* 2, l. 5 n. 4 (cf. ARISTOTLE, *De caelo* B.4, 286b18–20): “Perfectum dicitur esse illud extra quod nihil est accipere eorum quae possunt ipsi convenire, sicut homo dicitur esse perfectus cui non deest aliquid eorum quae ad hominem pertinent: et hoc determinatum est prius, tam in III *Physic.* quam in principio huius libri. Videmus autem quod rectae lineae semper potest fieri appositio quantum est ex natura ipsius lineae, licet forte ex aliqua alia causa non posset ei aliquid aliud apponi, sicut diametro totius mundi. Et hoc manifestum est si linea recta sit finita: unde omnis linea recta finita est imperfecta. De infinita autem manifestum est quod sit imperfecta: caret enim fine, quem nata est habere.”

On the other hand, no addition can be made to the circular line, since its end is conjoined to its principle.<sup>65</sup> Whence, it is manifest that the line that contains the circle is perfect. And the perfect is prior to the imperfect: simply, indeed, in nature; and in time, for in one and the same, the perfect is prior in nature, while the imperfect is prior in time. For example, some human being is in time prior a child than a perfect man, and yet the perfect man is prior in nature, since this is what nature intends; but simply, the perfect is also prior, for a child is generated from some man (►47.7). In this way, it is evident that, for this reason too, the circle is the first of the figured surfaces.

ARISTOTLE shows what should be the first figured body, saying that, likewise, the sphere is first among the solid or corporeal figures because only the spherical figure is contained by only one surface, which encompasses everywhere the spherical body.<sup>66</sup> On the other hand, corporeal rectilinear figures are contained by multiple surfaces, as the cubic body (is contained) by six surfaces; and the triangular pyramid, by four. And just as the circle is had in surfaces, so the sphere is had in solids or bodies.

ARISTOTLE shows the same through the opinions of others, of which he posits two:<sup>67</sup>

1. The opinion of those who resolve bodies into surfaces, and from surfaces generate bodies; for, among the solid figures, only the spherical figure is not resolved into multiple surfaces because it is contained by only one surface, while the other figures are resolved into multiple surfaces, as the pyramid (is resolved) into four triangular surfaces.<sup>68</sup>

However, this division of bodies into surfaces is not by that mode whereby some body is divided into its corporeal parts, for also the sphere is divided into its parts in this way;

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<sup>65</sup> *In De caelo* 2, l. 5 n. 4 (cf. ARISTOTLE, *De caelo* B.4, 286b20–23): “Lineae vero circulari non potest fieri additio, quia finis eius coniungitur principio: unde manifestum est quod linea continens circulum est perfecta. Perfectum autem est prius imperfecto: simpliciter quidem natura et tempore; in uno autem et eodem perfectum prius est natura, sed imperfectum est prius tempore, sicut aliquis homo prius tempore est puer quam vir perfectus; tamen vir perfectus est prius natura, quia hoc est quod natura intendit; simpliciter autem etiam tempore perfectum est prius, nam puer ab aliquo viro generatur. Sic igitur patet quod propter hanc rationem etiam circulus est prima superficialium figurarum.” For our translation of these terms, see *ibid.*, n. 2: “Dicitur autem superficialis figura, qua figuratur superficies; corporalis autem figura, qua figuratur corpus.”

<sup>66</sup> *In De caelo* 2, l. 5 n. 5 (cf. ARISTOTLE, *De caelo* B.4, 286b23–26): “ostendit [Philosophus] quae sit prima figurarum corporalium. Et dicit quod similiter sphaera est prima inter figuras *solidas*, idest corporeas: quia sola sphaerica figura continetur una sola superficie, quae undique ambit corpus sphaericum; figurae autem rectilineae corporales continentur pluribus superficiebus, sicut corpus cubicum sex superficiebus, et pyramis triangularis quatuor: sicut enim se habet circulus in superficiebus, ita se habet sphaera in *solidis*, idest in corporibus.”

<sup>67</sup> *In De caelo* 2, l. 5 n. 6 (cf. ARISTOTLE, *De caelo* B.4, 286b27–287a2): “ostendit [Philosophus] propositum per opiniones aliorum. Et ponit duas opiniones.”

<sup>68</sup> *In De caelo* 2, l. 5 n. 6 (cf. ARISTOTLE, *De caelo* B.4, 286b27–30): “Quarum prima est eorum qui resolvunt corpora in superficies, et ex superficiebus generant corpora. Quia solam sphaericam figuram inter figuras *solidas* non resolvunt in plures superficies, eo quod continetur una sola superficie: alias vero figuras resolvunt in plures superficies, sicut pyramidem in quatuor superficies triangulares.”

rather, this is division is as into those (parts) that differ in species from that which is divided (< ὡς εἰς ἕτερα τῶ εἶδει).<sup>69</sup>

And in this way, ARISTOTLE concludes that it is evident that the sphere is the first of solid figures.<sup>70</sup>

2. The opinion of those who assigned the order of figures according to the species of numbers, adapting figures to numbers.<sup>71</sup> And according to this, ARISTOTLE says that it is most reasonable (*rationabilissimum* = εὐλογώτατον) that the circle should be adapted to the unit, on account of its being the first and most simple of figures; that the triangle should be adapted to twoness, on account of the angles of the triangle being adapted to two right angles. For if the unit should be taken according to the triangle, it would follow that the circle, which is naturally prior to the triangle, would be outside the genus of figure, if the triangle should be the first of the figures.

That the circular line is prior to the straight is proven because the perfect is naturally prior to the imperfect, and the circular line is perfect because whatever is taken in it is a principle, an end, and a mean; whence, it cannot receive the addition of something external.<sup>72</sup>

On the other hand, no straight line is perfect.<sup>73</sup> This is evident in respect of the infinite line, which is imperfect because it lacks an end, from which something is denominated perfect (τέλειον) in Greek. And the same is evident in a finite line because whatever finite line can be increased (*augeri* = ἀύξῆσαι): that is, (it can) take a greater quantity; and in this way, there is something outside of it. And so, the circular line is naturally prior to the straight.

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<sup>69</sup> *In De caelo* 2, l. 5 n. 6 (cf. ARISTOTLE, *De caelo* B.4, 286b30–32): “Talis autem divisio corporum in superficies non est per illum modum quo corpus aliquod dividitur in suas partes corporeas; sic enim et sphaera dividitur in suas partes: sed haec est divisio quasi in ea quae differunt specie ab eo quod dividitur.”

<sup>70</sup> *In De caelo* 2, l. 5 n. 6 (cf. ARISTOTLE, *De caelo* B.4, 286b32–33): “Sic igitur concludit [Philosophus] planum esse quod sphaera sit prima solidarum figurarum.”

<sup>71</sup> *In De caelo* 2, l. 5 n. 7 (cf. ARISTOTLE, *De caelo* B.4, 286b33–287a2): “dicit [Philosophus] quod quidam assignaverunt ordinem figurarum secundum species numerorum, adaptando figuras numeris. Et secundum hoc dicit rationabilissimum esse quod circulus adaptetur unitati, propter hoc quod est prima et simplicissima figurarum; triangulus autem adaptetur dualitati, propter hoc quod anguli trianguli adaequantur duobus rectis. Si autem acciperetur unitas secundum triangulum, sequeretur quod circulus, qui est naturaliter prior triangulo, esset extra genus figurae, si triangulus esset prima figurarum.”

<sup>72</sup> *In De caelo* 1, l. 4 n. 9 (cf. ARISTOTLE, *De caelo* A.2, 269a19–20): “Probatur autem quod *circulus*, idest linea circularis, sit prior linea recta, quia perfectum naturaliter est prius imperfecto; circulus autem sive linea circularis est perfecta, quia quidquid in ea accipitur, est principium et finis et medium; unde non recipit alicuius exterioris additionem.”

<sup>73</sup> *In De caelo* 1, l. 4 n. 9 (cf. ARISTOTLE, *De caelo* A.2, 269a20–23): “Linea autem recta nulla est perfecta. Quod patet et quantum ad lineam infinitam, quae imperfecta est quia fine caret, ex quo denominatur aliquid perfectum in Graeco: et idem patet in linea finita, quia quamlibet lineam finitam contingit *augeri*, idest accipere maiorem quantitatem, et sic est aliquid extra eam. Et sic linea circularis naturaliter est prior quam recta.”

Thus, the straight line is imperfect because it is susceptible of addition, while the circular line is perfected in itself.<sup>74</sup>

### 36.10. Act vs. Potency in Figures

In a solid body, there is potentially any figure, which can be protracted from the solid through some dimension.<sup>75</sup> However, it is manifest that, in some great stone not yet divided, the figure of Mercury is not in act but only in potency.

Likewise, therefore, in a **cube**—that is, in a *body having six square surfaces*—a half cube—which is some other figure—is not in act.<sup>76</sup> Rather, in this mode, it is in act when the cube is already divided into two halves.

Every protraction of a new figure in an excised body comes to be (*fit*) according to some surface that terminates the figure.<sup>77</sup> It is therefore manifest that such a surface will not be in the body in act (before the excision) but only in potency; for if any surfaces other than the external should be in act in the solid body, for the same reason (*pari ratione*) the surface that terminates the half of the figure would be in act.

And what has been said of the surface is to be understood of the line, of the point, and of the unit.<sup>78</sup> For these are in act in the continuum only in respect of those that terminate the continuum.

### 36.11. Priority in Figures According to Act and Potency

That which is prior is in potency in that which is consequent.<sup>79</sup> Thus, in figures, it is manifest that the triangle, which is prior, is in potency in the tetragon, for the tetragon can be divided into two triangles.

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<sup>74</sup> *In Physic.* 4, l. 7, n. 5: “linea recta est imperfecta, additionem recipiens, [...] linea circularis in seipsa perficitur.”

<sup>75</sup> *In Metaph.* 3, l. 13, §509 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a20–22): “In corpore solido simili modo inest, scilicet potentialiter, quaelibet figura, quae potest protrahi ex illo solido per aliquam dimensionem. Sed manifestum est quod in quodam magno lapide nondum secto non inest «Mercurius» idest figura Mercurii, in actu, sed solum in potentia.”

<sup>76</sup> *In Metaph.* 3, l. 13, §509 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a22–23): “ergo similiter in cubo, idest in corpore habente sex superficies quadratas, non inest medietas cubi, quae est quaedam alia figura, actu. Sed hoc modo est actu, quando iam cubus dividitur in duas medietates.”

<sup>77</sup> *In Metaph.* 3, l. 13, §509 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a23–24): “Et quia omnis protractio novae figurae in solido exciso fit secundum aliquam superficiem, quae terminat figuram, manifestum est quod nec etiam superficies talis erit in corpore in actu, sed solum in potentia: quia si quaecumque superficies praeter exteriorem esset in actu in corpore solido, pari ratione esset in actu superficies, quae terminat medietatem figurae.”

<sup>78</sup> *In Metaph.* 3, l. 13, §509 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a24–25): “Quod autem dictum est de superficie, intelligendum est in linea, puncto, unitate. Haec enim in continuo non sunt in actu, nisi solum quantum ad illa quae terminant continuum.”

<sup>79</sup> *In De anima* 2, c. 5, 274–278 (cf. ARISTOTLE, *De anima* B.3, 414b28–32): “illud quod est prius est in potentia in eo quod est consequenter; manifestum est enim in figuris quod trigonum, quod est prius, est potentia in tetragono, potest enim tetragonum diuidi in duos trigonos.”

### 36.12. No Infinite Figures

It is impossible for a line that has some end to be infinite—unless perhaps it has an end towards one part, and it is infinite towards the other part.<sup>80</sup> And (this) is likewise (the case) concerning a surface—that if it has an end towards one part, it cannot be infinite towards another part. But when it is determined towards every part, it can in no mode be infinite, as it is evident that there is no infinite square, nor a circle, which is a figured surface (*superficialis figura*), nor a sphere, which is a figured body (*figura corporea*), for these are names of figures, and **figure** is *that (magnitude) which is comprehended by a terminus or by termini (quae termino vel terminis comprehenditur)*. And in this way, it is evident that no figured surface (*superficies figurata*) is infinite.

### 36.13. No Contraries in Figures

A figure seems not to be contrary to a figure, for no (reason) can be assigned for the circle—which does not have any angles—to be contrary to polygons—that is, figures having multiple angles.<sup>81</sup> Indeed, contraries are maximally distant, and no figure can be given such that it would be impossible to find other (figures) having more angles.

### 36.14. Proximity of Figure to Substantial Form

(It is) figures, among all qualities, (what both) maximally follow upon and demonstrate the species of things.<sup>82</sup> This is maximally evident in plants and animals, in which the diversity of species can be distinguished (*diiudicari*) by no more certain judgment than the diversity of figures.

This is so because just as quantity is—among all accidents—most proximately related to (*se habet ad*) substance (by reason of its matter; ►35.6),<sup>83</sup> so **figure**, which is a *quality around a quantity (qualitas circa quantitatem; ►36.5)*, is most proximately related to the

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<sup>80</sup> *In De caelo* 1, l. 11 n. 1 (cf. ARISTOTLE, *De caelo* A.5, 272b17–24): “Impossibile est lineam esse infinitam, cuius est aliquis finis, nisi forte ad alteram partem habeat finem et ad alteram partem sit infinita. Et simile etiam est de superficie, quod si habeat finem ad unam partem, quod non contingit eam esse infinitam ad illam partem. Sed quando ad omnem partem determinatur, nullo modo potest esse infinita; sicut patet quod non contingit esse *tetragonum*, id est quadratum, infinitum, neque circulum, qui est superficialis figura, neque sphaeram, quae est figura corporea; haec enim sunt nomina figurarum, figura autem est quae termino vel terminis comprehenditur. Et sic patet quod nulla superficies figurata est infinita.”

<sup>81</sup> *In De sensu* 1, c. 10, 200–206 (cf. ARISTOTLE, *De sensu* 4, 442b19–21): “*figura non uidetur esse contraria figure*: non enim est assignare < cui > *poligoniarum*, id est figurarum habencium multos angulos, sit *contrarium circumferens*, id est circulus, qui nullum angulum habet (contraria enim maxime distant, non est autem dare aliquam figuram qua non sit inuenire aliam plures angulos habentem).”

<sup>82</sup> *In Physic.* 7, l. 5, n. 5: “inter omnes qualitates, figurae maxime consequuntur et demonstrant speciem rerum. Quod maxime in plantis et animalibus patet, in quibus nullo certiori iudicio diversitas specierum diiudicari potest, quam diversitate figurarum.”

<sup>83</sup> *In Physic.* 7, l. 5, n. 5: “Et hoc ideo, quia sicut quantitas propinquissime se habet ad substantiam inter alia accidentia, ita figura, quae est qualitas circa quantitatem, propinquissime se habet ad formam substantiae. Unde sicut posuerunt aliqui dimensiones esse substantiam rerum, ita posuerunt aliqui figuras esse substantiales formas.”

form of a substance. Whence, just as some posited that dimensions are the substance of things, so some posited that figures are the substantial forms (of things).

### 36.15. Forms and Figures of Artifacts

From what has just been said, it happens that an image, which is the expressed representation of a thing, is considered above all according to figure rather than according to color or something else.<sup>84</sup> And because art is the imitator of nature (*ars est imitatrix naturae*), and the artifact is some image of a natural thing, the forms of artifacts are figures or something proximate (to figures).

Hence, because of the likeness of such forms and figures to substantial forms, ARISTOTLE says that, according to the reception of form and figure, there is no alteration, but rather a perfection.<sup>85</sup> Wherefrom, too, *matter* is only predicated of such (things) denominatively, as it is (predicated) also in natural substances (► 14.11); for we do not say that *man is earth*, but (that *man is made*) of earth (*terrenum*).

### 36.16. Figure vs. Form in Artifacts

(In artifacts), *form* and *figure* differ from each other in that *figure* conveys (*importat*) the termination of quantity, for **figure** is *that which is comprehended by a terminus or termini (quae termino vel terminis comprehenditur)*.<sup>86</sup> On the other hand, **form** is said (to be) *that which gives specific being to an artifact (quae dat esse specificum artificiato)*, for the forms of artifacts are accidents.

### 36.17. Matter and Figure

That which befits something according to itself can never be separated from it; but it can be separated from that which befits it through another, (if) it (is) separated insofar as it was befitting to it.<sup>87</sup> Thus, roundness cannot be separated from the circle because it befits

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<sup>84</sup> *In Physic. 7*, l. 5, n. 5: "Et ex hoc contingit quod imago, quae est expressa rei repraesentatio, secundum figuram potissime attendatur, magis quam secundum colorem vel aliquid aliud. Et quia ars est imitatrix naturae, et artificiatum est quaedam rei naturalis imago, formae artificialium sunt figurae vel aliquid propinquum."

<sup>85</sup> *In Physic. 7*, l. 5, n. 5 (cf. ARISTOTLE, *Physica* H.3, 246a25–29): "Et ideo propter similitudinem huiusmodi formarum et figurarum ad formas substantiales, dicit Philosophus quod secundum acceptionem formae et figurae non est alteratio, sed perfectio. Et exinde etiam est quod materia de huiusmodi non praedicatur nisi denominative, sicut etiam est in substantiis naturalibus: non enim dicimus hominem terram, sed terrenum."

<sup>86</sup> *In Physic. 7*, l. 5, n. 3 (cf. ARISTOTLE, *Physica* H.3, 245b26–246a25): "considerandum est quod forma et figura in hoc ab invicem differunt, quod figura importat terminationem quantitatis; est enim figura, quae termino vel terminis comprehenditur: forma vero dicitur, quae dat esse specificum artificiato; formae enim artificiatorum sunt accidentia."

<sup>87</sup> *STh I*, q. 50 a. 5 co.: "Quod enim convenit alicui secundum se, nunquam ab eo separari potest, ab eo autem cui convenit per aliud, potest separari, separato eo secundum quod ei conveniebat. Rotunditas enim a circulo separari non potest, quia convenit ei secundum seipsum, sed aeneus circulus potest amittere rotunditatem per hoc, quod circularis figura separatur ab aere. Esse autem secundum se competit formae, unumquodque enim est ens actu secundum quod habet formam. Materia vero est ens

it by itself; but a bronze circle can lose roundness because of the circular figure being separated from bronze. (Thus, the act of) being (*esse*) befits form according to itself, for any one (thing) is in act insofar as it has a form. Matter, on the other hand, is in act through form. Therefore, the composite from matter and form ceases to be in act when form is separated from matter.

### 36.18. Imperfection of Quantity Compared to Quality

All species of quantity—but not all species of qualities—have imperfection from the *ratio* of their species.<sup>88</sup>

Quantity is properly a disposition of matter.<sup>89</sup> Whence, all species of quantity are some mathematical (things), which cannot be separated from sensible matter according to being (*secundum esse*)—except time and place, which are natural things and (are) more adjacent to sensible matter. Whence, it is evident that no species of quantity can agree with spiritual things except according to metaphor.

Quality, on the other hand, follows upon form.<sup>90</sup> Whence, there are some altogether immaterial qualities that can be attributed to spiritual things.

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actu per formam. Compositum igitur ex materia et forma desinit esse actu per hoc, quod forma separatur a materia.”

<sup>88</sup> *De potentia*, q. 9 a. 7 co.: “omnes species quantitatis ex ratione suae speciei habent imperfectionem, non autem omnes species qualitatis.”

<sup>89</sup> *De potentia*, q. 9 a. 7 co.: “Et praeterea quantitas proprie est dispositio materiae; unde omnes species quantitatis sunt mathematica quaedam, quae secundum esse non possunt a materia sensibili separari, nisi tempus et locus quae sunt naturalia, et magis materiae sensibili annexa. Unde patet quod nulla species quantitatis potest in rebus spiritualibus convenire, nisi secundum metaphoram.”

<sup>90</sup> *De potentia*, q. 9 a. 7 co.: “Qualitas autem sequitur formam, unde quaedam qualitates sunt omnino immateriales, quae attribui possunt rebus spiritualibus.”



## 37. Relation

Here, we seek to clarify what relation or relative—the real genus—is.

### 37.1. The Relative

ARISTOTLE posits three modes of those (things) that are said (to be) **relative** (*ad aliquid* = πρὸς τι) according to themselves (*secundum se*):<sup>1</sup>

#### 1. According to **number and quantity** (*secundum numerum et quantitatem*).<sup>2</sup>

For example, *double* (in relation) *to half* (*duplum ad dimidium* = διπλάσιον πρὸς ἡμισυ), *triple* (in relation) *to third part* (*triplum ad tertiam partem* = τριπλάσιον πρὸς τριτημόριον), (and simply, ὅλως) *multiple* (in relation) *to submultiple* («*multiplicatum*,» *idest multiplex, ad partem* «*multiplicati*,» *idest ad submultiplex* = πολλαπλάσιον πρὸς πολλοστημόριον), and *container* (in relation) *to contained* (*continens ad contentum* = ὑπερέχον πρὸς ὑπερεχόμενον).<sup>3</sup>

Here, **container** (*continens* = ὑπερέχον) is taken for *that which exceeds according to quantity*, since everything that exceeds (*omne excedens*) according to quantity contains in itself that which is exceeded, for it is *this* and then more.<sup>4</sup> For example, *five* contains in itself *four*, and *tri-cubit* contains in itself *bi-cubit*.

Concerning this mode, ARISTOTLE posits the relations that follow upon number absolutely (► 37.2) and those that follow upon unity absolutely (► 37.8).<sup>5</sup>

#### 2. According to **action and affection** or (according to) **active and passive potency**; and universally (*universaliter* = ὅλως), (according to) every **active (in relation) to the passive** (*activum ad passivum* = τὸ ποιητικὸν πρὸς τὸ παθητικόν; ► 37.9).<sup>6</sup>

<sup>1</sup> *In Metaph.* 5, l. 17, §1001 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b26–32): “Hic determinat Philosophus de *ad aliquid* [...]. Primo ponit modos eorum, quae sunt ad aliquid secundum se. [...] Circa primum duo facit. Primo enumerat modos eorum, quae secundum se ad aliquid dicuntur. [...] Ponit ergo tres modos eorum, quae ad aliquid dicuntur.”

<sup>2</sup> *In Metaph.* 5, l. 17, §1001: “quorum *primus* est secundum numerum et quantitatem.”

<sup>3</sup> *In Metaph.* 5, l. 17, §1001 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b26–28): “sicut duplum ad dimidium, et triplum ad tertiam partem, et «multiplicatum,» idest multiplex, ad partem «multiplicati,» idest ad submultiplex, et continens ad contentum.”

<sup>4</sup> *In Metaph.* 5, l. 17, §1001: “Accipitur autem continens pro eo, quod excedit secundum quantitatem. Omne enim excedens secundum quantitatem continet in se illud quod exceditur. Est enim hoc et adhuc amplius; sicut quinque continet in se quatuor, et tricubitum continet in se bicubitum.”

<sup>5</sup> *In Metaph.* 5, l. 17, §1006 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b32–1021a14): “Prosequitur [Philosophus] tres modos enumeratos; et primo prosequitur primum. [...] Circa primum duo facit. Primo ponit relationes quae consequuntur numerum absolute. Secundo ponit relationes quae consequuntur unitatem absolute.”

<sup>6</sup> *In Metaph.* 5, l. 17, §1002 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b30): “Secundus modus est prout aliqua dicuntur ad aliquid secundum actionem et passionem, vel potentiam activam et passivam; [...] et universaliter omne activum ad passivum.”

For example, *that which can heat* (in relation) *to that which can be heated* (*calefactivum ad calefactibile* = τὸ θερμαντικὸν πρὸς τὸ θερμαντόν), which pertains to natural actions; and *that which can cut* (in relation) *to that which can be cut* (*et sectivum ad sectibile* = τὸ τμητικὸν πρὸς τὸ τμητόν), which pertains to artificial actions.<sup>7</sup>

**3.** Insofar as **the measurable** is said (in relation) **to the measure** (*mensurable... ad mensuram* = τὸ μετρητὸν πρὸς τὸ μέτρον; ► 37.10).<sup>8</sup>

Here, *measure*—and *measurable*—is not taken according to quantity, for this pertains to the first mode, in which each (of the two terms of the relation) is said (in relation) to the other.<sup>9</sup> Thus, *double* is said (in relation) *to half*; and *half* (is said in relation) *to double*. Rather, (*measure* and *measurable* are said) according to the mensuration of being and of truth (*secundum mensurationem esse et veritatis*), for the truth of (scientific) knowledge is measured by that which is (scientifically) knowable (*veritas scientiae mensuratur a scibili* < ἐπιστητὸν πρὸς ἐπιστήμην). Indeed, a (scientifically) known speech (*oratio scita*) is true or false because the thing is or is not—but not conversely.

Likewise, (this) is (the case) concerning *sensible* and *sense* (< αἰσθητὸν πρὸς αἴσθησιν).<sup>10</sup> Wherefrom, *measure* (in relation) *to measured*, and the converse, are not said mutually, as in the other modes. Rather, only *measurable* (is said in relation) *to measure*.

Likewise, also *image* is said (in relation) *to that of which it is the image*, as *measurable* (is said in relation) *to measure*, for the truth of an image is measured from the thing of which it is an image (i.e., its measure is according to the exemplar; ► 9.6).<sup>11</sup>

### 37.2. Relations That Follow upon Number Absolutely

The first mode of relations, which is according to number, is distinguished because it is either according to a comparison of a number to a number (*secundum comparisonem numeri ad numerum* < πρὸς αὐτούς) or (according to a comparison) of number to *one*

<sup>7</sup> In *Metaph.* 5, l. 17, §1002 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b29–30): “sicut calefactivum ad calefactibile, quod pertinet ad actiones naturales, et sectivum ad sectibile, quod pertinet ad actiones artificiales.”

<sup>8</sup> In *Metaph.* 5, l. 17, §1003 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b30–31): “Tertius modus est secundum quod mensurabile dicitur ad mensuram.”

<sup>9</sup> In *Metaph.* 5, l. 17, §1003 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b30–31): “Accipitur autem hic mensura et mensurabile non secundum quantitatem (hoc enim ad primum modum pertinet, in quo utrumque ad utrumque dicitur: nam duplum dicitur ad dimidium, et dimidium ad duplum), sed secundum mensurationem esse et veritatis. Veritas enim scientiae mensuratur a scibili. Ex eo enim quod res est vel non est, oratio scita vera vel falsa est, et non e converso.”

<sup>10</sup> In *Metaph.* 5, l. 17, §1003 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b32): “Et similiter est de sensibili et sensu. Et propter hoc non mutuo dicuntur mensura ad mensurabile et e converso, sicut in aliis modis, sed solum mensurabile ad mensuram.”

<sup>11</sup> In *Metaph.* 5, l. 17, §1003: “Et similiter etiam imago dicitur ad id cuius est imago, tamquam mensurabile ad mensuram. Veritas enim imaginis mensuratur ex re cuius est imago.”

(*numeri ad unum* < πρὸς ἓν).<sup>12</sup> And according to a comparison to either (a number or to *one*, it is further distinguished) in two modes, for it is either according to a comparison of a number indeterminately to a number, or (of a number) indeterminately to *one*.

And this is what ARISTOTLE says, that the first (*prima* = τὰ... πρῶτα) that are said (in relation) to something according to number are said either simply (*aut «simpliciter»* = ἢ ἀπλῶς), that is universally or indeterminately (*idest universaliter, vel indeterminate*), or determinately (*aut determinate* = ἢ ὠρισμένως).<sup>13</sup> And either mode (in relation) to them (*ad eos* = πρὸς αὐτούς): namely, (in relation to) numbers, or (in relation) to *one* (*aut ad unum* = ἢ πρὸς ἓν), that is, (in relation) to the unit.

Every mensuration that is (found) in continuous quantities is derived in some mode from number.<sup>14</sup> Hence, relations that are according to continuous quantity are also attributed to number (► 37.6).

### 37.3. Species of Numerical Proportion

Numerical proportion is divided first into two (species): namely, equality and inequality. There are two species of inequality: namely, the exceeding and the exceeded (*excedens et excessum*) or (*et*) the greater and the less (*magis et minus*). The exceeding unequal (i.e., the greater) is divided into five species (► 5.2):<sup>15</sup>

1. Sometimes, the greater number is a **multiple** (*multiplex*) in respect of the lesser: namely, when it contains it in an aliquot mode (*aliquoties*), as *six* contains *two* thrice.<sup>16</sup> And if it should contain it twice, it is said (to be its) *double* (*duplum*), as *two* (is related) to *one*, or *four* (is related) to *two*; if (it should contain the lesser number) thrice, (it is said to be its) *triple* (*tripulum*); if four times, *quadruple* (*quadruplum*); and so on.

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<sup>12</sup> *In Metaph.* 5, l. 17, §1006 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b32–33): “Dicit ergo [Philosophus], quod primus modus relationum, qui est secundum numerum, distinguitur hoc modo: quia vel est secundum comparationem numeri ad numerum, vel numeri ad unum. Et secundum comparationem ad utrumque dupliciter: quia vel est secundum comparationem numeri indeterminate ad numerum, aut ad unum determinate.”

<sup>13</sup> *In Metaph.* 5, l. 17, §1006 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b32–33): “ Et hoc est quod [Philosophus] dicit, quod prima, quae dicuntur ad aliquid secundum numerum, aut dicuntur «simpliciter,» idest universaliter, vel indeterminate, aut determinate. Et utrolibet modo ad eos, scilicet numeros. «Aut ad unum,» idest ad unitatem.”

<sup>14</sup> *In Metaph.* 5, l. 17, §1007: “Sciendum est autem, quod omnis mensuratio, quae est in quantitibus continuis, aliquo modo derivatur a numero. Et ideo relationes, quae sunt secundum quantitatem continuam, etiam attribuuntur numero.”

<sup>15</sup> *In Metaph.* 5, l. 17, §1008: “Sciendum est etiam, quod proportio numeralis dividitur primo in duas; scilicet aequalitatis, et inaequalitatis. Inaequalitatis autem sunt duae species; scilicet excedens et excessum, et magis et minus. Inaequale autem excedens in quinque species dividitur.” This division is taken from NICOMACHUS through BOETHIUS, *De institutione arithmetica*, l.21–32.

<sup>16</sup> *In Metaph.* 5, l. 17, §1009: “Numerus enim maior quandoque respectu minoris est multiplex; quando scilicet aliquoties continet ipsum, sicut sex continet duo ter. Et si quidem contineat ipsum bis, dicitur duplum; sicut duo ad unum vel quatuor ad duo. Si ter, tripulum. Si quater, quadruplum. Et sic inde.”

2. Sometimes, the greater number contains the whole lesser number once, and moreover some part of it.<sup>17</sup> And then it is said (to be its) **superparticular** (*superparticularis*). And if it should contain the whole and a half, it is called *sesquialter*, as *three* (is related) *to two*; and if (it should contain the whole and) a third (part, it is called) *sesquitercius*, as *four* (is related) *to three*; if (it should contain the whole and) a fourth, *sesquiquartus*, as *five* (is related) *to four*; and so on.

3. Sometimes, the greater number contains the whole lesser once and moreover not only one part but multiple parts.<sup>18</sup> In this way, it is said (to be its) **superpartient** (*superpartiens*). And if it should contain two parts, it is said (to be its) *superbipartiens*, as *five* is related *to three*; if, instead, (it should contain) three (parts), it is said (to be its) *supertripartiens*, as *seven* is related *to four*; and if (it should contain) four (parts), it is the (said to be its) *superquadripartiens*, as *nine* is related *to five*; and so on.

4. Sometimes, the greater number contains the whole lesser (number) multiple times and moreover some part of it.<sup>19</sup> Then, it is said (to be its) **multiple superparticular** (*multiplex superparticularis*). And if it should contain it twice and a half part of it, it will be called *double sesquialter*, as *five* (is related) *to two*; and if (it should contain it) thrice and a half part of it, it will be called *triple sesquialter*, as *seven* (is related) *to two*; and if (it should contain the lesser number) four times and a half part of it, it is said (to be its) *quadruple sesquialter*, as *nine* (is related) *to two*. The species of such proportions can also be taken from the part of the superparticular, as if one should say *double sesquitercius* when the greater number has the lesser twice and a third part of it, as *seven* is related *to three*; or *double sesquiquartus*, as *nine* (is related) *to four*; and so on.

5. Sometimes, the greater number has the whole lesser multiple times, and also multiple parts of it. Then, it is said (to be its) **multiple superpartient** (*multiplex superpartiens*). And

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<sup>17</sup> *In Metaph. 5, l. 17, §1010*: “Quandoque vero numerus maior continet totum numerum minorem semel, et insuper unam aliquam partem eius. Et tunc dicitur superparticularis. Et si quidem contineat totum et medium, vocatur sesquialterum, sicut tria ad duo. Si autem tertiam, sesquitercius, sicut quatuor ad tria. Si quartam, sesquiquartus, sicut quinque ad quatuor. Et sic inde.”

<sup>18</sup> *In Metaph. 5, l. 17, §1011*: “Quandoque numerus maior continet minorem totum semel; et insuper non solum unam partem, sed plures partes. Et sic dicitur superpartiens. Et si quidem contineat duas partes, dicitur superbipartiens, sicut quinque se habent ad tria. Si vero tres, dicitur supertripartiens, sicut septem se habent ad quatuor. Si autem quatuor, sic est superquadripartiens; et sic se habet novem ad quinque. Et sic inde.”

<sup>19</sup> *In Metaph. 5, l. 17, §1012*: “Quandoque vero numerus maior continet totum minorem pluries, et insuper aliquam partem eius; et tunc dicitur multiplex superparticularis. Et si quidem contineat ipsum bis et mediam partem eius, dicitur duplum sesquialterum, sicut quinque ad duo. Si autem ter et mediam partem eius, vocabitur triplum sesquialterum, sicut se habent septem ad duo. Si autem quater et dimidiam partem eius, dicitur quadruplum sesquialterum, sicut novem ad duo. Possent etiam ex parte superparticularis huiusmodi proportionis species sumi, ut dicatur duplex sesquitercius, quando maior numerus habet minorem bis et tertiam partem eius, sicut se habent septem ad tria: vel duplex sesquiquartus, sicut novem ad quatuor, et sic de aliis.”

likewise, the proportion can be divided according to the species of the multiples and according to the species of the superpartients.<sup>20</sup> (For example), if one should say, *double superbipartiens* when the greater number has the whole lesser twice and two of its parts, as *eight* (is related) *to three*; or also *triple superbipartiens*, as *eleven* (is related) *to three*. Or also *double supertriptiens*, as *eleven* (is related) *to four*, for it has the whole twice and three parts of it.

There are also as many species from the part of the inequality of that which is exceeded, for the lesser number is said (to be a) **submultiple** (*submultiplex*), **subparticular** (*subparticularis*), **subsuperpartient** (*subpartiens*), **submultiple subparticular** (*submultiplex subparticularis*), **submultiple subsuperpartient** (*submultiplex subpartiens*), and so on of the others.<sup>21</sup>

#### 37.4. The First Species of Proportion

The first species of proportion—namely, *multiplicity*—consists in the comparison of one number to the unit, for any of its species is found first in some number in respect of the unit.<sup>22</sup> (The proportion) *double* is found first in *two* in respect of the unit; likewise, the proportion *triple* (is found) in *three* in respect of the unit; and so on.

The first termini (< τὰ... πρῶτα) in which some proportion is found give the species to that proportion.<sup>23</sup> Whence, in whatsoever other termini it should be found, (the same proportion) is found in them according to the *ratio* of the first termini.

For example, the proportion double (*proportio dupla* = διπλάσιον) is found first between *two* and *one*; whence, from this proportion it also receives the name, for the double proportion is said (to be the) proportion of *two to one* (2 : 1).<sup>24</sup> And because of this, if one

<sup>20</sup> *In Metaph.* 5, l. 17, §1013: “Quandoque etiam numerus maior habet minorem totum pluries, et etiam plures partes eius, et tunc dicitur multiplex superpartiens. Et similiter proportio potest dividi secundum species multiplicatis, et secundum species superpartientis, si dicatur duplum superbipartiens, quando habet maior numerus totum minorem bis et duas partes eius, sicut octo ad tria. Vel etiam triplum superbipartiens, sicut undecim ad tres. Vel etiam duplum supertriptiens, sicut undecim ad quatuor. Habet enim totum bis, et tres partes eius.”

<sup>21</sup> *In Metaph.* 5, l. 17, §1014: “Et totidem species sunt ex parte inaequalitatis eius qui exceditur. Nam numerus minor dicitur submultiplex, subparticularis, subpartiens, submultiplex subparticularis, submultiplex subpartiens, et sic de aliis.”

<sup>22</sup> *In Metaph.* 5, l. 17, §1015: “Sciendum autem quod prima species proportionis, scilicet multiplicitas, consistit in comparatione unius numeri ad unitatem. Quaelibet enim eius species invenitur primo in aliquo numero respectu unitatis. Duplum primo invenitur in binario respectu unitatis. Et similiter proportio tripli in ternario respectu unitatis, et sic de aliis.”

<sup>23</sup> *In Metaph.* 5, l. 17, §1015 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b32–33): “Primi autem termini in quibus invenitur aliqua proportio, dant speciem ipsi proportioni. Unde in quibuscumque aliis terminis consequenter inveniatur, invenitur in eis secundum rationem primorum terminorum.”

<sup>24</sup> *In Metaph.* 5, l. 17, §1015 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b33–34): “Sicut proportio dupla primo invenitur inter duo et unum. Unde ex hoc proportio recipit rationem et nomen. Dicitur enim proportio dupla proportio duorum ad unum. Et propter hoc, si etiam unus numerus respectu alterius numeri sit duplus,

number should also be a double in respect of another number, this is, however, insofar as the lesser number receives the *ratio* of *one* and the greater (number receives) the *ratio* of *two*. Thus, *six* is related to (*se habet ad*) *three* in *double* proportion insofar as *three* is related to *six* as *one* (is related) to *two*.

(This is the case), likewise, in the *triple* proportion and in all other species of multiplicities.<sup>25</sup> Hence, ARISTOTLE says that this relation of *double* is due to a determinate number—namely, *two*—being referred to *one*—that is, to the unit (< τὸ... διπλάσιον πρὸς ἓν ἀριθμὸς ὠρισμένος).

On the other hand, *multiple* (*multiplex* = πολλαπλάσιον) conveys a relation of a number to the unit ( $x : 1$ ): not, however, of some determinate number but of *number* universally (*in universalis*).<sup>26</sup> Thus, if a determinate number—such as *two* or *three*—should be taken, there would be one species of multiplicity—such as *double* or *triple*. And as *double* is related to *two*, and *triple* (is related) to *three*, which are determinate numbers, so *multiple* (is related) to *multiplicity*, which signifies an indeterminate number.

Other proportions cannot be considered according to a number (in relation) to the unit: namely, neither the superparticular proportion nor the superpartient, nor the multiple superparticular, nor the multiple superpartient.<sup>27</sup> All of these species of proportions are considered insofar as a greater number contains a lesser (number) once (*semel*) or multiple times (*aliquoties*) and, moreover, one or multiple parts of it. The unit cannot have a part; hence, none of these proportions can be considered according to the comparison of a number to the unit, but according to the comparison of a number to a number.

Thus, *double* is either according to a determinate number or according to an indeterminate number.<sup>28</sup>

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tamen hoc est secundum quod minor numerus accipit rationem unius, et maior rationem duorum. Sex enim se habet in dupla proportione ad tria, in quantum tria se habent ad sex ut unum ad duo.”

<sup>25</sup> *In Metaph.* 5, l. 17, §1015 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b33–34): “Et simile est in tripla proportione, et in omnibus aliis speciebus multiplicatis. Et ideo dicit, quod ista relatio dupli, est per hoc quod numerus determinatus, scilicet duo, «refertur ad unum,» idest ad unitatem.”

<sup>26</sup> *In Metaph.* 5, l. 17, §1016 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1020b34–1021a1): “Sed hoc quod dico, multiplex, importat relationem numeri ad unitatem; sed non alicuius determinati numeri, sed numeri in universali. Si enim determinatus numerus accipiatur ut binarius vel ternarius, esset una species multiplicatis, ut dupla vel tripla. Sicut autem duplum se habet ad duo, et triplum ad tria, quae sunt numeri determinati, ita multiplex ad multiplicatam, quia significat numerum indeterminatum.”

<sup>27</sup> *In Metaph.* 5, l. 17, §1017: “Aliae autem proportionum species non possunt attendi secundum numerum ad unitatem, scilicet neque proportio superparticularis, neque superpartiens, neque multiplex superparticularis, neque multiplex superpartiens. Omnes enim hae proportionum species attenduntur secundum quod maior numerus continet minorem semel, vel aliquoties; et insuper unam vel plures partes eius. Unitas autem partem habere non potest: et ideo nulla harum proportionum potest attendi secundum comparationem numeri ad unitatem, sed secundum comparationem numeri ad numerum.”

<sup>28</sup> *In Metaph.* 5, l. 17, §1017: “Et sic est duplex, vel secundum numerum determinatum, vel secundum numerum indeterminatum.”

1. If according to a determinate number, such is the *sesquialter* (*sesquialterum* = ἡμιόλιον; i.e.,  $x + \frac{x}{2} : x$ ) or (rather, in relation to) the *subsesquialter* (lit. *supersesquialterum* < πρὸς τὸ ὑψημιόλιον; i.e.,  $x : x + \frac{x}{2}$ ), for the *sesquialter* proportion consists first in these terms: namely, *three* and *two* (i.e., the first of such proportions is  $3 : 2$ , or  $2 + \frac{2}{2} : 2$ ); and it is found in all other (proportions) under the *ratio* of these.<sup>29</sup> Whence, what is said (to be) a *sesquialter* (proportion) conveys the relation of a determinate number to a determinate number: namely, of *three to two*.

2. On the other hand, what is said (to be a) *superparticular* (proportion) is referred to a *subparticular* (proportion) not according to determinate numbers, as also the multiple is referred to *one*, but according to an indeterminate number, for the aforesaid first species of inequality are taken according to indeterminate numbers, as *multiple*, *superparticular*, *superpartient*, etc., while the species of these (inequalities) are taken according to determinate numbers, as *double*, *triple*, *sesquialter*, *sesquitercius*, and so on.<sup>30</sup>

### 37.5. The *Ratio* of *Two* and of *Double* Are Not the Same

Although (the number) *two* (*dualitas* = δυάς) should be a *double* (*dupla* = διπλάσιον; i.e., *two* is the double of *one*), however, the being (i.e., the essence; ► 30.3, 1) of *two* and of *double* is not the same in such a way that they would be the same according to *ratio*, as the definition and the (thing) defined (are the same).<sup>31</sup>

If it should be true (that *two* and *double* are the same), as some (ancient philosophers) said, it would follow that many are one (in act).<sup>32</sup> For it happens that many (diverse affections) are in some one (subject) first, as *evenness*—and the proportion *double*—is first in (the number) *two*. And in this way, it follows that *even* and *double* would be the same.

<sup>29</sup> *In Metaph.* 5, l. 17, §1018 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a1–2): “Si autem secundum numerum determinatum, sic «est hemiolium,» idest sesquialterum, aut «subhemiolium,» idest supersesquialterum. Proportio enim sesquialtera primo consistit in his terminis, scilicet ternario et binario; et sub ratione eorum in omnibus aliis invenitur. Unde quod dicitur hemiolium vel sesquialterum importat relationem determinati numeri ad determinatum numerum, scilicet trium ad duo.” St. Thomas erroneously takes *subhemiolium* (= ὑψημιόλιον) to mean *supersesquialterum* instead of *subsesquialterum*, which is the corresponding proportion of the lesser in relation to the greater.

<sup>30</sup> *In Metaph.* 5, l. 17, §1019 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a2–3): “Quod vero dicitur superparticulare, refertur ad subparticulare, non secundum determinatos numeros, sicut etiam multiplex refertur ad unum, sed secundum numerum indeterminatum. Primae enim species inaequalitatis superius numeratae accipiuntur secundum indeterminatos numeros, ut multiplex, superparticulare, superpartiens etc. Species vero istorum accipiuntur secundum numeros determinatos, ut duplum, triplum, sesquialterum, sesquitercium, et sic de aliis.”

<sup>31</sup> *In Metaph.* 1, l. 9, §149: “licet dualitas sit dupla, non tamen idem est esse dualitatis et dupli, ita quod sint idem secundum rationem, sicut definitio et definitum.”

<sup>32</sup> *In Metaph.* 1, l. 9, §149 (cf. ARISTOTLE, *Metaphysica* A.5, 987a22–25): “Si autem etiam esset verum quod illi dicebant, sequeretur quod multa essent unum. Contingit enim aliqua multa primo inesse alicui uni, sicut dualitati primo inest paritas et proportio dupla. Et sic sequitur quod par et duplum sint idem.”

Likewise, from (the assumption) that *double* is the substance (i.e., the essence or quiddity) of *two*, (it follows) that whatever (subject) the double is in, (that subject) would be the same as *two*.<sup>33</sup> Which is what the Pythagoreans argued, for they assigned *many* and *diverse* (to things) as though they should be one: for example, they said that numeric properties should be the same as the properties of natural things.

### 37.6. Proportions of Continuous Quantities

Some continuous quantities happen to have a proportion to each other but not according to some number, whether determinate or indeterminate.<sup>34</sup> For there is some proportion of every continuous quantity, even if it should not be a numeric proportion.

There is a common measure of any two numbers: to wit, the unit, which taken multiple times (*aliquoties*) renders any number.<sup>35</sup> However, a common measure of whatsoever continuous quantities is not found. On the contrary, there are some incommensurable continuous quantities, as the diameter of the square is incommensurable to the side. This is so because there is no proportion of it (i.e., of the square's diameter) to the side (that is) as the proportion of a number to a number or of a number to one.

Therefore, when—in quantities—it is said that *this* is *greater than that*, or that (*this*) is related to *that* as *container to contained*, not only is this *ratio* not considered according to some determinate species of number, but nor would it be (considered) according to number, since every number is commensurable with another (number); for every number has one common measure—namely, the unit.<sup>36</sup>

On the other hand,<sup>37</sup> *container* and *contained* are not said according to some numeric commensuration, for that is said (to be related as) **container to contained** (*continens...*

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<sup>33</sup> *In Metaph.* 1, l. 9, §149 (cf. ARISTOTLE, *Metaphysica* A.5, 987a25–28): “similiter quod cuicumque inest duplum sit idem dualitati, ex quo duplum est dualitatis substantia. Quod quidem etiam et Pythagoricis contingebat. Nam multa et diversa assignabant quasi unum essent, sicut proprietates numerales dicebant idem esse cum proprietatibus naturalium rerum.”

<sup>34</sup> *In Metaph.* 5, l. 17, §1020: “Contingit enim aliquas quantitates continuas habere proportionem adinvicem, sed non secundum aliquem numerum, nec determinatum, nec indeterminatum. Omnium enim quantitatum continuarum est aliqua proportio; non tamen est proportio numeralis.”

<sup>35</sup> *In Metaph.* 5, l. 17, §1020: “Quorumlibet enim duorum numerorum est una mensura communis, scilicet unitas, quae aliquoties sumpta, quemlibet numerum reddit. Non autem quarumlibet quantitatum continuarum invenitur esse una mensura communis; sed sunt quaedam quantitates continuae incommensurabiles: sicut diameter quadrati est incommensurabilis lateri. Et hoc ideo, quia non est proportio eius ad latus, sicut proportio numeri ad numerum, vel numeri ad unum.”

<sup>36</sup> *In Metaph.* 5, l. 17, §1021 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a3–6): “Cum ergo dicitur in quantitativibus, quod haec est maior illa, vel se habet ad illam ut continens ad contentum, non solum haec ratio non attenditur secundum aliquam determinatam speciem numeri, sed nec etiam quod sit secundum numerum, quia omnis numerus est alteri commensurabilis. Omnes enim numeri habent unam communem mensuram, scilicet unitatem.”

<sup>37</sup> *In Metaph.* 5, l. 17, §1021 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a6–8): “Sed continens et contentum non dicuntur secundum aliquam commensurationem numeralem. Continens enim ad contentum dicitur, quod est tantum, et adhuc amplius. Et hoc est indeterminatum, utrum sit commensurabile, vel non



*ad contentum* = τὸ... ὑπερέχον πρὸς τὸ ὑπερεχόμενον) which is as much and then more (*quod est tantum, et adhuc amplius* = τοσοῦτόν... ἔστι καὶ ἔτι). And it is indeterminate (< ἀόριστον) whether it should be commensurable or non-commensurable. For a quantity, however it should be taken (in relation to another), is either equal or unequal. Whence, if it is not equal, it follows that it should be unequal and containing, even if it should not be commensurable.

Hence, it is evident that all the aforesaid (relatives according to quantity, τὰ πρὸς τι πάντα) are said (in relation) to something (*ad aliquid*, i.e., relatively) according to number and according to the affections of numbers (< κατ' ἀριθμὸν λέγεται καὶ ἀριθμοῦ πάθη), which are *commensuration, proportion, and other such (affections)*.<sup>38</sup>

### 37.7. Proportion in Other Quantities

As ARISTOTLE says in the *Metaphysics* (►28.5), the *ratio of measure* is found first in numbers; secondly, in continuous quantities; and thereafter it is transferred also to qualities insofar as an excess of one quality over another can be found in them—whether through the mode of *intention*, insofar as somethings is said (to be) whiter than another, or through the mode of *extension*, insofar as (that) whiteness is said (to be) greater which is in a greater surface.<sup>39</sup>

However, since **proportion** (*proportio*) is *some relation of quantities to one another, (quedam habitudo quantitatum ad invicem)* wherever a quantum is said (to exist) in whatever mode, there too a proportion can be said (to exist).<sup>40</sup>

1. First, indeed, in numbers, which are all commensurate to one another, for they all communicate in (i.e., have in common) the first measure, which is the unit.<sup>41</sup>

There are, however, diverse proportions of numbers according as diverse numbers are compared to one another. Thus, one is the proportion of *three to two* (3 : 2), which is called

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commensurable. Quantitas enim qualiscumque accipiatur, vel est aequalis, vel inaequalis. Unde, si non est aequalis, sequitur quod sit inaequalis et continens, etiam si non sit commensurabilis.”

<sup>38</sup> *In Metaph.* 5, l. 17, §1021 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a8–9): “Patet igitur quod omnia praedicta dicuntur ad aliquid secundum numerum, et secundum passiones numerorum, quae sunt commensuratio, proportio, et huiusmodi.”

<sup>39</sup> *In De sensu* 1, c. 6, 74–83: “considerandum est quod, sicut Philosophus tradit in X Methaphisice, ratio mensure primo quidem inuenitur in numeris, secundo in quantitibus continuis, deinde uero transfertur etiam ad qualitates secundum quod in eis potest inueniri excessus unius qualitatis super aliam siue per modum intentionis, prout aliquid dicitur alio albius, siue per modum extensionis, prout dicitur albedo maior que est in maiori superficie.”

<sup>40</sup> *In De sensu* 1, c. 6, 83–86: “Quia uero proportio est quedam habitudo quantitatum ad inuicem, ubicunque dicitur quantum quocunque modo, etiam ibi potest dici proportio.”

<sup>41</sup> *In De sensu* 1, c. 6, 86–89: “et primo quidem in numeris, qui omnes sunt ad inuicem commensurabiles: communicant enim omnes in prima mensura, que est unitas.”

*sexquialtera* (i.e., one-and-a-half times as much, or  $x + \frac{x}{2} : x$ , for three is the whole of two and one half of two,  $3 = 2 + \frac{2}{2}$ ); and another (is the proportion) of *four to three* ( $4 : 3$ ), which is called *sexquitercia* (i.e., one-and-a-third times as much, or  $x + \frac{x}{3} : x$ , for four is the whole of three and one third of three,  $4 = 3 + \frac{3}{3}$ ).<sup>42</sup>

2. On the other hand, since continuous quantities are not resolved into something indivisible, as numbers (are resolved) into the unit, it is not necessary that all continuous quantities be commensurable to one another.<sup>43</sup>

Some (continuous quantities) are to be found—of which one exceeds the other—that nonetheless do not have one common measure.<sup>44</sup>

Those continuous quantities have a common measure which have a proportion to one another according to the proportion of one number to another.<sup>45</sup> For example, if one is of three cubits and another of four, one and the other are measured by the cubit.

3. And in this mode, in qualities too, there can be excess and defect either according to some numeric proportion or according to an incommensurable excess.<sup>46</sup>

### 37.8. Relations That Follow upon Unity Absolutely

ARISTOTLE posits the relatives that are taken according to unity but not by comparison of *a number to one* or (by comparison of *a number*) *to a number*.<sup>47</sup>

He says that, in a mode other than the aforesaid (< κατ' ἄλλον τρόπον), *equal* (*aequale* = ἴσον), *alike* (*simile* = ὅμοιον), and *same* (*idem* = ταυτό) are said relatively, for these are said according to unity (< κατὰ... τὸ ἓν λέγεται πάντα):<sup>48</sup>

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<sup>42</sup> *In De sensu* 1, c. 6, 89–93: “sunt autem diuersae proportionēs numerorum secundum quod diuersi numeri ad inuicem comparantur; alia enim est proportio trium ad duo, quae uocatur sexquialtera, et alia quatuor ad tria, quae uocatur sexquitercia.”

<sup>43</sup> *In De sensu* 1, c. 6, 94–97: “quia uero quantitates continue non resoluuntur in aliquid indiuisibile sicut numeri in unitatem, non est necessarium omnes quantitates continuas esse ad inuicem commensurabiles.”

<sup>44</sup> *In De sensu* 1, c. 6, 97–99: “est inuenire aliquas quarum una excedit alteram, quae tamen non habent unam mensuram communem.”

<sup>45</sup> *In De sensu* 1, c. 6, 99–104: “quecunque tamen quantitates continue proportionantur ad inuicem secundum proportionem numeri ad numerum, earum est una mensura communis, puta si una sit trium cubitorum et alia quatuor, utraque mensuratur cubito.”

<sup>46</sup> *In De sensu* 1, c. 6, 104–108: “et ad hunc modum etiam in qualitibus contingit esse excessum et defectum uel secundum aliquam proportionem numeralem uel secundum excessum incommensurabilem.”

<sup>47</sup> *In Metaph.* 5, l. 17, §1022: “Ponit [Philosophus] *relativa*, quae accipiuntur secundum unitatem, et non per comparationem numeri ad unum vel ad numerum.”

<sup>48</sup> *In Metaph.* 5, l. 17, §1022 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a9–11): “et dicit [Philosophus] quod alio modo a praedictis dicuntur *relative*, *aequale*, *simile*, et *idem*. Haec enim dicuntur secundum unitatem.”

1. Those are **the same** (*eadem* = ταῦτά) whose substance is one (*quorum substantia <est> una* = ὧν μία ἡ οὐσία).<sup>49</sup>

2. Those are **alike** (*similia* = ὅμοια) whose quality is one (*quorum qualitas <est> una* = ὧν ἡ ποιότης μία).<sup>50</sup>

3. Those are **equal** (*aequalia* = ἴσον) whose quantity is one (*quorum quantitas <est> una* = ὧν τὸ ποσὸν ἓν).<sup>51</sup>

Since *one* is the principle and measure of number (< τὸ... ἐν τοῦ ἀριθμοῦ ἀρχὴ καὶ μέτρον), it is also evident that these are said (to be relative) *to something* (*ad aliquid*) *according to number* (< κατ' ἀριθμόν): that is, according to something that pertains to the genus of number.<sup>52</sup> However, these (are) not (said to be related) in the same mode as the former (< οὐ τὸν αὐτὸν... τρόπον), for the former relations were according to *number* (*in relation*) *to number* or according to *number* (*in relation*) *to one*, while these (are said to be relations) according to *one* absolutely.

### 37.9. Relation in Active and Passive Potencies and Acts

The relatives that are in active (things) and in passive (*in activis et passivis* < τὰ... ποιητικὰ καὶ παθητικὰ) are relative in two modes:<sup>53</sup>

1. **According to active (potency) and passive potency** (*secundum potentiam activam et passivam* = κατὰ δύναμιν ποιητικὴν καὶ παθητικὴν).<sup>54</sup>

2. **According the acts of these potencies** (*secundum actus harum potentiarum* = κατὰ... ἐνεργείας τὰς τῶν δυνάμεων), which are to act (*agere*) and to be acted upon (*pati*).<sup>55</sup>

<sup>49</sup> *In Metaph.* 5, l. 17, §1022 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a11): "Nam eadem sunt, quorum substantia est una."

<sup>50</sup> *In Metaph.* 5, l. 17, §1022 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a11–12): "Similia, quorum qualitas est una."

<sup>51</sup> *In Metaph.* 5, l. 17, §1022 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a12): "Aequalia, quorum quantitas est una."

<sup>52</sup> *In Metaph.* 5, l. 17, §1022 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a12–14): "Cum autem unum sit principium numeri et mensura, patet etiam, quod haec dicuntur ad aliquid «secundum numerum,» id est secundum aliquid ad genus numeri pertinens; non eodem modo tamen haec ultima cum primis. Nam primae relationes erant secundum numerum ad numerum, vel secundum numerum ad unum; hoc autem secundum unum absolute."

<sup>53</sup> *In Metaph.* 5, l. 17, §1023 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a14–19): "Prosequitur [Philosophus] de secundo modo relationum, quae sunt in activis et passivis: et dicit, quod huiusmodi relativa sunt relativa dupliciter."

<sup>54</sup> *In Metaph.* 5, l. 17, §1023 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a15–16): "Uno modo secundum potentiam activam et passivam."

<sup>55</sup> *In Metaph.* 5, l. 17, §1023 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a16): "et secundo modo secundum actus harum potentiarum, qui sunt agere et pati."

Thus, *that which can heat* is said (in relation) *to that which can be heated* (*calefactivum <dicitur> ad calefactibile* = τὸ θερμαντικὸν πρὸς τὸ θερμαντόν) according to active and passive power.<sup>56</sup> For (what is already) heated is *that which can heat*, while what can be made hot is *that which can be heated*. Thus, *that which can heat* (in relation) *to that which can be heated*, and *that which can cut* (in relation) *to that which can be cut*, are said relatively according to the acts of the aforesaid potencies.

This mode of relations differs from the aforesaid, for those (actions) that are according to number are some (kind of) actions only according to likeness: for example, to multiply, to divide, and other such (actions found in mathematics).<sup>57</sup> Mathematical (things) abstract from motion. And hence, such actions—which are according to motion—cannot be in them (< αἱ δὲ κατὰ κίνησιν ἐνέργειαι οὐχ ὑπάρχουσιν).

It should also be known that the diversity of those relatives that are said according to active and passive potency is considered according to diverse times.<sup>58</sup> For some of them are said relatively according to past time: for example, *what produced* (is said in relation) *to what has been produced* (*quod fecit, ad illud quod factum est* = τὸ πεπιοηκὸς πρὸς τὸ πεπιοημένον), as *father* (is said in relation) *to son* because the former begot, (while) the latter was begotten; and these differ according to *having acted* and *having been acted upon* (*fecisse, et passum esse*). Others, in turn, (are said relatively) according to a future time, as *what is to produce* is referred to *what is to be produced* (*facturus refertur ad faciendum*).

To this genus of relations are reduced those relations that are said according to the privation of potency: for example, *impossible* and *invisible*, for something is said (to be) *impossible*—and likewise, *invisible*—*for* (i.e., *to*) *this* or *that* (*huic vel illi; ▶ 31.19*).<sup>59</sup>

<sup>56</sup> *In Metaph.* 5, l. 17, §1023 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a16–19): “sicut calefactivum dicitur ad calefactibile secundum potentiam activam et passivam. Nam calefactum est, quod potest calefacere; calefactibile vero, quod potest calefieri. Calefaciens autem ad calefactum, et secans ad id quod secatur, dicuntur relative secundum actus praedictarum potentiarum.”

<sup>57</sup> *In Metaph.* 5, l. 17, §1024 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a19–21): “Et differt iste modus relationum a praemissis. Quae enim sunt secundum numerum, non sunt aliquae actiones nisi secundum similitudinem, sicut multiplicare, dividere et huiusmodi, ut etiam in aliis dictum est, scilicet in secundo Physicorum; ubi ostendit, quod mathematica abstrahunt a motu, et ideo in eis esse non possunt huiusmodi actiones, quae secundum motum sunt.”

<sup>58</sup> *In Metaph.* 5, l. 17, §1025 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a21–25): “Sciendum etiam est quod eorum relativorum, quae dicuntur secundum potentiam activam et passivam, attenditur diversitas secundum diversa tempora. Quaedam enim horum dicuntur relative secundum tempus praeteritum, sicut quod fecit, ad illud quod factum est; ut pater ad filium, quia ille genuerit, iste genitus est; quae differunt secundum fecisse, et passum esse. Quaedam vero secundum tempus futurum, sicut facturus refertur ad faciendum.”

<sup>59</sup> *In Metaph.* 5, l. 17, §1025 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a25–26): “Et ad hoc genus relationum reducuntur illae relationes, quae dicuntur secundum privationem potentiae, ut impossibile et invisibile. Dicitur enim aliquid impossibile huic vel illi; et similiter invisibile.”

### 37.10. Relation of Measured to Measure

The third mode of relations differs from the aforesaid (i.e., relations according to number and relations according to potency, τὰ... κατ' ἀριθμὸν καὶ δύνανμιν) in that, in the aforesaid, any one (of them) is said relatively (*relative* < πρὸς τι) because it is referred to another (< τῷ ὅπερ ἐστὶν ἄλλου λέγεσθαι αὐτὸ ὃ ἐστίν) and not because another is referred to it (< μὴ τῷ ἄλλο πρὸς ἐκεῖνο).<sup>60</sup> Thus, *double* is referred to *half*, and conversely (too). Likewise, *father* (is referred) to *son*, and conversely (i.e., *son* is referred to *father*).

In this third mode, on the other hand, something is said relatively only because something is referred to it.<sup>61</sup> For example, it is evident that the sensible and the (scientifically) knowable or intelligible are said relatively because others are referred to them; for something is said (to be *scientifically*) *knowable* because (scientific) knowledge of it is possessed; likewise, something that can be sensed is said (to be) *sensible*.

Whence, (in this mode, a thing) is not said relatively on account of something that should be from their part—which would be a quality, a quantity, an action or an affection—, as happened in the aforesaid relations.<sup>62</sup> Rather, (they are said relatively) only on account of the actions of others, which—however—are not terminated in them.

Thus, if seeing should be the action of what can see reaching the thing seen, as heating reaches what can be heated, (then) just as what can be heated is referred to what heats, so what can be seen would be (related) to what sees.<sup>63</sup> However, seeing, understanding, and (other) such actions, remain in the agents and do not pass over into the things that are acted upon. Whence, what can be seen or what can be known does not undergo something (just) because it is seen or understood. And on account of this, they are not themselves referred to others—rather, others are referred to them.

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<sup>60</sup> *In Metaph.* 5, l. 17, §1026 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a26–29): “Prosequitur [Philosophus] de *tertio modo* relationum; et dicit quod in hoc differt iste tertius modus a praemissis, quod in praemissis, unumquodque dicitur relative ex hoc, quod ipsum ad aliud refertur; non ex eo quod aliud referatur ad ipsum. Duplum enim refertur ad dimidium, et e converso; et similiter pater ad filium, et e converso.”

<sup>61</sup> *In Metaph.* 5, l. 17, §1026 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a29–30): “sed hoc tertio modo aliquid dicitur relative ex eo solum, quod aliquid refertur ad ipsum; sicut patet, quod sensibile et scibile vel intelligibile dicuntur relative, quia alia referuntur ad illa. Scibile enim dicitur aliquid, propter hoc, quod habetur scientia de ipso. Et similiter sensibile dicitur aliquid quod potest sentiri.”

<sup>62</sup> *In Metaph.* 5, l. 17, §1027 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a31–33): “Unde non dicitur relative propter aliquid quod sit ex eorum parte, quod sit qualitas, vel quantitas, vel actio, vel passio, sicut in praemissis relationibus accidebat; sed solum propter actiones aliorum, quae tamen in ipsa non terminantur.”

<sup>63</sup> *In Metaph.* 5, l. 17, §1027 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021a33–b1): “Si enim videre esset actio videntis perveniens ad rem visam, sicut calefactio pervenit ad calefactibile; sicut calefactibile refertur ad calefaciens, ita visibile referretur ad videntem. Sed videre et intelligere et huiusmodi actiones, ut in nono huius dicitur, manent in agentibus, et non transeunt in res passas; unde visibile et scibile non patitur aliquid, ex hoc quod intelligitur vel videtur. Et propter hoc non ipsamet referuntur ad alia, sed alia ad ipsa.”

And (this) is likewise (the case) in all other (things) in which something is said relatively (*relative*) on account of a relation of another to it, as the left and the right in a column.<sup>64</sup> Indeed, since left and right should designate principles of motions in animated things, they can only be attributed to a column or to something inanimate insofar as animated (things) are in some mode related to it, as a column is said to be (on the) right because a man is to its left.

And (this) is likewise (the case) concerning an image in respect of (its) exemplar; and (concerning) the denarius that comes to be the price of purchase.<sup>65</sup>

In all of these (cases), the whole *ratio* of referring (*tota ratio referendi*) in two extremes depends on one of the two (extremes, *pendet ex altero*).<sup>66</sup> And hence, all (those relatives that are) of this mode are in some mode related as *measurable* and *measure*, **for anything whatsoever is measured by that on which it depends** (*ab eo quaelibet res mensuratur, a quo ipsa dependet*).

However, it ought to be known that, although (scientific) knowledge (*scientia*), according to the name, seems to be referred to the (scientific) knower (*ad scientem*) and to the (scientifically) knowable (*ad scibile*)—for (scientific) knowledge is said (to be) of the (scientific) knower, and (scientific) knowledge is said (to be) of the (scientifically) knowable—, however, the intellect, insofar as it is said (to be in relation) to something, (it is) not (said to be relative) *to this* (thing) of which it is (relatively said) as it is said of a subject.<sup>67</sup> For it is manifest (*constat*) that the intellect is said (in relation) to the intelligible as (in relation) to an object (► 14.9). If it should be said (in relation) to the intelligent, it would be said twice (in relation) *to something*; and since the being (*esse*; i.e., essence) of the relative should be *to be related to another in some mode* (*ad aliud quodammodo se habere*), it would follow that the same would have a double being (i.e., a double quiddity).

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<sup>64</sup> *In Metaph.* 5, l. 17, §1027: “Et simile est in omnibus aliis, in quibus relative aliquid dicitur propter relationem alterius ad ipsum, sicut dextrum et sinistrum in columna. Cum enim dextrum et sinistrum designent principia motuum in rebus animatis, columnae et alicui inanimato attribui non possunt, nisi secundum quod animata aliquo modo se habeant ad ipsam, sicut columna dicitur dextra, quia homo est ei sinister.”

<sup>65</sup> *In Metaph.* 5, l. 17, §1027: “Et simile est de imagine respectu exemplaris, et denario, quo fit pretium emptionis.”

<sup>66</sup> *In Metaph.* 5, l. 17, §1027: “In omnibus autem his tota ratio referendi in duobus extremis, pendet ex altero. Et ideo omnia huiusmodi quodammodo se habent ut mensurabile et mensura. Nam ab eo quaelibet res mensuratur, a quo ipsa dependet.”

<sup>67</sup> *In Metaph.* 5, l. 17, §1028: “Sciendum est autem, quod quamvis scientia secundum nomen videatur referri ad scientem et ad scibile, dicitur enim scientia scientis, et scientia scibilis, et intellectus ad intelligentem et intelligibile; tamen intellectus secundum quod ad aliquid dicitur, non ad hoc cuius est sicut subiecti dicitur: sequeretur enim quod idem relativum bis diceretur. Constat enim quoniam intellectus dicitur ad intelligibile, sicut ad obiectum. Si autem diceretur ad intelligentem, bis diceretur ad aliquid; et cum esse relativi sit ad aliud quodammodo se habere, sequeretur quod idem haberet duplex esse.”

Likewise, it is evident that *seeing* is not said (in relation) *to the one who sees* but (in relation) to the object, which is color; or (in relation) “to some other such thing,” which ARISTOTLE says on account of those that are seen at night but not by their own color.<sup>68</sup>

Although it can rightly be said that seeing should be of that which sees (*quod visus sit videntis*), however, sight is referred to that which sees not insofar as it is sight but insofar as it is an accident (i.e., the act of seeing) or a potency (i.e., the power of seeing) of that which sees.<sup>69</sup> For a relation has a regard to (*respicit*) something external, while a subject (has a regard to something) only insofar as it is an accident.

### 37.11. Why There Are Three Modes of Real Relation

It is evident that such are the (three) modes (►37.1) in which, according to themselves (*secundum se*), some (two things) are said (to be in relation) *to something (ad aliquid)*.<sup>70</sup>

The reason for these modes is this: since a **relation that is in things** should consist in some *order of one thing to another*, there must be as many modes of such relations as (there are) modes (in which) one thing can be ordered to another.<sup>71</sup>

Now, one thing is ordered to another (*ordinatur... una res ad aliam*) either:<sup>72</sup>

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<sup>68</sup> *In Metaph.* 5, l. 17, §1028 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b1–3): “Et similiter de visu patet quod non dicitur ad videntem, sed ad obiectum quod est color vel aliquid aliud tale. Quod dicit [Philosophus] propter ea, quae videntur in nocte non per proprium colorem, ut habetur in secundo de Anima.” Cf. ARISTOTLE, *De anima* B.7, 419a1–7; *In De anima* 2, c. 15, 28–63. As St. Thomas explains, the virtue of color is imperfect in acting in respect of the virtue of light, for **color** is nothing other than *some light obscured in some mode by the admixture of an opaque body*; whence, it does not have a virtue such that it could make the medium (to be) in that disposition by which it comes to be susceptible of color—something that pure light, on the other hand, can do. Therefore, it is also evident that, since light should be—in some mode—the substance of color, every visible (thing) is reduced to the same nature; and it is not necessary for color to be made visible in act by an extrinsic light. Thus, that illuminated colors should be seen by that which is in darkness, happens because also the medium is illuminated as much as suffices for the alteration (suffered on account) of sight. *In De anima* 2, c. 14, 374–387: “uirtus coloris in agendo est imperfecta respectu uirtutis luminis: nam color nichil aliud est quam lux quedam quodam modo obscurata ex ammixtione corporis opaci, unde non habet uirtutem ut faciat medium in illa dispositione qua fit susceptium coloris; quod tamen potest facere lux pura. Ex quo etiam patet quod, cum lux sit quodam modo substantia coloris, ad eandem naturam reducitur omne uisibile, nec oportet quod color per lumen extrinsecum fiat actu uisibile. Quod autem colores illuminati uidentur ab eo qui est in obscuro, contingit ex hoc quod etiam medium illuminatur in quantum sufficit ad inmutationem uisus.”

<sup>69</sup> *In Metaph.* 5, l. 17, §1029 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b2–3): “Quamvis et hoc recte posset dici, scilicet quod visus sit videntis. Refertur autem visus ad videntem, non in quantum est visus, sed in quantum est accidens, vel potentia videntis. Relatio enim respicit aliquid extra, non autem subiectum nisi in quantum est accidens. Et sic patet, quod isti sunt modi, quibus aliqua dicuntur secundum se ad aliquid.”

<sup>70</sup> *In Metaph.* 5, l. 17, §1029 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b3–4): “Et sic patet, quod isti sunt modi, quibus aliqua dicuntur secundum se ad aliquid.”

<sup>71</sup> *In Metaph.* 5, l. 17, §1004: “Ratio autem istorum modorum haec est. Cum enim relatio, quae est in rebus, consistat in ordine quodam unius rei ad aliam, oportet tot modis huiusmodi relationes esse, quot modis contingit unam rem ad aliam ordinari.”

<sup>72</sup> *In Metaph.* 5, l. 17, §1004: “Ordinatur autem una res ad aliam, vel secundum esse, [...] et sic est tertius modus. Vel secundum uirtutem activam et passivam [...]; et sic est secundus modus. Vel secundum quod quantitas unius rei potest mensurari per aliam; et sic est primus modus.”

1. **Insofar as the quantity of one thing can be measured by another**; such is the first mode (► 37.1, ¶1).<sup>73</sup>

2. **According to active and passive virtue**, insofar as one thing receives (something) from the other or confers something to the other; such is the second mode (► 37.1, ¶2).<sup>74</sup>

3. **According to being** (*secundum esse*), insofar as the being of one thing depends upon another (and not conversely); such is the third mode (► 37.1, ¶3; 37.10; 47.19).<sup>75</sup>

### 37.12. No Real Relation in Quality as Such

The **quality of a thing**, as such (*inquantum huiusmodi*), has a regard (*respicit*) only to the subject in which it is.<sup>76</sup> Whence, according to it, one thing is ordered to another only:

1. By reason of quantity (*ratione quantitatis*) or of something that pertains to quantity, as something is said (to be) whiter than another, or as (that) is said (to be) alike which has some one quality.<sup>77</sup>

2. Insofar as a quality receives the *ratio* of *passive potency* or *active (potency)* on account of it being a principle of action or of affection.<sup>78</sup>

### 37.13. Other Genera Do Not Cause a Relation: They Follow upon a Relation

The other genera follow upon a relation more than they could cause a relation.<sup>79</sup>

1. **When** (*quando*) consists in some relation *to time* (*ad tempus*; ► 33.6, ¶1).<sup>80</sup>

2. **Where** (*ubi*, consists in some relation) *to place* (*ad locum*; ► 33.6, ¶2).<sup>81</sup>

3. **Situation** (*positio* < τὸ κείσθαι) conveys (*importat*) an *order of parts* (► 33.6, ¶3).<sup>82</sup>

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<sup>73</sup> *In Metaph.* 5, l. 17, §1004: “Vel secundum quod quantitas unius rei potest mensurari per aliam; et sic est primus modus.”

<sup>74</sup> *In Metaph.* 5, l. 17, §1004: “Vel secundum virtutem activam et passivam, secundum quod una res ab alia recipit, vel alteri confert aliquid; et sic est secundus modus.”

<sup>75</sup> *In Metaph.* 5, l. 17, §1004: “vel secundum esse, prout esse unius rei dependet ab alia, et sic est tertius modus.”

<sup>76</sup> *In Metaph.* 5, l. 17, §1005: “Qualitas autem rei, inquantum huiusmodi, non respicit nisi subiectum in quo est. Unde secundum ipsam una res non ordinatur ad aliam, nisi secundum quod [...].”

<sup>77</sup> *In Metaph.* 5, l. 17, §1005: “Vel ratione quantitatis, vel alicuius ad quantitatem pertinentis; sicut dicitur aliquid albius alio, vel sicut dicitur simile, quod habet unam aliquam qualitatem.”

<sup>78</sup> *In Metaph.* 5, l. 17, §1005: “secundum quod qualitas accipit rationem potentiae passivae vel activae, prout est principium actionis vel passionis.”

<sup>79</sup> *In Metaph.* 5, l. 17, §1005: “Alia vero genera magis consequuntur relationem, quam possint relationem causare.”

<sup>80</sup> *In Metaph.* 5, l. 17, §1005: “Nam quando consistit in aliquali relatione ad tempus.”

<sup>81</sup> *In Metaph.* 5, l. 17, §1005: “Ubi vero, [consistit in aliquali relatione] ad locum.”

<sup>82</sup> *In Metaph.* 5, l. 17, §1005: “Positio autem ordinem partium importat.”



4. **Habitus** (conveys) a relation of *possessor to (thing) possessed* (*habentis ad habitum*; ► 33.7).<sup>83</sup>

#### 37.14. Disposition

ARISTOTLE posits the common *ratio* of the name *disposition*, saying that **disposition** (*dispositio* = διάθεσις) is nothing other than *the order of the parts in that which has parts* (*ordo partium in habente partes* = τοῦ ἔχοντος μέρη τάξις).<sup>84</sup> And he posits the modes in which *disposition* is said, which are three:

1. According to the order of parts in a place (< κατὰ τόπον; i.e., the same as *situation*).<sup>85</sup>

In this way, *disposition* or *site* (*dispositio sive situs*) is some category (► 33.6, ¶3; 37.13).<sup>86</sup>

2. Insofar as the order of parts is considered according to potency or virtue (< κατὰ δύναμιν).<sup>87</sup>

In this way, disposition is posited in the first species of quality (according to the *Categories*; ► 36.1, ¶4), for something is said to be disposed in this mode because its parts have an order in an active or passive virtue (► 22.2): for example, according to health or to illness.<sup>88</sup>

3. Insofar as the order of the parts is considered according to the species and figure of a whole (< κατ' εἶδος).<sup>89</sup>

In this way, disposition or **site** (*situs*) is posited (as) a difference in the genus of quantity, for some quantity has position, as line, surface, body, and place; and another does not have (position), as number and time (► 35.7).<sup>90</sup>

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<sup>83</sup> In *Metaph.* 5, l. 17, §1005: "Habitus autem relationem habentis ad habitum [importat]."

<sup>84</sup> As St. Thomas explains, ARISTOTLE treats of the name *disposition* in close proximity to *secundum quod* because, in one mode (► 17.3, ¶4), *according to* (*secundum quod* < τὸ καθ' ὃ) signifies position (*positio* < τὸ κατὰ θέσιν). In *Metaph.* 5, l. 20, §1058 (cf. ARISTOTLE, *Metaphysica* Δ.19, 1022b1–3): "Quia uno modo Secundum quod positionem significat, ideo consequenter Philosophus prosequitur *de nomine dispositionis*; et ponit rationem communem huius nominis dispositio, dicens, quod dispositio nihil est aliud quam ordo partium in habente partes. Ponit autem modos quibus dicitur dispositio: qui sunt tres."

<sup>85</sup> In *Metaph.* 5, l. 20, §1058 (cf. ARISTOTLE, *Metaphysica* Δ.19, 1022b1–2): "Quorum primus est secundum ordinem partium in loco."

<sup>86</sup> In *Metaph.* 5, l. 20, §1058: "Et sic dispositio sive situs est quoddam praedicamentum."

<sup>87</sup> In *Metaph.* 5, l. 20, §1059 (cf. ARISTOTLE, *Metaphysica* Δ.19, 1022b2): "Secundus modus est, prout ordo partium attenditur secundum potentiam sive virtutem."

<sup>88</sup> In *Metaph.* 5, l. 20, §1059: "et sic dispositio ponitur in prima specie qualitatis. Dicitur enim aliquid hoc modo esse dispositum, utputa secundum sanitatem vel aegritudinem, ex eo quod partes eius habent ordinem in virtute activa vel passiva."

<sup>89</sup> In *Metaph.* 5, l. 20, §1060 (cf. ARISTOTLE, *Metaphysica* Δ.19, 1022b2): "Tertius modus est, prout ordo partium attenditur secundum speciem et figuram totius."

<sup>90</sup> In *Metaph.* 5, l. 20, §1060: "et sic dispositio sive situs ponitur differentia in genere quantitatis. Dicitur enim quod quantitas alia est habens positionem, ut linea, superficies, corpus et locus; alia non habens, ut numerus et tempus."

ARISTOTLE shows that the name *disposition* should signify order, for it signifies position, as the imposition itself of name demonstrates (i.e., *dispositio* < *positio*, just like διάθεσις < θέσις); and *order* belongs to the *ratio* of *position*.<sup>91</sup>

Insofar as *disposition* (*dispositio* = حال *hāl*) designates *order*, it is a relation (► 37.11, ¶3).<sup>92</sup>

### 37.15. Disposition in Causes

The disposition that disposes matter to receive (a form) is reduced to the material cause.<sup>93</sup> However, this disposition is not a cause simply (*simpliciter*) but (a cause) according to something (*secundum quid*).<sup>94</sup>

Inversely, the disposition of the agent to act is reduced to the efficient cause.<sup>95</sup>

(In the genus of the formal cause), disposition is reduced to the form to which it disposes, as the incomplete is reduced (to the complete; i.e., because *whole* has the ratio of *form*; ► 13.1).<sup>96</sup>

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<sup>91</sup> *In Metaph.* 5, l. 20, §1061 (cf. ARISTOTLE, *Metaphysica* Δ.19, 1022b2–3): “Ostendit [Philosophus] etiam quod hoc nomen dispositio, ordinem significet. Significat enim positionem, sicut ipsa nominis impositio demonstrat: de ratione autem positionis est ordo.”

<sup>92</sup> *STh* I, q. 116 a. 2 ad 3: “Ad tertium [sc., *si fatum est in creaturis, aut est substantia, aut accidens, et quodcumque horum detur, oportet quod multiplicetur secundum creaturarum multitudinem. Cum ergo fatum videatur esse unum tantum, videtur quod fatum non sit in creaturis, sed in Deo*] dicendum quod fatum dicitur dispositio, non quae est in genere qualitatis; sed secundum quod dispositio designat ordinem, qui non est substantia, sed relatio. Qui quidem ordo, si consideretur per comparisonem ad suum principium, est unus, et sic dicitur unum fatum. Si autem consideretur per comparisonem ad effectus, vel ad ipsas causas medias, sic multiplicatur, per quem modum poeta dixit, te tua fata trahunt.” We find this use also in *De veritate*, q. 1 a. 1 ad 5: “Ad quintum [sc., *illa quorum est una dispositio, sunt eadem. Sed veri et entis est eadem dispositio. Ergo sunt eadem. Dicitur enim in II Metaphysic.: dispositio rei in esse est sicut sua dispositio in veritate. Ergo verum et ens sunt omnino idem*] dicendum, quod dispositio non accipitur ibi secundum quod est in genere qualitatis, sed secundum quod importat quemdam ordinem; cum enim illa quae sunt causa aliorum essendi sint maxime entia, et illa quae sunt causa veritatis sint maxime vera; concludit Philosophus, quod idem est ordo alicui rei in esse et veritate; ita, scilicet, quod ubi invenitur quod est maxime ens, est maxime verum. Unde nec hoc ideo est quia ens et verum ratione sunt idem, sed quia secundum hoc quod aliquid habet de entitate, secundum hoc est natum adaequari intellectui; et sic ratio veri sequitur rationem entis.” Here, the quote “dispositio rei in esse est sicut sua dispositio in veritate” follows Michael SCOT’s (?) translation of ARISTOTLE, known as *Nova Metaphysica*, in which *dispositio* originates in حال *hāl*, as per AVERROES, *tafsir ma ba’d at-tabī’at*, Text 4, Book I, Tome I, 13.6–7: “فيجب من ذلك ان يكون كل واحد من الاشياء حاله في الوجود حاله في الحق.” Cf. ARISTOTLE, *Metaphysica* α.1, 993b30–31: “ἕκαστον ὡς ἔχει τοῦ εἶναι, οὕτω καὶ τῆς ἀληθείας.” MOERBEKE renders this text thus: “unumquodque sicut se habet ut sit, ita et ad veritatem.” Clearly, this is an analogy of proportionality, which joins two relations. From these texts, it is not difficult to see that *order* should be reduced to *dependence in being*, which is the third mode of relation.

<sup>93</sup> *In Sent.* 4, d. 17 q. 2 a. 5 qc. 1 co.: “Dispositio autem reducitur ad causam materialem, si accipiatur dispositio quae disponit materiam ad recipiendum.”

<sup>94</sup> *STh* II-II, q. 27 a. 3 co.: “Est autem quadruplex genus causae, scilicet finalis, formalis, efficiens et materialis, ad quam reducitur etiam materialis dispositio, quae non est causa simpliciter, sed secundum quid.”

<sup>95</sup> *In Sent.* 4, d. 17 q. 2 a. 5 qc. 1 co.: “secus autem est de dispositione agentis ad agendum, quia illa reducitur ad genus causae efficientis.”

<sup>96</sup> *In Sent.* 4, d. 2 q. 2 a. 1 qc. 1 ad 2: “dispositio reducitur ad genus formae ad quam disponit; et ideo Baptismus Joannis reducitur ad sacramenta novae legis, sicut incompletum in genere illo; et hoc patet ex ordine procedendi quem Magister servat.”

### 37.16. Relatives by Reason of Another

ARISTOTLE posits three modes in which some (things) are said (to be relative) to something not by themselves but by reason of another (*ratione alterius, secundum aliud*):<sup>97</sup>

1. When some (things) are said (to be in relation) *to another on account of their genera* being (in relation) to another (*propter hoc quod sua genera sunt ad aliquid* < τὰ... ἂν τὰ γένη αὐτῶν ἢ τοιαῦτα).<sup>98</sup>

For example, (the habit or art of) medicine (*medicina* = ἡ ἰατρική) is said (to be in relation) to something (*ad aliquid* = πρὸς τι) because (scientific) knowledge (*scientia* = ἡ ἐπιστήμη) is (in relation) to something; for it is said that medicine is the science of the healthy and of the ill (i.e., its genus, τὸ γένος αὐτῆς, is the subject that is susceptible of health and of illness).<sup>99</sup> And in this mode, (scientific) knowledge is referred-to because it is an accident.

2. When some **abstract** (things) are said (to be in relation) *to something (ad aliquid)* because the **concrete** (things) having (*habentia* = ἔχοντα) those abstract (things) are said (to be in relation) *to another (ad aliud)*.<sup>100</sup>

For example, *equality* (*aequalitas* = ἰσότης) and *likeness* (*similitudo* = ὁμοιότης) are said (to be in relation) *to something* because *the equal* (*aequale* = τὸ ἴσον) and *the like* (*simile* = τὸ ὅμοιον) are (in relation) to something (► 37.8).<sup>101</sup> However, according to the name, *equality* and *likeness* do not convey (*non dicuntur*) a relation (*ad aliquid*).

3. When a **subject** is said (to be in relation) *to something by reason of an accident (ratione accidentis* < κατὰ συμβεβηκός).<sup>102</sup>

For example, man—or white—is said (to be in relation) *to something* because it happens to be the double (of something).<sup>103</sup>

<sup>97</sup> *In Metaph.* 5, l. 17, §1001: “ponit [Philosophus] modos [...] eorum, quae sunt ad aliquid ratione alterius.” *Ibid.*, §1030 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b4–11): “Ponit tres modos, quibus aliqua dicuntur ad aliquid non secundum se, sed secundum aliud.”

<sup>98</sup> *In Metaph.* 5, l. 17, §1030 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b4–5): “Quorum primus est, quando aliqua dicuntur ad aliquid propter hoc quod sua genera sunt ad aliquid.”

<sup>99</sup> *In Metaph.* 5, l. 17, §1030 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b5–6): “sicut medicina dicitur ad aliquid, quia scientia est ad aliquid. Dicitur enim, quod medicina est scientia sani et aegri. Et isto modo refertur scientia per hoc quod est accidens.”

<sup>100</sup> *In Metaph.* 5, l. 17, §1031 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b6–7): “Secundus modus est, quando aliqua abstracta dicuntur ad aliquid, quia concreta habentia illa abstracta ad aliud dicuntur.”

<sup>101</sup> *In Metaph.* 5, l. 17, §1031 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b7–8): “sicut aequalitas et similitudo dicuntur ad aliquid, quia simile et aequale ad aliquid sunt. Aequalitas autem et similitudo secundum nomen non dicuntur ad aliquid.”

<sup>102</sup> *In Metaph.* 5, l. 17, §1032 (cf. ARISTOTLE, *Metaphysica* Δ.15, 1021b8): “Tertius modus est, quando subiectum dicitur ad aliquid, ratione accidentis.”

<sup>103</sup> *In Metaph.* 5, l. 17, §1032 (ARISTOTLE, *Metaphysica* Δ.15, 1021b8–11): “sicut homo vel album dicitur ad aliquid, quia utriusque accidit duplum esse; et hoc modo caput dicitur ad aliquid, eo quod est pars.”

### 37.17. Reality of Relation: First vs. Second Intentions

As AVERROES says, relation (*relatio* = مضاف *muḍāf*) is the weaker being (*debilioris esse* = أضعف وجوداً *'aḍ'afu wuḡūdan*) among all the categories.<sup>104</sup> Wherefrom, some have reckoned that it is from second (things) understood (*ex secundis intellectibus* = من المعقولات *mina l-ma'qūlāti l-ṭawānī*; i.e., among second intentions):

1. The **first (things) understood** (*prima intellecta*) are *the things outside the soul*, in which the intellect first considers those (things) that are to be understood.<sup>105</sup>

2. The **second (things) understood** (*secunda intellecta*) are said (to be) *the intentions that follow upon the mode of understanding*, for the intellect understands this insofar as it is reflected over itself, understanding that it itself understands and (understanding) the mode in which it understands.<sup>106</sup>

Therefore, according to this position, it would follow that a relation should not be in things outside the mind, but only in the intellect, as the intention of *genus* and (of) *species*, and second substances (►21.7).<sup>107</sup>

However, this cannot be (the case), for in no category is something posited unless a thing outside the mind exists.<sup>108</sup> Indeed, being of *ratio* is divided against the (common) being

<sup>104</sup> *De potentia*, q. 7 a. 9 co.: “sciendum est, quod sicut dicit Commentator in XI Metaph., quia relatio est debilioris esse inter omnia praedicamenta, ideo putaverunt quidam eam esse ex secundis intellectibus.” AVERROES, *tafsir ma ba'd at-tabi'at*, Commentary 19, Book XII, Tome VII, 1507.14–16: “انه يلزم ان يكون الجوهر والمضاف داخلين تحت جنس واحد وانما خص المضاف لأنه اضعف وجوداً من سائر المقولات حتى ظن قوم انه من المعقولات. AVERROES is commenting here on ARISTOTLE, *Metaphysica* Λ.4, 1070a35–36: “ἀλλ' ἄτοπον εἰ ταῦτὰ πάντων· ἐκ τῶν αὐτῶν γὰρ ἔσται τὰ πρὸς τι καὶ αἱ οὐσίαι.” In this context, ARISTOTLE had just affirmed that, in a way, the principles and causes of diverse (things) are diverse—but speaking universally and analogically, they are the same for all. As St. Thomas explains following AVERROES, ARISTOTLE then raises the question as to whether the principles of substances, of relations, and of the other categories should be the same. And he especially posits relation (< خص المضاف >) because those that are (in relation) to something (*ad aliquid* < المضاف < πρὸς τι) seem to be more remote from substance than the other genera, for they are of a weaker being. In *Metaph.* 12, l. 4 §§2456–7: “*Inquirendo* [Philosophus] *discutit veritatem praemissam* [sc., quod quodammodo sunt alia aliorum et principia et causae, et quodammodo sunt eadem omnium, secundum universalitatem, et secundum proportionem]; [...]. Dicit ergo primo, quod dubitatio est, utrum substantiarum, et eorum quae sunt ad aliquid, et similiter aliorum praedicamentorum, sint eadem principia, aut alia et alia. Et ponit specialiter de ad aliquid, quia ea quae sunt ad aliquid, remotiora videntur esse a substantia quam alia genera, ex eo quod sunt debilioris esse.”

<sup>105</sup> *De potentia*, q. 7 a. 9 co.: “Prima enim intellecta sunt res extra animam, in quae primo intellectus intelligenda fertur.”

<sup>106</sup> *De potentia*, q. 7 a. 9 co.: “Secunda autem intellecta dicuntur intentiones consequentes modum intelligendi: hoc enim secundo intellectus intelligit in quantum reflectitur supra se ipsum, intelligens se intelligere et modum quo intelligit.”

<sup>107</sup> *De potentia*, q. 7 a. 9 co.: “Secundum ergo hanc positionem sequeretur quod relatio non sit in rebus extra animam, sed in solo intellectu, sicut intentio generis et speciei, et secundarum substantiarum.”

<sup>108</sup> *De potentia*, q. 7 a. 9 co.: “Hoc autem esse non potest. In nullo enim praedicamento ponitur aliquid nisi res extra animam existens. Nam ens rationis dividitur contra ens divisum per decem praedicamenta ut patet V Metaph. Si autem relatio non esset in rebus extra animam non poneretur ad aliquid unum genus praedicamenti.”

that is divided into ten categories (►30.5). And if a relation should not be in the things outside the soul, (to be related) to something (*ad aliquid*) would not be posited (to be) one genus of category (►33.1; 33.3, ¶2).

Besides, the perfection and the good that are in things outside the soul are not only considered insofar as something inheres absolutely in things, but also according to the order of one thing to another, just like the good of an army consists in the order of the parts of the army—and ARISTOTLE compares the order of the universe to this order (►8.12).<sup>109</sup>

Therefore, there must be some order in things themselves (*in ipsis rebus*)—and this order is some relation.<sup>110</sup> Whence, there must be some relations in things themselves, according to which one (thing) is ordered to another (thing).

One thing is ordered to another (thing) either according to quantity or according to an active or passive virtue (►37.11), for from these two alone (i.e., from quantity and from virtue) is something considered (to be) in one (thing) in respect of an extrinsic (thing).<sup>111</sup> Indeed, something is measured not only by an intrinsic quantity but also by an extrinsic (quantity); and any one (thing) acts on another (*agit in alterum*) through an active virtue and is affected by another (*patitur ab altero*) through a passive (virtue).

Instead, something is ordered through substance and (through) quality only to itself, not to another, except by accident: to wit, (1) insofar as quality—or substantial form or matter—has the *ratio* of active or passive virtue (►37.12, ¶2); (2) according as some *ratio* of quantity is considered in them insofar as *one* in substance causes *the same*, and *one* in quality (causes) *the like* (►37.8); and (3) number or multitude (causes) *the unlike* and *the diverse* in the same (genera): the unlike, insofar as something is considered (to be) more or less than the other, for in this way, something is said (to be) *whiter* than another (►37.12, ¶1).<sup>112</sup>

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<sup>109</sup> *De potentia*, q. 7 a. 9 co.: “Et praeterea perfectio et bonum quae sunt in rebus extra animam, non solum attenditur secundum aliquid absolute inhaerens rebus, sed etiam secundum ordinem unius rei ad aliam, sicut etiam in ordine partium exercitus, bonum exercitus consistit: huic enim ordini comparat Philosophus ordinem universi.”

<sup>110</sup> *De potentia*, q. 7 a. 9 co.: “Oportet ergo in ipsis rebus ordinem quemdam esse; hic autem ordo relatio quaedam est. Unde oportet in rebus ipsis relationes quasdam esse, secundum quas unum ad alterum ordinatur.”

<sup>111</sup> *De potentia*, q. 7 a. 9 co.: “Ordinatur autem una res ad aliam vel secundum quantitatem, vel secundum virtutem activam seu passivam. Ex his enim solum duobus attenditur aliquid in uno, respectu extrinseci. Mensuratur enim aliquid non solum a quantitate intrinseca, sed etiam ab extrinseca. Per virtutem etiam activam unumquodque agit in alterum et per passivam patitur ab altero.”

<sup>112</sup> *De potentia*, q. 7 a. 9 co.: “per substantiam autem et qualitatem ordinatur aliquid ad seipsum tantum, non ad alterum, nisi per accidens; scilicet secundum quod qualitas, —vel forma substantialis aut materia,— habet rationem virtutis activae vel passivae, et secundum quod in eis consideratur aliqua ratio quantitatis, prout unum in substantia facit idem, et unum in qualitate simile, et numerus, sive multitudo,

Wherefrom, when ARISTOTLE assigns the species of relation, he posits some (to be) caused from quantity, while (he posits) some (to be caused) from action and affection.<sup>113</sup> In this way, therefore, things that have an order to something must be really referred to it, and the relation must be something in them.

### 37.18. Foundation of Relation on Other Accidents

The weakness of the being (*esse*) of a relation is considered according to its inherence (in relation) to a subject, since it does not posit some absolute thing in the subject: rather, (it posits something in the subject) only in respect to another (*per respectum ad aliud*).<sup>114</sup>

Hence, in order to understand ARISTOTLE'S division of relation (*ad aliquid*), we ought to consider that, since relation has the weakest being (*debilissimum esse*) because it consists only in being related to another (*ad aliud se habere*), it must be founded on another accident; for the accidents (that are) more perfect are closer to substance, while other accidents are in substance by means of them (*eis mediantibus*).<sup>115</sup>

Relation (*relatio*) is maximally founded on two (accidents) that have an order to another: namely, on **quantity** and on **action**, for quantity can also be the measure of something exterior, and the agent transfers its action into another.<sup>116</sup>

Thus, some relations are founded over quantity—and above all, over number, to which the first *ratio* of measure belongs (*competit*), as is evident in *double* and *half*, *multiple* and *submultiple*, and in other such (proportions; ► 37.2).<sup>117</sup> Likewise, *same*, *alike*, and *equal* are founded on *unity*, which is the principle of number (► 37.8).

Other relations are instead founded on action and affection (► 37.9), either *according to the act itself*, as *that which heats* is said (in relation) *to that which is heated*; or *according*

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dissimile et diversum in eisdem, et dissimile secundum quod aliquid magis vel minus altero consideratur: sic enim albius aliquid altero dicitur.”

<sup>113</sup> *De potentia*, q. 7 a. 9 co.: “Et propter hoc Philosophus in V Metaph. species assignans relationis, quasdam ponit ex quantitate causatas, quasdam vero ex actione et passione. Sic ergo oportet quod res habentes ordinem ad aliquid, realiter referantur ad ipsum, et quod in eis aliqua res sit relatio.”

<sup>114</sup> *In Sent.* 1, d. 8 q. 4 a. 3 ad 4: “debilitas esse relationis consideratur secundum inhaerentiam sui ad subjectum: quia non ponit aliquid absolutum in subjecto, sed tantum per respectum ad aliud.”

<sup>115</sup> *In Physic.* 3, l. 1, n. 6 (cf. ARISTOTLE, *Physica* Γ.1, 200b28–32): “Tertia divisio est unius generis entium, scilicet eius quod est *ad aliquid*.” Ibid.: “Ad huius igitur tertiae divisionis intellectum, considerandum est quod, cum relatio habeat debilissimum esse, quia consistit tantum in hoc quod est ad aliud se habere, oportet quod super aliquid aliud accidens fundetur; quia perfectiora accidentia sunt propinquiora substantiae, et eis mediantibus alia accidentia substantiae insunt.”

<sup>116</sup> *In Physic.* 3, l. 1, n. 6: “Maxime autem super duo fundatur relatio, quae habent ordinem ad aliud, scilicet super quantitatem et actionem: nam quantitas potest esse mensura etiam alicuius exterioris; agens autem transfundit actionem suam in aliud.”

<sup>117</sup> *In Physic.* 3, l. 1, n. 6: “Relationes igitur quaedam fundantur super quantitatem; et praecipue super numerum, cui competit prima ratio mensurae, ut patet in duplo et dimidio, multiplici et submultiplici, et in aliis huiusmodi. Idem etiam et simile et aequale fundantur super unitatem, quae est principium numeri.”

to *having acted*, as *father* is referred to *son* because he begot him; or *according to potency to act*, as *master* (is related) to *servant* because he can coerce him.<sup>118</sup>

Wherefrom, according to ARISTOTLE, there is a relation (*ad aliquid* = πρὸς τι) according to superabundance and defect (< καθ' ὑπεροχὴν... καὶ κατ' ἔλλειψιν), which is founded on quantity, as *double* and *half*.<sup>119</sup> And (there is) another (relation) according to the active and the passive (< κατὰ τὸ ποιητικὸν καὶ παθητικόν), and (simply or universally, ὅλως, according to) the mover and the mobile (< κατὰ... τὸ... κινητικὸν... καὶ κινητόν), which are referred to each other, as is evident by itself.

Thus, those (things) that are (in relation) to something (*ad aliquid* = πρὸς τι) seem to be more remote from substance than the other genera, since they are of a weaker being.<sup>120</sup> Whence, too, they inhere in substance by means of other accidents, as *equal* and *unequal*, (and) *double* and *half*, (inhere in substance) by means of quantity (*mediate quantitate*); and *mover* and *moved*, *father* and *son*, (and) *master* and *servant*, (inhere in substance) by means of action and affection. This is so because substance exists by itself, while quantity and quality are beings in another. Relatives, on the other hand, are not only *in another* (*in alio*), but (also in relation) *to another* (*ad aliud*).

### 37.19. Posteriority and Imperfection of Relations

In creatures, relations have a dependent being (*esse dependens*) because their being is other than the being of substance.<sup>121</sup> Whence, they have a proper mode of being according to a proper *ratio*, as happens also in other accidents (► 33.21).

Thus, since all accidents are some forms added over substance and caused by the principles of substance, their being (*esse*) must be added over the being of the substance

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<sup>118</sup> *In Physic.* 3, l. 1, n. 6: "Aliae vero relationes fundantur super actionem et passionem: vel secundum ipsum actum, sicut calefaciens dicitur ad calefactum; vel secundum hoc quod est egisse, sicut pater refertur ad filium quia genuit; vel secundum potentiam agendi, sicut dominus ad servum quia potest eum coercere."

<sup>119</sup> *In Physic.* 3, l. 1, n. 6: "Hanc igitur divisionem manifeste expressit Philosophus in V *Metaphys.*; sed hic breviter tangit, dicens quod ad aliquid aliud quidem est secundum superabundantiam et defectum; quod quidem fundatur super quantitatem, ut duplum et dimidium: aliud autem secundum activum et passivum, et motivum et mobile, quae ad invicem referuntur, ut patet per se." Cf. ARISTOTLE, *Physica* Γ.1, 200b28–32: "τοῦ δὲ πρὸς τι τὸ μὲν καθ' ὑπεροχὴν λέγεται καὶ κατ' ἔλλειψιν, τὸ δὲ κατὰ τὸ ποιητικὸν καὶ παθητικόν, καὶ ὅλως κινητικὸν τε καὶ κινητόν: τὸ γὰρ κινητικὸν κινητικὸν τοῦ κινητοῦ καὶ τὸ κινητόν κινητόν ὑπὸ τοῦ κινητικοῦ."

<sup>120</sup> *In Metaph.* 12, l. 4 §2457: "ea quae sunt ad aliquid, remotiora videntur esse a substantia quam alia genera, ex eo quod sunt debilioris esse. Unde et substantiae inhaerent mediantibus aliis generibus, sicut aequale et inaequale, duplum et dimidium, mediante quantitate. Movens autem et motum, pater et filius, dominus et servus, mediante actione et passione. Et hoc ideo, quia substantia est per se existens; quantitas autem et qualitas sunt entia in alio; sed relativa non solum sunt in alio, sed ad aliud."

<sup>121</sup> *ScG* 4, 14 n. 12: "In nobis enim relationes habent esse dependens, quia earum esse est aliud ab esse substantiae: unde habent proprium modum essendi secundum propriam rationem, sicut et in aliis accidentibus contingit. [...] Per quod etiam patet quod ex imperfectione quae in relationibus creatis esse videtur, non sequitur quod personae divinae sint imperfectae [...]."

and must depend upon it (i.e., on the being of the substance).<sup>122</sup> The being of any one of them is more prior or more posterior the more the accidental form, according to its proper *ratio*, will be closer (*propinquior*) to the substance and more perfect.

On account of this, too, the relation that really befalls a substance has both the last and the most imperfect being:<sup>123</sup>

1. **Last** (*postremum*), because not only does it require the being of a substance, but also the being of other accidents, from which the relation is caused, as *one* in quantity causes *equality*, and *one* in quality causes *likeness*.<sup>124</sup>

2. **Most imperfect** (*imperfectissimum*), for the proper *ratio of relation* consists in being *to another* (*ad alterum*); whence, its proper being, which it adds over substance, not only depends on the being of a substance, but also on the being of something external.<sup>125</sup>

### 37.20. Relation as Accident and as Order

Relation itself, which is nothing other than some order of one creature to another, has something insofar as it is an accident, and something insofar as it is a relation or order.<sup>126</sup>

It has that it should be *in a subject* insofar as it is an accident—but not insofar as it is a relation or order.<sup>127</sup> Rather, (insofar as it is a relation or order, it has) only that it should be *to another* (*ad aliud*) as though crossing over into another (*quasi in aliud transiens*) and—in some mode—standing by the related thing (*quodammodo rei relatae assistens*). In this way, a relation is something inherent but not due to its being a relation—just like an action, too, due to its being an action, is considered as (proceeding) *from* an agent; but insofar as it is an accident, it is considered as *in* an agent subject.

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<sup>122</sup> ScG 4, 14 n. 12: “Quia enim omnia accidentia sunt formae quaedam substantiae superadditae, et a principiis substantiae causatae; oportet quod eorum esse sit superadditum supra esse substantiae, et ab ipso dependens; et tanto uniuscuiusque eorum esse est prius vel posterius, quanto forma accidentalis, secundum propriam rationem, fuerit propinquior substantiae vel magis perfecta.”

<sup>123</sup> ScG 4, 14 n. 12: “Propter quod et relatio realiter substantiae adveniens et postremum et imperfectissimum esse habet.”

<sup>124</sup> ScG 4, 14 n. 12: “postremum quidem, quia non solum praeexigit esse substantiae, sed etiam esse aliorum accidentium, ex quibus causatur relatio, sicut unum in quantitate causat aequalitatem, et unum in qualitate similitudinem.”

<sup>125</sup> ScG 4, 14 n. 12: “imperfectissimum autem, quia propria relationis ratio consistit in eo quod est ad alterum, unde esse eius proprium, quod substantiae superaddit, non solum dependet ab esse substantiae, sed etiam ab esse alicuius exterioris.”

<sup>126</sup> *De potentia*, q. 7 a. 9 ad 7: “ipsa relatio quae nihil est aliud quam ordo unius creaturae ad aliam, aliud habet in quantum est accidens et aliud in quantum est relatio vel ordo.”

<sup>127</sup> *De potentia*, q. 7 a. 9 ad 7: “In quantum enim accidens est, habet quod sit in subiecto, non autem in quantum est relatio vel ordo; sed solum quod ad aliud sit quasi in aliud transiens, et quodammodo rei relatae assistens. Et ita relatio est aliquid inhaerens, licet non ex hoc ipso quod est relatio; sicut et actio ex hoc quod est actio, consideratur ut ab agente; in quantum vero est accidens, consideratur ut in subiecto agente.”



Hence, nothing prevents such an accident from ceasing to exist (*esse desinat*) without the mutation of that (subject) in which it is, for its *ratio* is not perfected on account of being in the subject itself but on account of its crossing over into another.<sup>128</sup> Which (if) removed, the *ratio* of this accident is removed in respect of the act, but it remains in respect of the cause, just as (if) matter (is) subtracted, heating is removed even though the cause of heating should remain.

### 37.21. Relations of *Ratio* and Real Relations in the Termini

There are some relations that are not really (*realiter*) something in that (subject) of which they are predicated:<sup>129</sup>

1. This sometimes happens from the part of one and of the other extreme [of the relation] (*ex parte utriusque extremi*).<sup>130</sup>

For example, when it is said that the same (thing) is the same as itself (*idem eidem idem*), for this relation of identity would be multiplied indefinitely (*in infinitum*) if any (given) thing should be the same (in respect) to itself by an added (i.e., a real) relation: it is evident that anything is identical to itself.<sup>131</sup>

Therefore, this relation is only according to *ratio*: to wit, insofar as one and the same thing is taken in reason as two extremes of a relation.<sup>132</sup> And likewise, in many others.

2. There are some relations of which one really is in one extreme, and the other (is) in the other (extreme) only according to *ratio*.<sup>133</sup>

For example, (scientific) knowledge and the (scientifically) knowable (are related in this mode), for the (scientifically) knowable is said relatively not because it itself is referred through some relation that exists in it, but because another is referred to it.<sup>134</sup>

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<sup>128</sup> *De potentia*, q. 7 a. 9 ad 7: "Et ideo nihil prohibet quod esse desinat huiusmodi accidens sine mutatione eius in quo est, quia sua ratio non perficitur prout est in ipso subiecto, sed prout transit in aliud; quo sublato, ratio huius accidentis tollitur quidem quantum ad actum, sed manet quantum ad causam; sicut et subtracta materia, tollitur calefactio, licet maneat calefactionis causa."

<sup>129</sup> *In Physic.* 5, l. 3, n. 8: "Sunt enim quaedam relationes quae non sunt aliquid realiter in eo de quo praedicantur."

<sup>130</sup> *In Physic.* 5, l. 3, n. 8: "Quod quidem quandoque contingit ex parte utriusque extremi."

<sup>131</sup> *In Physic.* 5, l. 3, n. 8: "sicut cum dicitur idem eidem idem: haec enim identitatis relatio in infinitum multiplicaretur, si quaelibet res esset sibi eadem per relationem additam: manifestum est enim quod quodlibet sibi ipsi est idem."

<sup>132</sup> *In Physic.* 5, l. 3, n. 8: "Est ergo haec relatio secundum rationem tantum, in quantum scilicet unam et eandem rem ratio accipit ut duo extrema relationis. Et similiter est in multis aliis."

<sup>133</sup> *In Physic.* 5, l. 3, n. 8: "Quaedam vero relationes sunt, quarum una realiter est in uno extremo, et alia secundum rationem tantum in altero."

<sup>134</sup> *In Physic.* 5, l. 3, n. 8: "sicut scientia et scibile: scibile enim relative dicitur, non quia ipsum refertur per aliquam relationem in ipso existentem, sed quia aliud refertur ad ipsum, ut patet per Philosophum in *V Metaphys.*"

Likewise, (it) is (the same mode of relation) when a column is (said to be) to the right of an animal, for right and left are real relations in the animal because in them are found determinate virtues on which such relations are founded.<sup>135</sup> In the column, on the other hand, (left and right) are not according to the thing (*secundum rem*) but only according to *ratio*, because it does not have the aforesaid virtues that are the foundations of those relations.

3. There are some relatives in which there is found a really existing relation from the part of one and the other extreme.<sup>136</sup>

For example, (such mutual, real relations are found) in equality and likeness, for, in one and in the other (extreme), a quantity or a quality (► 37.12, ¶1, ¶2) is found, which is the root of such relations. Likewise, (this) is evident also in many other relations.<sup>137</sup>

### 37.22. Mutation and Relations

In those relations that posit something (real) only in one of the extremes, it does not seem difficult that (if) the extreme in which the relation really exists (is) mutated, something anew (*de novo*) should be said relatively of the other (extreme) without its (i.e., the latter's) mutation, since nothing would really befall it.<sup>138</sup>

On the other hand, in those (things) in which a relation is really found in both extremes, it seems difficult that something should be said relatively of one on account of the mutation of the other without its (own) mutation, since nothing befalls something anew (*de novo*) without the mutation of that to which it befalls.<sup>139</sup>

Whence, it is to be said that if something, by its mutation, is made equal to me in quantity without my being mutated, this equality was first in me—in some mode—as in its root, from which it has real being (*esse reale*).<sup>140</sup> Indeed, from my having such a quantity, it

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<sup>135</sup> *In Physic.* 5, l. 3, n. 8: "Et similiter est cum columna dicitur dextra animali: dextrum enim et sinistrum sunt relationes reales in animali, quia in eis inveniuntur determinatae virtutes, in quibus huiusmodi relationes fundantur: in columna autem non sunt secundum rem, sed secundum rationem tantum, quia non habet praedictas virtutes, quae sunt fundamenta harum relationum."

<sup>136</sup> *In Physic.* 5, l. 3, n. 8: "Quaedam vero relativa sunt, in quibus ex parte utriusque extremi invenitur relatio realiter existens."

<sup>137</sup> *In Physic.* 5, l. 3, n. 8: "sicut in aequalitate et similitudine: in utraque enim invenitur quantitas vel qualitas, quae est huius relationis radix. Et simile etiam apparet in multis aliis relationibus."

<sup>138</sup> *In Physic.* 5, l. 3, n. 8: "In illis igitur relationibus quae non ponunt rem aliquam nisi in uno extremorum, non videtur difficile quod mutato illo extremo, in quo relatio realiter existit, de novo dicatur aliquid relative de altero, absque sui mutatione, cum nihil ei realiter adveniat."

<sup>139</sup> *In Physic.* 5, l. 3, n. 8: "Sed in illis in quibus relatio invenitur realiter in utroque extremorum, videtur difficile quod aliquid relative dicatur de uno per mutationem alterius absque mutatione sui: cum nihil de novo adveniat alicui absque mutatione eius cui advenit."

<sup>140</sup> *In Physic.* 5, l. 3, n. 8: "Unde dicendum est quod si aliquis per suam mutationem efficiatur mihi aequalis, me non mutato, ista aequalitas primo erat in me quodammodo, sicut in sua radice, ex qua habet

belongs to me to be equal to all those (things) that have the same quantity. Therefore, when something receives that quantity anew (*de novo*), this common root of equality is determined to this; and hence, nothing befalls me anew because of my starting to be equal to another on account of its mutation.

### 37.23. Only Relations Can Be According to *Ratio*

Only in those that are said (to be in relation) *to something (ad aliquid)* are some found (to be) only according to *ratio (secundum rationem)* and not according to thing (*secundum rem*).<sup>141</sup> This is not (the case) in other genera because the other genera, such as quantity and quality, signify—according to their proper *ratio*—something that inheres in something.

Instead, those that are said (in relation) *to something* signify—according to their proper *ratio*—only a respect to something (*respectum ad aliud*), which respect is sometimes in the nature itself of things: for example, when some things are ordered to each other according to their nature and have an inclination (*inclinationem habent*) to each other.<sup>142</sup> Such relations must be real. For example, in the heavy body there is an inclination and an order (in relation) to a mean place; whence, some respect is in the heavy itself in respect of a mean place. And it is likewise (the case) concerning other such (things).

Sometimes, however, the respect signified by those that are said (to be in relation) *to something* is only in the apprehension itself of reason, which confers one to the other; and then the relation is only of *ratio*: for example, when reason compares *man* to *animal* as a species to a genus.<sup>143</sup>

When something proceeds from a principle of the same nature, it is necessary that both—namely, that which proceeds (*procedens*) and that from which it proceeds—agree in the same genus; and in this way, they must have real respects to each other.<sup>144</sup>

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esse reale: ex hoc enim quod habeo talem quantitatem, competit mihi quod sim aequalis omnibus illis, qui eandem quantitatem habent. Cum ergo aliquis de novo accipit illam quantitatem, ista communis radix aequalitatis determinatur ad istum: et ideo nihil advenit mihi de novo per hoc quod incipio esse alteri aequalis per eius mutationem.”

<sup>141</sup> *STh* I, q. 28 a. 1 co.: “considerandum est quod solum in his quae dicuntur ad aliquid, inveniuntur aliqua secundum rationem tantum, et non secundum rem. Quod non est in aliis generibus, quia alia genera, ut quantitas et qualitas, secundum propriam rationem significant aliquid alicui inhaerens.”

<sup>142</sup> *STh* I, q. 28 a. 1 co.: “Ea vero quae dicuntur ad aliquid, significant secundum propriam rationem solum respectum ad aliud. Qui quidem respectus aliquando est in ipsa natura rerum; utpote quando aliquae res secundum suam naturam ad invicem ordinatae sunt, et invicem inclinationem habent. Et huiusmodi relationes oportet esse reales. Sicut in corpore gravi est inclinatio et ordo ad locum medium, unde respectus quidam est in ipso gravi respectu loci medii. Et similiter est de aliis huiusmodi.”

<sup>143</sup> *STh* I, q. 28 a. 1 co.: “Aliquando vero respectus significatus per ea quae dicuntur ad aliquid, est tantum in ipsa apprehensione rationis conferentis unum alteri, et tunc est relatio rationis tantum; sicut cum comparat ratio hominem animali, ut speciem ad genus.”

<sup>144</sup> *STh* I, q. 28 a. 1 co.: “Cum autem aliquid procedit a principio eiusdem naturae, necesse est quod ambo, scilicet procedens et id a quo procedit, in eodem ordine conveniant, et sic oportet quod habeant reales respectus ad invicem.”

### 37.24. Opposite Relations

According to the thing (*secundum rem*), the distance (*distantia* = διάστημα) is the same from *one* to *two* as from *two* to *one*.<sup>145</sup> However, they differ according to *ratio* (*secundum rationem* < ὁ... λόγος οὐχ εἷς), for insofar as we begin the comparison from *two* proceeding towards *one*, it is said (to be the) *double*; contrarily, it is said (to be the) *half*.

Likewise, the space of that which ascends and of that which descends is the same; but according to the diversity of the principle and the terminus, it is called *ascent* or *descent*.<sup>146</sup>

It is likewise (the case) in the mover and the (thing) moved.<sup>147</sup> For motion, insofar as it proceeds from the mover into the mobile, is the act of the mover; but insofar as it is in the mobile (proceeding) from the mover, it is the act of the mobile.

### 37.25. Diverse Oppositions in Proportions

Diverse proportions have some opposition to one another.<sup>148</sup> For example, in consonants, it is evident that one is said (to be an) *octave* (*dyapason*), which consists in a double proportion, which is (a relation) of *two to one*; and another is said (to be a) *fifth* (*dyapente*), which consists in a *sesquialter* proportion, which is (a relation) of *three to two*.

ARISTOTLE shows that there are diverse opposite proportions according to a twofold opposition that is found in numbers:<sup>149</sup>

1. According to many and few (*secundum multum et paucum*).<sup>150</sup> According to this, the double proportion and the half proportion are opposed, for the double proportion is of many (in relation) to few (*multi ad paucum* = πολλοῦ πρὸς ὀλίγον), while the half proportion is of few (in relation) to many (*pauci ad multum* = ὀλίγοῦ πρὸς πολλύ).

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<sup>145</sup> *In Physic.* 3, l. 4, n. 11 (cf. ARISTOTLE, *Physica* Γ.3, 202a18–19): “Eadem enim distantia est unius ad duo et duorum ad unum secundum rem, sed differunt secundum rationem; quia secundum quod incipimus comparationem a duobus procedendo ad unum, dicitur duplum, e contrario vero dicitur dimidium.”

<sup>146</sup> *In Physic.* 3, l. 4, n. 11 (cf. ARISTOTLE, *Physica* Γ.3, 202a19–20): “Et similiter idem est spatium ascendentis et descendens; sed secundum diversitatem principii et termini, vocatur ascensio vel descensio.”

<sup>147</sup> *In Physic.* 3, l. 4, n. 11 (cf. ARISTOTLE, *Physica* Γ.3, 202a21): “Et similiter est in movente, et moto. Nam motus secundum quod procedit a movente in mobile, est actus moventis; secundum autem quod est in mobili a movente, est actus mobilis.”

<sup>148</sup> *In De sensu* 1, c. 17, 25–30 (cf. ARISTOTLE, *De sensu* 7, 448a8–9): “diuerse autem proportionibus habent quandam oppositionem ad inuicem, ut patet in consonantiis quarum una dicitur dyapason, que consistit in dupla proportionibus que est duorum ad unum, alia uero dicitur dyapente, que consistit in proportionibus sexquialtera que est trium ad duo.”

<sup>149</sup> *In De sensu* 1, c. 17, 35–37 (cf. ARISTOTLE, *De sensu* 7, 448a11–13): “Ostendit autem [Philosophus] consequenter diuersas proportionibus esse oppositas secundum duplicem oppositionem que in numeris inuenitur.”

<sup>150</sup> *In De sensu* 1, c. 17, 37–41 (cf. ARISTOTLE, *De sensu* 7, 448a11–13): “quarum una est secundum multum et paucum et secundum hoc opponuntur proportio dupli et proportio dimidii (nam proportio dupli est multi ad paucum, proportio uero dimidii est pauci ad multum).”

2. According to the even and the odd (*secundum par et impar*).<sup>151</sup> According to this, the double proportion and the *sesquialter* are opposed, for the double proportion is of two (in relation) to one, as of the even (in relation) to the odd (*paris ad impar* = ἄρτιου πρὸς περιπτόν), since one is the form of the odd numbers, while the *sesquialter* ratio is of three (in relation) to two, which is of the odd to the even (*imparis ad parem* = περιπτοῦ πρὸς ἄρτιον).

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<sup>151</sup> *In De sensu* 1, c. 17, 41–47 (cf. ARISTOTLE, *De sensu* 7, 448a11–13): “alia uero oppositio est secundum par et impar et secundum hoc opponuntur proportio dupla et sexqualtera (nam proportio dupla est duorum ad unum quasi paris ad impar, unum enim est forma imparis numeri, sexqualtera autem proportio est trium ad duo, quod est imparis ad parem).”



## 38. One

Since being is divided into one and many, we must determine what one is.

### 38.1. The Analogy of One

One (*unum* = ἓν) is said of things in two modes (► 34.9):<sup>1</sup>

#### 1. Insofar as it is convertible with *being* (*secundum quod convertitur cum ente*).<sup>2</sup>

In this mode, **one** signifies *undivided being*.<sup>3</sup> Hence, the *ratio* of one (*unum*) consists in *being indivisible* (*esse indivisibile* < ἀδιαίρετον) or *not being divided* (*non esse divisum* < μὴ διηρημένον).

The *one* that is convertible with *being* is not determined to the genus of quantity.<sup>4</sup> Rather, it is found in all beings (► 30.9). Just as *being* is said in multiple modes, so is *one*. Hence, as ARISTOTLE says, *one*—like *being*—is said by itself (*per se* = καθ' αὐτό; ► 38.4) and by accident (*per accidens* = κατὰ συμβεβηκός; ► 38.17).

2. Insofar as it signifies the *ratio of first measure*, either (a) *simply* (*simpliciter*), which is the *one* that is the principle of number, i.e., of discrete quantity (► 34.8); or (b) *in some genus* (► 27.8).<sup>5</sup>

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<sup>1</sup> *In Metaph.* 3, l. 12, §501: “Unum autem, secundum quod dicitur de aliis rebus, dicitur dupliciter.” *In Sent.* 2, d. 3 q. 1 a. 3 ad 1: “unum dicitur dupliciter.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “unum dupliciter dicitur.” *In Sent.* 1, d. 24 q. 1 a. 1 ad 1: “unum dupliciter dicitur.” *De potentia*, q. 3 a. 16 ad 3: “duplex est unum.” St. Thomas explains that AVICENNA did not make this distinction: *In Metaph.* 10, l. 3, §1981.

<sup>2</sup> *In Metaph.* 3, l. 12, §501: “Uno modo secundum quod convertitur cum ente.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “quod convertitur cum ente.” *In Sent.* 1, d. 24 q. 1 a. 1 ad 1: “Est enim unum quod convertitur cum ente.” *De potentia*, q. 3 a. 16 ad 3: “quoddam scilicet quod convertitur cum ente.”

<sup>3</sup> *STh I*, q. 11 a. 1 co.: “unum enim nihil aliud significat quam ens indivisum.” *STh I*, q. 30 a. 3 co.: “unum enim significat ens indivisum.” *De veritate*, q. 1 a. 1 co., 141–142: “nihil aliud enim est unum quam ens indivisum.” *De veritate*, q. 21 a. 1 co., 159–160: “dicitur enim unum quasi ens indivisum.” *De potentia*, q. 9 a. 7 co.: “est enim unum idem quod ens indivisum.” *Quodlibet* 10, q. 1 a. 1 co.: “est enim unum, ens indivisum.” *In Physic.* 5, l. 7, n. 5: “unum est ens indivisum.” *In Metaph.* 3, l. 8 §436: “unum nihil est aliud quam ens indivisum.” *In Metaph.* 4, l. 2, §553: “Est enim unum ens indivisum.” *In Metaph.* 10, l. 3, §1974: “Dicitur enim unum ens indivisibile vel indivisum.” *In De div. nom.*, c. 4, l. 1: “est enim unum, ens indivisum.” *In Metaph.* 10, l. 4, §1985 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a20–23): “Ratio vero unius consistit in hoc, quod est esse indivisibile, aut non esse divisum.” *STh I*, q. 85 a. 8 co.: “ratio unius est quod sit indivisibile, ut dicitur in X Metaphys.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “haec est vera definitio unius: unum est ens quod non dividitur.”

<sup>4</sup> *In Sent.* 2, d. 3 q. 1 a. 3 ad 1: “Uno modo secundum quod convertitur cum ente, quod non determinatur ad aliquod genus.” *In Sent.* 1, d. 24 q. 1 a. 1 ad 1: “Loquendo de uno quod convertitur cum ente, non est determinatum ad genus quantitatis, immo invenitur in omnibus entibus.” *In Metaph.* 10, l. 1, §1921 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a15): “unum dicitur multis modis.” *In Physic.* 1, l. 3, n. 3 (cf. ARISTOTLE, *Physica* A.2, 185b6): “sicut ens dicitur multipliciter, ita et unum.” *In Metaph.* 5, l. 7, §843 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b16–17): “Dicit ergo [Philosophus], quod unum dicitur et per se et per accidens.” *In Metaph.* 10, l. 1, §1921: “unum per accidens habet alios suos modos.”

<sup>5</sup> *In Metaph.* 3, l. 12, §501: “Alio modo dicitur unum secundum quod significat rationem primae mensurae, vel simpliciter, vel in aliquo genere.” *In Sent.* 2, d. 3 q. 1 a. 3 ad 1: “Alio modo dicitur unum quod est principium numeri, qui est discreta quantitas.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “quod est principium numeri.” *In Sent.* 1, d. 24 q. 1 a. 1 ad 1: “et est unum quod est principium numeri.” *De potentia*, q. 3 a. 16 ad 3: “Aliud vero unum est quod est principium numeri.”

Insofar as it is convertible with *being*, *one* designates the substance of the thing (*signat substantiam rei*); and likewise, (so does) *being* (*ens*) itself.<sup>6</sup> On the other hand, insofar as it is the principle of number, *one* designates an accident (*signat accidens*).

Indeed, ARISTOTLE posits a **property** that follows upon *one* according to the conditions found in things (► 38.5).<sup>7</sup> Its *ratio* is *to be the principle of some number*. This is evident because **one** is *the first measure of number*, by which every number is measured; and *measure* has the *ratio* of *principle* (► 8.1; 8.2) because the thing measured is known by a measure—and a thing is known by its proper principles. Whence, it is evident that, concerning anything, *one* is **the principle of the known or of the knowable**, and that it is the principle of knowing in all things. In this way, **to be one is to be a principle**.

Thus, according to ARISTOTLE, AVERROES and AVICENNA, *one*, insofar as it is the principle of number, posits something added to *being* (*additum ad esse*): to wit, the *being of measure* (*esse mensurae*).<sup>8</sup> This *ratio* (of *measure*; ► 28.1) is found first in the unit, and thereafter—and consequently—in numbers; then, in continuous quantities; and thereafter, it has been transferred to all the other genera, as ARISTOTLE says (► 28.5). Indeed, that which is the principle in each genus, is the measure and rule of that genus (► 27.8), as the unit (is the principle, measure, and rule) in the genus of number (► 34.8).

Since the *ratio* of *measure* follows upon the *ratio* of *non-division*, *one* is not said altogether equivocally of that which is convertible with *being* and of that which is the principle of number, but according to prior and posterior (i.e., analogically; ► 20.7; 30.14).<sup>9</sup>

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<sup>6</sup> *Quodlibet* 12, q. 5 a. 1 co.: “unum prout convertitur cum ente, signat substantiam rei, et similiter ipsum ens; sed unum prout est principium numeri, signat accidens.”

<sup>7</sup> *In Metaph.* 5, l. 7, §848 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b17–20): “Ponit [Philosophus] *modos unius per se*; et circa hoc duo facit. Primo ostendit *quot modis dicitur unum*. [...] Circa primum duo facit. Primo *distinguit modos unius naturaliter*, idest secundum conditiones in rebus inventas. [...] Circa primum duo facit. Primo *distinguit modos unius*. Secundo vero ponit quamdam proprietatem consequentem ad unum, ibi, «Uni vero esse, est principium.» Ibid., l. 8, §872: “ponit quamdam proprietatem consequentem unum; et dicit, quod ratio unius est in hoc, quod sit principium alicuius numeri. Quod ex hoc patet, quia unum est prima mensura numeri, quo omnis numerus mensuratur: mensura autem habet rationem principii, quia per mensuram res mensuratae cognoscuntur, res autem cognoscuntur per sua propria principia. Et ex hoc patet, quod unum est principium noti vel cognoscibilis circa quodlibet, et est in omnibus principium cognoscendi.” Ibid., §906: “unum esse, est principium esse.”

<sup>8</sup> *In Sent.* 1, d. 24 q. 1 a. 3 co.: “secundum [...] Aristotelem, Averroem et Avicennam, unum, secundum quod est principium numeri, ponit aliquid additum ad esse, scilicet esse mensurae, cuius ratio primo invenitur in unitate, et deinde consequenter in aliis numeris et deinceps in quantitativibus continuis; et deinde translatum est hoc nomen ad alia omnia genera, ut dicit Philosophus.” *STh* I-II, q. 90 a. 1 co.: “In unoquoque autem genere id quod est principium, est mensura et regula illius generis, sicut unitas in genere numeri.”

<sup>9</sup> *In Metaph.* 5, l. 8, §875: “Haec autem ratio mensurae consequitur rationem indivisionis [...]. Et ideo unum non omnino aequivoce dicitur de eo quod convertitur cum ente, et de eo quod est principium numeri; sed secundum prius et posterius.”



### 38.2. *Being and One Are Diverse According to Ratio*

The *one* that is convertible with being designates *being* (*ens*) itself, adding over (it) the *ratio* of *non-division*, which does not posit some nature added to the thing because it is a negation or privation.<sup>10</sup> Hence, *one* does not differ in anything from *being* according to the thing (*secundum rem*) but only in *ratio*, for negation or privation is not a being of nature (*ens naturae*) but (a being) of *ratio* (*rationis*; ► 30.5).

Whence, it is evident that *one* is convertible with *being* (*ens*), for every being is either simple or composite:<sup>11</sup>

1. What is **simple** is undivided both in act and in potency.<sup>12</sup>
2. What is **composite** does not have being (*esse*) as long as its parts are divided, but (it has being) as soon as (its parts) constitute and compose the composite thing itself.<sup>13</sup>

Whence, it is manifest that the being of each thing (*esse cuiuslibet rei*) consists in non-division (*consistit in indivisione*).<sup>14</sup> And hence, as each thing preserves (*custodit*) its being, so it preserves its unity.

### 38.3. *Being and One Signify One and the Same Nature*

As ARISTOTLE says, *one* and *being* (*ens*) are one and the same nature.<sup>15</sup>

Some (things) are one in number which are not one nature but diverse: for example, Socrates (i.e., this individual human), this white (which happens to be Socrates), and this musical (i.e., the musician who happens to be Socrates).<sup>16</sup> Unlike these, *one* and *being* do not signify diverse natures but one (nature).

(Two names) can signify one nature—and not diverse (natures)—in two modes:<sup>17</sup>

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<sup>10</sup> *In Metaph.* 4, l. 2, §560 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b32–33): “Unum enim quod cum ente convertitur, ipsum ens designat, superaddens indivisionis rationem, quae, cum sit negatio vel privatio, non ponit aliquam naturam enti additam. Et sic in nullo differt ab ente secundum rem, sed solum ratione. Nam negatio vel privatio non est ens naturae, sed rationis.”

<sup>11</sup> *STh* I, q. 11 a. 1 co.: “unum non addit supra ens rem aliquam, sed tantum negationem divisionis, unum enim nihil aliud significat quam ens indivisum. Et ex hoc ipso apparet quod unum convertitur cum ente.”

<sup>12</sup> *STh* I, q. 11 a. 1 co.: “Quod autem est simplex, est indivisum et actu et potentia.”

<sup>13</sup> *STh* I, q. 11 a. 1 co.: “Quod autem est compositum, non habet esse quandiu partes eius sunt divisae, sed postquam constituunt et componunt ipsum compositum.”

<sup>14</sup> *STh* I, q. 11 a. 1 co.: “Unde manifestum est quod esse cuiuslibet rei consistit in indivisione. Et inde est quod unumquodque, sicut custodit suum esse, ita custodit suam unitatem.”

<sup>15</sup> *In Metaph.* 4, l. 2, §548: “ens et unum sunt idem et una natura.” Cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b22–23: “τὸ ὄν καὶ τὸ ἔν ταῦτόν καὶ μία φύσις.”

<sup>16</sup> *In Metaph.* 4, l. 2, §548: “quaedam sunt idem numero quae non sunt una natura, sed diversae, sicut Socrates, et hoc album, et hoc musicum. Unum autem et ens non diversas naturas, sed unam significant.”

<sup>17</sup> *In Metaph.* 4, l. 2, §548: “non diversas naturas, sed unam significant. Hoc autem contingit dupliciter.”

1. Some are *one* in such a way that they follow one upon the other convertibly (insofar as they are the same in subject even if they are diverse in ratio), as *principle* and *cause*.<sup>18</sup>
2. Some (others) are convertible not only such that they should be (*ut sint*) the same in subject, but are also *one* according to *ratio*, as *tunic* (*tunica*) and *garment* (*indumentum*).<sup>19</sup>

*One* and *being* signify one nature according to diverse *ratios* (i.e., *one* and *being* are the same in subject and nature but diverse in *ratio* and name; ► 38.2).<sup>20</sup> Whence, they are related as *principle* and *cause*—and not as *tunic* and *vesture* (*vestis*), which are utterly synonymous (i.e., are the same in subject, nature, and ratio, but not in name).

#### 38.4. Modes of *One* by Itself

ARISTOTLE posits the modes of *one* by itself, distinguishing:<sup>21</sup>

1. **One naturally** (speaking): that is, *according to the conditions discovered in things* (► 38.5).
2. **One logically** (speaking): that is, *according to logical intentions* (► 38.15).

<sup>18</sup> *In Metaph.* 4, l. 2, §548: “Quaedam enim sunt unum quae consequuntur se adinvicem convertibiliter sicut principium et causa.” Cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b23–24: “τῷ ἀκολουθεῖν ἀλλήλοις ὡςπερ ἀρχὴ καὶ αἴτιον.”

<sup>19</sup> *In Metaph.* 4, l. 2, §548: “Quaedam vero non solum convertuntur ut sint idem subiecto, sed etiam sunt unum secundum rationem, sicut vestis et indumentum.” Cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b24–25: “ὡς ἐνὶ λόγῳ δηλούμενα.”

<sup>20</sup> *In Metaph.* 4, l. 2, §549: “Unum autem et ens significant unam naturam secundum diversas rationes. Unde sic se habent sicut principium et causa, sed non sicut tunica et vestis, quae sunt nomina penitus synonyma.” *De potentia*, q. 9 a. 7 ad 13: “unum et ens convertuntur secundum supposita; sed tamen unum addit secundum rationem, privationem divisionis; et propter hoc non sunt synonyma, quia synonyma sunt quae significant idem secundum rationem eandem.”

<sup>21</sup> *In Metaph.* 5, l. 7, §848 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b36–1017a3): “Ponit [Philosophus] modos unius per se; et circa hoc duo facit. [...] Circa primum duo facit. Primo distinguit modos unius naturaliter, idest secundum conditiones in rebus inventas. Secundo vero logice, idest secundum intentiones logicales.” We follow the division found in this place as a basis, and then merge into it the divisions of *one* found elsewhere. Thus, in Book 10 St. Thomas explains that there are four principal modes in which *one* (*unum* = τὸ ἓν) is said first and by itself (*primo et per se* = πρώτων καὶ καθ’ αὐτά) and not by accident (*per accidens* = κατὰ συμβεβηκός); of these modes, some (i.e., two of them) are on account of **one motion** (this corresponds to mode 1 in the next section), and the other (two) on account of **one ratio** (this corresponds to mode 4, in the next section). In turn, the *one* by accident has its own modes. *In Metaph.* 10, l. 1, §1921 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a15–19): “cum multipliciter dicatur unum, principales modi sunt quatuor: ita tamen quod dicamus modos unius, secundum quos unum dicitur primo et per se, et non per accidens. Nam unum per accidens habet alios suos modos.” Ibid., §1929 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a29–34): “Ponit alios modos unius; dicens, quod quaedam alia dicuntur unum non propter motum unum, sed propter rationem unam.” In the *Physics* we find another division. As St. Thomas explains, just as *being* is said in multiple (modes), so (is) *one*. And *one* is said in three (modes): (1) as the **continuum** is one, as a line and a body (this corresponds to mode 1 in the next section); (2) as the **indivisible** is one, as the point (this corresponds to mode 5 in the next section); (3) as *one* are said (to be) those whose **ratio** (λόγος) or definition is one (this corresponds to mode 4 in the next section). *In Physic.* 1, l. 3, n. 3 (cf. ARISTOTLE, *Physica* A.2, 185b5–9): “sicut ens dicitur multipliciter, ita et unum: et ideo considerandum est quomodo dicantur omnia esse unum. Dicitur enim unum tripliciter: vel sicut continuum est unum, ut linea et corpus; vel sicut indivisibile est unum, ut punctum; vel sicut unum dicuntur illa quorum ratio est una, seu definitio, sicut vappa et vinum dicuntur unum.” We leave the discussion of the continuum to the next chapter due to its importance to our subject.

### 38.5. Naturally One

ARISTOTLE posits five modes of *one* by itself, naturally (speaking):<sup>22</sup>

1. **One in continuity** (discussed in the next chapter; ► 39.13), insofar as (those that are said to be one) are continuous (*eo quod sunt continua* = τῷ συνεχῆ εἶναι).<sup>23</sup>
2. **One in formally undifferentiated subject genus** (► 38.9), insofar as *a whole subject is indifferent in form according to species* (*ex eo quod subiectum <totum> est indifferens <forma> secundum speciem* = τῷ τὸ ὑποκείμενον τῷ εἶδει εἶναι ἀδιάφορον), and (is one) not only by reason of continuous quantity (i.e., as in ¶1).<sup>24</sup>
3. **One in differentiated subject genus** (► 38.10), (are those) *whose genus, which is divided by opposing differences, is one* (*quorum genus est unum, oppositis differentiis divisum* = ὧν τὸ γένος ἐν διαφέρον ταῖς ἀντικειμέναις διαφοραῖς).<sup>25</sup>
4. **One in definition** (► 38.11), (are) whatever (things) so related that the definition of one, which is the ratio that signifies the essence, is not divided from the definition of the other, which also signifies the essence (*quaecumque ita se habent quod definitio unius, quae est ratio significans quid est esse, non dividitur a definitione alterius, quae significat etiam quid est esse eius* = ὅσων ὁ λόγος ὁ τὸ τί ἦν εἶναι λέγων ἀδιαίρετος πρὸς ἄλλον τὸν δηλοῦντα τί ἦν εἶναι τὸ πρᾶγμα).<sup>26</sup>
5. **One in indivisible understanding** (► 38.13, are those things) whose understanding, which understands their essence, is altogether indivisible (*quorum intellectus intelligens quidditatem eorum est omnino indivisibilis* = ὅλως δὲ ὧν ἡ νόησις ἀδιαίρετος ἡ νοοῦσα τὸ

<sup>22</sup> In *Metaph.* 5, l. 7, §848 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b36–1016b3): “Ponit [Philosophus] *modos unius per se* [...]. Primo ostendit *quot modis dicitur unum*. [...] Primo distinguit *modos unius naturaliter*, idest secundum conditiones in rebus inventas. [...] Primo *distinguit modos unius*. [...] Primo ponit *modos unius*. [...] Ponit autem in prima parte *quinq[ue] modos unius*.”

<sup>23</sup> In *Metaph.* 5, l. 7, §849 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b36–1016a1): “*Quorum primus est, quod eorum quae secundum se dicuntur unum, quaedam dicuntur unum esse «natura continuitatis,» idest essendo continua: vel «eo quod sunt continua,» sicut dicit alia translatio.*” Of the two readings that St. Thomas mentions, we follow the recension of MOERBEKE, which literally has *eo quod continua sint*.

<sup>24</sup> In *Metaph.* 5, l. 7, §859 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a17–18): “Dicit [Philosophus], quod secundo modo dicitur unum, non tantum ratione continuae quantitatis, sed ex eo quod subiectum totum est indifferens forma secundum speciem.”

<sup>25</sup> In *Metaph.* 5, l. 7, §861 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a24–25): “Tertium modum ponit [Philosophus...] Dicit, quod aliqua dicuntur unum, quorum genus est unum, oppositis differentiis divisum. Et ille modus habet aliquam similitudinem cum praecedenti. Ibi enim aliqua dicebantur esse unum, quia genus subiectum est unum: hic etiam aliqua dicuntur esse unum, quia eorum genus, quod est subiectum differentiis, est unum [...]. Differt tamen hic modus a praedicto, quia in illo modo subiectum erat unum non distinctum per formas; hic autem genus subiectum est unum distinctum per diversas differentias quasi per diversas formas.”

<sup>26</sup> In *Metaph.* 5, l. 7, §864 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a32–34): “Quartum modum ponit [Philosophus...] Dicit quod unum etiam dicuntur, quaecumque ita se habent quod definitio unius, quae est ratio significans quid est esse, non dividitur a definitione alterius, quae significat etiam quid est esse eius.”

τί ἤν εἶναι).<sup>27</sup> And these (things) are perfectly and maximally one (*perfecte et maxime sunt unum*; whence, they are principles in their respective genera; ► 27.7).

### 38.6. Reduction to a First One

ARISTOTLE reduces all these modes to a first one, saying that it is evident that those (things) that are altogether indivisible are maximally said (to be) one.<sup>28</sup> All other modes are reduced to this mode because this is universally (*universaliter* = καθόλου) true: that those (things) which do not have a division, insofar as they do not have a division, are said (to be) one (*quaecumque non habent divisionem, secundum hoc dicuntur unum* = ὅσα μὴ ἔχει διαίρεσιν, ἧ μὴ ἔχει, ταύτη ἐν λέγεται).

For example, those that are not divided in that which is man (< ἧ ἄνθρωπος), are said (to be) one in man (< εἷς ἄνθρωπος), as Socrates and Plato; those that are not divided in the ratio of animal (< ἧ ζῶον), are said (to be) one in animal (< ἐν ζῶον); and those that are not divided in magnitude or measure (< ἧ μέγεθος; ► 34.2) are said (to be) one according to magnitude (< ἐν μέγεθος), as (are) the continua (► 39).<sup>29</sup>

Wherefrom, too, the number and diversity of the above-positing modes of one can be taken. For one is either indivisible simply or indivisible according to something. If

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<sup>27</sup> *In Metaph.* 5, l. 7, §865 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b1–2): “Quintum modum ponit [Philosophus...] Dicit, quod «omnino» idest perfecte et maxime sunt unum, quorum intellectus intelligens quidditatem eorum est omnino indivisibilis.”

<sup>28</sup> *In Metaph.* 5, l. 8, §866 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b3–5): “Hic Philosophus *reducit omnes modos ad unum* primum [...]. Primo *ponit reductionem praedictam*. [...] Dicit ergo primo, quod ex hoc patet, quod illa quae sunt penitus indivisibilia, maxime dicuntur unum: quia ad hunc modum omnes alii modi reducuntur, quia universaliter hoc est verum, quod quaecumque non habent divisionem, secundum hoc dicuntur unum, inquantum divisionem non habent.” Based on the division of one found in Book 10, St. Thomas explains the reduction to one mode as follows. ARISTOTLE reduces the above-positing modes of one to one ratio, collecting together into a whole (*colligendo*) what he had said. Thus, he says that one is said in four modes: (1) the **continuum** according to nature (*continuum secundum naturam* = τὸ συνεχὲς φύσει), as a line or a body (discussed in the next chapter); (2) the **whole** (*totum* = τὸ ὅλον; also discussed in the next chapter); (3) the **singular** (*singulare* = τὸ καθ’ ἕκαστον; corresponding to one mode of the fifth mode); (4) the **universal** (*universale* = τὸ καθόλου), as the species (corresponding to another mode of the fifth mode). All these (things) are said to be one by one ratio: to wit, *to be indivisible* (*esse indivisibile* < τῷ ἀδιαίρετον εἶναι) for properly, one is *indivisible being*. However, in the former two modes (1 and 2, as numbered here), (something) is said (to be) one because the motion is indivisible (*est motus indivisibilis* < τὴν κίνησιν); in the latter (two) modes (3 and 4, as numbered here), because (something) is indivisible in understanding or in ratio (*est intelligentia, aut ratio indivisibilis* = τὴν νόησιν ἢ τὸν λόγον), in such a way that we comprehend under this (mode) the apprehension of the particular (i.e., because particulars can be somehow apprehended by the intellect only through sense). *In Metaph.* 10, l. 1, §1932 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a34–b1): “*Reducit* [Philosophus] *modos unius supra positos ad unam rationem*, colligendo quae supra dixerat. Dicit ergo quod unum dicitur quatuor modis. Primo quidem continuum secundum naturam. Secundo totum. Tertio singulare. Quarto, universale ut species. Et omnia haec dicuntur unum per rationem unam, scilicet per hoc quod est esse indivisibile. Nam proprie unum est ens indivisibile. Sed in primis duobus dicitur unum, quia est motus indivisibilis; in aliis autem duobus, quia est intelligentia, aut ratio indivisibilis; ut sub hoc etiam comprehendatur apprehensio rei particularis.”

<sup>29</sup> *In Metaph.* 5, l. 8, §866 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b5–6): “Sicut quae non dividuntur in eo quod est homo, dicuntur unum in homine, sicut Socrates et Plato. Et quae non dividuntur in ratione animalis, dicuntur unum in animali. Et quae non dividuntur in magnitudine vel mensura, dicuntur unum secundum magnitudinem, sicut continua.”

(indivisible) simply, this is the last mode (► 38.5, ¶5), which is the principal. If, on the other hand, it is divisible according to something, (it is divisible) either according to quantity, and thus is the first mode (► ¶1); if according to nature, then either in respect to the subject or in respect to the division that is had from the part of the form. If in respect to the subject, then either in respect of the real subject, and this is the second mode (► ¶2); or in respect of the subject of the *ratio*, and thus is the third mode (► ¶3). The indivisibility of form, which is the indivisibility of a *ratio*—that is, of a definition—makes the fourth mode (► ¶4).<sup>30</sup>

### 38.7. Derived Modes of Being One

From these modes, some other ulterior modes are derived.<sup>31</sup> For there are many (*plurima*) that are said (to be) *one* because they *produce one* (< ποιεῖν... ἓν), as many men are said (to be) *one* because they run a ship (*trahunt navem*). Some are said (to be) *one* because they *undergo one action* (< πάσχειν... ἓν), as many men are one people because they are ruled by one king. Some are said (to be) *one* because they *have something one* (< ἔχειν... ἓν), as many owners of one plot of land are one in its ownership. Some are said (to be) *one* because they *are something one* (< εἶναι ἓν),<sup>32</sup> as many white men are said (to be) *one* because any of them is white.

However, in respect of all these secondary modes, those are said (to be) *one* first which are one according to their substance.<sup>33</sup> For it is one substance by reason of continuity (< συνεχεῖα), as in the first mode (► 38.5, ¶1; 39.12); or on account of the species (< εἶδος) of the subject, as in the second mode (► ¶2; 38.9); and also in the third mode (► ¶3;

<sup>30</sup> *In Metaph.* 5, l. 8, §867: “Et ex hoc potest accipi etiam numerus et diversitas modorum unius suprapositorum; quia unum aut est indivisibile simpliciter, aut indivisibile secundum quid. Siquidem simpliciter, sic est ultimus modus, qui est principalis. Si autem est indivisibile secundum quid, aut secundum quantitatem tantum, aut secundum naturam. Si secundum quantitatem, sic est primus modus. Si secundum naturam, aut quantum ad subiectum, aut quantum ad divisionem quae se tenet ex parte formae. Si quantum ad subiectum, vel quantum ad subiectum reale, et sic est secundus modus. Vel quantum ad subiectum rationis, et sic est tertius modus. Indivisibilitas autem formae, quae est indivisibilitas rationis, idest definitionis, facit quartum modum.”

<sup>31</sup> *In Metaph.* 5, l. 8, §868 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b6–8): “Ex his autem modis ulterius aliqui alii modi derivantur. Plurima autem sunt, quae dicuntur unum, ex eo quod faciunt unum; sicut plures homines dicuntur unum, ex hoc quod trahunt navem. Et etiam dicuntur aliqua unum, ex eo quod unum patiuntur; sicut multi homines sunt unus populus, ex eo quod ab uno rege reguntur. Quaedam vero dicuntur unum ex eo quod habent aliquid unum, sicut multi possessores unius agri sunt unum in dominio eius. Quaedam etiam dicuntur unum ex hoc quod sunt aliquid unum; sicut multi homines albi dicuntur unum, quia quilibet eorum albus est.”

<sup>32</sup> St. Thomas seems to misread the last example, which is *being relative to one* (*ad aliquid esse unum* = πρὸς τι εἶναι ἓν) rather than *being something one* (*aliquid esse unum*). However, he realizes that these are all modes in which some accident furnishes the unity, as is evident by the example he provides: many white men are *something one*, indeed, but *in quality*, and not simply, which is *being one in substance*.

<sup>33</sup> *In Metaph.* 5, l. 8, §869 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b8–9): “Sed respectu omnium istorum modorum secundariorum, primo dicuntur unum illa quae sunt unum secundum suam substantiam, de quibus supra dictum est in quinque modis suprapositis. Una namque substantia est, aut ratione continuitatis, sicut in primo modo: aut propter speciem subiecti, sicut in secundo modo, et etiam in tertio, prout unitas generis aliquid habet simile cum unitate speciei: aut etiam propter rationem, sicut in quarto et in quinto modo.”

38.10), insofar as the unity of the genus has some likeness to the unity of the species; or on account of the *ratio* (< λόγῳ), as in the fourth (► ¶4; 38.11) and fifth mode (► ¶5; 38.13).

### 38.8. One as Order of the Parts of a Whole

ARISTOTLE adds to the above-positing modes another mode of unity that is not taken from the *ratio* of *non-division*, as the aforesaid, but rather from the *ratio* of *division*.<sup>34</sup> He says that, sometimes, some (things) are said (to be) *one* on account of continuity alone; but sometimes not unless it should be something whole and perfect (< ὅλον). This happens when it has some one species (< εἶδος), though not as the homogeneous subject that pertains to the second mode (► 38.5, ¶2) is said (to be) *one* in species, but insofar as the species consists in some totality that requires a determinate order of parts (► 39.19, ¶2).

For example, it is evident that we do not say (that) something (is) *one*, such as an artifact, when we see the parts (e.g.) of a shoe composed in any whichever way—except perhaps insofar as *one* is taken for *continuous*.<sup>35</sup> Rather, we say that all the parts of the shoe are one when they are composed in such a way that there should be a shoe and it should have a species—namely, that of *shoe*.

Wherefrom, it is evident that the circular line is maximally one because it not only has continuity, as the straight line, but also has totality and perfection, which the straight line does not have.<sup>36</sup> For **perfect** and **whole** is *that which lacks nothing*; which happens to the circular line, for no addition can be made to it, as is made to the straight line (► 36.9).

### 38.9. One in Formally Undifferentiated Subject Genus

Some (beings) can be continuous which, nonetheless, are diverse in subject according to species. For example, if gold should be continued by silver or by some such (thing). And

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<sup>34</sup> In *Metaph.* 5, l. 8, §866 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b11–13): “super modos positos ponit [Philosophus] alium modum unitatis.” Ibid., §870 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b11–17): “Addit alium modum a supradictis, qui non sumitur ex ratione indivisionis sicut praedicti, sed magis ex ratione divisionis; et dicit, quod quandoque aliqua dicuntur unum propter solam continuitatem, quandoque vero non, nisi sit aliquod totum et perfectum; quod quidem contingit quando habet aliquam unam speciem, non quidem sicut subiectum homogeneum dicitur unum specie quod pertinet ad secundum modum positum prius, sed secundum quod species in quadam totalitate consistit requirens determinatum ordinem partium.” Note that BEKKER’s edition begins with ἐπεὶ instead of ἔτι, as supposed by the recension that St. Thomas is reading; the latter is, nonetheless, a variant attested in *codex Vaticanus* 256, as BEKKER’s critical apparatus indicates.

<sup>35</sup> In *Metaph.* 5, l. 8, §870 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b13–16): “sicut patet quod non dicimus unum aliquid, ut artificiatum, quando videmus partes calceamenti qualitercumque compositas, nisi forte secundum quod accipitur unum pro continuo; sed tunc dicimus esse unum omnes partes calceamenti, quando sic sunt compositae, quod sit calceamentum et habeat aliquam unam speciem, scilicet calceamenti.”

<sup>36</sup> In *Metaph.* 5, l. 8, §871 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b16–17): “Et ex hoc patet, quod linea circularis est maxime una; quia non solum habet continuitatem, sicut linea recta; sed etiam habet totalitatem et perfectionem, quod non habet linea recta. Perfectum est enim et totum, cui nihil deest: quod quidem contingit lineae circulari. Non enim potest sibi fieri additio, sicut fit lineae rectae.”

then, such two (things) will be one if quantity alone should be considered, but not if the nature of the subject should be considered. In contrast, if the whole continuous subject should be of one form according to species, it will be one both according to the *ratio* of *quantity* and according to the *ratio* of *nature*.<sup>37</sup>

A subject is said to be indifferent according to species when the same sensible species is not divided in such a way that there should be diverse sensible forms in diverse parts of the subject.<sup>38</sup> For example, sometimes it happens that one part of a sensible body is white and another (is) black.

However, *indifferent subject* can be taken in two modes:<sup>39</sup>

1. The **first** subject (i.e., the subject most proximate to the affection or accident).
2. The **final or last** subject, at which the division (of subjects) reaches its end.<sup>40</sup>

### 38.10. One in Differentiated Subject Genus

This mode has some likeness to the precedent (mode; ► 38.9).<sup>41</sup> For, there, some (things) were said to be one because the subject genus is one. Here, too, some (things) are said to be one because their genus, which is the subject of differences, is one (► 36.1, ¶1). For example, *man*, *horse*, and *dog* are said (to be) *one* because they communicate in (i.e., have in common) *animal* as in one genus (that is) subjected to differences.

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<sup>37</sup> *In Metaph.* 5, l. 7, §859: “Quaedam enim esse possunt continua quae tamen in subiecto sunt diversa secundum speciem; sicut si continetur aurum argento, vel aliqua huiusmodi. Et tunc talia duo erunt unum si attendatur sola quantitas, non autem si attendatur natura subiecti. Si vero totum subiectum continuum sit unius formae secundum speciem, erit unum et secundum rationem quantitatis et secundum rationem naturae.”

<sup>38</sup> *In Metaph.* 5, l. 7, §860 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a18–19): “Subiectum autem dicitur esse indifferens secundum speciem, quando eadem species sensibilis non dividitur, ita quod sint diversae formae sensibiles in diversis partibus subiecti, sicut quandoque contingit quod unius corporis sensibilis una pars est alba, et alia nigra.”

<sup>39</sup> *In Metaph.* 5, l. 7, §860 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a19–24): “Hoc autem subiectum indifferens potest accipi dupliciter. Uno modo subiectum primum. Alio modo subiectum finale sive ultimum, ad quod pervenitur in fine divisionis.”

<sup>40</sup> St. Thomas provides examples based on the ancient belief that liquids are ultimately resolved into water (and air), considered as the root of moistness in everything, as he explains. Thus, it is evident that a whole wine is said to be one because its parts communicate in one first subject that is indifferent according to species; and likewise, (this) is (the case) concerning water. For all liquids or humors are said (to be) *one* in some last one, since oil and wine, and all such (liquids), are lastly resolved into water and air, which is the root of humidity in all (things). *In Metaph.* 5, l. 7, §860: “Sicut patet quod totum vinum dicitur unum esse, quia partes eius communicant in uno primo subiecto quod est indifferens secundum speciem. Et similiter est de aqua. Omnes enim liquores sive humores dicuntur unum in uno ultimo. Nam oleum et vinum et omnia huiusmodi resolvuntur ultimo in aquam vel aerem, qui in omnibus est radix humiditatis.”

<sup>41</sup> *In Metaph.* 5, l. 7, §861 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a25–27): “Et ille modus habet aliquam similitudinem cum praecedenti. Ibi enim aliqua dicebantur esse unum, quia genus subiectum est unum: hic etiam aliqua dicuntur esse unum, quia eorum genus, quod est subiectum differentiis, est unum; sicut homo et equus et canis dicuntur unum, quia communicant in animali, quasi in uno genere, subiecto differentiis.”

However, this mode differs from the aforesaid because, in that mode, the subject was one (insofar as it was) not distinguished by forms (*non distinctum per formas*).<sup>42</sup> Here, the subject genus is one distinguished by diverse differences as though by diverse forms.

And in this way, it is evident that some (things) are said to be one in genus in a **most proximate** mode as, likewise, also some (things) are said to be one in matter.<sup>43</sup> For those that are said to be one in (proximate) matter are distinguished by forms.

Indeed, even though a genus is not matter—for (else) it would not be predicated of (its) species, since matter is a part (► 13.10)—, nonetheless, the *ratio* of *genus* is taken from that which is material in a thing, just like the *ratio* of *difference* (is taken) from that which is formal.<sup>44</sup> Thus, *rational soul* is not a difference of *man*, since it is not predicated of *man*; rather, (what *is* predicated of *man* is) *having a rational soul* (*habens animam rationalem*), which is what the name *rational* signifies. And likewise, *sensitive nature* is not the genus of *man* but a part (of man), while *having a sensitive nature* (*habens naturam sensitivam*), which is what the name *animal* signifies, is the genus of *man*. Likewise, therefore, the mode in which some (things) are one in matter is proximate (to the mode in which some things are) one in genus.

However, it ought to be known that *one by reason of a genus* is said in multiple modes.<sup>45</sup> For, sometimes, some (things) are said (to be) *one* in genus in such a way as has been said: namely, because their genus, whatever (it may be), is one. Sometimes, however, some (things) are said to be one in genus only in the higher genus, which, with adjunction of unity or identity, is predicated of the last species of a lower genus when there are some other, higher species of a highest genus, in one of which the infinite species (*infinite species*, i.e., the species that are not the lowest or most special) agree (*conveniunt*).

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<sup>42</sup> *In Metaph.* 5, l. 7, §861: “Differt tamen hic modus a praedicto, quia in illo modo subiectum erat unum non distinctum per formas; hic autem genus subiectum est unum distinctum per diversas differentias quasi per diversas formas.”

<sup>43</sup> *In Metaph.* 5, l. 7, §862 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a27–28): “Et sic patet quod propinquissimo modo dicuntur aliqua esse unum genere, et similiter sicut aliqua dicuntur esse unum materia. Nam illa etiam quae dicuntur esse unum materia, distinguuntur per formas.”

<sup>44</sup> *In Metaph.* 5, l. 7, §862: Genus enim, licet non sit materia, quia non praedicaretur de specie, cum materia sit pars, tamen ratio generis sumitur ab eo quod est materiale in re; sicut ratio differentiae ab eo quod est formale. Non enim anima rationalis est differentia hominis, cum de homine non praedicetur; sed habens animam rationalem, quod significat hoc nomen rationale. Et similiter natura sensitiva non est genus hominis, sed pars. Habens etiam naturam sensitivam, quod nomine animalis significatur, est hominis genus. Similiter ergo et propinquus modus est quo aliqua sunt unum materia et unum genere.”

<sup>45</sup> *In Metaph.* 5, l. 7, §863 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a28–30): “Sed sciendum est, quod unum ratione generis dicitur dupliciter. Quandoque enim aliqua dicuntur ita unum in genere sicut dictum est, quia scilicet eorum unum est genus qualitercumque. Quandoque vero non dicuntur aliqua esse unum in genere, nisi in genere superiori, quod cum adiunctione unitatis vel identitatis praedicatur de ultimis speciebus generis inferioris, quando sunt aliquae aliae superiores species supremi generis, in quarum una infinite species conveniunt.”



For example, *figure* is one highest genus that contains under itself multiple species: namely, *circle*, *triangle*, *square*, and (other) such (species).<sup>46</sup> And *triangle*, too, contains diverse species: namely, *equilateral* and *isosceles*. These two triangles are said (to be) *one figure*, which is a remote genus—but not *one triangle*, which is the proximate genus.

The reason for this is that these two triangles do not differ by the differences whereby *figure* is divided; but they differ by the differences whereby *triangle* is divided (► 34.6).<sup>47</sup> And (that) is said (to be) **the same** *from which something does not differ by a difference*.

### 38.11. One in Definition

The definition itself—to wit, according to itself—must be divisible (< καθ' αὐτὸν πᾶς λόγος διαίρετός), since it should be constituted (*constet*) from genus and difference (► 13.16).<sup>48</sup> However, it is possible for the definition of one (thing) to be indivisible from the definition of another when the two have one definition, either:

1. **One simply** (*simpliciter unum*), if (both) definitions should signify the whole that is in the definition, for (those) are simply one whose definition is one.<sup>49</sup>

For example, tunic (*tunica*) and garment (*indumentum*; ► 38.3).<sup>50</sup>

2. **(One) according to something** (*secundum quid*), if the common definition should not totally comprehend the *ratio* of the two (things) that agree (*conveniunt*) in it.<sup>51</sup>

For example, ox and horse agree in one definition of *animal*, which are never *one simply*, but *(one) according to something*: namely, insofar as one and the other is an animal.<sup>52</sup>

<sup>46</sup> *In Metaph.* 5, I. 7, §863 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a30–32): “Sicut figura est unum genus supremum continens sub se multas species, scilicet circulum, triangulum, quadratum, et huiusmodi. Et triangulus etiam continet diversas species, scilicet aequilaterum, qui dicitur isopleurus, et triangulum duorum aequalium laterum, qui dicitur aequitibiarum vel isosceles. Isti igitur duo trianguli dicuntur una figura, quod est genus remotum, sed non unus triangulus, quod est genus proximum.”

<sup>47</sup> *In Metaph.* 5, I. 7, §863: “Cuius ratio est, quia hi duo trianguli non differunt per differentias quibus dividitur figura. Differunt autem per differentias quibus dividitur triangulus. Idem autem dicitur a quo aliquid non differt differentia.”

<sup>48</sup> *In Metaph.* 5, I. 7, §864 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a34–35): “Ipsa enim definitio, scilicet secundum se, oportet quod sit divisibilis, cum constet ex genere et differentia. Sed potest esse quod definitio unius sit indivisibilis a definitione alterius, quando duo habent unam definitionem.”

<sup>49</sup> *In Metaph.* 5, I. 7, §864: “sive illae definitiones significant totum hoc quod est in definito [...]: et tunc sunt simpliciter unum, quorum definitio est una.”

<sup>50</sup> *In Metaph.* 5, I. 7, §864: “sicut tunica et indumentum.”

<sup>51</sup> *In Metaph.* 5, I. 7, §864: “sive illa communis definitio non totaliter comprehendat rationem duorum, quae in ea conveniunt [...]. Unde numquam sunt unum simpliciter, sed secundum quid.”

<sup>52</sup> *In Metaph.* 5, I. 7, §864 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a35–1016b1): “sicut bos et equus conveniunt in una definitione animalis. Unde numquam sunt unum simpliciter, sed secundum quid, in quantum scilicet utrumque eorum est animal. Et similiter augmentum et diminutio conveniunt in una definitione generis, quia utraque est motus secundum quantitatem. Similiter in omnibus superficiebus est una definitio huius speciei quae est superficies.”

Likewise, *increase* and *decrease* agree in one definition of genus, for either of them is a *motion according to quantity*. Likewise, in all surfaces there is one definition of that species which is *surface*.

### 38.12. One on Account of One *Ratio*

ARISTOTLE posits (two) modes of those (beings) that are said (to be) *one* not on account of one motion, but on account of one *ratio* (and not merely of one definition; ► 38.11).<sup>53</sup>

Of such mode are (those things) whose understanding is one (*quorum intelligentia <est> una* = ὧν ἡ νόησις μία), which are apprehended by the soul in one apprehension.<sup>54</sup> Such (beings, *talia* = τοιαῦτα) are said (to be) **apprehended in one apprehension whose indivisible apprehension is one** (*quorum est una apprehensio indivisibilis* < ὧν ἀδιαίρετος).

This happens in two modes, because either:<sup>55</sup>

1. The indivisible apprehension is *of that which is one in species* (*eius quod est unum specie* = τοῦ ἀδιαίρετου εἶδει).<sup>56</sup>

*One in species* is the indivisible that is *one* according to science (*secundum scientiam* = τῇ ἐπιστήμῃ) and according to (intellective) knowledge (*secundum... notitiam* = τῷ γνωστῷ).<sup>57</sup> In diverse singulars there is not some nature *one in number* that could be said (to be a) *species*. Yet, the intellect apprehends as *one* that in which all the inferior (*inferiora*; i.e., individuals) agree (*conveniunt*). Thus, in the apprehension of the intellect, the species, which is really diverse in diverse individuals, becomes indivisible.

2. Or (the indivisible apprehension is) *of that which is one in number* (*eius quod est unum numero* = τοῦ ἀδιαίρετου... ἀριθμῷ; i.e., what is apprehended through sense).<sup>58</sup> Thus, the *indivisible in number* is **the singular** (*singulare* = τὸ καθ' ἕκαστον) itself, which cannot be predicated of many.

<sup>53</sup> *In Metaph.* 10, l. 1, §1929 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a29–30): “*Ponit* [Philosophus] *alios modos unius*; dicens, quod quaedam alia dicuntur unum non propter motum unum, sed propter rationem unam.”

<sup>54</sup> *In Metaph.* 10, l. 1, §1929 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a30–34): “*Huiusmodi autem sunt quorum intelligentia est una, quae una apprehensione apprehenduntur ab anima. Et dicuntur una apprehensione apprehendi talia, quorum est una apprehensio indivisibilis.*”

<sup>55</sup> *In Metaph.* 10, l. 1, §1930: “*Quod quidem contingit dupliciter.*”

<sup>56</sup> *In Metaph.* 10, l. 1, §1930 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a31): “*Aut quia apprehensio indivisibilis est eius quod est unum specie.*”

<sup>57</sup> *In Metaph.* 10, l. 1, §1930 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a32–33): “*Specie autem unum, est indivisibile, quod est unum secundum scientiam et notitiam. Non enim in diversis singularibus est aliqua natura una numero, quae possit dici species. Sed intellectus apprehendit ut unum id in quo omnia inferiora conveniunt. Et sic in apprehensione intellectus, species fit indivisibilis, quae realiter est diversa in diversis individuis.*”

<sup>58</sup> *In Metaph.* 10, l. 1, §1930 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a31–32): “*aut eius quod est unum numero. Numero quidem indivisibile est ipsum singulare, quod non potest praedicari de multis.*”

Since *substance* is prior in *ratio* to all the other genera, and *one* is said in these modes (i.e., both ¶1 and ¶2) on account of one *ratio*, it follows that the first *one* according to these modes should be *one in substance*: to wit, what is the cause of *one* in substances (i.e., in the same way that, if something continuous and whole has in itself the principle of first motion, this will be the first *one* in magnitude; ► 39.12).<sup>59</sup>

### 38.13. One in Indivisible Understanding

Those are perfectly and maximally *one* whose understanding is indivisible:<sup>60</sup> for example, (essentially) simple (things), which are not composed from material and formal principles.

Whence, the intellect that receives (*accipiens*) their quiddity does not comprehend them as composing their definition from diverse principles.<sup>61</sup> Rather, (it comprehends them):

1. **By the mode of negation** (*per modum negationis*).<sup>62</sup> For example, the **point** is that which does not have a part (*cuius pars non est*).

2. Or, also, **by the mode of a relation to composite things** (*per modum habitudinis ad composita*).<sup>63</sup> For example, if **the unit** should be said to be *the principle of number* (*principium numeri*; and, likewise, the **point** is *the principle of magnitude*).

Such (simple things) have an understanding (that is) indivisible in itself, while those that are in whatever mode divisible can be understood separately.<sup>64</sup> Hence, it follows that such (simple things) are inseparable (*sunt inseparabilia* < μή δύναται χωρίσαι) according to time (*secundum tempus* = χρόνω), according to place (*secundum locum* = τόπω), and according to *ratio* (*secundum rationem* = λόγω).

Wherefrom, they are maximally *one* (*maxime unum* = μάλιστα... ἕν). And above all, that which is indivisible in the genus of substance, for that which is indivisible in a genus of

<sup>59</sup> *In Metaph.* 10, l. 1, §1931 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a33–34): “Et quia substantia prior est ratione omnibus aliis generibus, cum unum dicatur his modis propter rationem unam, sequitur quod primum unum secundum hos modos, sit unum substantia; quod scilicet est substantiis causa unius; sicut secundum primos duos modos, primum unum erat magnitudo circulariter mota.” ARISTOTLE and St. Thomas are referring here to the outermost celestial sphere, according to ancient astronomy.

<sup>60</sup> *In Metaph.* 5, l. 7, §865 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b1–2): “Dicit [Philosophus], quod «omnino» idest perfecte et maxime sunt unum, quorum intellectus intelligens quidditatem eorum est omnino indivisibilis, sicut simplicia, quae non componuntur ex principiis materialibus et formalibus.”

<sup>61</sup> *In Metaph.* 5, l. 7, §865: “Unde intellectus accipiens quidditatem eorum, non comprehendit ea, quasi componens definitionem eorum ex diversis principiis; sed magis [...]”

<sup>62</sup> *In Metaph.* 5, l. 7, §865: “per modum negationis, sicut punctus est, cuius pars non est.”

<sup>63</sup> *In Metaph.* 5, l. 7, §865: “vel etiam per modum habitudinis ad composita, sicut si dicatur quod unitas est principium numeri.”

<sup>64</sup> *In Metaph.* 5, l. 7, §865 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b2–3): “Et, quia talia habent intellectum indivisibilem in seipsis, ea autem quae sunt quocumque modo divisa, possunt intelligi separatim, ideo sequitur quod huiusmodi sunt inseparabilia, et secundum tempus, et secundum locum, et secundum rationem.”

accident is composed with another—that is, with the subject in which it is—even if it itself should not be composite. On the other hand, the indivisible substance is neither composite according to itself nor is it composed with another. And although some (things) are said (to be) *one* because (they are) indivisible according to place, time or *ratio*, those are maximally said (to be) *one* among them which are not divided according to substance.<sup>65</sup>

#### **38.14. Indivisibility According to Quantity vs. According to Species and Genus**

*One* has the *ratio* of *indivisibility* because **one** is nothing other than *undivided being*.<sup>66</sup> However, something is indivisible in two (modes):

**1. According to quantity**, as the point and the unit.<sup>67</sup> And this indivisible is opposed to the division of quantity.

**2. According to species**, as that which is not divided into multiple species.<sup>68</sup>

However, between these two indivisibles, prior and more principal is that which is indivisible according to species, just as also the species of a thing is prior to its quantity.<sup>69</sup> Therefore, that which is indivisible according to species is a principle more than that which is indivisible according to quantity.

According to the division of numerical quantity, the genus seems to be more indivisible because there is one genus of multiple species; but according to the division of species, one species is more indivisible.<sup>70</sup>

Indeed, the last (universal) that is predicated of many (and) that is not a genus of multiple species—namely, the most special species—is more one according to species than the

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<sup>65</sup> *In Metaph.* 5, l. 7, §865 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b3): “Et propter hoc sunt maxime unum; praecipue illud quod est indivisibile in genere substantiae. Nam quod est indivisibile in genere accidentis, etsi ipsum in se non sit compositum, est tamen alteri compositum, idest subiecto in quo est. Indivisibilis autem substantia, neque secundum se composita est, nec alteri componitur. Vel ly substantia, potest esse ablativi casus. Et tunc est sensus, quod licet aliqua dicantur unum quia sunt indivisibilia secundum locum vel tempus vel rationem, tamen inter ea illa maxime dicuntur unum, quae non dividuntur secundum substantiam. Et redit in eundem sensum cum priore.”

<sup>66</sup> *In Metaph.* 3, l. 8, §436 (cf. ARISTOTLE, *Metaphysica* B.3, 999a1–3): “Unum vero habet rationem indivisibilitatis, quia unum nihil est aliud quam ens indivisum. Dupliciter est autem aliquid indivisibile: scilicet secundum quantitatem, et secundum speciem.”

<sup>67</sup> *In Metaph.* 3, l. 8, §436: “Secundum quantitatem, quidem, sicut punctus et unitas: et hoc indivisibile opponitur divisioni quantitatis.”

<sup>68</sup> *In Metaph.* 3, l. 8, §436: “Secundum speciem autem, sicut quod non dividitur in multas species.”

<sup>69</sup> *In Metaph.* 3, l. 8, §436 (cf. ARISTOTLE, *Metaphysica* B.3, 999a3–4): “Sed inter haec duo indivisibilia prius et principalius est quod est indivisibile secundum speciem, sicut et species rei est prior quam quantitas eius; ergo illud quod est indivisibile secundum speciem, est magis principium eo quod est indivisibile secundum quantitatem.”

<sup>70</sup> *In Metaph.* 3, l. 8, §436 (cf. ARISTOTLE, *Metaphysica* B.3, 999a4–5): “Et quidem secundum quantitatis numeralis divisionem videtur esse magis indivisibile genus, quia multarum specierum est unum genus: sed secundum divisionem speciei magis est indivisibilis una species.”

genus.<sup>71</sup> For example, *man*, and whatever other most special species, is not the genus of other men. Therefore, (in this order) it is more a principle than the genus.

### 38.15. Logically One

According to logical intentions (*secundum intentiones logicales*):<sup>72</sup>

1. Those are said (to be) **one in number** (*numero* = κατ' ἀριθμόν) whose matter is one (*quorum materia est una* = ὧν ἡ ὕλη μία), for matter, insofar as it is under designated dimensions (*secundum quod stat sub dimensionibus signatis*), is the principle of the individuation of form (► 35.7).<sup>73</sup> And because of this, the singular has that it should be one in number—and divided from others—from matter.

2. Those things are said (to be) **one in species** (*specie* = κατ' εἶδος) whose ratio—i.e., definition (*ratio, idest definitio* = ὁ λόγος)—is one, for only the species is properly defined, since every definition consists in a genus and a difference; and if some genus is defined, this is insofar as it is a species.<sup>74</sup>

3. Those are **one in genus** (*genere* = κατὰ γένος) which agree in figure of predication (*quae conveniunt in figura praedicationis* = ὧν τὸ αὐτὸ σχῆμα τῆς κατηγορίας): that is, which have one mode of predicating.<sup>75</sup> For example, the mode whereby *substance* is predicated is other than that (mode) whereby *quality* or *action* is predicated; and all substances have one mode of predicating insofar as they are predicated as *not existing in a subject* (► 33.1).

4. Those are **one in proportion or in analogy** (*analogia* = κατ' ἀναλογίαν)<sup>76</sup> which agree in that this is related to that as another (is related) to another (*quaecumque in hoc*

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<sup>71</sup> *In Metaph.* 3, l. 8, §436 (cf. ARISTOTLE, *Metaphysica* B.3, 999a5–6): “Et sic ultimum praedicatum de pluribus quod non est genus plurium specierum, scilicet species specialissima, est magis unum secundum speciem quam genus. Sicut homo et quaelibet alia species specialissima, non est genus aliquorum hominum. Est ergo magis principium species quam genus.”

<sup>72</sup> *In Metaph.* 5, l. 7, §848: “[distinguit Philosophus modos unius] logice, idest secundum intentiones logicales.” Ibid., l. 8, §876 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b31–32): “ponit aliam divisionem unius, quae est magis logica; dicens, quod quaedam sunt unum numero, quaedam specie, quaedam genere, quaedam analogia.”

<sup>73</sup> *In Metaph.* 5, l. 8, §876 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b32–33): “Numero quidem sunt unum, quorum materia est una. Materia enim, secundum quod stat sub dimensionibus signatis, est principium individuationis formae. Et propter hoc ex materia habet singulare quod sit unum numero ab aliis divisum.”

<sup>74</sup> *In Metaph.* 5, l. 8, §877 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b33): “Specie autem dicuntur unum, quorum una est ratio, idest definitio. Nam nihil proprie definitur nisi species, cum omnis definitio ex genere et differentia constet. Et si aliquod genus definitur, hoc est in quantum est species.”

<sup>75</sup> *In Metaph.* 5, l. 8, §878 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b33–34): “Unum vero genere sunt, quae conveniunt in figura praedicationis, idest quae habent unum modum praedicandi. Alius enim est modus quo praedicatur substantia, et quo praedicatur qualitas vel actio; sed omnes substantiae habent unum modum praedicandi, in quantum praedicantur non ut in subiecto existentes.”

<sup>76</sup> *In Metaph.* 5, l. 8, §879 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b34–35): “Proportione vero vel analogia sunt unum quaecumque in hoc conveniunt, quod hoc se habet ad illud sicut aliud ad aliud.”

*conveniunt, quod hoc se habet ad illud sicut aliud ad aliud < quaecumque se habent ut aliud ad aliud = ὅσα ἔχει ὡς ἄλλο πρὸς ἄλλο).*

This can be taken in two modes (►20.1), (for) either (a) they agree in that *two of them have diverse relations to one*, as *curative (sanativum)* said of urine signifies a *relation of sign of health*, while said of (the art of) medicine signifies a relation of cause in respect of the same; or (b) they agree *in that the proportion of two things is the same in respect of diverse (things)*, as tranquility is to the sea what serenity is to the air (►20.11).<sup>77</sup>

### 38.16. Order of the Modes of Being Logically One

In these modes of (being logically) one, the posterior always follows the precedent and is not convertible (i.e., there is an order of dependence).<sup>78</sup> Thus, whatever things are one in number are one in species; but not conversely. And the same is evident of the others (i.e., whatever is one in species is one in genus, but not conversely; and whatever is one in genus is one according to analogy, but not conversely).

Those (things) that are of diverse genera as of most general (genera) have diverse principles according to the thing (*secundum rem*), even if they are the same according to analogy (►21.12).<sup>79</sup> Yet, those that are contained under one most-general genus, even though they be in diverse subalternate genera, can have the same principles according to the community of the genus (i.e., according to the *logical* or *formal* genus; ►21.11).

What ARISTOTLE says (i.e., that diversity of species follows upon diversity of genera, and diversity according to number follows upon diversity of species) is to be understood (to occur) when the natures that are united (*conjunguntur*) are not of diverse genera, for accident and subject, even though they are united, do not produce a number (*non faciunt numerum*) because they are diverse in genus (and hence, rather than *one* by themselves, they are one by accident; ►38.17).<sup>80</sup>

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<sup>77</sup> *In Metaph.* 5, l. 8, §879: “Et hoc quidem potest accipi duobus modis, vel in eo quod aliqua duo habent diversas habitudines ad unum; sicut sanativum de urina dictum habitudinem significat signi sanitatis; de medicina vero, quia significat habitudinem causae respectu eiusdem. Vel in eo quod est eadem proportio duorum ad diversa, sicut tranquillitatis ad mare et serenitatis ad aerem. Tranquillitas enim est quies maris et serenitas aeris.” Compare, respectively, to a harmonic mean (►6.7) and a discrete proportion (►6.8).

<sup>78</sup> *In Metaph.* 5, l. 8, §880 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b35–1017a3): “In istis autem modis unius, semper posterius sequitur ad praecedens et non convertitur. Quaecumque enim sunt unum numero, sunt specie unum et non convertitur. Et idem patet in aliis.”

<sup>79</sup> *De malo*, q. 8 a. 1 ad 13: “ea quae sunt diversorum generum quasi generalissimorum, sunt diversa principia secundum rem, licet sint eadem secundum analogiam, ut dicitur in X Metaph. Sed ea quae continentur sub uno genere generalissimo, licet sint in diversis generibus subalternis, possunt habere eadem principia secundum communitatem illius generis.”

<sup>80</sup> *In Sent.* 3, d. 5 q. 1 a. 3 ad 5: “illud Philosophi [sc., Philosophus dicit in 5 Metaph., quod ad diversitatem in genere sequitur diversitas in specie, et ad hanc diversitas secundum numerum] est intelligendum quando naturae diversorum generum non conjunguntur: accidens enim et subjectum, quia conjunguntur (quamvis sint diversa genere), non faciunt numerum.”

### 38.17. One by Accident

ARISTOTLE teaches (us) to consider the *one* by accident, first, in singular terms.<sup>81</sup> And this, in two modes, in each of which three (beings) are to be taken: namely, one composite (being) and two simple (beings). The two modes are:

#### 1. Insofar as an accident is compared to a subject.

Thus, if *one* by accident should be taken according to a comparison of an accident to a subject, then there are these three (beings): first is Coriscus; second is the musical; third, Coriscus the musical (i.e., Coriscus the musician).<sup>82</sup> And these three (beings) are one by accident, for Coriscus and the musical are the same in subject.

#### 2. Insofar as one accident is compared to another (accident).

Likewise, when an accident is compared to an accident, three (beings) are to be taken, of which the first is the musical; the second is the just; the third is Coriscus the musical just.<sup>83</sup>

All of these are said to be one according to accident, but for diverse reasons (► 17.9).<sup>84</sup> For the just and the musical, which are two simple (beings) in the second acceptation, are said (to be) *one* by accident because they happen to one subject.<sup>85</sup> On the other hand, the musical and Coriscus, which are two simple (beings) in the first acceptation, are said (to be) *one* by accident because one of them—namely, the musical—happens to the other—namely, Coriscus.

Likewise, (the case is the same) in relation to *some musical* with *Coriscus*, which is a composite with one simple (being).<sup>86</sup> (And these) are said (to be) *one* by accident in the

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<sup>81</sup> *In Metaph.* 5, l. 7, §843 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b16–18): “Per accidens autem unum docet considerare primo in terminis singularibus; et hoc dupliciter. Uno modo secundum quod accidens comparatur ad subiectum. Alio modo secundum quod unum accidens comparatur ad aliud. In utroque autem istorum tria est accipere; scilicet unum compositum et duo simplicia.”

<sup>82</sup> *In Metaph.* 5, l. 7, §843 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b18–19): “Si enim unum per accidens accipiatur secundum comparationem accidentis ad subiectum, sic sunt ista tria: primum est Coriscus, secundum est musicus, tertium Coriscus musicus. Et haec tria sunt unum per accidens. Nam idem subiecto est Coriscus et musicus.”

<sup>83</sup> *In Metaph.* 5, l. 7, §843 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b19–20): “Et similiter, quando comparatur accidens ad accidens, tria est accipere; quorum primum est musicum, secundum est iustum, tertium est musicus iustus Coriscus.”

<sup>84</sup> *In Metaph.* 5, l. 7, §843 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b20–21): “Et omnia praedicta dicuntur esse unum secundum accidens; tamen alia et alia ratione.”

<sup>85</sup> *In Metaph.* 5, l. 7, §844 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b21–23): “Iustum enim et musicum, quae sunt duo simplicia in secunda acceptatione, dicuntur unum per accidens, quia accidunt uni subiecto. Musicus vero et Coriscus, quae sunt duo simplicia in prima acceptatione, dicuntur unum per accidens, quia «alterum eorum,» scilicet musicum «accidit alteri,» scilicet Corisco.”

<sup>86</sup> *In Metaph.* 5, l. 7, §844 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b23–26): “Et similiter quantum ad aliquid musicus Coriscus cum Corisco, quod est compositum cum uno simplicium, in prima acceptatione dicuntur unum per accidens, quia inter partes istas quae sunt in hac oratione, idest in hoc termino complexo,

first acceptation because, among the parts that are in this complex terminus—namely, Coriscus the musical—, one of the parts of the complex terminus—namely, the musical— happens to the other part (which is) designated by itself—namely, Coriscus.

And for the same reason, it can be said that Coriscus the musical is one with Coriscus the just, which are two composite (beings) in the second acceptation because both parts of one and of the other composite happen to one—namely, to Coriscus.<sup>87</sup> Indeed, if the musical and Coriscus the musical is the same, and the just and Coriscus the just (is the same), to whichever happens the musical, (to it, too) happens Coriscus the musical; and whatever happens to Coriscus (also) happens to Coriscus the just. Whence, if the musical happens to Coriscus, it follows that Coriscus the musical happens to Coriscus the just. And in this way, it differs in nothing to say that Coriscus the musical happens to Coriscus the just (and to say) that the musical happens to Coriscus.

### 38.18. One by Accident in Universals

Predicates by accident are predicated priorly of singulars and posteriorly of universals, though it should be conversely (the case) concerning predicates by themselves (► 17; 19).<sup>88</sup> Consequently, ARISTOTLE manifests in universal terms what he had shown in singular (terms).

He says that, if some accident should be said with some name of a genus—or (with) any universal—, *one* by accident is taken likewise as it is taken in the aforesaid (cases) when an accident is joined to a singular name: for example, when it is said that *man* and *musical man* are *one* by accident, even though they should differ in respect of something.<sup>89</sup>

Indeed, singular substances neither are in a subject nor are they predicated of a subject. Whence, only they underly—and nothing underlies them. (On the other hand), universal

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scilicet, Coriscus musicus, altera pars termini complexi, scilicet musicus, accidit alteri parti per se signatae, scilicet Corisco.”

<sup>87</sup> *In Metaph.* 5, l. 7, §844 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b26–27): “Et eadem ratione potest dici, quod musicus Coriscus est unum cum iusto Corisco, quae sunt duo composita in secunda acceptione, quia ambae partes utriusque compositi accidunt uni, scilicet Corisco. Si enim idem est musicus et musicus Coriscus, et iustus et iustus Coriscus, cuicumque accidit musicum accidit musicus Coriscus; et quicquid accidit Corisco accidit Corisco iusto. Unde, si musicum accidit Corisco, sequitur, quod musicus Coriscus accidit iusto Corisco. Et sic nihil differt dicere musicum Coriscum accidere iusto Corisco, quam musicum accidere Corisco.”

<sup>88</sup> *In Metaph.* 5, l. 7, §845 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b28–34): “Quia vero huiusmodi praedicata per accidens per prius praedicantur de singularibus, et per posterius de universalibus, cum tamen e converso sit de praedicatis per se, manifestat [Philosophus] consequenter in terminis universalibus quod in singularibus ostenderat.”

<sup>89</sup> *In Metaph.* 5, l. 7, §845 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b28–30): “dicens [Philosophus], quod similiter accipitur unum per accidens, si aliquod accidens dicatur cum aliquo nomine alicuius generis, vel cuiuscumque universalis, sicut accipitur unum per accidens in praedictis, quando accidens adiungitur nomini singulari; sicut cum dicitur, quod homo et musicus homo sunt unum per accidens, licet quantum ad aliquid differant.”



substances are indeed *said of* a subject but *are not in* a subject. Whence, they do not underly accidents—and something underlies them. Therefore, since accidents are joined to particular substances, the reason for (what has just been) said cannot be other than that an accident is in (*inest*) a particular substance, as musical is in Coriscus when Coriscus is said (to be) *musical*.<sup>90</sup>

However, when *man* is said (to be) *musical*, the reason can be twofold, for either:<sup>91</sup>

1. This is said because musical happens to a man, by which a substance is signified, and for this (reason) it befits it that it should be capable of underlying an accident.<sup>92</sup>
2. This is said because both—namely, man and musical—are in some singular (subject), such as Coriscus, as the musical was said to be just because they are in the same singular and in the same mode—namely, by accident.<sup>93</sup>

However, perhaps this is not in the same mode.<sup>94</sup> Rather, the universal substance is in the singular as a genus, as the name *animal*. Or, if it should not be a genus, at least it is in the substance of the subject—that is, as a substantial predicate—, as the name *man*.

On the other hand, the other—namely, musical—is not as a genus or essential predicate but as a habit or affection (*ut habitus vel passio* = ὡς ἕξις ἢ πάθος) of the subject (i.e., of the substance, τῆς οὐσίας).<sup>95</sup> ARISTOTLE posits these two—habit and affection—because some accidents remain in the subject as habits, which are changed with difficulty (*sunt difficile mobiles*), while other accidents are transient (*pertranseuntia*) and do not remain, as affections.

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<sup>90</sup> *In Metaph.* 5, l. 7, §846: “Singulares enim substantiae nec sunt in subiecto, nec de subiecto praedicantur. Unde tantum substant et nihil eis substat. Substantiae quidem universales dicuntur de subiecto, sed non sunt in subiecto. Unde non substant accidentibus, et eis aliquid substat. Cum ergo accidens adiungitur particulari substantiae, non potest esse alia ratio dicti, nisi quia accidens inest substantiae particulari, ut quia musicum inest Corisco cum dicitur Coriscus musicus.”

<sup>91</sup> *In Metaph.* 5, l. 7, §847 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b30–32): “Sed, cum dicitur homo musicus, potest esse duplex ratio dicti.”

<sup>92</sup> *In Metaph.* 5, l. 7, §847 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b30–31): “Aut enim hoc dicitur, quia musicum accidit homini, per quod significatur substantia, et ex hoc competit sibi quod possit substare accidenti.”

<sup>93</sup> *In Metaph.* 5, l. 7, §847 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b31–32): “Aut hoc ideo dicit, quia ambo, scilicet homo et musicus, insunt alicui singulari, sicut Corisco: sicut musicum dicebatur iustum, quia eidem singulari insunt, et eodem modo, scilicet per accidens.”

<sup>94</sup> *In Metaph.* 5, l. 7, §847 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b32–34): “Sed forsitan hoc non eodem modo; sed universalis substantia inest singulari ut genus, sicut hoc nomen animal; aut si non sit genus, saltem est in substantia subiecti, idest ut substantiale praedicatum, sicut hoc nomen homo.”

<sup>95</sup> *In Metaph.* 5, l. 7, §847 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b34): “Sed aliud, scilicet musicum, non est ut genus vel essentialia praedicatum, sed ut habitus vel passio subiecti, vel quaecumque accidens. Ponit autem [Philosophus] haec duo, habitum et passionem, quia quaedam accidentia sunt manentia in subiecto, sicut habitus, qui sunt difficile mobiles; quaedam autem sunt accidentia pertranseuntia et non manentia, sicut passiones.”



## 39. The Continuum

*Being continuous is the first mode of being naturally one in ARISTOTLE'S division (► 38.5). Due to the importance of this mode of being one to the subject at hand, we devote a separate chapter to it.*

### 39.1. Modes of the Continuum

As ARISTOTLE says, *perfect* and *whole* pertain to the ratio of *unity* (*perfectum et totum ad unitatis rationem pertinent* < τὸ τέλειον καὶ ὅλον τοῦ ἐνός).<sup>1</sup> For example, only of a whole do we say, *one man* or *one heaven*. Likewise, whether motion is said (to be) *one* according to genus, according to species or according to substance—as that which is numerically one—, it is said (to be) *one motion* because it is perfect.

Sometimes, however, *one* is said also of the imperfect—provided it is continuous.<sup>2</sup> And the reason for this is that *one* can be considered either **according to quantity**, and thus, continuity alone suffices for the unity of a thing; or **according to substantial form**, which is the perfection of the whole, and thus, the perfect and the whole is said (to be) *one*.

Hence, as ARISTOTLE says, two modes of unity are apparent: as a **continuum** is said (to be) *one*, and as a (continuous) **whole** is said (to be) *one*.<sup>3</sup> Thus, *one* is said by itself as:

1. The **continuum** (*continuum* = τὸ συνεχές), which can be taken in two modes:<sup>4</sup>

(a) **Universally** (*universaliter* < ἀπλῶς; i.e., simply): to wit, in whatever mode something should be said (to be) *continuous* (► 39.2).<sup>5</sup>

(b) That which is continuous **according to nature** (*secundum naturam* = φύσει; ► 39.12) **only**,<sup>6</sup> which is maximally (*maxime* = μάλιστα) continuous, and not continuous by violence

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<sup>1</sup> *In Physic.* 5, l. 7, n. 5 (cf. ARISTOTLE, *Physica* E.4, 228b11–14): “Dicit ergo [Philosophus] primo, quod sive motus dicatur unus secundum genus sive secundum speciem sive secundum substantiam, sicut qui est numero unus, dicitur unus motus ex hoc quod est *perfectus*, sicut et in aliis rebus perfectum et totum ad unitatis rationem pertinent. Non enim dicimus unum hominem vel unum calceum, nisi de toto.”

<sup>2</sup> *In Physic.* 5, l. 7, n. 5 (cf. ARISTOTLE, *Physica* E.4, 228b14–15): “Quandoque autem dicitur unum etiam de imperfecto, dummodo sit continuum. Et ratio huius est, quia unum potest attendi vel secundum quantitatem, et sic sola continuitas sufficit ad unitatem rei; vel secundum formam substantialem, quae est perfectio totius; et sic perfectum et totum dicitur unum.”

<sup>3</sup> *In Metaph.* 10, l. 1, §1928 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a29): “Sic igitur apparent duo modi unitatis: aut sicut continuum dicitur unum, aut sicut totum dicitur unum.”

<sup>4</sup> *In Metaph.* 10, l. 1, §1922 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a19): “Et inter modos unius dicti per se, *unus modus* est secundum quod continuum dicitur unum. Quod quidem accipi potest dupliciter.”

<sup>5</sup> *In Metaph.* 10, l. 1, §1922 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a19): “aut universaliter, scilicet quocumque modo sit aliquid continuum dicatur unum.”

<sup>6</sup> *In Metaph.* 10, l. 1, §1922 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a19–20): “aut unum continuitate solum quod secundum naturam est continuum, quod maxime continuum est, et non est continuum per violentiam, aut per artem, neque per alium modum contactus, sicut patet in castraturis lignorum, neque per aliquam continuitatem, sicut in his quae continuantur vel ligantur clavo vel quocumque vinculo.”

or by art: neither by another mode of contact (*contactus* = ἀφῆ), as is evident in planks of wood; nor by some continuation (*per aliquam continuitatem* < *ligatione* = δεσμῶ), as in those (things) that are continued or bound together by a nail or by some other binding.

2. (Insofar as) that which is said (to be) *one* is considered not only to be **continuous**, but to have more: to wit, that it should be **a whole having some form or species** (*totum habens aliquam formam aut speciem* < τὸ ὅλον καὶ ἔχον τινὰ μορφήν καὶ εἶδος; ► 39.17), as an animal is *one*; and (as) a triangular surface is *one*.<sup>7</sup> Hence, this *one* adds over the unity of continuity the unity that is (had) from the form, according to which something *is a whole and has a species*.

### 39.2. Continuous

Those are **continuous** (*continua* = συνεχῆ) whose extremities are *one* (*quorum ultima sunt unum* = ὧν τὰ ἔσχατα ἓν).<sup>8</sup>

Hence, as ARISTOTLE manifests, the *continuum* (*continuum* = συνεχές) is some species of the contiguous (*aliqua species habiti* < ὅπερ ἐχόμενόν τι; ► 39.3), for there is said to be a **continuum** when the terminus of two (things) that are in contact come to be one and the same (*cum unus et idem fiat terminus duorum quae se tangunt* < ὅταν ταύτῳ γένηται καὶ ἓν τὸ ἐκατέρου πέρασ οἷς ἄπτονται).<sup>9</sup>

This, too, is what the name signifies, for *continuum* is said from containing (*a continendo dicitur* < συνέχεται).<sup>10</sup> Therefore, when multiple parts are contained in one (whole) and are as simultaneously related (*quasi simul se tenent*), then there is a continuum.

In contrast, this cannot occur when there are two extremities (*hoc non potest esse cum sint duo ultima* < τοῦτο δ' οὐχ οἷόν τε δυοῖν ὄντων εἶναι τοῖν ἔσχατοι), but only when there is one. Wherefrom, ARISTOTLE further concludes that there can be a continuation only in those (things) from which (something) *one* according to contact can naturally come to be

<sup>7</sup> In *Metaph.* 10, l. 1, §1925 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a22–23): “ponit [Philosophus] *secundum modum*: in quo quidem consideratur non solum quod id quod dicitur unum, «sit tale,» idest continuum; sed et quod plus habeat, scilicet quod sit quoddam totum habens aliquam formam aut speciem; sicut animal est unum, et superficies triangularis est una. Hoc igitur unum supra unitatem continuitatis addit unitatem quae est ex forma, secundum quam aliquid est totum, et speciem habens.”

<sup>8</sup> In *Physic.* 6, l. 1, n. 2 (cf. ARISTOTLE, *Physica* Z.1, 231a22): “*continua* sint, quorum ultima sunt unum.”

<sup>9</sup> In *Physic.* 5, l. 5, n. 8 (cf. ARISTOTLE, *Physica* E.3, 227a10–12): “manifestat [Philosophus] quid sit *continuum*: et dicit quod continuum est aliqua species habiti. Cum enim unus et idem fiat terminus duorum quae se tangunt, dicitur esse continuum.”

<sup>10</sup> In *Physic.* 5, l. 5, n. 8 (cf. ARISTOTLE, *Physica* E.3, 227a12–13): “Et hoc etiam significat nomen. Nam continuum a continendo dicitur: quando igitur multae partes continentur in uno, et quasi simul se tenent, tunc est continuum.” The verb *contīnĕo* has both the sense of containing or comprehending, and that of holding together within itself in a connected, continuous, uninterrupted, or unbroken way; and the same is true of its Greek equivalent. See LEWIS and SHORT, *A Latin Dictionary*, entry for *contīnĕo*, I.B.3; II.A.2; II.C.1; LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for *συνεχής*.

(*ex quibus natum est unum fieri secundum contactum* = ἐξ ὧν ἓν τι πέφυκε γίνεσθαι κατὰ τὴν σύναψιν).<sup>11</sup>

Indeed, some whole is one and continuous according to itself for the same reason that one continuum comes to be from multiple (things): whether through some nailing together, or through some gluing together, or through whatever mode of occurring, such that there should come to be one terminus for one and for the other; or also by this: that something is naturally begotten next to another, as a fruit grows out of a tree and is united to it in some mode.<sup>12</sup>

### 39.3. Contiguous

As ARISTOTLE says, not everything that is a consequent (► 39.4) is **contiguous** (*habitus* = ἐχώμενον), but (only) *when it is consequent in such a way that it is in contact* (*quando sic est consequenter, quod tangit* < ὃ ἂν ἐφεξῆς ὄν ἄπτηται) such that there is no mean, either of the same genus or of another (genus).<sup>13</sup> Thus, *contiguous* (*habitus*) adds *contact* (*contactum*) over *consequent* (*supra id quod est consequenter*).<sup>14</sup>

Those are said (to be) **in contact** (*contacta* = ἀπτόμενα) or **to touch each other** (*tangere se* = ἄπτεσθαι) *whose extremities are simultaneous* (*quorum ultima sunt simul* = ὧν τὰ ἄκρα ἅμα; that is, whose termini are neither prior nor posterior in some order; ► 8.7).<sup>15</sup>

(For example), the extremities of bodies are surfaces; the extremities of surfaces are lines; and the extremities of lines are points.<sup>16</sup> Hence, when two lines are contiguous, there are two points from the part of the two lines (i.e., the extremity of *this* line and the extremity of *that* line; ► 34.26), but one point from the part of the containing place.

<sup>11</sup> *In Physic.* 5, l. 5, n. 8 (cf. ARISTOTLE, *Physica* E.3, 227a13–15): “Sed hoc non potest esse cum sint duo ultima, sed solum cum est unum. Ex hoc autem ulterius concludit [Philosophus], quod continuatio esse non potest, nisi in illis ex quibus natum est unum fieri secundum contactum.”

<sup>12</sup> *In Physic.* 5, l. 5, n. 8 (cf. ARISTOTLE, *Physica* E.3, 227a15–17): “Ex eadem enim ratione aliquod totum est secundum se unum et continuum, ex qua ex multis fit unum continuum, vel per aliquam conclavationem, vel per aliquam incollationem, vel per quemcumque modum contingendi, ita quod fiat unus terminus utriusque; vel etiam per hoc quod aliquid naturaliter nascitur iuxta aliud, sicut fructus adnascitur arbori et continuatur quodammodo ei.”

<sup>13</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 227a6–7): “Deinde definit [Philosophus] quandam speciem eius quod est consequenter, quae dicitur habitus. Et dicit quod non omne quod est consequenter, est habitus; sed quando sic est consequenter, quod tangit; ita quod nihil sit medium, non solum eiusdem generis, sed nec alterius.”

<sup>14</sup> *In Post. an.* 2, l. 11, 21–23: “habitus autem supra id quod est consequenter addit contactum, sicut dicitur in V Phisicorum.” Cf. ARISTOTLE, *Physica* E.3, 226b34–227a6.

<sup>15</sup> *In Physic.* 5, l. 5, n. 2 (cf. ARISTOTLE, *Physica* E.3, 226b23): “*Tangere* autem se dicuntur, quorum sunt ultima simul.” Ibid. 6, l. 1, n. 2 (cf. ARISTOTLE, *Physica* Z.1, 231a21–26): “*contacta*, quorum ultima sunt simul.”

<sup>16</sup> *In Physic.* 5, l. 5, n. 2: “Ultima autem corporum sunt superficies, et ultima superficierum sunt lineae, et ultima linearum sunt puncta.” *STh* III, q. 75 a. 7 ad 1: “cum duae lineae se contingunt, sunt duo puncta ex parte duarum linearum, unum autem punctum ex parte loci continentis.”

### 39.4. Consequent

Those are **consequent** (*consequenter* = ἐφεξῆς) of which there is no mean of their genus (*quorum nihil est medium sui generis* = ὧν μηδὲν μεταξὺ συγγενές).<sup>17</sup>

For example, two soldiers in a line, or two clerics in a choir (are said to be consequent: that is, to follow one upon the other).<sup>18</sup>

Everything that is said (to be) *consequent* is consequent in respect of something (*est consequenter respectu alicuius* < τινὶ ἐφεξῆς), and not as prior but as posterior (*tanquam posterius* < ὕστερόν τι; i.e., follows upon it in some order).<sup>19</sup> Thus, it is not said that *one* should be consequent to *two*, nor (that) the new moon (should be consequent) to the second (i.e., a day consequent to a later day of the same month), but conversely.

Therefore, there are two requirements for something to be said to be consequent to another:<sup>20</sup>

1. That (the consequent) be *after some principle* (*quod sit post aliquod principium* = οὗ μετὰ τὴν ἀρχὴν ὄντος) in some order (*quodam ordine*; ► 8.5; 8.6).<sup>21</sup>

(This can be) either according to position (*secundum positionem* = θέσει), as in those that have an order in a place; or according to species (*secundum speciem* = εἴδει), as *two* is after the *unit*; or in any other mode in which some (things) are determinately ordered (*quocumque alio modo aliqua determinate <ordinentur>* = ἄλλω τινὶ οὕτως ἀφορισθέντος). For example, according to virtue (*secundum virtutem*), according to dignity (*secundum dignitatem*), according to cognition (*secundum cognitionem*), etc.<sup>22</sup>

2. That between the consequent and that upon which (the consequent) follows (*quod inter id quod est consequenter, et id cui est consequenter*) there be no mean of those that

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<sup>17</sup> *In Physic.* 6, l. 1, n. 2 (cf. ARISTOTLE, *Physica* Z.1, 231a21–26): “quod [...] *consequenter* autem sint, quorum nihil est medium sui generis.” *In Post. an.* 2, l. 11, 18–20: “dicuntur autem *consequenter* se habencia quorum nichil est medium eiusdem generis.”

<sup>18</sup> *In Post. an.* 2, l. 11, 20–21: “sicut duo milites in acie, uel duo clerici in choro.”

<sup>19</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 227a4–6): “Quare autem dixerit [Philosophus] et cuius est *consequenter*, et quod est post principium, manifestat subdens, quod omne quod dicitur *consequenter*, est *consequenter* respectu alicuius, et non tanquam prius, sed tanquam posterius. Non enim dicitur quod unum sit *consequenter* duobus, neque nova luna secundae, sed e converso.”

<sup>20</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 226b34–227a6): “definit [Philosophus] hoc quod est *consequenter* [...]. Et dicit quod ad hoc quod aliquid dicatur esse *consequenter* ad alterum, duo requiruntur.”

<sup>21</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 226b34–35): “Quorum unum est, quod sit post aliquod principium quodam ordine.”

<sup>22</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 226b35): “vel secundum positionem, sicut in iis quae habent ordinem in loco; vel secundum speciem, sicut dualitas est post unitatem; vel quocumque alio modo aliqua determinate ordinentur, sicut secundum virtutem, secundum dignitatem, secundum cognitionem, et huiusmodi.”

are in the same genus (*non sit aliquod medium <de numero> eorum <quae sunt> in eodem genere* = μηδὲν μεταξύ ἐστὶ τῶν ἐν ταύτῳ γένει).<sup>23</sup>

For example, a line is consequently related to a line if there is no line in between.<sup>24</sup> Likewise, a unit (is consequently related) to a unit (if there is no unit in between); and a house (is consequently related) to a house (if there is no house between them).

However, for something to be consequent to another, nothing prevents there being between them some mean of another genus.<sup>25</sup> For example, if an animal should be between two houses (the two houses would nonetheless be related consequently).

### 39.5. Consequent, Contiguous, and Continuous Compared

ARISTOTLE compares the *consequent*, the *contiguous* and the *continuous* to each other:<sup>26</sup>

#### 1. The consequent compared to the contiguous.<sup>27</sup>

It is manifest that, among these three, the consequent is first *according to the order of nature* insofar as (that) is said (to be) **prior** from which the consequence of being is not convertible (*a quo non convertitur consequentia essendi*; ►47.1, ¶1; 47.2), since every contiguous must necessarily be consequent.<sup>28</sup> Indeed, between those that are contiguous there must be some order (►8.5)—at least according to position. On the other hand, not every consequent need be contiguous, for there can be an order in those (things between) which there is no contact, as in (those that are) separated from matter.

Whence, the consequent is found among those (things) that are prior according to *ratio* (*secundum rationem* = τῷ λόγῳ), for it is found in numbers (*in numeris* = ἐν ἀριθμοῖς), in which contact is not found, which is only found in continua. Numbers, on the other hand,

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<sup>23</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 227a1): “Aliud quod requiritur est, quod inter id quod est consequenter, et id cui est consequenter, non sit aliquod medium de numero eorum quae sunt in eodem genere.”

<sup>24</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 227a2–3): “sicut linea consequenter se habet ad lineam, si nulla linea sit in medio; et similiter est de unitate ad unitatem, et de domo ad domum.”

<sup>25</sup> *In Physic.* 5, l. 5, n. 6 (cf. ARISTOTLE, *Physica* E.3, 227a3–4): “Sed nihil prohibet, ad hoc quod aliquid sit alteri consequenter, quin aliquid sit medium inter ea alterius generis; sicut si aliquod animal sit medium inter duas domus.”

<sup>26</sup> *In Physic.* 5, l. 5, n. 9 (cf. ARISTOTLE, *Physica* E.3, 227a17–27): “comparat [Philosophus] tria praemissorum ad invicem, de quibus principaliter intendit, scilicet *consequenter se habens*, *contactum* et *continuum*.” See also *In Metaph.* 11, l. 13, §§2413–4 (cf. ARISTOTLE, *Metaphysica* K.12, 1069a7–12).

<sup>27</sup> *In Physic.* 5, l. 5, n. 9 (cf. ARISTOTLE, *Physica* E.3, 227a17–21): “primo comparat [Philosophus] consequenter se habens ad contactum.”

<sup>28</sup> *In Physic.* 5, l. 5, n. 9 (cf. ARISTOTLE, *Physica* E.3, 227a17–19): “Dicit ergo [Philosophus] primo manifestum esse, quod consequenter se habens est primum inter tria praemissa ordine naturae, secundum quod dicitur esse prius, a quo non convertitur consequentia essendi; quia omne contactum necesse est esse consequenter: oportet enim inter ea quae se contingunt, esse aliquem ordinem, ad minus positione. Sed non oportet omne quod consequenter se habet, esse tangens: quia ordo potest esse in quibus non est tactus, sicut in separatis a materia.”

are prior to continuous quantities according to *ratio* as (being) simpler and more abstract (i.e., since the principle of magnitude adds *position* to the principle of number).<sup>29</sup>

## 2. The contiguous compared to the continuous.<sup>30</sup>

For the same reason, the contiguous is prior to the continuous.<sup>31</sup> For if something is continuous, it is necessary that it be in contact; but if it is in contact, it is not necessary that it be continuous.

ARISTOTLE proves this through the *ratio* of one and of the other.<sup>32</sup> Thus, it is not necessary that the extremities of some (things) should be one—which belongs to the *ratio* of *continuous*—if they are simultaneous—which belongs to the *ratio* of *contiguous*. Rather, conversely, if the extremities are one, it is necessary that they be simultaneous for the (same) reason whereby it can be said that one (thing) should be simultaneous to itself.

On the other hand, if *simultaneous* conveys (*importat*) a relation of distinct (things), those that are simultaneous cannot be one; and according to this, nor can those (things) that are continuous be contiguous.<sup>33</sup> However, (*simultaneous*) is taken (here) in common (i.e., regardless of whether one thing is said to be simultaneous to itself, or two to each other).

Whence, ARISTOTLE concludes that the continuation (*continuatio* < *insertus* = σύμφυσις, i.e., natural junction) according to which one part is brought into another in one terminus, is last in the order of generation, according as special (things) are posterior to common (things).<sup>34</sup> Hence, the continuation is last because it is necessary for some (things) to be

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<sup>29</sup> *In Physic.* 5, l. 5, n. 9 (cf. ARISTOTLE, *Physica* E.3, 227a19–21): “Unde hoc quod est consequenter, invenitur in iis quae sunt priora secundum rationem: invenitur enim in numeris, in quibus non invenitur tactus, qui invenitur solum in continuis. Numeri autem secundum rationem sunt priores continuis quantitativibus, sicut magis simplices et magis abstracti.”

<sup>30</sup> *In Physic.* 5, l. 5, n. 9 (cf. ARISTOTLE, *Physica* E.3, 227a21–27): “comparat [Philosophus...] secundo contactum ad continuum.”

<sup>31</sup> *In Physic.* 5, l. 5, n. 10 (cf. ARISTOTLE, *Physica* E.3, 227a21–22): “Comparat [Philosophus] *contactum* ad *continuum*. Et dicit quod eadem ratione contactum est prius quam continuum: quia si aliquid est continuum, necesse est quod sit tangens; sed non est necessarium, si tangit quod sit continuum.”

<sup>32</sup> *In Physic.* 5, l. 5, n. 10 (cf. ARISTOTLE, *Physica* E.3, 227a22–23): “Et hoc probat per rationem utriusque. Non enim necessarium est quod ultima aliquorum sint unum, quod est de ratione continui, si sunt simul, quod est de ratione contacti: sed necesse est e converso, si ultima sunt unum, quod sint simul, ea ratione qua potest dici, quod unum sit simul sibi ipsi.”

<sup>33</sup> *In Physic.* 5, l. 5, n. 10: “Si autem hoc quod dico *simul*, importat habitudinem distinctorum, non possunt esse unum quae sunt simul: et secundum hoc nec contacta esse possunt quae sunt continua, sed communiter accipiendo.”

<sup>34</sup> *In Physic.* 5, l. 5, n. 10 (cf. ARISTOTLE, *Physica* E.3, 227a23–27): “Unde concludit quod *insertus*, idest continuatio secundum quam una pars inseritur alteri in uno termino, est ultimus in ordine generationis, prout specialia sunt posteriora communibus, sicut prius generatur animal quam homo. Et ideo dico esse ultimum insertum, quia necesse est aliqua se tangere ad invicem, si ultima eorum sunt *adnata*, idest naturaliter unita; sed non est necessarium quod omnia quae se tangunt, quod sint naturaliter adnata ad invicem. Sed in quibus non potest esse contactus, manifestum est quod in his non potest esse *consertus*, idest continuatio.” The example, as *an animal is generated before a man*, responds to ancient science.



in contact with each other if their extremities are (to be) naturally united (*naturaliter unita* < *adnata* = συμφύσεται); but it is not necessary that all those that are in contact be naturally united to each other. Rather, it is evident that in those (things) in which there cannot be contact, there can be no continuation (*continuatio* < *consertus* = σύμφυσις).

### 39.6. Corollary: The Unit and the Point Are Not the Same

ARISTOTLE infers some corollary from what has been said.<sup>35</sup> Namely, that if the unit and the point are separated, as some say, positing mathematical (things) to be separated according to being (*secundum esse*), it follows that the unit and the point are not the same.

This is made manifest for two reasons:<sup>36</sup>

1. There are points in those (things) that are naturally apt to be in contact; and some (things) are in contact to each other according to points.<sup>37</sup> In units, on the other hand, only a consequent is found—but no contact.
2. There can be a mean between two points, for every line is a mean between two points.<sup>38</sup> On the other hand, it is not necessary for there to be some mean between two units. Indeed, it is evident that between the two units that constitute (the number) *two* and the first unit itself there is no mean.

### 39.7. It Is Impossible for a Continuum to Be Composed from Indivisibles

As ARISTOTLE says, if the above-positing definitions of *continuous* (► 39.2), *contiguous* (► 39.3), and *consequent* (► 39.4) are befitting, it follows from them that it is impossible for a continuum to be composed from indivisible (parts).<sup>39</sup>

For example, (it is impossible) for a line (to be composed) from points, if the line should be said (to be) something continuous (< εἴπερ ἡ γραμμὴ μὲν συνεχὴς) and the point (is

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<sup>35</sup> *In Physic.* 5, l. 5, n. 9: “infert [Philosophus] quoddam corollarium ex dictis.” *Ibid.*, n. 11 (cf. ARISTOTLE, *Physica* E.3, 227a27–29): “Concludit quoddam corollarium ex dictis; scilicet quod si unitas et punctum sunt separata, sicut quidam dicunt, ponentes mathematica separari secundum esse, sequitur quod unitas et punctum non sunt idem.” Cf. *In Metaph.* 11, l. 13, §2415 (*Metaphysica* K.12, 1069a12–14).

<sup>36</sup> *In Physic.* 5, l. 5, n. 11: “Et hoc manifestum fit duabus rationibus.”

<sup>37</sup> *In Physic.* 5, l. 5, n. 11 (cf. ARISTOTLE, *Physica* E.3, 227a29–30): “Primo quidem, quia puncta sunt in his quae nata sunt se tangere, et secundum puncta aliqua se tangunt ad invicem: in unitatibus autem non invenitur contactus, sed solum hoc quod est consequenter.”

<sup>38</sup> *In Physic.* 5, l. 5, n. 11 (cf. ARISTOTLE, *Physica* E.3, 227a30–32): “Secundo vero, quia inter duo puncta contingit esse aliquid medium; omnis enim linea est media inter duo puncta: sed inter duas unitates non necesse est esse aliquid medium. Patet enim quod inter duas unitates, quae constituunt dualitatem, et ipsam primam unitatem, nihil est medium.”

<sup>39</sup> *In Physic.* 6, l. 1, n. 2 (cf. ARISTOTLE, *Physica* Z.1, 231a21–24): “Dicit ergo [Philosophus] primo quod si definitiones prius positae *continui*, et eius quod *tangitur*, et eius quod est *consequenter*, sunt convenientes (scilicet quod *continua* sint, quorum ultima sunt unum: *contacta*, quorum ultima sunt simul: *consequenter* autem sint, quorum nihil est medium sui generis), ex his sequitur quod impossibile sit aliquid continuum componi ex indivisibilibus.”

said to be) something indivisible (< ἡ στιγμὴ δὲ ἀδιαίρετον).<sup>40</sup> ARISTOTLE adds this, lest someone use the name(s) *line* and *point* otherwise.

ARISTOTLE proves this through two reasons.<sup>41</sup> First, he shows that a continuum is not composed from indivisibles (► 39.8), neither by the mode of continuation nor by the mode of contact. Secondly, (that) nor (can this happen) by the mode of consequence (► 39.9).

### 39.8. No Continuum by Continuation or Contact

Regarding the first (i.e., that a continuum is not composed from indivisible parts, neither by the mode of continuation nor by the mode of contact), he posits two reasons:<sup>42</sup>

1. Whatever (things) from which something *one* is composed—whether by the mode of continuation or by the mode of contact—must have extremities that are either **one** or that are **simultaneous**.<sup>43</sup>

Yet, the extremities of points cannot be **one** (*ultima punctorum non possunt esse unum* < οὔτε γὰρ ἔν τὰ ἔσχατα τῶν στιγμῶν).<sup>44</sup> For *extremity* (*ultimum*) is said in respect to some part; and, in an indivisible (thing), it is impossible to take something that should be the last (part of it), and something else that should be some other part (< οὐ γὰρ ἔστι τὸ μὲν ἔσχατον τὸ δ' ἄλλο τι μόριον τοῦ ἀδιαίρετου).

Likewise, it cannot be said that the extremities of points are **simultaneous** (*non potest dici quod ultima punctorum sunt simul* < οὔθ' ἅμα τὰ ἔσχατα).<sup>45</sup> For nothing can be an extremity of an impartible thing (< οὐ γὰρ ἔστιν ἔσχατον τοῦ ἀμεροῦς οὐδέν), since an extremity is always other than that of which the extremity is (< ἕτερον γὰρ τὸ ἔσχατον καὶ οὐ ἔσχατον); and, in an impartible (thing), one thing and another (*aliud et aliud*, i.e., diverse parts) cannot be taken.

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<sup>40</sup> *In Physic.* 6, l. 1, n. 2 (cf. ARISTOTLE, *Physica* Z.1, 231a24–26): “ut lineam ex punctis; si tamen linea dicatur aliquid continuum, et punctum aliquid indivisibile. Addit autem hoc, ne aliquis nomine lineae et puncti aliter uteretur.”

<sup>41</sup> *In Physic.* 6, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Z.1, 231a26–b15): “probat [Philosophus] propositum. Et primo inducit rationes duas ad probandum propositum [...]. Circa primam rationem duo facit: primo ostendit quod ex indivisibilibus non componitur aliquid continuum, neque per modum continuationis, neque per modum contactus; secundo quod neque per modum consequenter se habentium.”

<sup>42</sup> *In Physic.* 6, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Z.1, 231a26– b6): “Circa primum ponit duas rationes.”

<sup>43</sup> *In Physic.* 6, l. 1, n. 3: “quarum prima talis est. Ex quibuscumque componitur aliquid unum, vel per modum continuationis, vel per modum contactus, oportet quod habeant ultima quae sint unum, vel quae sint simul.”

<sup>44</sup> *In Physic.* 6, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Z.1, 231a26–27): “Sed ultima punctorum non possunt esse unum: quia ultimum dicitur respectu alicuius partis; in indivisibili autem non est accipere aliquid quod sit ultimum, et aliud quod sit aliqua alia pars.”

<sup>45</sup> *In Physic.* 6, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Z.1, 231a27–29): “Similiter non potest dici quod ultima punctorum sunt simul: quia nihil potest esse ultimum rei impartibilis, cum semper alterum sit ultimum et illud cuius est ultimum; in impartibili autem non est accipere aliud et aliud.”

It remains, therefore, that a line cannot be composed from points, neither by the mode of continuation nor by the mode of contact.<sup>46</sup>

2. If some continuum should be constituted from points, it is necessary either that they be **continuous** to each other or that they be **in contact** (< ἀνάγκη ἦτοι συνεχεῖς εἶναι τὰς στιγμὰς ἢ ἀππομένας ἀλλήλων, ἐξ ὧν ἐστι τὸ συνεχές).<sup>47</sup> And the same reason is (valid) concerning all other indivisibles: that a continuum should not be composed from them.

To prove that indivisibles cannot be **continuous** to each other, the first reason should suffice.<sup>48</sup>

On the other hand, to prove that they cannot be **in contact**, another reason is brought in (by ARISTOTLE), as follows.<sup>49</sup> In everything that is in contact with another (< ἄπτεται... ἅπαν), either one whole is in contact with the other whole (< ἢ ὅλον ὅλου), or a part of one (is in contact with) a part of the other (< ἢ μέρος μέρους), or a part of one (is in contact with) the whole other (< ἢ ὅλου μέρος). Yet, since an indivisible (thing) does not have a part (< ἀμερῆς τὸ ἀδιαίρετον), it cannot be said that a part of one should be in contact with a part of the other, or (that) a part (of one should be in contact with) the whole (other). And in this way, if two points should be in contact, it is necessary that the whole should be in contact with the whole (< ἀνάγκη ὅλον ὅλου ἄπτεσθαι).

However, a continuum cannot be composed from two (things) of which one whole (thing) is in contact with the whole other.<sup>50</sup> For every continuum has disjunct parts in such a way that *this* should be a part and *that* (should be) another (< τὸ... συνεχές ἔχει τὸ μὲν ἄλλο τὸ δ' ἄλλο μέρος); and (this) is divided in parts (that are) diverse and distinct in place (< καὶ διαιρεῖται εἰς οὕτως ἕτερα καὶ τόπων κεχωρισμένα): that is, in position, in those (things) that have position (i.e., because the parts of dimensive quantity are distinct according to

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<sup>46</sup> *In Physic.* 6, l. 1, n. 3: “Relinquitur ergo quod linea non potest componi ex punctis, neque per modum continuationis, neque per modum contactus.”

<sup>47</sup> *In Physic.* 6, l. 1, n. 4 (cf. ARISTOTLE, *Physica* Z.1, 231a29–31): “Secundam rationem ponit [Philosophus...]: quae talis est. Si ex punctis constituitur aliquod continuum, necesse est quod aut sint continua ad invicem, vel se tangant: et eadem ratio est de omnibus aliis indivisibilibus, quod ex eis non componatur continuum.”

<sup>48</sup> *In Physic.* 6, l. 1, n. 4 (cf. ARISTOTLE, *Physica* Z.1, 231a31–b1): “Ad probandum autem quod indivisibilia non possunt sibi invicem esse continua, sufficiat ratio prima.”

<sup>49</sup> *In Physic.* 6, l. 1, n. 4 (cf. ARISTOTLE, *Physica* Z.1, 231b1–3): “Sed ad probandum quod non possunt se tangere, inducitur alia ratio, quae talis est. Omne quod tangit alterum, aut totum unum tangit totum aliud, aut pars unius partem alterius, aut pars unius totum aliud. Sed cum indivisibile non habeat partem, non potest dici quod pars unius tangat partem alterius, aut pars totum; et sic necesse est, si duo puncta se tangunt, quod totum tangat totum.”

<sup>50</sup> *In Physic.* 6, l. 1, n. 4 (cf. ARISTOTLE, *Physica* Z.1, 231b4–6): “Sed ex duobus, quorum unum totum tangit aliud totum, non potest componi continuum; quia omne continuum habet partes seiunctas, ita quod haec sit una pars, et haec alia; et dividitur in partes diversas et distinctas *loco*, idest positione, in his quae positionem habent: quae autem se secundum totum tangunt, non distinguuntur loco vel positione.”

position, while those of time are distinct according to the before and the after). And those (things) that are in contact according to the whole are not distinguished in place or position.

It remains, therefore, that a line cannot be composed from points by the mode of contact.<sup>51</sup>

### 39.9. No Continuum by Consequence

1. ARISTOTLE proves that a continuum is not composed from indivisible (parts) by the mode of that which is consequent.<sup>52</sup> For a point cannot be related consequentially to another point (< οὐδὲ ἐφεξῆς ἔσται στιγμῆ στιγμῆ) in such a way that a longitude—that is, a line—could be constituted from them (< ὥστ' ἐκ τούτων εἶναι τὸ μῆκος); nor (can) a now (be related consequentially) to another now (< ἢ τὸ νῦν τῷ νῦν) in such a way that a time could be constituted from them (< ἢ τὸν χρόνον).

Indeed, those are **consequent** one to the other *of which there is not some mean of the same genus*, as has been explained (< ὧν μηθέν ἐστι μεταξύ συγγενές; ► 39.4).<sup>53</sup> Yet, between two points there is always a mean line (< στιγμῶν... αἰεὶ μεταξύ γραμμῆ). In this way, if a line is composed from points, as given, it follows that there should always be another mean point between two points; and likewise, between two nows there is a mean time (< καὶ τῶν νῦν χρόνος). Therefore, a line is not composed from points—nor a time from nows—consequently related.

That between two points there should be a mean line—and between two nows, a time—ARISTOTLE manifests as follows.<sup>54</sup>

If there are two points, they must differ according to site—otherwise they would not be two but one.<sup>55</sup> And they cannot be in contact, as shown above (► 39.8). Whence, it remains

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<sup>51</sup> *In Physic.* 6, l. 1, n. 4: “Relinquitur ergo quod ex punctis non possit componi linea per modum contactus.”

<sup>52</sup> *In Physic.* 6, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Z.1, 231b6–8): “[ostendit Philosophus] quod [ex indivisibilibus] non componitur aliquod continuum] neque per modum consequenter se habentium.” Ibid., n. 5: “probat quod continuum non componatur ex indivisibilibus per modum eius quod est consequenter. Non enim punctum consequenter se habebit ad aliud punctum, ita quod ex eis constitui possit *longitudo*, idest linea; aut unum nunc alteri nunc, ita quod ex eis possit componi tempus.”

<sup>53</sup> *In Physic.* 6, l. 1, n. 5 (cf. ARISTOTLE, *Physica* Z.1, 231b8–10): “quia consequenter est unum alteri, quorum non est aliquid medium eiusdem generis, ut supra expositum est. Sed inter duo puncta semper est linea media: et sic si linea composita est ex punctis, ut tu das, sequitur quod semper inter duo puncta sit aliud punctum medium. Et similiter inter duo nunc est tempus medium. Non ergo linea componitur ex punctis, aut tempus ex nunc, sicut consequenter se habentibus.”

<sup>54</sup> *In Physic.* 6, l. 1, n. 3: “manifestat [Philosophus] quaedam quae poterant esse dubia in suis probationibus.” Ibid., n. 7: “manifestat duo quae supra dixerat. Quorum primum fuit, quod inter duo puncta sit linea media, et inter duo nunc, tempus. Et hoc manifestat sic.” Cf. ARISTOTLE, *Physica* Z.1, 231b12–13: “ἄλλο δὲ γένος οὐχ οἶόν τ' εἶναι μεταξύ τῶν στιγμῶν καὶ τῶν νῦν οὐθέν.”

<sup>55</sup> *In Physic.* 6, l. 1, n. 7: “Si sunt duo puncta, oportet quod differant secundum situm: alias non essent duo sed unum. Non autem possunt se contingere, ut supra ostensum est: unde relinquitur quod distent, et sit aliquod medium inter ea. Sed nullum aliud medium potest esse inter ea quam linea inter puncta, et tempus inter nunc. Quod sic probat.”

that they should be distant, and that there should be some mean between them. Yet, there can be no mean between them other than a line between the points, and a time between the nows. Which he proves as follows.

If between (two) points there should be a mean other than a line, it is manifest that the mean is either **indivisible** or **divisible** (< εἰ γὰρ ἔσται, δῆλον ὡς ἦτοι ἀδιαίρετον ἔσται ἢ διαιρετόν):<sup>56</sup>

**(a)** If it should be **indivisible**, it must be distinct in site from one and from the other (of the two points); and since it should not be in contact, there must, again, be some other mean between the indivisible that is posited (as) a mean and the extremities; and so on, infinitely—unless a divisible mean should be posited (as follows).<sup>57</sup>

**(b)** If the mean of the two points should be **divisible**, it will either be divisible into indivisible (parts) or into (parts) always divisible (< καὶ εἰ διαιρετόν, ἢ εἰς ἀδιαίρετα ἢ εἰς ἀεὶ διαιρετά).<sup>58</sup> Yet, it cannot be said that it should be divided into indivisible (parts), since (this) then renders the same difficulty (of) how the divisible could be composed from divisible (parts). It remains, hence, that the mean should be divisible into (parts) always divisible. And this is the *ratio* of the continuum. Therefore, the mean will be some continuum (< τοῦτο δὲ συνεχές); and no continuum can be a mean between two points other than a line.

Therefore, between two points there is a mean line; and for the same reason, between whatever two nows (there is a mean) time; and likewise, in the other continua.<sup>59</sup>

**2.** ARISTOTLE posits a second principal reason that is taken from another definition of the **continuum**: *that which is infinitely divisible (quod est in infinitum divisibile* < τὸ εἰς ἄπειρον διαιρετόν συνεχές ὄν; ► 39.11).<sup>60</sup> The reason is as follows. Whatever a line or time should

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<sup>56</sup> *In Physic.* 6, l. 1, n. 7 (cf. ARISTOTLE, *Physica* Z.1, 231b13–14): “quia si inter puncta esset aliud medium quam linea, manifestum est aut illud medium esse indivisibile aut divisibile.”

<sup>57</sup> *In Physic.* 6, l. 1, n. 7: “Si autem sit indivisibile, oportet quod sit distinctum ab utroque in situ; et cum non tangat, oportet iterum quod sit aliquod alterum medium inter indivisibile quod ponitur medium et extrema, et sic in infinitum, nisi ponatur medium divisibile.”

<sup>58</sup> *In Physic.* 6, l. 1, n. 7 (cf. ARISTOTLE, *Physica* Z.1, 231b14–15): “Si autem medium duorum punctorum fuerit divisibile, aut erit divisibile in indivisibilia, aut in semper divisibilia. Sed non potest dici quod dividatur in indivisibilia, quia tunc redibit eadem difficultas, quomodo ex indivisibilibus possit componi divisibile. Relinquitur igitur quod illud medium sit divisibile in semper divisibilia. Sed haec est ratio continui: ergo illud medium erit quoddam continuum. Nullum autem aliud continuum potest esse medium inter duo puncta quam linea.”

<sup>59</sup> *In Physic.* 6, l. 1, n. 7: “ergo inter qualibet duo puncta est linea media. Et eadem ratione inter qualibet duo nunc, tempus; et similiter in aliis continuis.”

<sup>60</sup> *In Physic.* 6, l. 1, n. 6 (cf. ARISTOTLE, *Physica* Z.1, 231b10–12): “Secundam rationem principalem ponit [Philosophus...], quae sumitur ex alia definitione continui, quam supra posuit in principio tertii, scilicet quod continuum sit quod est in infinitum divisibile: et est ratio talis. Ex quibuscumque componitur vel linea vel tempus, in ipsa dividitur: si igitur utrumque istorum componitur ex indivisibilibus, sequitur quod in indivisibilia dividatur. Sed hoc est falsum, cum nullum continuorum sit divisibile in impartibilia: sic enim

be composed from, it is divided into the same. Therefore, if either of these (i.e., a line or a time) is composed from indivisible (parts), it follows that it should be divided into indivisible (parts). Yet, this is false, since none of the continua is divisible into impartible (parts), for in this way it would not be *infinitely divisible*. Hence, no continuum is composed from indivisible (parts).

ARISTOTLE manifests (as follows) that every continuum should be divisible into divisible [parts] (< πᾶν συνεχές διαιρετὸν εἰς αἰεὶ διαιρετά).<sup>61</sup> If it be given that a continuum should be divisible into indivisible (parts), it would follow that, in order to constitute a continuum, two indivisibles would be in contact (< εἰ γὰρ εἰς ἀδιαίρετα, ἔσται ἀδιαίρετον ἀδιαίρετου ἀπτόμενον). Indeed, there must be one extremity of the continua, as is evident from their definition (i.e., those things are continuous *whose extremities are one*; ►39.2); and the parts of the continuum (must) be in contact, for if the extremities are one, it follows that they are simultaneous (►39.5). Hence, since it is impossible for two indivisibles to be in contact, it is impossible that a continuum should be divided into indivisible (parts).

Therefore, every magnitude is divisible into magnitudes (< πᾶν μέγεθος εἰς μεγέθη διαιρετόν).<sup>62</sup> For it is impossible for some continuum to be composed from atoms (< δέδεικται γὰρ ὅτι ἀδύνατον ἐξ ἀτόμων εἶναι τι συνεχές), that is, from indivisibles. And it is manifest that every magnitude is of the genus of continua (*magnitudo omnis est de genere continuorum* < μέγεθος δ' ἐστὶν ἅπαν συνεχές).

### 39.10. Contact in Non-Continuous Indivisibles

The **indivisible** is twofold:<sup>63</sup>

1. (The indivisible) that is **the terminus of a continuum** (*quod est terminus continui*), as a point in permanent (things); and a moment in successive (things).<sup>64</sup>

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non esset divisibile in infinitum. Nullum igitur continuum componitur ex indivisibilibus." Cf. ARISTOTLE, *Physica* Γ.1, 200b20.

<sup>61</sup> *In Physic.* 6, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Z.1, 231b12–18): "manifestat [Philosophus] quaedam quae poterant esse dubia in suis probationibus." Ibid., n. 7: "manifestat duo quae supra dixerat." Ibid., n. 8 (cf. ARISTOTLE, *Physica* Z.1, 231b15–18): "manifestat secundum, quod supposuerat, scilicet quod omne continuum sit divisibile in divisibilia. Quia si daretur quod continuum esset divisibile in indivisibilia, sequeretur quod duo indivisibilia se contingerent, ad hoc quod possent constituere continuum. Oportet enim quod continuorum sit unum ultimum, ut ex definitione eius apparet, et quod partes continui se tangant: quia si ultima sunt unum, sequitur quod sint simul, ut in quinto dictum est. Cum igitur sit impossibile duo indivisibilia se contingere, impossibile est quod continuum in indivisibilia dividatur."

<sup>62</sup> *In Physic.* 6, l. 3, n. 4 (cf. ARISTOTLE, *Physica* Z.2, 232a23–25): "Resumit ergo [Philosophus] hoc, quod omnis magnitudo sit divisibilis in magnitudines. Et hoc patet per hoc quod ostensum est supra, quod impossibile est aliquod continuum componi ex *atomis*, idest ex indivisibilibus; et manifestum est quod magnitudo omnis est de genere continuorum."

<sup>63</sup> *STh* I, q. 8 a. 2 ad 2: "indivisible est duplex."

<sup>64</sup> *STh* I, q. 8 a. 2 ad 2: "Unum quod est terminus continui, ut punctus in permanentibus, et momentum in successivis."

In permanent (things), such an indivisible cannot be in multiple parts of a place or in multiple places, since it has a determinate site (*habet determinatum situm*).<sup>65</sup> Likewise, the indivisible of action or of motion cannot be in multiple parts of time, since it has a determinate order in motion or in action.

2. (The indivisible) that is **outside the whole genus of the continuum** (*quod est extra totum genus continui*).<sup>66</sup>

Incorporeal substances are said to be indivisible in this mode.<sup>67</sup>

Such an indivisible is not applied to a continuum as something belonging to it, but insofar as its virtue happens upon it (*contingit illud*, i.e., touches it, is in contact with it).<sup>68</sup> Whence, according as its virtue can extend to one or to many, to a small or to a great (place), according to this, it is in one or in multiple places, and in a small place or in a great (one).

### 39.11. Motionless Definitions of the Continuous Compared

(ARISTOTLE posits two definitions of the **continuous** in the following works):

1. (In the *Physics*): that which is divisible infinitely (*quod est divisibile in infinitum* < τὸ εἰς ἄπειρον διαιρετὸν συνεχές ὄν).<sup>69</sup>

A continuum is in some mode divisible into infinite (parts), and in another mode, into finite (parts; ► 25.8).<sup>70</sup> Thus, if the division should be made into equal parts, the division cannot proceed infinitely, provided that the continuum is finite, for if from some finite (continuum) were always subtracted something measuring a span, it would be totally consumed. On the other hand, if the division should be made into unequal parts, the division would proceed infinitely: for example, if a whole should be divided in half—and again the half in half, which is a fourth part of the whole—, the division would proceed infinitely.

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<sup>65</sup> *STh* I, q. 8 a. 2 ad 2: “Et huiusmodi indivisibile, in permanentibus, quia habet determinatum situm, non potest esse in pluribus partibus loci, vel in pluribus locis, et similiter indivisibile actionis vel motus, quia habet determinatum ordinem in motu vel actione, non potest esse in pluribus partibus temporis.”

<sup>66</sup> *STh* I, q. 8 a. 2 ad 2: “Aliud autem indivisibile est, quod est extra totum genus continui.”

<sup>67</sup> *STh* I, q. 8 a. 2 ad 2: “et hoc modo substantiae incorporeae, ut Deus, Angelus et anima, dicuntur esse indivisibiles.”

<sup>68</sup> *STh* I, q. 8 a. 2 ad 2: “Tale igitur indivisibile non applicatur ad continuum sicut aliquid eius, sed in quantum contingit illud sua virtute. Unde secundum quod virtus sua se potest extendere ad unum vel multa, ad parvum vel magnum, secundum hoc est in uno vel pluribus locis, et in loco parvo vel magno.”

<sup>69</sup> *In Physic.* 3, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Γ.1, 200b20): “quod infinitum cadat in definitione continui, ostendit [Philosophus] quia multoties definientes continuum utuntur infinito; utpote cum dicunt quod continuum est quod est divisibile in infinitum.”

<sup>70</sup> *In De sensu* 1, c. 14, 139–148: “continuum quodam modo diuiditur in infinita, alio modo in finita: si enim fiat diuisio in partes equales, non poterit diuisio in infinitum procedere, dum modo continuum sit finitum, quia si a quoquo finito semper subtrahatur aliquid ad mensuram palmi, totaliter consumetur; si uero fiat diuisio in partes inequales, procedet diuisio in infinitum, puta si totum diuidatur in dimidium et iterum dimidium in dimidium, quod est quarta pars tocus, in infinitum procedet diuisio.”

Hence, *infinite* falls first in the definition of the continuous (< τὸ δ' ἄπειρον ἐμφαίνεται πρῶτον ἐν τῷ συνεχεῖ· διὸ καὶ τοῖς ὀριζομένοις τὸ συνεχές συμβαίνει προσχρήσασθαι πολλακίς τῷ λόγῳ τῷ τοῦ ἀπείρου), for the infinite that is (found) in the addition of number is caused from the infinite that is (found) in the division of the continuum (► 25.12).<sup>71</sup>

2. In the *Categories* (and in the *Physics*): that whose parts are united at one common terminus (*cuius partes ad unum terminum communem copulantur*, ► 39.2).<sup>72</sup>

These two definitions differ.<sup>73</sup> Indeed, since a continuum is some whole, it has (that) it is defined by its parts. And parts are compared to whole in two (modes): to wit, according to composition, insofar as the whole is composed from parts; and according to resolution, insofar as the whole is divided into parts (► 13.2). Hence, the definition of the *Physics* (§1) is according to the way of resolution, while definition posited in the *Categories* (§2) is according to the way of composition.

### 39.12. Continuous According to Nature

In the *Metaphysics*, ARISTOTLE defines the **continuum** through motion and not through *the unity of a terminus at which the parts of the continuum are joined together*, as (he does) in the *Categories* and in the *Physics* (► 39.11, §2; 39.2).<sup>74</sup> (Instead, he defines the continuum through motion in the *Metaphysics*) because, from this definition (i.e., based on motion), a diverse degree of unity can be taken in diverse continua, while (this can) not (be done) from the definition given therein (i.e., in the *Categories* and in the *Physics*).<sup>75</sup>

<sup>71</sup> *In Physic.* 3, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Γ.1, 200b17–19): “infinitum autem cadit in definitione continui. Et addit [Philosophus] primo, quia infinitum quod est in additione numeri, causatur ex infinito quod est in divisione continui.”

<sup>72</sup> *In Physic.* 3, l. 1, n. 3 (cf. ARISTOTLE, *Physica* Γ.1, 200b19): “invenitur etiam alia definitio continui, quae ponitur in Praedicamentis: continuum est cuius partes ad unum terminum communem copulantur.” Unfortunately, St. Thomas did not bequeath to us a commentary on the *Categories*. Therein, ARISTOTLE says that the line is continuous (συνεχές) because it is possible to take (λαβεῖν) a common terminus (κοινὸν ὄρον)—(i.e.), a point (στιγμὴν)—at which its parts are joined together (πρὸς ὃν τὰ μέρη αὐτῆς συνάπτει). And (likewise, the common terminus) of the plane (is) a line, for the parts of the plane are joined together at some common terminus. Likewise, a common terminus of a body can be taken—(i.e.), a line or a plane—at which the parts of the body are joined together. See ARISTOTLE, *Categoriae* 6, 5a1–6: “ἡ δὲ γραμμὴ συνεχές ἐστίν· ἐστὶ γὰρ λαβεῖν κοινὸν ὄρον πρὸς ὃν τὰ μέρη αὐτῆς συνάπτει, στιγμὴν, καὶ τῆς ἐπιφανείας γραμμὴν· τὰ γὰρ τοῦ ἐπιπέδου μέρη πρὸς τινα κοινὸν ὄρον συνάπτει. ὡσαύτως δὲ καὶ ἐπὶ τοῦ σώματος ἔχοις ἂν λαβεῖν κοινὸν ὄρον, γραμμὴν ἢ ἐπιφάνειαν, πρὸς ἃ τὰ τοῦ σώματος μέρη συνάπτει.” The same applies, analogically, to time and place; see *ibid.*, 6–14.

<sup>73</sup> *In Physic.* 3, l. 1, n. 3: “Differunt autem hae duae definitiones. Continuum enim, cum sit quoddam totum, per partes suas definiri habet: partes autem dupliciter comparantur ad totum, scilicet secundum compositionem, prout ex partibus totum componitur; et secundum resolutionem, prout totum dividitur in partes. Haec igitur definitio continui data est secundum viam resolutionis; quae autem ponitur in Praedicamentis, secundum viam compositionis.”

<sup>74</sup> *In Metaph.* 5, l. 7, §854 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a5–6): “hic definit Philosophus continuum per motum et non per unitatem termini, ad quem partes continui coniunguntur, sicut in Praedicamentis et in libro Physicorum habetur.”

<sup>75</sup> *In Metaph.* 5, l. 7, §854 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a5–6): “quia ex ista definitione potest sumi diversus gradus unitatis in diversis continuis, sicut postea patebit, non autem ex definitione ibi data.”



Thus, if something is said (to be) *continuous* and *whole* by nature because its motion is one, it is manifest that if something continuous and whole has in itself the principle of first motion, this will be the first *one* in magnitude.<sup>76</sup>

Whence, ARISTOTLE posits in the *Metaphysics* two modes of being one (in continuity).<sup>77</sup> And he shows the reason of unity in these modes, saying that something is such—continuous and one—because **its motion is one** and indivisible in place and in time: *in time*, because (if) one part of the continuum is moved towards whatever part of a place, so is the other; *in time*, for when one (part of the continuum) is moved, so is the other.

Therefore, (things) are said to be continuous in two modes:<sup>78</sup>

1. **According to themselves** (*secundum se* = καθ' αὐτά; ►39.13).

2. **By another** (*per aliud*; ►39.16).

### 39.13. Naturally Continuous According to Itself

ARISTOTLE defines the continuum (by itself, naturally speaking), saying that **continuum** (*continuum* = συνεχές) is said (to be) *that whose motion is according to itself only one and is not possible otherwise* (*id cuius est secundum se unus motus tantum, et non <est possibile> aliter* = οὐ κίνησις μία καθ' αὐτὸ καὶ μὴ οἷόν τε ἄλλως).<sup>79</sup>

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<sup>76</sup> In *Metaph.* 10, l. 1, §1928 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a26–27): “Unde si aliquod continuum et totum per naturam dicitur unum quia motus eius est unus, manifestum est quod si aliquod continuum et totum habet in se principium primi motus, hoc erit primum unum in magnitudine.” ARISTOTLE and St. Thomas apply these principles to ancient astronomy. Thus, among motions, the first motion is local (motion); and among local motions, the first (motion) is circular. And among the bodies that are moved in circular motion, something is that which has the principle of such motion: namely, the body that is revolved and revolves other bodies in daily motion (i.e., the outermost celestial sphere). Whence, it is manifest that this is the first *one* magnitude because it has the first principle of the first motion. In this way, therefore, two modes of unity are apparent: either as the continuous is said (to be one); or as the whole is said (to be) one. Ibid. (cf. ARISTOTLE, *Metaphysica* I.1, 1052a28): “Sicut inter motus, primus motus est localis; et inter motus locales, primus est circularis, ut probatur in octavo Physicorum. Et inter corpora, quae moventur motu circulari, aliquod est quod habet principium talis motus, scilicet corpus quod revolvitur et revolvit alia corpora motu diurno. Unde manifestum est, quod haec est prima magnitudo una, quia habet primum principium motus primi. Sic igitur apparent duo modi unitatis: aut sicut continuum dicitur unum, aut sicut totum dicitur unum.” The underlying assumptions are evidently wrong, but the same principles can be applied to modern astronomy insofar as there is some first, circular motion of the whole universe, as EINSTEIN acknowledged; and this motion must have a cause.

<sup>77</sup> In *Metaph.* 10, l. 1, §1927 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a25–26): “Ostendit [Philosophus] rationem unitatis in istis duobus modis; dicens, quod aliquid est tale et continuum et unum, eo quod motus eius est et unus et indivisibilis, loco et tempore. Loco quidem, quia versus quamcumque partem loci movetur una pars continui et alia. Tempore vero, quia quando movetur una, et alia.”

<sup>78</sup> In *Metaph.* 5, l. 7, §849 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1015b36–1016a1; 7): “Sed continua dicuntur aliqua dupliciter. Quaedam enim sunt continua, sicut dicit alia litera, per aliud, quaedam secundum se.” Neither MOERBEKE nor the *Traslatio Anonyma* has *per aliud*, which does not appear in ARISTOTLE.

<sup>79</sup> In *Metaph.* 5, l. 7, §852 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a5–6): “Et ad evidentiam huius [sc., quod ea quae sunt naturaliter colligata, prius accedunt ad ea quae sunt secundum se continua, quae sunt maxime unum], definit [Philosophus] continuum, dicens, quod continuum dicitur id cuius est secundum se unus motus tantum, et non est possibile aliter.”

Indeed, it is not possible, in a continuum, that diverse parts should be moved according to diverse motions (*diversis motibus*).<sup>80</sup> Rather, the whole continuum is moved according to one motion (*uno motu*).

ARISTOTLE says *according to itself* (*secundum se* = καθ' αὐτό) because it is possible that the continuum be moved in one mode by itself, and in one or multiple other (modes) by accident.<sup>81</sup> For example, if a man should be moved by himself in a ship against the motion of the ship, he is nonetheless moved by accident according to the motion of the ship.

For a motion to be one, it must be indivisible according to time (*secundum tempus* = κατὰ χρόνον): to wit, such that while one part of the continuum is moved, also another should be moved simultaneously.<sup>82</sup> For it does not happen in a continuum that one part should be moved and the other should (remain at) rest, or that one should (remain at) rest and the other be moved, such that the motion of diverse parts of the continuum would be in diverse parts of time.

It ought to be known, however, that what is said here—that the motion of the continuum is indivisible according to time—is not contrary to that which is proved in the *Physics*: namely, that the time of motion is divided according to the parts of the mobile.<sup>83</sup> For in the *Metaphysics* ARISTOTLE speaks absolutely in respect of motion, since—to wit—one part of the continuum does not begin to move before another.

In the *Physics*, on the other hand, he speaks referring to some sign (e.g., a point, σημεῖον) that is designated (*signatur*) in the magnitude through which motion comes to be; for that sign, which is a prior part of the magnitude, is traversed in a prior time, even though other parts of the continuum should also be moved in that prior part of time.<sup>84</sup>

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<sup>80</sup> *In Metaph.* 5, l. 7, §852: “Non enim possibile est in continuo, ut diversae partes diversis motibus moveantur, sed totum continuum movetur uno motu.”

<sup>81</sup> *In Metaph.* 5, l. 7, §852 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a5–6): “Dicit autem [Philosophus] secundum se, quia possibile est ut continuum moveatur uno modo per se, et uno alio vel pluribus per accidens; sicut si homo movetur in navi per se contra motum navis, movetur nihilominus motu navis per accidens.”

<sup>82</sup> *In Metaph.* 5, l. 7, §853 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a6): “Ad hoc autem quod sit unus motus, oportet quod sit indivisibilis: et hoc dico secundum tempus, ut videlicet simul dum movetur una pars continui, moveatur et alia. Non enim contingit in continuo quod una pars moveatur et alia quiescat, vel quod una quiescat et alia moveatur, ut sic motus diversarum partium continui sint in diversis partibus temporis.”

<sup>83</sup> *In Metaph.* 5, l. 7, §855: “Sciendum est autem, quod hoc quod hic dicitur, quod motus continui indivisibilis est secundum tempus, non est contrarium ei quod probatur in sexto Physicorum, scilicet, quod tempus motus dividitur secundum partes mobilis. Hic enim loquitur Philosophus quantum ad motum absolute, quia scilicet non ante incipit moveri una pars continui quam alia.”

<sup>84</sup> *In Metaph.* 5, l. 7, §855: “Ibi autem loquitur referendo ad aliquod signum, quod signatur in magnitudine, per quam fit motus. Illud enim signum, quod est prior pars magnitudinis, in priori tempore transitur, licet etiam in illa priori parte temporis aliae partes mobilis continui moveantur.” Cf. *In Physic.* 6, l. 6 (cf. ARISTOTLE, *Physica* Z.4, 234b21–235b5).

### 39.14. Naturally Continua by Themselves Are Not by Contact

As ARISTOTLE says, those (things) are **continuous according to themselves** (*secundum se continua* = καθ' αὐτὰ... συνεχῆ) which are not said (to be) continua by contact (*quae non <dicuntur> unum per contactum* = ὅσα μὴ ἀφῆ ἔν).<sup>85</sup>

He proves this as follows.<sup>86</sup> Those (things) that are in contact (*se tangunt*; ► 39.3), such as two (pieces of) wood, are not said (to be) *one* (piece of) wood or *one body*; nor (is) some other *one* that should pertain to the genus of the continuum (said to be *one* if it consists in continua that are in contact). Thus, it is evident that the unity of continua (*continuatorum*) is other than (the unity) of those things that are in contact (*tangentium*). For those that are in contact (*quae sunt se tangentia*) do not have the unity of continuity by themselves, but by some tie that unites them. On the other hand, those that are continuous are said (to be) *one* by themselves even though they should have a reflection. Thus, two reflected lines are continued at one common terminus, which is the point in the place where the angle is constituted.

### 39.15. Modes of the Continuum According to Nature

*Continuum according to nature* is said in two modes: **(1)** that which is **uniform**, as the straight line, and also the circular (line); **(2)** that which is **not uniform**, as two lines that constitute an angle in which they are continued.<sup>87</sup>

Of these, what is said (to be a) *straight* or *circular line* is maximally and priorly one, (rather) than the lines that constitute an angle.<sup>88</sup> Indeed, the straight line must have one motion, since it is not possible for one part of it to be moved and for the other to (remain at) rest, or for one to be moved in one way and for the other (to be moved in some) other way: rather, the whole is moved simultaneously and in one motion. And likewise, (this) is (the case) in a circular (line).

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<sup>85</sup> *In Metaph.* 5, l. 7, §856 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a7): “Prosequitur [Philosophus] de illis quae sunt *secundum se continua*, dicens, quod illa sunt secundum se continua quae non dicuntur unum per contactum.”

<sup>86</sup> *In Metaph.* 5, l. 7, §856 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a7–12): “Quod sic probat. Illa enim, quae se tangunt, ut duo ligna, non dicuntur unum lignum, nec unum corpus, nec unum aliquid aliud quod pertineat ad genus continui. Et sic patet quod alia est unitas continuorum, et alia tangentium. Quae enim sunt se tangentia non habent unitatem continuitatis per seipsa, sed per aliquod vinculum quod ea coniungit. Sed illa quae sunt continua, dicuntur unum secundum se, quamvis habeant reflexionem. Duae enim lineae reflexae continuantur ad unum communem terminum, qui est punctus in loco ubi constituitur angulus.”

<sup>87</sup> *In Metaph.* 10, l. 1, §1923 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a20–21): “Continuum autem secundum naturam dicitur dupliciter: scilicet, quod est totum uniforme, ut linea recta, aut etiam circularis: et quod non est totum uniforme, sicut duae lineae constituentes angulum in quo continuantur.”

<sup>88</sup> *In Metaph.* 10, l. 1, §1923: “Maxime autem horum est unum et per prius unum, quod dicitur linea recta vel circularis, quam lineae angulum constituentes. Nam linea recta oportet quod habeat unum motum. Non enim potest esse quod una pars eius moveatur et alia quiescat, nec una sic moveatur, alia vero aliter; sed tota simul et uno motu movetur. Et similiter etiam in circulari est.”

On the other hand, this does not befit (*non convenit*) two continuous (lines) that constitute an angle.<sup>89</sup> For we can imagine that one line should (remain at) rest and (that) the other should be moved approaching it and constituting a lesser angle; or (that it should be) withdrawn from it, constituting a greater angle; or even that one and the other should be moved into diverse parts.

Hence, those are more *one* which are continuous by themselves without reflection.<sup>90</sup> The reason for this is that a straight line can only have one motion on all its parts, while the reflected line can have one motion or two motions. Indeed, the reflected line can be understood to be moved whole in one part; and, again, it can be understood that, (if) one part (remains) at rest, the other part—which contains an angle together with the part at rest—could by its motion approach the resting part. For example, when the tibia is leaned towards the femur; whence, either of these—to wit, the tibia or the femur—is more *one* than that which is composed of the tibia and the femur.

Hence, ARISTOTLE says that, that continuum is more *one* whose motion is more indivisible and simpler (*magis unum, cuius motus est indivisibilior, et magis simplex* = μάλλον ἔν και πρότερον οὐ̃ ἀδιαιρετωτέρα ἢ κίνησις και μάλλον ἀπλή).<sup>91</sup>

### 39.16. Continua by Another

A bundle of timber is continuous by reason of a tie (*ratione ligaminis vel vinculi*).<sup>92</sup> And in this mode, too, (pieces of) wood glued together are said (to be) one by (reason of the) glue (i.e., in both cases, they are continua by another).

This happens in two modes. For sometimes, the continuation of the (things) bound together comes to be (*fit*) according to a straight line. Sometimes, on the other hand, (the

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<sup>89</sup> *In Metaph.* 10, l. 1, §1924: “Sed in duobus continuis constituentibus angulum, hoc non convenit. Possumus enim imaginari quod una linea quiescat, et altera moveatur ei appropinquans, et minorem angulum constituat; aut ab ea elongata, et constituens angulum maiorem. Vel etiam quod utraque moveatur in diversas partes.”

<sup>90</sup> *In Metaph.* 5, l. 7, §857 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a12–17): “Sed tamen magis sunt unum quae per se sunt continua sine reflexione. Cuius ratio est, quia linea recta non potest habere nisi unum motum in omnibus partibus suis. Linea vero reflexa potest habere unum motum, et duos motus. Potest enim intelligi linea reflexa tota moveri in unam partem: et iterum potest intelligi quod una parte quiescente, alia pars, quae cum parte quiescente continet angulum, appropinquet per suum motum ad partem quiescentem, sicut quando tibia vel crus applicatur ad coxam, quae hic dicitur femur. Unde utrumque eorum, scilicet tibia vel coxa, sunt magis unum quam scelos, ut habetur in Graeco, idest quam id quod est compositum ex tibia et coxa.” St. Thomas rejects a reading that would have *curvature* instead of *reflection*. *Ibid.*, §858: “Sciendum autem, quod litera quae habet curvitatē loco reflexionis, falsa est. Constat enim quod partes lineae curvae angulum non continentes, oportet quod simul moveantur et simul quiescant, sicut partes lineae rectae; quod non accidit in reflexa, ut dictum est.”

<sup>91</sup> *In Metaph.* 10, l. 1, §1924 (cf. ARISTOTLE, *Metaphysica* l.1, 1052a20–21): “Et ideo dicit [Philosophus] quod illud continuum est magis unum, cuius motus est indivisibilior, et magis simplex.”

<sup>92</sup> *In Metaph.* 5, l. 7, §850 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a1): “Prosequitur ergo [Philosophus] primo *continua secundum aliud*, dicens, quod continua per aliud sunt, sicut onus lignorum continuum est ratione ligaminis vel vinculi: et hoc modo ligna adinvicem conviscata dicuntur unum per viscum.”

continuation of the things bound together comes to be) according to an indirect line, as is the reflected line that contains an angle, which comes to be from the contact of two (lines) in one surface, of which the application is not direct. And by this (latter) mode, the parts of an animal are said (to be) *one* and a *continuum*. For example, the tibia, which has a reflection, and contains an angle (in relation) to the knee, is said (to be) one and continuous; and likewise, the arm.<sup>93</sup>

However, since this continuation, which is by another (*per aliud*), can be or come to be naturally or by art, those that are continuous by nature are more *one* than those that are continuous by art.<sup>94</sup> For in those that are continuous by nature, the one by which the continuation comes to be is not extraneous to the nature of the thing that is continued by it, as happens in those that are one by art, in which the tie or the glue—or something such—is altogether extraneous to the nature of the things bound together. And thus, those that are naturally bound together, priorly approach those that are continuous by themselves, which are maximally *one*.

### 39.17. The Continuous Whole

A continuum is said (to be) *one* because it is not divided in act, even if it is divisible.<sup>95</sup> Thus, in a continuum, something is in act—namely the separated part—and another thing is in potency—namely a non-separated part existing in the continuum.

For example, in magnitudes, a one-foot (long) line is in potency in a two-feet (long) line, but it is only in act when it is divided from the whole.<sup>96</sup> And a mathematical body is infinitely divisible, for in it is considered the *ratio* of *quantity* alone, in which there is nothing incompatible with (*repugnans*) infinite division.

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<sup>93</sup> *In Metaph.* 5, l. 7, §850 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a2–3): “Quod etiam contingit dupliciter: quia quandoque continuatio alligatorum fit secundum lineam rectam, quandoque autem secundum lineam indirectam, sicut est linea reflexa angulum continens, quae fit ex contactu duarum in una superficie, quarum applicatio non est directa. Per hunc enim modum partes animalis dicuntur unum et continuum. Sicut tibia, quae habet reflexionem, et angulum continet ad genu, dicitur una et continua, et similiter brachium.”

<sup>94</sup> *In Metaph.* 5, l. 7, §851 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016a4): “Sed, cum talis continuatio, quae est per aliud, possit esse vel fieri naturaliter et arte, magis unum sunt quae sunt continua per naturam, quam quae sunt continua per artem: quia in his quae sunt continua per naturam, illud unum, per quod fit continuatio, non est extraneum a natura rei quae per ipsum continuatur, sicut accidit in his quae sunt unum per artificium, in quibus vinculum, vel viscus, vel aliquid tale est omnino extraneum a natura colligatorum. Et ita ea quae sunt naturaliter colligata, prius accedunt ad ea quae sunt secundum se continua, quae sunt maxime unum.”

<sup>95</sup> *In Metaph.* 10, l. 4, §1985: “Dicitur enim et continuum unum, quia non et actu divisum, licet sit divisibile.” *In De sensu* 1, c. 14, 171–173: “in continuo aliquid est in actu, scilicet pars separata, et aliud in potencia, scilicet pars in continuo existens non separata.”

<sup>96</sup> *In De sensu* 1, c. 14, 188–190: “uidemus in magnitudinibus quod linea unius pedis est in potencia in linea bipedali, et tunc est actu quando diuiditur a toto.” *Ibid.*, 218–221: “corpus mathematicum est diuisibile in infinitum, in quo consideratur sola ratio quantitatis, in qua nichil est repugnans diuisioni infinite.” *In Physic.* 1, l. 9, n. 9: “In corpore enim mathematico non consideratur nisi quantitas, in qua nihil invenitur diuisioni in infinitum repugnans.”

On the other hand, a natural body, which is not composed from mathematical (bodies), cannot be infinitely divided, for it is considered under a **whole form**.<sup>97</sup> And the natural form that is considered requires a determinate quantity, as (it requires) other (determinate) accidents (►23.7). Thus, when (a natural body) has already been brought to a minimum, it is immediately (*statim*) converted into another (species) due to the weakness of (its) virtue. Whence, a minimal flesh can be found, determined under some (extreme) termini.

ARISTOTLE shows (that there are) two diversities in the continuous whole (►13.4; 13.7): (1) of continuous wholes, some are continuous **by nature** and some **by art** (►39.18); (2) a continuous whole is found to be related to the **position of the parts** in (diverse) modes (►39.19).<sup>98</sup>

### 39.18. Continuous Whole by Nature vs. by Art

Those (wholes) that are continuous by nature are more whole than those that are (continuous) by art, as has been said of *one* (i.e., one by nature vs. one by art; ►39.16): namely, that those that are continuous by nature are more *one*—just as if a *totality* should be some *union*.<sup>99</sup> Wherefrom, it is evident that **what is more one is more whole**.

Indeed, since something is a whole by nature, while something (else is a whole) by art, ARISTOTLE adds that (a whole) is maximally *one* if it is *one* by nature and not by violence (< μάλιστα... εἴ τι φύσει τοιοῦτον καὶ μὴ βίᾳ).<sup>100</sup> For example, those are conjoined by

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<sup>97</sup> *In De sensu* 1, c. 14, 221–227: “set corpus naturale, quod consideratur sub tota forma, non potest in infinitum diuidi, quia, quando iam ad minimum deducitur, statim propter debilitatem uirtutis conuertitur in aliud; unde est inuenire minimam carnem, sicut dicitur in I Phisicorum. Nec tamen corpus naturale componitur ex mathematicis.” *In Physic.* 1, l. 9, n. 9: “licet corpus, mathematice acceptum, sit divisibile in infinitum, corpus tamen naturale non est divisibile in infinitum. [...] in corpore naturali consideratur forma naturalis, quae requirit determinatam quantitatem sicut et alia accidentia. Unde non potest inveniri quantitas in specie carnis nisi infra aliquos terminos determinata.” *Ibid.*, n. 13 (cf. ARISTOTLE, *Physica* A.4, 187b35–188a2): “Omne corpus remoto aliquo fit minus, cum omne totum sit maius sua parte; cum autem quantitas carnis sit determinata secundum magnitudinem et parvitatem, ut ex dictis patet, necesse est esse aliquam minimam carnem; ergo ab ea non potest aliquid segregari, quia sic esset aliquid minus minimo. Non igitur ex quolibet potest fieri quodlibet per segregationem.”

<sup>98</sup> *In Metaph.* 5, l. 21, §1104: “Ostendit [Philosophus] duas diversitates in isto secundo modo totius [qui, sc., pertinet ad totum integrale; cf. *ibid.*, §1101].” *Ibid.* (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b34–36): “quarum prima est, quod continuorum quaedam sunt continua per artem, quaedam per naturam.” *Ibid.*, §1105 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a1–3): “Secundam diversitatem ponit [Philosophus]. [...] oportet quod omnia tota ista continuum habeant positionem in suis partibus. Sed ad positionem partium totum continuum tripliciter se invenitur habere.”

<sup>99</sup> *In Metaph.* 5, l. 21, §1104 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1023b34–36): “continuorum quaedam sunt continua per artem, quaedam per naturam. Et illa quae sunt continua per naturam, magis sunt «talia,» idest tota, quam quae sunt per artem. Sicut de uno dictum est supra; scilicet quod illa quae sunt continua per naturam, magis sunt unum, ac si totalitas sit aliqua unio: ex quo patet quod, quod est magis unum, est magis totum.”

<sup>100</sup> *In Metaph.* 10, l. 1, §1926 (cf. ARISTOTLE, *Metaphysica* I.1, 1052a23–25): “Et quia aliquid est totum per naturam, aliquid vero per artem, addidit [Philosophus], quod «maxime est unum,» siquidem est unum per naturam, et non per violentiam. Sicut per violentiam ad aliquod totum constituendum coniunguntur quaecumque uniuntur aut visco aut aliqua tali coniunctione. Sed id quod est coniunctum per naturam est magis unum, quia scilicet est sibiipsi causa quod sit continuum, quia per suam naturam est tale.”

violence to constitute some whole which are united with glue or some (other) such conjunction. On the other hand, that which is conjoined by nature is more *one*: to wit, because it is the cause of its being continuous itself, since it is such by its nature.

### 39.19. The Continuous Whole and the Position of Its Parts

In (continuous) quantity there is an order of the parts, since *there is a principle, a mean, and a last* (< τοῦ ποσοῦ ἔχοντος... ἀρχὴν καὶ μέσον καὶ ἔσχατον), in which the *ratio* of **position** consists.<sup>101</sup> Therefore, all (continuous) wholes must have a continuous position in its parts.

A continuous whole is found to be related to the position of (its) parts in three modes:<sup>102</sup>

1. There are some (continuous) wholes in which a diverse **position** of parts **does not produce diversity** (< ὅσων μὲν μὴ ποιεῖ ἢ θέσις διαφορὰν).<sup>103</sup>

This is evident in water, for in whatever way the parts of water should be transposed, it differs in nothing.<sup>104</sup> And likewise, it is (the case) concerning other liquids, such as oil, wine, and such (others).

In these, the whole is signified by saying *all* (*dicitur omne* < πᾶν λέγεται), and not (by) the name *whole* itself.<sup>105</sup>

Thus, we say *all the water* (*omnis aqua*) or *all the wine* (*omne vinum*) or *all the number* (*omnis numerus*); but not *the whole* (*totus*; e.g., *totus numerus*, the whole number), except according to metaphor.<sup>106</sup> This perhaps is according to a property of the Greek language, for among us (i.e., the Latins) it (i.e., *totus*) is said properly.

2. There are some (continuous wholes) in which **position produces a difference** (< ὅσων δὲ ποιεῖ).<sup>107</sup>

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<sup>101</sup> *In Metaph.* 5, l. 21, §1105 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a1–2): “Cum enim ita sit quod in quantitate sit ordo partium, quia est ibi principium, medium et ultimum, in quo ratio positionis consistit, oportet quod omnia tota ista continuam habeant positionem in suis partibus.”

<sup>102</sup> *In Metaph.* 5, l. 21, §1105 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a1–6): “Sed ad positionem partium totum continuum tripliciter se invenitur habere.”

<sup>103</sup> *In Metaph.* 5, l. 21, §1105 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a1–2): “Quaedam enim tota sunt in quibus diversa positio partium non facit diversitatem.”

<sup>104</sup> *In Metaph.* 5, l. 21, §1105: “sicut patet in aqua. Qualitercumque enim transponantur partes aquae, nihil differunt: et similiter est de aliis humidis, sicut de oleo, vino et huiusmodi.”

<sup>105</sup> *In Metaph.* 5, l. 21, §1105 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a2): “In his autem significatur totum per hoc quod dicitur omne, non autem ipso nomine totius.”

<sup>106</sup> *In Metaph.* 5, l. 21, §1105: “Dicimus enim, omnis aqua, vel omne vinum, vel omnis numerus; non autem totus, nisi secundum metaphoram: et hoc forte est secundum proprietatem Graeci idiomatis. Nam apud nos dicitur proprie.”

<sup>107</sup> *In Metaph.* 5, l. 21, §1106 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a2): “Quaedam vero sunt in quibus positio differentiam facit.”

For example, (position produces a difference) in man and in whatever animal; and in a house, and (others) such (continuous wholes).<sup>108</sup> For it is not a house in whatever mode the parts should be ordered, but (only) according to a determinate order of parts; and likewise, neither (is it) a man (if it lacks a determinate order of parts); nor an animal.

In these, we say *whole* (*totum* < ὅλον) and not *all* (*omne*).<sup>109</sup> Thus, we say, speaking of one animal alone, *the whole animal*—not *all the animal*.

**3.** There are some (continuous wholes) in which **both happen** (ὅσα δὲ ἄμφω ἐνδέχεται, καὶ ὅλα καὶ πάντα) because position somehow produces a difference in them.<sup>110</sup>

In these we say both: i.e., *all* and *whole* (< καὶ γὰρ ὅλον καὶ πᾶν λέγεται· ἔχει γὰρ ἄμφω).<sup>111</sup>

These are (those) in which, (if) a transposition of the parts (is) made, the matter remains the same (< ἔστι δὲ ταῦτα ὅσων ἡ μὲν φύσις ἡ αὐτὴ μένει τῇ μεταθέσει), but the form or figure (does) not (remain) the same (< ἢ δὲ μορφή οὔ).<sup>112</sup>

This is evident, for example, in wax (< κηρός), which, regardless of how its parts should be transposed, is nonetheless wax, although not of the same figure.<sup>113</sup> And likewise, it is (the same) concerning a vestment (< ἱμάτιον), and concerning all those (continuous wholes) that are of like parts that retain diverse figures. Liquids, even if they are of like parts, cannot have a proper figure (i.e., of their own), since they are not terminated by proper termini (i.e., by their own termini) but by those of another (i.e., the container); and hence, transposition in them varies nothing that should be from their part.<sup>114</sup>

The reason of this diversity is that *all* (*omne*) is distributive; hence, it requires a multitude in act or in proximate potency; and, since (such continuous wholes) are of like parts, they are divided into parts that are co-alike to the whole, and a multiplication of the whole

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<sup>108</sup> *In Metaph.* 5, l. 21, §1106: “sicut in homine, et in quolibet animali, et in domo et huiusmodi. Non enim est domus qualitercumque partes ordinentur, sed secundum determinatum ordinem partium: et similiter nec homo nec animal.”

<sup>109</sup> *In Metaph.* 5, l. 21, §1106 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a3): “et in his dicimus totum, et non omne. Dicimus enim de uno solo animali loquentes, totum animal, non omne animal.”

<sup>110</sup> *In Metaph.* 5, l. 21, §1107 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a3): “Quaedam vero sunt in quibus contingunt ambo, quia positio quodammodo facit differentiam in eis.”

<sup>111</sup> *In Metaph.* 5, l. 21, §1107 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a3): “In his autem dicimus utrumque, scilicet et omne et totum.”

<sup>112</sup> *In Metaph.* 5, l. 21, §1107 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a3–5): “et ista sunt in quibus facta transpositione partium manet eadem materia, sed non eadem forma sive figura.”

<sup>113</sup> *In Metaph.* 5, l. 21, §1107 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a5): “ut patet in cera, cuius qualitercumque transponantur partes, nihilominus est cera, licet non eiusdem figurae: et similiter est de vestimento, et de omnibus quae sunt similium partium, retinentium diversam figuram.”

<sup>114</sup> *In Metaph.* 5, l. 21, §1107 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a6–8): “Humida enim, etsi sunt similium partium, non tamen figuram possunt habere propriam, quia non terminantur terminis propriis, sed alienis: et ideo transpositio in eis nihil variat quod sit ex parte eorum.”



comes to be there.<sup>115</sup> Indeed, if any part of water is water, in any one water there are multiple waters, although in potency, just as in one number there are multiple units in act.

On the other hand, **whole** signifies a *collection of parts in something one* (*collectio partium in aliquo uno*).<sup>116</sup> Hence, *whole* is properly said in those (continuous wholes) in which one perfect (continuous whole) comes to be from all the parts taken simultaneously, (and) whose perfection befits none of the parts. For example, a house or an animal. Whence, *all the animal* is not said of *one* animal but of *many*.

And hence, ARISTOTLE says that, in those wholes in which *all* is said as of (something) *one* that refers to the whole, *all* (*omnia* = πάντα) can be said in plural as referring to the parts in diverse (things).<sup>117</sup> For example, we say, *all this number* (*omnis hic numerus* = πᾶς οὗτος ὁ ἀριθμός), *all these units* (*omnes hae unitates* = πᾶσαι αὐταὶ αἱ μονάδες), and *all this water* (*omnis haec aqua*), (if) the whole is demonstrated (*demonstrato*, i.e., indicated); and *all these waters* (*omnes hae aquae*), (if) the parts are demonstrated.

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<sup>115</sup> *In Metaph.* 5, l. 21, §1108: “Ratio autem huius diversitatis est, quia omne, distributivum est: et ideo requirit multitudinem in actu, vel in potentia propinqua: et quia ea sunt similium partium, dividuntur in partes consimiles toti, fitque ibi multiplicatio totius. Nam si quaelibet pars aquae est aqua, in unaquaque aqua sunt multae aquae, licet in potentia; sicut in uno numero sunt multae unitates in actu.”

<sup>116</sup> *In Metaph.* 5, l. 21, §1108: “Totum vero significat collectionem partium in aliquo uno: et ideo in illis proprie dicitur totum in quibus, ex omnibus partibus acceptis simul, fit unum perfectum, cuius perfectio nulli partium competit, sicut domus et animal. Unde omne animal, non dicitur de uno animali, sed de pluribus.”

<sup>117</sup> *In Metaph.* 5, l. 21, §1108 (cf. ARISTOTLE, *Metaphysica* Δ.26, 1024a8–10): “et ideo in fine dicit [Philosophus], quod in illis totis in quibus dicitur omne, ut de uno referente ad totum, potest dici omnia in plurali, ut in diversis referendo ad partes: sicut dicitur, omnis hic numerus et omnes hae unitates et omnis haec aqua, demonstrato toto, et omnes hae aquae, demonstratis partibus.”



## 40. One and Many

*We examine here the division of being into one and many.*

### 40.1. Denomination of *One* from *Unity* and of *Many* from *Multitude*

In a denominative way (*denominative*), that is said (to be) **one** (*unum*) which has unity (*quod habet unitatem*), as (in a denominative way, too, that is said to be) **white** (*album*) which has whiteness (*quod habet albedinem*), or what underlies it (*quod ei subiicitur*).<sup>1</sup>

For the same reason, **many** (*multa*) is said from *multitude* (*a multitudine*) in a denominative way; and **two** (*duo*), from *twoness* (*a dualitate*).<sup>2</sup>

### 40.2. The *Ratio* of *Multitude* or *Plurality*

The *ratio* of **multitude** or **plurality** (*multitudo, pluralitas = πλήθος*) consists in *being divided or divisible* (*divisa, aut divisibilia < τὸ ἡ διηρημένον ἢ διαιρετόν*) *one from another*.<sup>3</sup>

Hence, as ARISTOTLE says, something is said to be **many** or **plural** (*multa, plurale = πολλά*) because it is *divided* (*divisum = διηρημένον*) or *divisible* (*divisibile = διαιρετόν*).<sup>4</sup> He says, “divided,” on account of those (beings) that are separated in act from each other; and because of this, they are said (to be) *many*. (He says), “divisible,” on account of those (beings) that are not separated in act but approach separation: due to easiness of division, we (may) say (that they are a) *multitude*; for example, we say, “many waters” (► 39.19).

### 40.3. Intrinsic vs. Extrinsic Multitude

The *ratio* of *unity* (*ratio unitatis*) posits *undivided being simply* (*ens indivisum simpliciter*); whence, it abstracts from any mode of distinction.<sup>5</sup> However, it does not belong to the *ratio* of *one* to deprive of all division. Rather, it suffices for its *ratio* that any division be removed. Hence, it is possible for (something) *one* to be part of a *multitude* and for the same

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<sup>1</sup> *De unione Verbi*, a. 3 co.: “unum denominative dicitur quod habet unitatem, sicut album quod habet albedinem, sive quod ei subiicitur.”

<sup>2</sup> *De unione Verbi*, a. 3 co.: “Et eadem ratione multa denominative dicuntur a multitudine, et duo a dualitate.”

<sup>3</sup> *In Metaph.* 10, l. 4, §1984 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a22–23): “Ratio enim multitudinis consistit in hoc quod est esse divisa abinvicem, aut divisibilia.”

<sup>4</sup> *In Metaph.* 10, l. 4, §1984 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a20–22): “Dicit autem [Philosophus] *divisa*, propter ea quae actu a se invicem separata sunt, et propter hoc multa dicuntur. *Divisibilia* autem, propter ea quae non sunt actu separata, sed appropinquant separationi, sicut humida, ut aer et aqua, et alia his similia, in quibus propter facilitatem divisionis, multitudinem dicimus. Dicitur enim multa aqua et multus aer.” *In De Trin.*, q. 4 a. 1 co., 68–72: “sicut dicit Philosophus in X Metaphysice, plurale dicitur aliquid ex hoc quod est divisibile vel divisum.”

<sup>5</sup> *In Sent.* 1, d. 24 q. 1 a. 4 ad 3: “ratio unitatis ponit ens indivisum simpliciter: unde abstrahit a quolibet modo distinctionis.” *Ibid.*, ad 4: “Non enim de ratione sua unum privat omnem divisionem; sed sufficit ad rationem ejus, quaecumque divisio removeatur. Et inde potest esse quod unum est pars multitudinis, et quod ipsa multitudo dicitur quodammodo unum, prout scilicet aliquid non dividitur, ad minus secundum intellectum aggregantem.”

multitude to be said (to be) *one* in some mode: to wit, insofar as something is not divided—at least according to the aggregating intellect (for example, according to an understanding that composes by affirming—rather than negating—something of a subject, even if it should not be an essential predication).

Just as *one* removes *division*, which according to *ratio* is prior to *one* and to *multitude* (since the *ratios* of *one* and of *multitude* depend upon the *ratio* of *division*) but does not remove *multitude*, so *multitude* does not remove *unity*: rather, it removes the division of any of those (beings) from which the multitude is constituted (i.e., so that each of them is something *one*).<sup>6</sup>

The *ratio* of *one* is perfected (*perficitur*, i.e., comes to be completed) in *non-division* (*in indivisione*).<sup>7</sup> However, division *from others* is among the consequents of (and hence, posterior to) the *ratio* of *one*. Therefore, the *one* that is convertible with *being* does not deprive of the **extrinsic multitude** that constitutes *one* as a part, but of the **intrinsic multitude** that is opposed to unity.<sup>8</sup> When something is said to be *one*, what is negated is not that there should be something outside it with which it would constitute a multitude; rather, (what) is negated (is) its own division into multiple (beings).

Thus, the *one* that is convertible with *being* has the *ratio* of *privation* in respect of the division that is preserved in multitude.<sup>9</sup> In turn, *privation* involves *negation in a subject* (so that *one* is deprived of *division* because division is negated in a *being* as in a subject). Hence, *one* is opposed to *multitude* as privation is opposed to habit (► 44). However, *one* is not a privation of the (extrinsic) multitude that (together with another *one* or other *ones*)

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<sup>6</sup> *STh* I, q. 30 a. 3 ad 3: “unum non est remotivum multitudinis, sed divisionis, quae est prior, secundum rationem, quam unum vel multitudo. Multitudo autem non removet unitatem, sed removet divisionem circa unumquodque eorum ex quibus constat multitudo.”

<sup>7</sup> *In Sent.* 4, d. 44 q. 2 a. 2 qc. 3 ad 4: “Ratio autem unius perficitur in indivisione, ut patet in 4 Metaph. Sed divisio ab aliis est de consequentibus ad rationem unius.”

<sup>8</sup> *De potentia*, q. 3 a. 16 ad 3: “unum [...] quod convertitur cum ente [...] nihil addit supra ens nisi indivisionem; et hoc unum privat multitudinem, in quantum multitudo ex divisione causatur; non quidem multitudinem extrinsecam quam unum constituit sicut pars; sed multitudinem intrinsecam quae unitati opponitur. Non enim ex hoc quod aliquid dicitur esse unum, negatur quin aliquid sit extra ipsum quod cum eo constituat multitudinem; sed negatur divisio ipsius in multa.”

<sup>9</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “Si autem loquimur de uno quod convertitur cum ente, sic unum habet rationem privationis [...] respectu divisionis quae salvatur in multitudine.” *De veritate*, q. 21 a. 5 ad 7: “unum quod convertitur cum ente, dicitur secundum rationem negationis, quam addit supra ens.” *De potentia*, q. 9 a. 7 co.: “unum quod convertitur cum ente, ponit quidem ipsum ens, sed nihil superaddit nisi negationem divisionis.” *In Sent.* 1, d. 28 q. 1 a. 1 ad 2: “Omnis enim negatio quae est in aliquo subjecto determinato, potest dici privatio. Unde in 8 Metaph. dicitur, quod privatio est negatio in subjecto vel in substantia.” *In Sent.* 2, d. 12 q. 1 a. 5 expos.: “privatio est negatio in subjecto apto nato, ut in 4 Metaph. dicitur (unde praesupponitur subjectum, etabilitas ipsius ad receptionem formae quae privatur).” *In Sent.* 2, d. 34 q. 1 a. 1 ad 2: “privatio est negatio in subjecto, ut in 4 Metaphys. dicitur: caecitas enim nihil aliud est quam negatio visionis in eo quod natum est videre.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “opponitur [unum quod convertitur cum ente] multitudini, sicut privatio habitui, ut dicit Philosophus. [...] Nec unum est privatio illius multitudinis quam constituit; sed multitudinis quae negatur esse in ipso quod dicitur unum.”

it constitutes, but of the (intrinsic) multitude that is negated to be in the same (being) that is said (to be) *one*.

#### 40.4. Material vs. Formal Division

Since division causes multitude—for every plurality follows upon some division—, while non-division (causes) unity, judgment concerning the one and the many must be taken according to the *ratio* of *division*.<sup>10</sup> However, **division** is twofold: (1) **material**, according to *quantity* (►40.5); (2) **formal**, according to *form or essence* (►40.6).

#### 40.5. Material Division

Material division comes to be following (*fit secundum*) the division of the continuum.<sup>11</sup> This division does not transcend the genus of quantity. Whence, too, the multitude that follows upon this division, and the unit that deprives of it, are in the genus of quantity. Since upon this division, which exists only in bodies, follows the number that is a species of quantity, such a number is only in material things having quantity.

The *one* (or *unit*) that is the principle of number adds something accidental—which has the *ratio* of *measure*—over that of which it is said (►34.8).<sup>12</sup> Otherwise, the number that is constituted from units would not be some accident—nor (would it be) some species of a genus. Hence, numerical multitude—i.e., the number that is a species of quantity—also posits some accident added over *being*.

Division according to (dimensive, i.e., bulk) quantity follows upon the *ratio* of *multitude* because the *ratio* of *number*—according as it is a species of quantity, insofar as it adds the *ratio* of *measure*—follows upon the *ratio* of *multitude* taken in common.<sup>13</sup> Whence, ARISTOTLE says that **number** is a *multitude measured by one*.

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<sup>10</sup> *De potentia*, q. 9 a. 7 co.: “cum divisio multitudinem causet, indivisio vero unitatem, oportet secundum rationem divisionis de uno et multo iudicium sumi.” *STh* I, q. 30 a. 3 co.: “omnis pluralitas consequitur aliquam divisionem. Est autem duplex divisio. Una materialis [...]. Alia est divisio formalis.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “Est enim duplex divisio: scilicet divisio secundum quantitatem [...] Est etiam quaedam divisio secundum formam vel essentiam.” Cf. *STh* I, q. 47 a. 2 co.

<sup>11</sup> *STh* I, q. 30 a. 3 co.: “Una [divisio] materialis, quae fit secundum divisionem continui, et hanc consequitur numerus qui est species quantitatis. Unde talis numerus non est nisi in rebus materialibus habentibus quantitatem.” *De potentia*, q. 9 a. 7 co.: “Est autem et alia divisio secundum quantitatem quae genus quantitatis non transcendit. Unde et multitudo consequens hanc divisionem, et unitas eam privans, sunt in genere quantitatis.” *ScG* 2, 44 n. 9: “secundum divisionem quantitatis, quae in solis corporibus est.”

<sup>12</sup> *De potentia*, q. 9 a. 7 co.: “Quod quidem unum, aliquid accidentale addit supra id de quo dicitur, quod habet rationem mensurae; alias numerus ex unitate constitutus, non esset aliquod accidens, nec alicuius generis species.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “multitudo numeralis, quae est species quantitatis, ponit aliquid in creaturis.” *STh* I, q. 30 a. 3 co.: “Numerus autem qui est species quantitatis, ponit quoddam accidens additum supra ens, et similiter unum quod est principium numeri.”

<sup>13</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “divisio secundum quantitatem; et talis divisio consequitur rationem multitudinis, eo quod rationem multitudinis communiter acceptae sequitur ratio numeri, prout est species quantitatis, secundum quod addit rationem mensurae: unde dicit Philosophus, quod numerus est multitudo mensurata per unum.”

In turn, the understanding of the division of the continuum follows upon the *ratio* of *number*, for the *ratio* of *division*, and of *quantity* and *measure*, is found, according to AVERROES, in discrete quantity prior than in continuous quantity.<sup>14</sup> Such a (quantitative) division is not posited in the definition of the *one* that is convertible with *being*.

#### 40.6. Formal Division

According to form or essence, one thing is divided from another by its form.<sup>15</sup> This formal division, which comes to be by some formal opposition—i.e., by opposite or diverse forms—involves no (dimensive) quantity, and altogether exceeds the genus of quantity. Whence, the multitude that follows upon this division, and the *one* that deprives of this division, must be of greater community and ambit than the genus of quantity, for such a multitude alone can be in immaterial things. Thus, upon this formal division follows the multitude that is not in some genus: rather, it is among the transcendentals, according to which *being* is divided into *one* and *many*. However, formal distinction always requires inequality (in virtual quantity; ►22.7), for the forms of things are like numbers (►16.7).

The *one* that is convertible with *being* only adds over *being* the negation of division: not that it should signify *non-division* alone, but its substance with it, for **one** is the same as *undivided being*.<sup>16</sup> Hence, of whatever *one* should be said, that undivided thing is signified. For example, *one* said of *man* signifies *the undivided nature or substance of man*.

For the same reason, when “many things” is said, *multitude* so taken signifies the (same) things with non-division concerning any which one of them (►40.3).<sup>17</sup> Thus, the multitude that corresponds to *one* adds nothing except *distinction* over the many things; which

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<sup>14</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “et rationem numeri sequitur intellectus divisionis continui: ratio enim divisionis et quantitatis et mensurae, secundum Commentatorem, prius invenitur in quantitate discreta quam in quantitate continua: et talis divisio non ponitur in definitione unius quod convertitur cum ente.”

<sup>15</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “Est etiam quaedam divisio secundum formam vel essentiam, secundum quod una res per formam suam dividitur ab alia.” *De potentia*, q. 9 a. 7 co.: “Est autem quaedam divisio quae omnino genus quantitatis excedit, quae scilicet est per aliquam oppositionem formalem, quae nullam quantitatem concernit. Unde oportet quod multitudo hanc divisionem consequens, et unum quod hanc divisionem privat, sint maioris communitatis et ambitus quam genus quantitatis.” *STh I*, q. 30 a. 3 co.: “Alia est divisio formalis, quae fit per oppositas vel diversas formas, et hanc divisionem sequitur multitudo quae non est in aliquo genere, sed est de transcendentibus, secundum quod ens dividitur per unum et multa. Et talem multitudinem solam contingit esse in rebus immaterialibus.” *De spirit. creat.*, a. 8 ad 15: “numerus qui causatur ex divisione continui est species quantitatis, et est tantum in substantiis materialibus. Sed in substantiis immaterialibus est multitudo quae est de transcendentibus, secundum quod unum et multa dividunt ens; et haec multitudo consequitur distinctionem formalem.” *STh I*, q. 47 a. 2 co.: “Distinctio autem formalis semper requirit inaequalitatem, quia [...] formae rerum sunt sicut numeri.”

<sup>16</sup> *De potentia*, q. 9 a. 7 co.: “Unum vero quod convertitur cum ente, non addit supra ens nisi negationem divisionis, non quod significet ipsam indivisionem tantum, sed substantiam eius cum ipsa: est enim unum idem quod ens indivisum.” *STh I*, q. 30 a. 3 co.: “Et eadem ratione, cum dicuntur res multae, multitudo sic accepta significat res illas cum indivisione circa unamquamque earum.”

<sup>17</sup> *STh I*, q. 30 a. 3 co.: “Et eadem ratione, cum dicuntur res multae, multitudo sic accepta significat res illas cum indivisione circa unamquamque earum.” *De potentia*, q. 9 a. 7 co.: “Et similiter multitudo correspondens uni nihil addit supra res multas nisi distinctionem, quae in hoc attenditur quod una earum non est alia; quod quidem non habent ex aliquo superaddito, sed ex propriis formis.”

(distinction) is considered in this: that *one of them is not another* (►40.7)—which they do not have from something added over, but from their own forms.

Since the *ratio* of *one* conveys a negation of the same division found in the *ratio* of *multitude*, just as the *one* that is convertible with *being* is not determined to some genus, nor is the multitude that follows upon it.<sup>18</sup> Thus taken, *one* and *many* are among the first differences of *being* insofar as *being* is divided into *one* and *many* and into *act* and *potency*. Whence, *one* and *many* are not determined to some genus: taken so, *multitude* is not a number—i.e., a species of quantity—and *one* is not the principle of number.

Thus, as ARISTOTLE and AVERROES say, the *one* and the *many* that divide *being* are not the same as the *one* (and the *many*) that is a species of quantity.<sup>19</sup> The multitude that divides *being* does not positively add an accident over *being*; rather, (it adds) only the *ratio* of *distinction*, according to which *one is not another* (►40.7). Indeed, while numeral multitude, which is a species of quantity, posits something in creatures, the multitude that divides being does not positively add an accident over being, but a distinction of *ratio* alone (►21.7), insofar as *one is not another*.

Formal division cannot exist without a diversity of degrees, since such a division is reduced to privation and form.<sup>20</sup> Thus, one of the co-divided forms must be better (*melior*); and the other, worse (*viliior*). Whence, according to ARISTOTLE, the species of things are like numbers, of which one is greater or less than another (►16.7).

Division according to form or essence, which precedes the *ratio* of *one* according to understanding, is found first (again, according to our mode of understanding) in affirmation and negation (►40.9).<sup>21</sup>

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<sup>18</sup> *In Sent.* 2, d. 3 q. 1 a. 3 ad 1: “unum dicitur dupliciter. Uno modo secundum quod convertitur cum ente, quod non determinatur ad aliquod genus, et similiter nec multitudo sequens ad tale unum.” *In Sent.* 1, d. 24 q. 1 a. 3 co.: “hujusmodi divisionis hoc modo acceptae in ratione multitudinis, negatio importatur in ratione unius. Et sic accepta, unum, et multa sunt de primis differentiis entis, secundum quod ens dividitur in unum et multa et in actum et in potentiam. Unde sic accepta non determinantur ad aliquod genus; et sic haec multitudo sic accepta non est numerus qui est species quantitatis: nec hoc unum sic acceptum, est unum quod est principium numeri.”

<sup>19</sup> *In Sent.* 1, d. 24 q. 1 a. 3 co.: “Alii philosophi, scilicet Aristoteles et Averroes, dicunt, quod unum et multa quae dividunt ens, non sunt idem cum uno quod est species quantitatis.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “Multitudo vero quae dividit ens, non addit accidens positive supra ens, sed rationem distinctionis tantum, secundum quod una non est altera.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 5: “multitudo numeralis, quae est species quantitatis, ponit aliquid in creaturis. [...] Multitudo vero quae dividit ens, non addit accidens positive supra ens, sed rationem distinctionis tantum, secundum quod una non est altera.”

<sup>20</sup> ScG 2, 44 n. 9: “secundum divisionem formalem. Quae sine graduum diversitate esse non potest: cum talis divisio reducat ad privationem et formam; et sic oportet quod altera formarum condivisarum sit melior et altera viliior. Unde, secundum Philosophum, species rerum sunt sicut numeri, quorum unus alteri addit aut minuit.”

<sup>21</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: “Est etiam quaedam divisio secundum formam vel essentiam [...]: et ista divisio primo invenitur in affirmatione et negatione, quae secundum intellectum praecedit rationem unius.”

#### 40.7. The Ratio of Distinction or Alterity

Those are **distinct** of which one is not another (*quorum unum non est aliud*).<sup>22</sup> Hence, the ratio of **distinction** (*distinctio*) has a negation (i.e., *is not*).

Distinction—or alterity, if by **alterity** (*alteritas*) we understand a difference whereby some (beings) are constituted (to be) other than each other (*differentia qua aliqua inter se altera constituuntur*)—is the principle of plurality.<sup>23</sup> Everything that is a cause of division must be posited as a cause of plurality: just as (a being) is said (to be) *one* because it is not divided, so (beings) are said (to be) *many* because they are divided; and just as non-division causes unity, so division causes multitude. Therefore, any judgment concerning one and many must be taken according to the (appropriate, corresponding) ratio of *division*.

BOETHIUS prefers to say *alterity* (*alteritas*) rather than *otherness* (*alietas*) because not only substantial differences—to which it belongs to cause *another* (*facere aliud*)—constitute a plurality, but so do accidental (differences)—to which it belongs to cause (to be) *other than another* (*alterum*).<sup>24</sup> However, *alterity* follows upon *otherness*, and not conversely.

#### 40.8. Distinction Due to Formal vs. Material Division

The distinction of some (beings) one from another can only properly be either:<sup>25</sup>

##### 1. On account of **material** or **quantitative** division (►40.5).<sup>26</sup>

Distinction according to material and quantitative division is found in corporeal things,<sup>27</sup> in which there are multiple individuals of the same species because the form of the species

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<sup>22</sup> ScG 1, 71 n. 5: “in ratione distinctionis est negatio: distincta enim sunt quorum unum non est aliud.” St. Thomas sometimes uses interchangeably the names *distinctio* and *divisio*; more rarely, *discretio*. Thus, *In Sent.* 1, d. 26 q. 2 a. 2 co.: “omnis distinctio vel divisio est vel per quantitatem vel per formam, secundum Philosophum.” *In De div. nom.*, c. 4, l. 6: “considerandum est quod unum addit supra rationem entis, indivisionem: est enim unum, ens indivisum; unde unitati distinctio sive discretio opponitur.”

<sup>23</sup> ScG 1, 54 n. 7: “distinctio autem est pluralitatis principium.” *In De Trin.*, *expositio capituli primi*, 106–108: “alteritas est principium pluralitatis, alteritatem intelligens differentiam qua aliqua inter se altera constituuntur.” *Ibid.*, q. 4 a. 1 co., 68–72: “omne illud quod est causa diuisionis oportet ponere causam pluralitatis.” *De potentia*, q. 9 a. 7 co.: “cum divisio multitudinem causet, indivisio vero unitatem, oportet secundum rationem diuisionis de uno et multo iudicium sumi.” *In Sent.* 1, d. 24 q. 1 a. 3 co.: “Sicut enim unum dicitur ex eo quod non dividitur, ita multa dicuntur ex eo quod dividuntur.” Since the ratio of *distinction* is diverse in diverse things, St. Thomas often points to a particular ratio using expressions such as “et huius diuisionis ratio est, quia...”

<sup>24</sup> *In De Trin.*, *expositio capituli primi*, 108–113: “maluit [Boethius] dicere alteritatem quam alietatem, quia non solum substantiales differentie pluralitatem constituunt, quarum est facere aliud, sed etiam accidentales, quarum est facere alterum; ad alietatem uero sequitur alteritas, set non e conuerso.”

<sup>25</sup> *De potentia*, q. 10 a. 5 co.: “distinctio aliquorum ab invicem non proprie potest esse nisi vel propter diuisionem materialem seu quantitativam, vel propter diuisionem formalem.” ScG 2, 44 n. 9: “Omnis distinctio est aut secundum diuisionem quantitatis [...]: aut secundum diuisionem formalem.”

<sup>26</sup> *De potentia*, q. 10 a. 5 co.: “vel propter diuisionem materialem seu quantitativam.” ScG 2, 44 n. 9: “aut secundum diuisionem quantitatis.”

<sup>27</sup> *De potentia*, q. 10 a. 5 co.: “Distinctio autem secundum materialem et quantitativam diuisionem, inuenitur in corporalibus rebus, in quibus eiusdem speciei sunt individua plura ex eo quod forma speciei



is found in diverse parts of matter according to quantitative division (► 35.19). Whence, if there should be some individual composed from the whole matter in which the form of a species can be, it would be impossible for there to be multiple individuals of that species.

In material things, in which it is possible for multiplication to come to be through the division of matter and quantity, it is possible for two individuals of one species to be related equally (*ex aequo*), as also two parts of quantity are related equally (► 6.11).<sup>28</sup>

## 2. On account of **formal** division (► 40.6).<sup>29</sup>

The distinction of things having one nature, at least of (the same) genus, can be (had) by formal division only by reason of some opposition.<sup>30</sup> Whence, we find that differences of whatever genus are opposites.

Where a first difference according to form is found, there it is impossible for two things to be related equally (*ex aequo*).<sup>31</sup> Indeed, as ARISTOTLE says, the forms of things are like numbers, in which species vary by the addition or subtraction of a unit (► 16.7). And the formal differences of things consist in some order of perfection, for *plant* differs in species from *stone* in that it adds over (it) *life*; *brute animal* (differs) from *plant* in that it adds over (it) *sense*; and *man* (differs) from *brute (animal)* in that it adds over *reason*.

Therefore, in immaterial things, in which there can be no multiplication according to the division of matter, plurality can only exist with some order.<sup>32</sup> Thus, in created immaterial substances there is an order of perfection insofar as one is of a more perfect nature than another.

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in diversis partibus materiae secundum quantitatem divisionis invenitur: unde et si aliquod est individuum quod constat ex tota materia, in qua possibile est esse formam speciei, impossibile est quod illius speciei sint individua plura, sicut probat Aristoteles de mundo, in principio caeli et mundi.”

<sup>28</sup> *De potentia*, q. 10 a. 5 co.: “In rebus enim materialibus, in quibus possibile est fieri multiplicationem per divisionem materiae et quantitatis, ut dictum est, possibile est duo individua unius speciei ex aequo se habere, sicut et duae partes quantitatis ex aequo se habent.”

<sup>29</sup> *De potentia*, q. 10 a. 5 co.: “vel propter divisionem formalem.” ScG 2, 44 n. 9: “aut secundum divisionem formalem.”

<sup>30</sup> *De potentia*, q. 10 a. 5 co.: “Distinctio autem aliquorum habentium unam naturam saltem generis, per divisionem formalem esse non potest nisi ratione alicuius oppositionis. Unde invenimus quod cuiuslibet generis differentiae sunt oppositae.”

<sup>31</sup> *De potentia*, q. 10 a. 5 co.: “ubi autem invenitur prima differentia secundum formam, ibi impossibile est quod aliquo duo se habeant ex aequo. Ut enim Philosophus dicit, formae rerum sunt sicut numeri, in quibus variantur species per unitatis additionem vel subtractionem: et formales rerum differentiae consistunt in quodam perfectionis ordine. Nam planta specie differt a lapide in hoc quod superaddit vitam; animal vero brutum a planta in hoc quod superaddit sensum: homo vero a bruto in hoc quod superaddit rationem.”

<sup>32</sup> *De potentia*, q. 10 a. 5 co.: “Et ideo in rebus immaterialibus, in quibus non potest esse multiplicatio secundum divisionem materiae, impossibile est quod sit pluralitas nisi cum ordine quodam. In substantiis quidem immaterialibus creatis est ordo perfectionis, secundum quod unus Angelus est perfectioris naturae quam alius.”

As ARISTOTLE teaches, if someone, in dividing, uses those (affections) that are by accident and not by themselves, the correct order of division does not follow.<sup>33</sup> For example, if it were said, “of animals, one is rational and another irrational; of irrationals, one is white and another black,” the division would not be correct. Indeed, (something) *one* simply does not come to be from those (beings) that are (*one*) by accident; hence, there would not be (something) *one* simply.

#### 40.9. The First *Ratio* of *Distinction*

The first *ratio* of *distinction* or *division*, according to which something is distinguished from something (else), is found in affirmation and negation.<sup>34</sup>

However, the opposition of affirmation and negation follows upon—and does not cause—distinction, since an existent is distinguished from another by something that inheres in it substantially or accidentally. Rather, that *this is not that*, follows from their being distinct.<sup>35</sup>

Thus, wherever there is some distinction, there is necessarily found an opposition of affirmation and negation; for those (beings) that do not differ according to any affirmation or negation are utterly indistinct, so that—in respect of everything—one (of them) would necessarily be that which the other is; and, in this way, they would be thoroughly the same and in no mode distinct.<sup>36</sup>

It is impossible to affirm and to negate something of the same (subject) insofar as it is the same.<sup>37</sup> Conversely, if affirmations and negations pertaining to that distinction should be distinguished in something, then they could be verified of the same (subject), since every distinction—whether of thing or of *ratio* (*sive rei sive rationis*)—is founded in affirmation and negation.

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<sup>33</sup> *De potentia*, q. 10 a. 5 co.: “Ut enim Philosophus docet, si quis in subdividendo utatur his quae sunt per accidens et non per se, non rectum divisionis ordinem sequitur; sicut si diceretur: animalium aliud est rationale aliud irrationale; irrationalium vero aliud album, aliud nigrum; non esset recta divisio, quia cum ex his quae sunt per accidens, non fiat unum simpliciter, ultima species, ex differentiis multis constituta, non esset unum simpliciter.”

<sup>34</sup> *De veritate*, q. 2 a. 15 co.: “Prima autem ratio distinctionis est in affirmatione et negatione.” *In Metaph.* 4, l. 9, §660: “Prima enim ratio distinctionis consideratur in affirmatione et negatione.” *In Sent.* 1, d. 24 q. 1 a. 3 co.: “prima autem ratio divisionis, secundum quam aliquid ab aliquo distinguitur, est in affirmatione et negatione.”

<sup>35</sup> *De potentia*, q. 10 a. 5 co.: “oppositio affirmationis et negationis [...] sequitur distinctionem, non autem distinctionem causat, cum existens ab altero distinguatur per aliquid sibi inhaerens substantialiter vel accidentaliter; quod autem hoc non sit hoc, sequitur ex hoc quod distincta sunt.”

<sup>36</sup> *ScG* 4, 14 n. 14: “Ubicumque enim est aliqua distinctio, oportet inveniri negationis et affirmationis oppositionem. Quae enim secundum nullam affirmationem et negationem differunt, penitus indistincta sunt: oportet enim quod quantum ad omnia unum esset quod et alterum, et sic essent penitus idem, et nullo modo distincta.”

<sup>37</sup> *In Sent.* 1, d. 34 q. 1 a. 1 ad 2: “de eodem, secundum quod idem est, impossibile est aliquid idem affirmare et negare; sed si in aliquo distinguantur affirmationes et negationes pertinentes ad illam distinctionem, de ipso verificari poterunt: quia omnis distinctio, sive rei sive rationis, fundatur in affirmatione et negatione.”

This is evident even in synonyms.<sup>38</sup> For example, *tunic* (*tunica*) and *vesture* (*vestis*) signify the same thing, but the names are diverse (► 38.11); and the same can be said of *garment* (*indumentum*). Whence, it would be impossible to verify affirmations and negations that pertain to the thing, for example, if we were to say, “the tunic is white, the garment is not white.” Yet, affirmations and negations that pertain to the names themselves could be verified if we were to say, “*garment* is neuter in gender, *vesture* is not neuter in gender.”

Likewise, it is evident that any truth of a negative (proposition) in existents (i.e., concerning existing things) is founded over a truth of an affirmative (proposition).<sup>39</sup> For example, the truth of the negative, “the Ethiopian is not white,” is founded over the truth of the affirmative, “the Ethiopian is black.” Thus, every difference that is by opposition of affirmation and negation must be reduced to a difference of some affirmative opposition.

#### 40.10. One and Many According to Something

Nothing prevents that which is divided in one mode to be undivided in another mode.<sup>40</sup> For example, what is divided in number is undivided in species. Hence, it is possible for something to be *one* in one mode, according to something (*secundum quid*), and *many* in another mode, according to something (else).

Thus, that which is one in subject can be many in *ratio*.<sup>41</sup> For example, white and musical are the same in subject but many in *ratio*, for the *ratio* of *musical* is other than the *ratio* of *white*. Whence, it is possible to conclude that *one* (in subject) is *many* (in *ratio*).

In another mode, too, that which is *one whole* and *in act* may happen to be *many* according to the division of the parts.<sup>42</sup> Whence, the whole is *one* in its totality, but has a multitude

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<sup>38</sup> *In Sent.* 1, d. 34 q. 1 a. 1 ad 2: “sicut patet etiam in synonymis; tunica enim et vestis eandem rem significant, tamen nomina sunt diversa; et similiter indumentum. Unde affirmationes et negationes quae pertinent ad rem, non possunt verificari, ut dicatur: tunica est alba, indumentum non est album; sed affirmationes et negationes quae pertinent ad ipsa nomina, possunt verificari, ut dicatur: indumentum est neutri generis, vestis non est neutri generis.” The Latin *vestis* and *tunica* are feminine, while *indumentum* is neuter.

<sup>39</sup> *De potentia*, q. 10 a. 5 co.: “Similiter etiam patet quod veritas cuiuslibet negativae in existentibus supra veritatem affirmativae fundatur: sicut veritas huius negativae Aethiops non est albus, fundatur supra veritatem huius affirmativae Aethiops est niger. Et ideo oportet omnem differentiam quae est per oppositionem affirmationis et negationis, reduci in differentiam alicuius affirmativae oppositionis.”

<sup>40</sup> *STh* I, q. 11 a. 1 ad 2: “nihil prohibet id quod est uno modo divisum, esse alio modo indivisum; sicut quod est divisum numero, est indivisum secundum speciem, et sic contingit aliquid esse uno modo unum, alio modo multa.” *STh* I-II, q. 17 a. 4 co.: “nihil prohibet aliqua esse secundum quid multa, et secundum quid unum.”

<sup>41</sup> *In Physic.* 1, l. 4, n. 3 (cf. ARISTOTLE, *Physica* A.2, 185b25–34): “id quod est unum uno modo, potest esse multa alio modo: sicut quod est unum subiecto, potest esse multa ratione, sicut album et musicum idem sunt subiecto sed ratione multa; alia enim est ratio musici et alia albi. Unde concludi potest quod unum sit multa.”

<sup>42</sup> *In Physic.* 1, l. 4, n. 3 (cf. ARISTOTLE, *Physica* A.2, 185b34–186a4): “Alio etiam modo contingit quod id quod est unum toto et actu, sit multa secundum partium divisionem: unde totum est unum in sua totalitate, sed habet partium multitudinem. [...] Unum enim in actu et multa in actu opponuntur; sed unum in actu

of parts. Indeed, *one in act* and *many in act* are opposites; but *one in act* and *many in potency* are not opposites. Therefore, as ARISTOTLE says, *one* is said in multiple (modes): to wit, *one in potency* and *one in act*; and, in this way, nothing prevents *one* from being *one in act* and *many in potency*, as is evident of whole and parts (►35.26).

Some (beings) can come into the same division (*in eadem divisionem venire*) insofar as they agree (*conveniunt*) in something common, whatever the common (thing) should be—whether it be a genus or an accident.<sup>43</sup>

Thus, nothing prevents something from being *one* insofar as it is in one genus and being *multiple* insofar as it is referred to another genus.<sup>44</sup> For example, a continuous surface is *one* insofar as it is considered in the genus of quantity; but if one part should be white and another black, it would be multiple insofar as it is referred to the genus of color.

#### 40.11. One Simply, Many According to Something

(A being) will be **simply one** (*unum simpliciter*) and **many according to something** (*multa secundum quid*) if it should be simply undivided (*indivisum simpliciter*) either:<sup>45</sup>

1. Because it is **undivided according to** that which pertains to the **essence** of the thing, even though it should be divided in respect of those that are outside the essence of the thing.<sup>46</sup>

For example, what is one in subject and many according to accidents (is *one simply*).<sup>47</sup>

Substance is *being simply*, while accident is *being according to something*—as *being of ratio* (is, too, *being according to something*; ►30.5).<sup>48</sup> And hence, whatever (beings) are *one* according to substance are *one* simply, and (are) many according to something.

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et multa in potentia non sunt opposita. Et propter hoc subdit quod unum dicitur multipliciter, scilicet unum in potentia et unum in actu: et sic idem nihil prohibet esse unum in actu et multa in potentia, sicut patet de toto et partibus.”

<sup>43</sup> *De veritate*, q. 16 a. 1 ad 1: “aliqua possunt in eadem divisionem venire secundum quod in aliquo communi conveniunt, quidquid sit illud commune, sive sit genus, sive sit accidens.”

<sup>44</sup> *STh* I-II, q. 20 a. 6 co.: “nihil prohibet aliquid esse unum, secundum quod est in uno genere; et esse multiplex, secundum quod refertur ad aliud genus. Sicut superficies continua est una, secundum quod consideratur in genere quantitatis, tamen est multiplex, secundum quod refertur ad genus coloris, si partim sit alba, et partim nigra.”

<sup>45</sup> *STh* I, q. 11 a. 1 ad 2: “Sed tamen si sit indivisum simpliciter [...], huiusmodi erit unum simpliciter, et multa secundum quid.”

<sup>46</sup> *STh* I, q. 11 a. 1 ad 2: “vel quia est indivisum secundum id quod pertinet ad essentiam rei, licet sit divisum quantum ad ea quae sunt extra essentiam rei.”

<sup>47</sup> *STh* I, q. 11 a. 1 ad 2: “vel quia est indivisum secundum id quod pertinet ad essentiam rei, licet sit divisum quantum ad ea quae sunt extra essentiam rei, sicut quod est unum subiecto et multa secundum accidentia.”

<sup>48</sup> *STh* I-II, q. 17 a. 4 co.: “Ens autem simpliciter est substantia, sed ens secundum quid est accidens, vel etiam ens rationis. Et ideo quaecumque sunt unum secundum substantiam, sunt unum simpliciter, et

For example, a whole in the genus of substance, composed from its parts, whether integral or essential (► 13.4), is one simply, for a whole (in this genus) is a being and a substance simply, while (its) parts are beings and substances in the whole.<sup>49</sup>

2. Because it is **undivided in act and divided in potency**.<sup>50</sup> For example, what is one in the whole and many according to the parts (is one simply).<sup>51</sup>

#### 40.12. One According to Something, Many Simply

If something should be, conversely (to what has just been said), undivided according to something and simply divided, it will be **many simply** and one according to something.<sup>52</sup>

Thus, if something is divided according to essence and undivided according to *ratio* or according to a principle or a cause, it will be many simply and one according to something, as those (beings) that are many in number and one in species, or one in principle.<sup>53</sup> Hence, those (beings) that are diverse according to substance and one according to accident are diverse simply and one according to something.

For example, many individuals that are one in genus or in species are simply many and one according to something, for to be one in genus or in species is to be one according to *ratio* (*secundum rationem*).<sup>54</sup> Likewise, many men are one people, and many stones are one heap, such that a heap is many simply (*simpliciter multa*) and (is) one according to something (*secundum quid unum*), which is a unity of composition or of order.

#### 40.13. Division of *Being* into *One* and *Many*

One and many (*unum et multa*) are accidents by themselves of *being* insofar as it is *being* (*per se accidentia entis, inquantum est ens*).<sup>55</sup>

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multa secundum quid." *De unione Verbi*, a. 3 co.: "Secundum substantiam autem dicitur aliquid unum et multa simpliciter sicut ens."

<sup>49</sup> *STh* I-II, q. 17 a. 4 co.: "Sicut totum in genere substantiae, compositum ex suis partibus vel integralibus vel essentialibus, est unum simpliciter, nam totum est ens et substantia simpliciter, partes vero sunt entia et substantiae in toto."

<sup>50</sup> *STh* I, q. 11 a. 1 ad 2: "vel quia est indivisum in actu, et divisum in potentia."

<sup>51</sup> *STh* I, q. 11 a. 1 ad 2: "sicut quod est unum toto et multa secundum partes."

<sup>52</sup> *STh* I, q. 11 a. 1 ad 2: "Si vero aliquid e converso sit indivisum secundum quid, et divisum simpliciter [...] erit multa simpliciter, et unum secundum quid."

<sup>53</sup> *STh* I, q. 11 a. 1 ad 2: "utpote quia est divisum secundum essentiam, et indivisum secundum rationem, vel secundum principium sive causam [...]; ut quae sunt multa numero et unum specie, vel unum principio." *STh* I-II, q. 17 a. 4 co.: "Quae vero sunt diversa secundum substantiam, et unum secundum accidens, sunt diversa simpliciter, et unum secundum quid."

<sup>54</sup> *STh* I-II, q. 17 a. 4 co.: "Similiter etiam multa individua, quae sunt unum genere vel specie, sunt simpliciter multa, et secundum quid unum, nam esse unum genere vel specie, est esse unum secundum rationem." *STh* I-II, q. 17 a. 4 co.: "sicut multi homines sunt unus populus, et multi lapides sunt unus acervus; quae est unitas compositionis, aut ordinis." *Q. d. de anima*, a. 11 co.: "acervus [...] est secundum quid unum et simpliciter multa."

<sup>55</sup> *ScG* 1, 50 n. 6: "Per se autem accidentia entis, inquantum est ens, sunt unum et multa."

Nonetheless, (as just noted), a difference must be considered in this: that some (beings) are simply many (*simpliciter multa*) and (are) one according to something (*secundum quid unum*), while some (others), conversely.<sup>56</sup> And in this (latter) mode, *one* is said as *being*.

Indeed, *being* (*ens*) is divided into *one* and *many* (*per unum et multa*): as (*quasi*) simply, into *one*; and (as) according to something, into *many*, for *multitude* itself would not be contained, too, under *being* if it should not be contained—in some mode—under *one* (i.e., given that *one* and *being* are convertible, if a multitude is a being, it is somehow one).<sup>57</sup>

Indeed, as (pseudo-)DIONYSIUS says, all things are *one* according to something, and there is no multitude that does not participate in one (►40.22).<sup>58</sup> Rather, those that are many in parts, are one in whole; those that are many in accidents, are one in subject; those that are many in number, are one in species; those that are many in species, are one in genus; and those that are many in processions (*multa processibus*), are one in principle.

#### 40.14. The Ratios of One and of Multitude Compared

Insofar as *one* and *many* divide *common being* (*ens commune*; ►30.2; 30.16), *unity* and *multitude* add something over the *being* of which *unity* or *multitude* is said, (but) only according to *ratio* (*secundum rationem*).<sup>59</sup> Whence, as common being is related to absolute and relative (beings), so, too, the *one* and the *many* that divide *common being*—and likewise, the distinction and indistinction that are added (to *common being*) according to *ratio*—(are related to absolute and relative beings).

While the *one* that is convertible with *being* certainly posits *being* (*ens*) itself, and adds over *being* nothing but the negation of *division*, the multitude that corresponds to it adds—over the things that are said (to be) *multiple*—that any *one* of them should *be one*, and that (any) *one* of them should *not be another*, in which the *ratio* of *distinction* consists.<sup>60</sup>

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<sup>56</sup> *STh* I-II, q. 17 a. 4 co.: “Est tamen differentia attendenda in hoc, quod quaedam sunt simpliciter multa, et secundum quid unum, quaedam vero e converso. Unum autem hoc modo dicitur sicut et ens.”

<sup>57</sup> *STh* I, q. 11 a. 1 ad 2: “Sic igitur ens dividitur per unum et multa, quasi per unum simpliciter, et multa secundum quid. Nam et ipsa multitudo non contineretur sub ente, nisi contineretur aliquo modo sub uno.”

<sup>58</sup> *STh* I-II, q. 17 a. 4 co.: “Quinimmo omnia multa sunt secundum aliquid unum, ut Dionysius dicit, ult. cap. de Div. Nom.” *STh* I, q. 11 a. 1 ad 2: “Dicit enim Dionysius, ult. cap. de Div. Nom. quod non est multitudo non participans uno, sed quae sunt multa partibus, sunt unum toto; et quae sunt multa accidentibus, sunt unum subiecto; et quae sunt multa numero, sunt unum specie; et quae sunt speciebus multa, sunt unum genere; et quae sunt multa processibus, sunt unum principio.”

<sup>59</sup> *In Sent.* 1, d. 24 q. 1 a. 4 co.: “unitas et multitudo, [...] secundum quod unum et multa dividunt ens commune [...], non addunt aliquid supra ens, de quo dicitur unitas vel multitudo, nisi secundum rationem. Unde sicut ens communiter se habet ad absoluta et relativa, et similiter distinctio et indistinctio, quae secundum rationem adduntur, ita et unum et multa quae dividunt ens commune.”

<sup>60</sup> *De potentia*, q. 9 a. 7 co.: “unum quod convertitur cum ente, ponit quidem ipsum ens, sed nihil superaddit nisi negationem divisionis. Multitudo autem ei correspondens addit supra res, quae dicuntur multae, quod unaquaeque earum sit una, et quod una earum non sit altera, in quo consistit ratio distinctionis.”

Hence, while *one* adds over *being* one negation insofar as something is undivided in itself, *multitude* adds two negations: namely, (1) insofar as something is *undivided in itself*; and (2) insofar as *it is divided from another*; which **to be divided** (*dividi*) is *for one of them not to be another*.<sup>61</sup>

However, multitude is caused from a being (*ex ente*), for the difference by which beings are divided one from another is itself some being.<sup>62</sup> Hence, in the *ratio* of *multitude* is included the negation of a thing, while in the *ratio* of *one* (is included) simultaneously the negation of a negation and (the negation) of a thing. This is evident as follows.

**One** is *that which is not divided*; and what is negated by the *one* that is convertible with *being* is *division*.<sup>63</sup> However, (this division) must be such that it (i.e., the *one* that is convertible with *being*) should be preserved (*salvetur*) in every division, which is a division by affirmation and negation. Hence, the negation of this division constitutes the *ratio* of *one*, for **one** is *what is not divided* by a division such that *this* and *not this* should be taken. In this way, *one*, insofar as it negates an affirmation and a negation, simultaneously is a negation of a thing (i.e., *not this*) and (a negation) of a negation (i.e., of the division itself).

On the other hand, the aforesaid division (i.e., a division such that *this* and *not this* should be taken, which division does not preserve the *one*) is included in the *ratio* of *multitude*.<sup>64</sup> And, in this way, the negation of a thing is included there, since **many** are *those that are divided in such a way that one of them is not another*.

Thus, there is a negation in (the *ratio* of) *multitude* insofar as one thing is distinguished from another by negation.<sup>65</sup> Whence, in (the *ratio* of) *multitude* there is a **real** negation or

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<sup>61</sup> *De potentia*, q. 9 a. 7 co.: “Et sic, cum unum addat supra ens unam negationem—secundum quod aliquid est indivisum in se—multitudo addit duas negationes, prout scilicet aliquid est in se indivisum, et prout est ab alio divisum. Quod quidem dividi est unum eorum non esse alterum.”

<sup>62</sup> *De potentia*, q. 3 a. 16 ad 3: “multitudo autem causatur ex ente. Ipsa enim differentia, per quam entia dividuntur ad invicem, quoddam ens est.” *Quodlibet* 10, q. 1 a. 1 ad 3: “in ratione multitudinis includitur negatio rei; sed in ratione unius negatio negationis et rei simul. Quod sic patet.”

<sup>63</sup> *Quodlibet* 10, q. 1 a. 1 ad 3: “Unum enim est quod non dividitur; divisio autem est quae negatur per unum quod convertitur cum ente. Oportet autem quod sit talis, quod in omni divisione salvetur. Haec autem est divisio per affirmationem et negationem. Et ideo huius divisionis negatio constituit rationem unius. Est enim unum quod non dividitur tali divisione quod sit accipere hoc, et non hoc. Et sic unum, in quantum negat affirmationem et negationem, simul est negatio rei, et negationis simul.”

<sup>64</sup> *Quodlibet* 10, q. 1 a. 1 ad 3: “Praedicta vero divisio includitur in ratione multitudinis, et sic includitur ibi negatio rei: quia multa sunt quae sic dividuntur, quod eorum unum non est alterum.” *In Sent.* 1, d. 24 q. 1 a. 3 co.: “multitudo dicit in ratione sua negationem, secundum scilicet quod multa sunt quorum unum non est alterum.”

<sup>65</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 1: “in multitudine negatio est, secundum quod una res distinguitur ab alia per negationem; unde in multitudine est negatio vel privatio realis, secundum quod una res non dicitur esse alia: et huiusmodi distinctionem per negationem negat negatio importata in ratione unitatis. Unde dico, quod negatio ista in qua perficitur ratio unitatis, non est nisi negatio rationis tantum. Omnis enim respectus qui est entis ad negationem vel ad non ens, non est nisi rationis. Unde relatio qua refertur ens ad non ens, non est nisi tantum in ratione: et similiter privatio, qua de ente negatur non ens, est in ratione tantum, ut privatio privationis, vel negatio negationis.”

privation (*negatio vel privatio realis*) insofar as one *thing* is said *not to be* another. And such a mode of distinction denies, by negation, the negation involved in the *ratio* of *unity*. Whence, this negation, in which the *ratio* of *unity* is perfected (*perficitur*), is but a negation of *ratio* only, for every respect that is of a being to a negation or to non-being is only of *ratio* (► 21.7). Whence, a relation by which a being is referred to non-being is but in *ratio* alone (i.e., not in the thing); and likewise, a privation by which non-being is negated of being, is in *ratio* alone, as (is) the privation of a privation or the negation of a negation.

#### 40.15. Formal and Material Division Simply vs. According to Something

Just as *the ratio of unity* consists in *non-division*, so, too, the *ratio of number* or of *multitude* consists in some *division* or *distinction*.<sup>66</sup> Whence, those (beings) that we find divided simply (*simpliciter*), we say that they are many simply; and those that we find divided according to something (*secundum quid*), we say that they are many insofar as something.

However, division *considered simply* is either according to essence or form, or according to quantity or matter (► 40.4).<sup>67</sup> Whence, we say (according to form) that those that differ according to essence are many, as *man* and *stone* (are many simply); and likewise, we say (according to quantity) that two parts of a line already divided are two lines (simply).<sup>68</sup>

On the other hand, division *according to something* is that (division) which is considered according to the properties of a thing.<sup>69</sup> For example, we say that a white man is other than and distinct from itself black. And even more *according to something* than this, in those (beings) in which a diversity of relations is considered according only to *ratio*: for example, a point, if it were said to be multiple insofar as it is the principle of multiple lines.

#### 40.16. Modes of Being Formally One or Many

Something has being (*esse*) and unity from the same (principle), for *one* (*unum*) follows upon *being* (*ens*; ► 30.9).<sup>70</sup> Hence, since each thing has (its act of) being (*esse*) from its form (► 9.5), it will also have its unity from (its) form.

<sup>66</sup> *In Sent.* 1, d. 24 q. 1 a. 2 co.: “sicut ratio unitatis consistit in indivisione, ita et ratio numeri vel multitudinis consistit in divisione vel distinctione aliqua. Unde ea quae invenimus divisa simpliciter, dicimus esse multa simpliciter; et quae invenimus divisa secundum quid, dicimus esse multa secundum quid.”

<sup>67</sup> *In Sent.* 1, d. 24 q. 1 a. 2 co.: “Divisio autem simpliciter attenditur vel secundum essentiam, sive formam; vel secundum quantitatem, seu materiam.”

<sup>68</sup> *In Sent.* 1, d. 24 q. 1 a. 2 co.: “unde ea quae differunt secundum essentiam, dicimus esse multa, ut hominem et lapidem; et similiter duas partes lineae jam divisae dicimus duas lineas.”

<sup>69</sup> *In Sent.* 1, d. 24 q. 1 a. 2 co.: “Divisio autem secundum quid est quae attenditur secundum proprietates rei; sicut dicimus hominem album esse alium et distinctum a se nigro, et adhuc magis secundum quid in illis in quibus attenditur diversitas relationum secundum rationem tantum; sicut punctus si diceretur multiplex, secundum quod est principium plurium linearum.”

<sup>70</sup> *ScG* 2, 58 n. 5: “Ab eodem aliquid habet esse et unitatem: unum enim consequitur ad ens. Cum igitur a forma unaquaeque res habeat esse, a forma etiam habebit unitatem.”



Since *one* is convertible with *being*, just as something (is said) to be accidental or to be substantial, so is it said to be *one* or *many* either according to an accidental form or according to a substantial (form).<sup>71</sup>

Something is said (to be) *one* or *many* simply (*simpliciter*) **according to substance**, just as (it is said to be a) *being* (► 40.10).<sup>72</sup> However, according to ARISTOTLE, *substance* is said in two modes (► 15.2; 15.5):<sup>73</sup>

**1. The suppositum**, which is not predicated of another.<sup>74</sup>

**2. The form or nature of the species**, which is predicated of the suppositum.<sup>75</sup>

In mere creatures, these (i.e., the suppositum and the form or nature of the species) are indeed not simultaneously one and many, for diverse supposita do not have one essence in number; nor, again, in mere creatures, is there found some one suppositum that has two natural substances.<sup>76</sup>

**According to accidental forms**, something—which is the subject of diverse accidental forms—is said (to be) *many* either successively or simultaneously.<sup>77</sup>

**1. Successively**, as Socrates sitting down is other than himself standing up; whence, Socrates, insofar as he is priorly standing and thereafter sitting, is multiple successively.<sup>78</sup>

**2. Simultaneously**, as Socrates is many insofar as he is white and musical.<sup>79</sup>

That *biped animal*, which is predicated of Socrates, should be one and not many happens because one of them is compared to the other as potency to act.<sup>80</sup>

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<sup>71</sup> *De unione Verbi*, a. 3 co.: “Quia vero unum convertitur cum ente, sicut est esse accidentale et esse substantiale, ita dicitur aliquid esse unum vel multa vel secundum formam accidentalem, vel secundum substantialem.”

<sup>72</sup> *De unione Verbi*, a. 3 co.: “Secundum substantiam autem dicitur aliquid unum et multa simpliciter sicut ens.”

<sup>73</sup> *De unione Verbi*, a. 3 co.: “Sed secundum Philosophum, in V Metaph., substantia secundum duos modos dicitur.”

<sup>74</sup> *De unione Verbi*, a. 3 co.: “suppositum, quod de alio non praedicatur.”

<sup>75</sup> *De unione Verbi*, a. 3 co.: “et forma, vel natura speciei, quae de supposito praedicatur.”

<sup>76</sup> *De unione Verbi*, a. 3 co.: “Et haec quidem in creaturis puris non sunt simul unum et multa. Non est enim una numero essentia diversorum suppositorum, nec iterum invenitur in creaturis puris aliquod unum suppositum habens duas naturales substantias.”

<sup>77</sup> *De unione Verbi*, a. 3 co.: “Secundum quidem formas accidentales dicitur aliquid multa quod est subiectum diversis formis accidentalibus vel successive vel simul.”

<sup>78</sup> *De unione Verbi*, a. 3 co.: “Successive quidem, sicut Socrates sedens est alter a se stante; unde Socrates, in quantum est prius stans et postea sedens, est multa successive.”

<sup>79</sup> *De unione Verbi*, a. 3 co.: “Simul autem, sicut Socrates in quantum est albus et musicus est multa.”

<sup>80</sup> *De unione Verbi*, a. 3 co.: “Quod enim animal bipes, quod praedicatur de Socrate, sit unum et non multa, ex hoc contingit, quia unum eorum comparatur ad alterum ut potentia ad actum.”

On the other hand, *white* and *musical* are not so related to each other (i.e., they are not related as potency and act, but accidentally; ►17.9).<sup>81</sup> Hence, Socrates, insofar as he is white and musical, is many not simply (*simpliciter*) but according to something (*secundum quid*), just as according to accidents, too, something is said (to be) *according to something* and not simply.<sup>82</sup>

#### 40.17. Modes of Being Naturally Many

That some (beings) should be said (to be) *one* in five modes (i.e., the five modes of being *one* naturally speaking; ►38.5) is evident through the opposite (of these same modes).<sup>83</sup> Thus, ARISTOTLE takes the modes of *many* from the modes of *one*, saying that (beings) are said (to be) *many* by opposition to *one* (< τὰ πολλὰ ἀντικειμένως λεχθήσεται τῷ ἑνί).

Indeed, (beings) are said (to be) *many* in as many modes as (something) is said (to be) *one*, because (in) how(ever) many (modes) one of the opposites is said, (in) as many (modes), too, (is) the rest (said):<sup>84</sup>

1. Some are said (to be) *many*, and are numbered as a plurality (*numerantur ut plura* < ἀριθμοῦμεν ὡς πλείω), because they are not continuous (< τὰ μὲν γὰρ τῷ μὴ συνεχῆ εἶναι; ἢ τὰ μὴ συνεχῆ), which is in opposition to the first mode of *one* (i.e., continuous according to nature; ►38.5, ¶1; 39.12).<sup>85</sup>

However, the continuum is many in some mode (namely, in potency; ►35.26), for every continuum is infinitely divisible; and thus, it contains in itself multiple parts.<sup>86</sup> Hence, whosoever posits a continuous being must also posit something—in some mode—

<sup>81</sup> *De unione Verbi*, a. 3 co.: “Album autem et musicum non sic se habent ad invicem.”

<sup>82</sup> *De unione Verbi*, a. 3 co.: “et ideo Socrates, in quantum est albus et musicus, est multa, non quidem simpliciter, sed secundum quid. Sicut et secundum accidentia dicitur aliquid esse secundum quid, et non simpliciter.”

<sup>83</sup> *In Metaph.* 5, l. 8, §869 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b9–11): “respectu omnium istorum modorum secundariorum, primo dicuntur unum illa quae sunt unum secundum suam substantiam, de quibus supra dictum est in quinque modis suprapositis. [...] Et quod adhuc ex his modis aliqua dicantur unum, patet per oppositum.” Ibid., §881 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1017a3–4): “Ex modis unius accipit [Philosophus] modos multorum; et dicit, quod multa dicuntur per oppositum ad unum.” Opposition is discussed in the next chapter.

<sup>84</sup> *In Metaph.* 5, l. 8, §881: “Et ideo quot modis dicitur unum, tot modis dicuntur multa; quia quoties dicitur unum oppositorum, toties dicitur et reliquum.” Cf. ARISTOTLE, *Topica* A.15, 106b13–15.

<sup>85</sup> *In Metaph.* 5, l. 8, §881 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1017a4): “Unde aliqua dicuntur multa propter hoc, quod non sunt continua. Quod est per oppositum ad primum modum unius.” Ibid., §869 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b9–10): “Aliqua enim sunt numero plura, vel numerantur ut plura, quia non sunt continua.” St Thomas reflects two renderings of ARISTOTLE’s text. He interprets the first one as *are many in number (sunt numero plura)*, following the *Traslatio Anonyma*, which has *numero solum plura*, presupposing ἀριθμῶ μόνως instead of ἀριθμοῦμεν ὡς, as per the critical apparatus. The second rendering, *numeramus ut plura*, follows MOERBEKE, who is reading a more accurate manuscript.

<sup>86</sup> *In Physic.* 1, l. 3, n. 3 (cf. ARISTOTLE, *Physica* A.2, 185b9–11): “continuum est quodammodo multa: omne enim continuum est in infinitum divisibile, et sic continet in se multas partes. Unde qui ponit ens continuum, necesse est quod ponat quodammodo multa. Et non solum propter multitudinem partium, sed etiam propter diversitatem quae videtur esse inter totum et partes.”

multiple: and not only because of the multitude of parts, but also because of the diversity that there seems to be between the whole and the parts (i.e., parts can be homogeneous, which is one in species, or heterogeneous, which is multiple in species; ► 39.19).

**2. & 3.** Others are said (to be) *many* on account of their having a matter divided according to species (< τὰ δὲ τῷ διαιρητῆν ἔχειν τὴν ὕλην κατὰ τὸ εἶδος; ἢ ὧν μὴ ἔν τὸ εἶδος), whether we understand (this) concerning first—that is, proximate—matter (< ἢ τὴν πρώτην) or last [matter] (< ἢ τὴν τελευταίαν), into which resolution is last made.<sup>87</sup> And if *matter* should be taken for the (real) genus that has a likeness to matter, then:

**2.** If it is the matter of nature, this mode of multitude is taken in opposition to the second mode of *one* (i.e., a *formally undifferentiated subject genus*; ► 38.5, ¶2; 38.9).

**3.** If it is the matter of *ratio*, this mode of multitude is taken in opposition to the second and third mode of *one* (i.e., a *formally differentiated subject genus*; ► 38.5, ¶3; 38.10).

**4.** Others are said (to be) *many* which have multiple *ratios* (*rationes plures*) that convey an essence (*quae habent rationes, quod quid est esse dicentes, plures* < τὰ δὲ τῷ τοὺς λόγους πλείους τοὺς τί ἦν εἶναι λέγοντας; ἢ ὧν ὁ λόγος μὴ εἷς).<sup>88</sup> And this is taken in opposition to the fourth mode (► 38.5, ¶4; 38.11).

Indeed, it is impossible for all (beings) to be one according to *ratio* (*secundum rationem*). Three absurdities would result from this: **(a)** Contraries would be one according to *ratio*: for example, *good* and *bad* (would be one). **(b)** The *ratio* of *good* and of *non-good* would be the same, since *bad* follows upon *non-good*. Likewise, it would follow that the *ratio* of *being* and of *non-being* would be the same. And thus, it would also follow that not only all beings should be one being, but also that they would be non-being, or nothing, for those (beings) that are one according to *ratio* are related in such a way that whatever is predicated of any (one of them, is) also (predicated) of the other. Hence, if *being* and

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<sup>87</sup> St. Thomas explains that, through the division of proximate matter, wine and oil are said (to be) *multiple* (*multa*, i.e., insofar as, following ancient science, the proximate matter of both wine and oil is considered to be water, the matter of all liquids; and this matter is divided by the differentiating forms of wine and oil). On the other hand, through the division of remote matter, wine and stone (are said to be multiple: that is, because water and air are made from the same, absolutely undifferentiated first matter, which is differentiated by the forms of the elements, i.e., water and earth). In *Metaph.* 5, l. 8, §882 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1017a4–6): “Alia dicuntur multa propter hoc quod materiam habent divisam secundum speciem, sive intelligamus de «materia prima,» idest proxima, aut de finali sive ultima, in quam ultimo fit resolutio. Per divisionem quippe proximae materiae dicuntur multa vinum et oleum: per divisionem vero materiae remotae, vinum et lapis. Et si materia accipiatur tam pro materia naturae quam pro materia rationis, scilicet pro genere quod habet similitudinem materiae, hic modus multitudinis sumitur per oppositum ad secundum et tertium modum unius.” Ibid., §869 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b10): “vel quia non habent speciem unam.”

<sup>88</sup> In *Metaph.* 5, l. 8, §883 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1017a6): “Alia vero dicuntur multa quae habent rationes, quod quid est esse dicentes, plures. Et hoc sumitur per oppositum ad quartum modum.” Ibid., §869 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b11): “vel quia non conveniunt in una ratione.”

*nothing* are one according to *ratio*, it follows, if all things are one being, that all are nothing. (c) Diverse genera, such as *quantity* and *quality*, would be the same according to *ratio*.<sup>89</sup>

5. That which is opposed to the fifth mode (i.e., the indivisible in understanding, such as the unit and the point; ▶38.5, ¶5; 38.13) has the *ratio* of *plurality* only according to something (*secundum quid*; ▶40.10; e.g., one point is divisible only insofar as we use it as two; ▶34.26) and in potency—for, on account of being divisible, something is multiple only in potency (▶40.11, ¶2).<sup>90</sup>

As already noted (▶35.13), it is impossible for all things to be one as the indivisible is one, since that which is indivisible cannot be a quantum, and every quantity is divisible.<sup>91</sup> Consequently, it cannot be qualified, if we understand this to be a quality that is founded over quantity. And if it is not a quantum, it can be neither finite nor infinite, for the indivisible terminus—for example, the point—is an end but not an ended (*est finis et non finitus*), while the finite and the infinite agree (*conveniunt*) in (the genus of) quantity.

#### 40.18. Modes of Being Logically Many

BOETHIUS proposes that alterity (i.e., distinction; ▶40.7) is the proper principle of plurality because plurality cannot be understood without it (*praeter eam*).<sup>92</sup> And he proves this through the following reason: Of all things that differ in genus, species or number (i.e., of things that are multiple because they are not *logically one*; ▶38.15), there is some alterity or difference (that is) the cause of the diversity. Now, all plural things, whether they be three or however many, are diverse either in genus, in species, or in number. Therefore, the principle of all plural (things) is some alterity.

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<sup>89</sup> *In Physic.* 1, l. 3, n. 5 (cf. ARISTOTLE, *Physica* A.2, 185b19–25): “non potest dici omnia esse unum secundum rationem: quia si hoc esset, sequerentur tria inconvenientia. Primum est quod contraria essent unum secundum rationem, scilicet quod eadem ratio esset boni et mali [...]. Secundum inconveniens est quod eadem esset ratio boni et non boni, quia ad malum sequitur non bonum; et sic sequeretur quod esset eadem ratio entis et non entis; et sic sequeretur etiam quod omnia entia non solum essent unum ens [...], sed etiam essent non ens vel nihil; quia quaecumque sunt unum secundum rationem, ita se habent quod de quocumque praedicatur unum, et aliud. Unde si ens et nihil sunt unum secundum rationem, sequitur, si omnia sunt unum ens, quod omnia sunt nihil. Tertium inconveniens est quod diversa genera, ut quantitas et qualitas, sint eadem secundum rationem.”

<sup>90</sup> *In Metaph.* 5, l. 8, §883: “Quod autem opponitur quinto modo, nondum habet rationem pluralitatis nisi secundum quid et in potentia. Non enim ex hoc quod aliquid est divisibile propter hoc est multa nisi in potentia.”

<sup>91</sup> *In Physic.* 1, l. 3, n. 4 (cf. ARISTOTLE, *Physica* A.3, 185b16), already discussed.

<sup>92</sup> *In De Trin.*, *expositio capituli primi*, 118–120: “proponit [Boethius] alteritatem esse proprium principium pluralitatis, quia praeter eam pluralitas intelligi non potest.” Cf. BOETHIUS, *De Trinitate*, in *The Theological Tractates* (Cambridge, Massachusetts: Harvard University Press, 1968), 6.13–15: “Principium enim pluralitatis alteritas est; praeter alteritatem enim nec pluralitas quid sit intellegi potest.” *In De Trin.*, *expositio capituli primi*, 125–132: “probat [Boethius] quod supposuerat, scilicet alteritatem esse proprium principium pluralitatis. Et est ratio sua talis: omnium rerum genere uel specie uel numero differentium est aliqua alteritas siue differentia causa diuersitatis; set omnes res plures, siue sint tres siue quotlibet, sunt diuerse uel genere uel specie uel numero; ergo omnium plurium principium est aliqua alteritas.” Cf. BOETHIUS, *De Trinitate*, 6.17–31.

Concerning this reasoning, BOETHIUS does three (things):<sup>93</sup>

1. He posits the minor (i.e., that plurality in either genus, species or number—whether of three or however many things—is evident).<sup>94</sup>
2. He posits the proof of the minor (premise), which is as follows: *diverse* (*diversum*) is said (in) as many (modes) as *same* (*idem*); and *same* is said in three modes: in genus, in species, and in number; therefore, also *diverse* (is said in as many modes).<sup>95</sup>

He supposes the former from what is said in ARISTOTLE's *Topics*: that (in) how(ever) many (modes) one of the opposites is said, (in) as many (modes), too, (is) the rest (said); and what is said in ARISTOTLE's *Metaphysics*: that *same* and *diverse* are opposites.<sup>96</sup>

He manifests the latter (i.e., that *same* [*idem* = ταυτόν] is said in three modes: in genus [*genere* = γένει], in species [*specie* = εἶδει], and in number [*numero* = ἀριθμῶ]) through examples (i.e., same in genus, as *man* is said to be the same as *horse* because they have the same genus, *animal*; in species, as Cato and Cicero, because the species is the same, *man*; in number, as Tully and Cicero, because it is one in number), which he supposes from ARISTOTLE's *Topics*.<sup>97</sup>

3. He proves the major (premise, i.e., that of all things that differ in genus, species or number, there is some alterity or difference that is the cause of the diversity) in respect to that which could be doubtful (► 40.19).<sup>98</sup>

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<sup>93</sup> *In De Trin., expositio capituli primi*, 133: “Circa hanc rationem tria facit.”

<sup>94</sup> *In De Trin., expositio capituli primi*, 133–134: “primo ponit minorem.” Cf. BOETHIUS, *De Trinitate*, 6.15–17: “Trium namque rerum uel quotlibet tum genere tum specie tum numero diuersitas constat.”

<sup>95</sup> *In De Trin., expositio capituli primi*, 133–138: “secundo [... ponit Boethius] probationem minoris. Que talis est: quotiens dicitur idem, totiens dicitur diuersum; set idem dicitur tribus modis: genere, specie, et numero; ergo et diuersum.” Cf. BOETHIUS, *De Trinitate*, 6.17–24: “quotiens enim idem dicitur, totiens diuersum etiam praedicatur. Idem uero dicitur tribus modis: aut genere ut idem homo quod equus, quia his idem genus ut animal; uel specie ut idem Cato quod Cicero, quia eadem species ut homo; uel numero ut Tullius et Cicero, quia unus est numero. Quare diuersum etiam uel genere uel specie uel numero dicitur.”

<sup>96</sup> *In De Trin., expositio capituli primi*, 138–142: “Primam supponit ex hoc quod dicitur in I Topicorum, quod quotiens dicitur unum oppositorum, totiens dicitur et reliquum, et ex hoc quod dicitur X Metaphisice, quod idem et diuersum sunt opposita.” Cf. ARISTOTLE, *Topica* A.15, 106b13–15: “Πάλιν ἐπὶ τοῦ κατ’ ἀντίφασιν ἀντικείμενου σκοπεῖν εἰ πλεοναχῶς λέγεται. εἰ γὰρ τοῦτο πλεοναχῶς λέγεται, καὶ τὸ τοῦτω ἀντικείμενον πλεοναχῶς ῥηθήσεται”; *Metaphysica* I.3, 1054b22–23: “ἕτερον καὶ ταῦτόν [...] ἀντίκειται.” Ibid. Δ.9, 1018a12–15: “διάφορα δὲ λέγεται ὅς’ ἕτερα ἔστι τὸ αὐτό τι ὄντα, μὴ μόνον ἀριθμῶ ἀλλ’ ἢ εἶδει ἢ γένει ἢ ἀναλογία. ἔτι ὧν ἕτερον τὸ γένος, καὶ τὰ ἐναντία, καὶ ὅσα ἔχει ἐν τῇ οὐσίᾳ τὴν ἑτερότητα.”

<sup>97</sup> *In De Trin., expositio capituli primi*, 142–143: “secundam manifestat per exempla, et supponit eam ex I Topicorum.” Cf. ARISTOTLE, *Topica* A.7, 103a7–14: “δόξειε δ’ ἂν τὸ ταῦτόν ὡς τύπω λαβεῖν τριχῆ διαιρεῖσθαι. ἀριθμῶ γὰρ ἢ εἶδει ἢ γένει τὸ ταῦτόν εἰθθαμεν προσαγορεύειν, ἀριθμῶ μὲν ὧν ὀνόματα πλείω τὸ δὲ πρᾶγμα ἓν, οἷον λῶπιον καὶ ἱμάτιον, εἶδει δὲ ὅσα πλείω ὄντα ἀδιάφορα κατὰ τὸ εἶδος ἔστι, καθάπερ ἄνθρωπος ἀνθρώπων καὶ ἵππος ἵππων· τὰ γὰρ τοιαῦτα τῷ εἶδει λέγεται ταῦτά, ὅσα ὑπὸ ταῦτό εἶδος. ὁμοίως δὲ καὶ γένει ταῦτά, ὅσα ὑπὸ ταῦτό γένος ἔστιν, οἷον ἵππος ἀνθρώπων.”

<sup>98</sup> *In De Trin., expositio capituli primi*, 144–145: “probat [Boethius] maiorem quantum ad id quod poterat esse dubium.”

Indeed, it is manifest, from the name itself, that the principle of diversity of those (beings) that are diverse in genus or in species should be some alterity. Thus, some (beings) are diverse in genus because they have another genus (*est eis genus alterum*, the name of which is diverse, e.g., *man* and *stone*); and (some are) diverse in species which are contained under another species (*sub altera specie continentur*, e.g., *man* and *ox*).<sup>99</sup>

On the other hand, in those (beings) that are said (to be) *diverse in number*, it is not manifest, from the name itself, that some alterity should be the principle of diversity and plurality.<sup>100</sup> Rather, it seems conversely, according to the name, that the plurality that is designated in number should be the principle of diversity, since some (beings) are said to be diverse in number according to name (e.g., *Cato* and *Cicero*), as (is the case in any diversity) in genus (e.g., *man* and *stone*) or in species (e.g., *man* and *ox*).

#### 40.19. The Cause of Diversity in Number

To verify the major (premise) of his syllogism (namely, *there is some alterity or difference that is the cause of the diversity of all things that differ in number*, in respect of which there could be some doubt), BOETHIUS shows that also some alterity or variety produces this difference whereby some (beings) are said to differ in number.<sup>101</sup>

He proves this through the following (reasoning): Diverse accidents (*altera accidentia*) are found in three men that agree (*conveniunt*) in genus and species, just as a diverse species (is found) in *man* and *ox*; and a diverse genus, in *man* and *stone*.<sup>102</sup> Whence, just as *man* and *ox* are distant in species, so two men are distant in accidents.

Someone could say (i.e., objecting) that a variety of accidents is not a cause of plurality according to number.<sup>103</sup> Indeed, that which is present or absent without the corruption of

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<sup>99</sup> *In De Trin., expositio capituli primi*, 146–151: “Quod enim diuersitatis illorum que sunt diuersa genere uel specie principium sit aliqua alteritas, manifestum est ex ipso nomine: ex hoc enim aliqua sunt diuersa genere, quod est eis genus alterum, et diuersa specie, quod sub altera specie continentur.”

<sup>100</sup> *In De Trin., expositio capituli primi*, 151–158: “Set in his que dicuntur diuersa esse numero, non est manifestum ex ipso nomine quod aliqua alteritas sit principium diuersitatis et pluralitatis, immo magis uidetur e conuerso secundum nomen, quod pluralitas que in numero designatur sit principium diuersitatis, cum ita dicantur aliqua esse diuersa numero secundum nomen sicut genere uel specie.”

<sup>101</sup> *In De Trin., expositio capituli primi*, 158–161: “Et ideo ad uerificandum maiorem sui sillogismi, ostendit [Boethius] quod hanc etiam differentiam qua aliqua dicuntur differre numero, facit aliqua alteritas siue uarietas.”

<sup>102</sup> *In De Trin., expositio capituli primi*, 162–167: “Quod probat per hoc quod in tribus hominibus qui conueniunt genere et specie inueniuntur altera accidentia, sicut in homine et boue altera species, et in homine et lapide genus alterum; unde sicut homo et bos distant specie, ita duo homines distant accidentibus.” Cf. BOETHIUS, *De Trinitate*, 6.24–26: “Sed numero differentiam accidentium uarietas facit. Nam tres homines neque genere neque specie sed suis accidentibus distant.”

<sup>103</sup> *In De Trin., expositio capituli primi*, 168–174: “posset aliquis dicere quod uarietas accidentium non est causa pluralitatis secundum numerum, quia remotis accidentibus, uel secundum rem, scilicet separabilibus, uel animo siue cogitatione, sicut inseparabilibus, adhuc remanent subiecta, cum accidens sit quod adest et abest preter subiecti corruptionem.”

the subject should be an accident; and (if) accidents (are) removed, the subjects still remain, whether separable (i.e., separable accidents, ► 15.20, if they should be removed) according to thing (*secundum rem*) or inseparable (i.e., inseparable accidents, ► 15.19, if they should be removed) in soul or thought (*animo sive cogitatione*).

Hence, BOETHIUS obviates this response saying that, although all accidents could be separated, at least in the soul, however, the diversity of some accident can in no mode be separated from diverse individuals even in the soul: namely, the diversity of place (which is an accident based on quantity, and ultimately on position; ► 33.6; 35.4).<sup>104</sup> For two bodies do not undergo (*non patiuntur*) the same place: neither according to the thing (*secundum rem*) nor according to the forming of the soul (*secundum animi fictionem*).

Whence, he concludes that, because of this, there are some men *plural in number*, who have *plural*—that is, *diverse*—*accidents*.<sup>105</sup>

#### 40.20. How Diversity of Accidents Produces Diversity in Number

A variety of accidents other than untermimated dimensions does not produce a diversity in number as a cause.<sup>106</sup> Yet, (variety of accidents other than untermimated dimensions) is said to produce (diversity in number) as a sign that demonstrates (it). Thus, it maximally produces a diversity of place insofar as it is a proximate sign.

Diversity according to number is caused from the division of mater existing under dimensions (► 35.10).<sup>107</sup> This matter, according as it exists under dimensions, prevents two bodies from being in the same place, insofar as the matters of the two bodies must be distinct according to site. And thus, it is evident that diversity according to number is caused from the same (principle) from which (is also caused) the necessity for a diversity

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<sup>104</sup> *In De Trin., expositio capituli primi*, 174–182: “ideo huic responsioni obuiat dicens quod quamuis omnia accidentia possint saltem animo separari, tamen alicuius accidentis diuersitas nullo modo potest nec etiam animo a diuersis indiuiduis separari, scilicet diuersitas loci: duo enim corpora non patiuntur eundem locum, nec secundum rem, nec secundum animi fictionem; quia hoc non intelligi nec ymaginari potest.” Cf. BOETHIUS, *De Trinitate*, 6.27–30: “nam uel si animo cuncta ab his accidentia separemus, tamen locus cunctis diuersus est quem unum fingere nullo modo possumus; duo enim corpora unum locum non obtinebunt, qui est accidens.”

<sup>105</sup> *In De Trin., expositio capituli primi*, 182–184: “Vnde concludit quod ex hoc sunt aliqui homines *plures numero*, quod sunt *accidentibus plures*, id est diuersi.” Cf. BOETHIUS, *De Trinitate*, 6.30–31: “Atque ideo sunt numero plures, quoniam accidentibus plures fiunt.”

<sup>106</sup> *In De Trin.*, q. 4 a. 4 ad s.c. 1, 97–102: “uarietas aliorum accidentium preter dimensiones interminatas non facit diuersitatem in numero sicut causa, set dicitur facere sicut signum demonstrans; et sic maxime diuersitas loci facit, in quantum est propinquius signum.”

<sup>107</sup> *In De Trin.*, q. 4 a. 4 co., 55–67: “diuersitas secundum numerum causatur ex diuisione materie sub dimensionibus existentis, ipsa etiam materia secundum quod sub dimensionibus existit prohibet duo corpora esse in eodem loco, in quantum oportet duorum corporum distinctas secundum situm esse materias; et sic patet quod ex eodem causatur diuersitas secundum numerum ex quo causatur necessitas diuersitatis locorum in diuersis corporibus. Et ideo ipsa diuersitas locorum in se considerata est signum diuersitatis secundum numerum, sicut et de aliis accidentibus preter dimensiones primas interminatas supra dictum est.”

of places in diverse bodies. Hence, the diversity of places itself—considered in itself—is a sign of diversity according to number, as (is the case), too, concerning accidents other than the first untermiated dimensions.

On the other hand, if diversity of place should be considered according to its cause, it is thus evident that diversity of place is the cause of diversity according to number.<sup>108</sup> And hence, BOETHIUS, who makes (of) the variety of accidents a diversity according to number, (when) all other (principles) are removed, inevitably constitutes (this) to be verified in the diversity of places.

#### 40.21. Participation in *One* According to Intention

As (pseudo-)DIONYSIUS says, *one*, considered according to its intention (*secundum suam intentionem consideratum*), non-withdrawingly (*inegressibiliter* = ἀνεκφοιτήτως) is the cause of everything, for diverse (beings) are caused from *one* in such a way that *one* does not withdraw from its unity.<sup>109</sup>

He manifests this through the following reason: That in which some (beings) participate is the cause of the participants, as whiteness is the cause of white (things); and all existents participate in one; therefore, one is the cause of all existents.<sup>110</sup>

He proves this—i.e., that all (beings) participate in one—through that (case) of which (the reasoning) seems less (compelling): namely, through number, which is in some mode opposed to *one* as the divided (is opposed) to the undivided. Indeed, every number participates in *one*, whether *number* should be taken according to itself, as it is signified when *two* (*binarius*) or *three* (*ternarius*) is said; or insofar as it denominates some part, as when we say, *half* (*dimidium*), *third* (*tertium*) or *tenth* (*decimum*).<sup>111</sup>

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<sup>108</sup> *In De Trin.*, q. 4 a. 4 co., 67–77: “set si diuersitas loci consideretur secundum suam causam, sic planum est quod diuersitas loci est causa diuersitatis secundum numerum. Et ideo Boetius, quod uarietas accidentium facit diuersitatem secundum numerum, omnibus aliis remotis, in locorum diuersitate hic ineuitabiliter uerificari constituit; quia scilicet nullum aliud accidentium que exterius apparent completa est ita propinquum ad causam diuersitatis secundum numerum sicut diuersitas locorum.”

<sup>109</sup> *In De div. nom.*, c. 13, l. 2: “*unum*, secundum suam intentionem consideratum, est omnium causa *inegressibiliter*: sic enim ex uno diversa causantur, quo tamen unum non egreditur a sua unitate.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.6–7: “Ἐν δέ, ὅτι πάντα ἐνιαίως ἐστὶ κατὰ μιᾶς ἐνότητος ὑπεροχὴν καὶ πάντων ἐστὶ τοῦ ἐνὸς ἀνεκφοιτήτως αἴτιον”; *ibid.*, 13: “Οὐδὲ γὰρ ἐστὶ πληθος ἀμέτοχόν πη τοῦ ἐνός.”

<sup>110</sup> *In De div. nom.*, c. 13, l. 2: “manifestat [Dionysius] propositum quinque rationibus, quarum prima talis est: id quo aliqua participant est causa participantium, sicut albedo est causa alborum; sed nihil est existentium quod non participet uno; ergo unum est causa omnium existentium.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.7–8: “Οὐδὲν γὰρ ἐστὶ τῶν ὄντων ἀμέτοχον τοῦ ἐνός.”

<sup>111</sup> *In De div. nom.*, c. 13, l. 2: “Quod autem omnia participant uno, probat per id de quo minus videtur, scilicet per numerum qui quodammodo opponitur uni, sicut divisum indiviso: omnis enim numerus participat uno sive numerus accipiatur secundum se, ut significatur cum dicitur binarius vel ternarius sive accipiatur numerus secundum quod denominat aliquam partem, ut cum dicimus dimidium vel tertium vel decimum.”



He proves this by showing that *one* is predicated of *number* in either mode.<sup>112</sup> For we say that two, three, and ten (is, each, something) *one*. And, again, we say that half, third, and tenth (is, each, something *one*). Therefore, just as number participates in *one*, so all wholes and all parts participate in one. And in this way, it follows that all existents have being by that which is one, as participants (have being) by that which is participated.

Someone could object that *one* is not the cause of all (beings), nor of multitude or number, because it is some part of multitude.<sup>113</sup> To this, he responds that the *one* that is the cause of all (beings) is not the *one* that is a part of many. Indeed, the latter *one* is partial and participated, while (the *one* that is the cause) is before every multitude—not only in the order of time and of nature, but also in the order of cause—, since it determines every participable *one* and every multitude by the mode whereby the participant is determined to a form by that (in) which it participates (► 26.3).

#### 40.22. Every Multitude Participates in One

As (pseudo-)DIONYSIUS says, there is no multitude that should not participate in *one*, since all multitudes (*multa*) are *one* according to something (*secundum aliquid*; ► 40.10), as:<sup>114</sup>

1. Those that are many according to parts are one according to whole (*ea quae sunt multa partibus sunt unum toto* = τὸ... πολλὰ τοῖς μέρεσιν ἐν τῷ ὅλῳ).<sup>115</sup>
2. Those that are many according to accidents are one according to subject (*ea quae sunt multa accidentibus sunt unum subiecto* = τὸ πολλὰ τοῖς συμβεβηκόσιν ἐν τῷ ὑποκειμένῳ), as the white and the musical.<sup>116</sup>
3. Those that are many according to number are one according to species (*ea quae sunt multa numero, sunt unum specie* < τὸ πολλὰ τῷ ἀριθμῷ ἢ ταῖς δυνάμεσιν ἐν τῷ εἶδει), as

<sup>112</sup> *In De div. nom.*, c. 13, l. 2: “Et hoc probat [Dionysius] per hoc quod unum, utroque modo, de numero praedicatur: dicimus enim binarium et ternarium vel denarium unum; et iterum dicimus *dimidium* vel *tertium* vel *decimum*. Sicut ergo numerus uno participat, ita *omnia* tota et *omnium* partes *uno* participant. Et sic sequitur quod *per id quod est unum, omnia existentia esse* habeant, sicut participantia per participatum.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.8–11.

<sup>113</sup> *In De div. nom.*, c. 13, l. 2: “posset enim aliquis obiicere quod *unum non est causa omnium*, neque multitudinis seu numeri, quia est pars quaedam multitudinis. Sed ipse [Dionysius] respondet quod *unum* quod est *omnium causa*, *non est illud unum* quod est pars *multorum*, quia illud unum est partiale et participatum, sed est ante omnem multitudinem, non solum ordine temporis et naturae, sed etiam ordine causae quia determinat *omne unum* participabile et omnem *multitudinem* per modum quo participans determinatur ad formam per id quod participat.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.11–12.

<sup>114</sup> *In De div. nom.*, c. 13, l. 2: “nulla enim *multitudo est* quae non participet uno, quia omnia multa sunt unum secundum aliquid: sicut [...]” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.13.

<sup>115</sup> *In De div. nom.*, c. 13, l. 2: “sicut *ea quae sunt multa partibus sunt unum toto*.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.13–14.

<sup>116</sup> *In De div. nom.*, c. 13, l. 2: “*et ea quae sunt multa accidentibus*, ut album et musicum *sunt unum subiecto*.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.14.

many individuals, such as Socrates and Plato, are one in the species of *man*.<sup>117</sup> He adds, “[or] according to virtues” (*virtutibus* < ταῖς δυνάμεσιν), for also in one individual of the same species there are many virtues that follow upon one and the same species.<sup>118</sup>

Or (pseudo-DIONYSIUS adds, *or according to virtues*) because there are diverse virtues in diverse individuals insofar as they are diversely disposed to the acts of the species, for not all men have the same power or virtue to understand.

4. Those that are many according to species are one according to genus (*illa quae sunt multa speciebus, sunt unum genere* = τὸ πολλὰ τοῖς εἶδεσιν ἐν τῷ γένει), as *man* and *dog* differ indeed in species, but agree (*conveniunt*) in the one genus of *animal*.<sup>119</sup>

5. And, ultimately, those that are many in procession agree in one principle (*ea quae sunt multa processibus, conveniunt in uno principio* < τὸ πολλὰ ταῖς προόδοις ἐν τῇ ἀρχῇ), as *to be*, *to live*, *to understand*, and such (other beings that proceed in some order) are diverse processions that proceed from one principle.<sup>120</sup>

In this way, it becomes manifest that all (beings), in whatsoever mode they should be many, agree (*conveniunt*) in something one.<sup>121</sup> For, among beings, there is nothing that does not participate—according to something (*secundum aliquid* < πῆ)—in the *one* itself, which certainly, **according to its ratio** (*secundum suam rationem*), is according to all [modes] (*secundum omnia* = κατὰ πάντα, i.e., in every way) singularly (*singulare* = ἐνικῶ): that is, undivided in itself.

Indeed, multiple individuals that are one in genus are many (if they are) divided according to species. Likewise, everything that is in something, is in it by the mode of that in which

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<sup>117</sup> *In De div. nom.*, c. 13, l. 2: “et ea quae sunt multa numero, sunt unum specie, sicut multa individua, ut Socrates et Plato, sunt unum in specie hominis.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.15.

<sup>118</sup> *In De div. nom.*, c. 13, l. 2: “addit autem [Dionysius] *virtutibus* quia et in uno individuo eiusdem speciei sunt multae virtutes, unam et eandem speciem consequentes sive quia in diversis individuis sunt diversae virtutes secundum quod diversimode disponuntur ad actus speciei: non enim est eadem potestas aut virtus omnium hominum ad intelligendum.”

<sup>119</sup> *In De div. nom.*, c. 13, l. 2: “et illa quae sunt multa speciebus, sunt unum genere, sicut homo et canis differunt quidem specie, conveniunt autem in uno genere animalis.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.15–16.

<sup>120</sup> *In De div. nom.*, c. 13, l. 2: “et ulterius ea quae sunt multa processibus, conveniunt in uno principio, sicut esse et vivere et intelligere et huiusmodi, sunt diversae processiones procedentes ab uno principio quod est Deus, ut ex praemissis patet.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.16: “τὸ πολλὰ ταῖς προόδοις ἐν τῇ ἀρχῇ.”

<sup>121</sup> *In De div. nom.*, c. 13, l. 2: “Et sic manifestum fit quod, cum omnia quocumque modo sint multa, conveniunt tamen in aliquo uno: *nihil enim est* in entibus, *quod non participet secundum aliquid*, ipso uno; *quod* quidem secundum suam rationem, *est secundum omnia singulare*, idest indivisum in se.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.16–18: “οὐδὲν ἔστι τῶν ὄντων, ὃ μὴ μετέχει πῆ τοῦ ἐνὸς τοῦ ἐν τῷ κατὰ πάντα ἐνικῶ.”

it is, as all effects are in (their) principle.<sup>122</sup> And all (things that are) participated operate towards that (in) which they participate as towards a principle (► 26).

Whence, it remains that *one*, insofar as it is singular (and) participated in all (beings), indivisibly comes—in itself as in one principle—to all existents and all wholes: for example, to all genera and opposites, as are the differences by which a whole genus is divided.<sup>123</sup>

Moreover, as (Pseudo-)DIONYSIUS says, that from which the consequence of being is not convertible, is naturally prior and a principle in some mode.<sup>124</sup> And *one* is of such a mode, for no multitude is found without *one*, but some *one* is found without any multitude (e.g., the unit is found in two, but no number is found in the unit).

Therefore, *one* is prior to every multitude and (is) its principle. A sign of this is apparent in numbers, for the unit is before every number (i.e., is its principle), regardless of how it should be multiplied.

#### 40.23. Procession of Many from One

A multitude proceeds from *one* in three modes:<sup>125</sup>

1. By **division** (*per divisionem*; ► 13.2), as one whole is divided into multiple parts.<sup>126</sup> This multitude takes away (*tollit*) the plenitude and union (*adunatio*; cf. ἔνωσις) that was in the whole.
2. By the mode of **community** (*per modum communitatis*; ► 27.2), as many species proceed (*proveniunt*) from one genus, and many individuals from one species.<sup>127</sup> This *one*, multiplied in this way, is not one singular but one common.

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<sup>122</sup> *In De div. nom.*, c. 13, l. 2: “Nam multa individua quae sunt unum genere, multa sunt divisa secundum speciem; et similiter, omne quod est in aliquo, est in eo per modum eius in quo est, ut omnes effectus sunt in principio. Omnia autem participata operantur ad id quod participant, sicut ad principium.”

<sup>123</sup> *In De div. nom.*, c. 13, l. 2: “Unde relinquitur quod unum, in quantum est singulare, in omnibus participatum, *singulariter* idest indivisibiliter *coacceptit* in se, sicut in principio uno, *omnia* existentia, et *tota omnia*, sicut universa genera *et opposita*, sicut sunt differentiae quibus dividitur totum genus.”

<sup>124</sup> *In De div. nom.*, c. 13, l. 2: “Deinde, cum dicit [Dionysius]: *et sine uno*... ponit secundam rationem [sc., per quam unum, secundum suam intentionem consideratum, sit omnium causa] quae talis est: illud a quo non convertitur consequentia essendi, est naturaliter prius et quodammodo principium. Sed unum est huiusmodi quia *sine uno non* invenitur aliqua *multitudo*, sed invenitur aliquod *unum* absque omni *multitudine*. Unum igitur est prius omni multitudine et principium eius. Cuius signum apparet in numeris, quia *unitas est ante omnem numerum*, qualitercumque multiplicetur.” Cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, XIII.2, 227.19–228.2: “Καὶ ἄνευ μὲν τοῦ ἐνὸς οὐκ ἔσται πλήθος, ἄνευ δὲ πλήθους ἔσται τὸ ἐν ὡς καὶ μόνος πρὸ παντὸς ἀριθμοῦ πεπληθυσμένον. Καὶ εἰ πᾶσι τὰ πάντα ἡνωμένα τις ὑπόθοιτο, τὰ πάντα ἔσται τῷ ὅλῳ ἓν.”

<sup>125</sup> *In De div. nom.*, c. 2, l. 6: “Considerandum est autem quod multitudo procedit ex uno tripliciter.”

<sup>126</sup> *In De div. nom.*, c. 2, l. 6: “uno quidem modo, per divisionem sicut unum totum dividitur in multas partes, sed talis multitudo tollit plenitudinem et adunationem quae erat in toto.”

<sup>127</sup> *In De div. nom.*, c. 2, l. 6: “Alio modo, per modum communitatis sicut ex uno genere proveniunt multae species et ex una specie multa individua, sed istud unum sic multiplicatum non est unum singulare, sed commune.”

3. According to us (*apud nos*), *one* is multiplied by **profusion** (*per effusionem*, by pouring forth), as many brooks proceed from one spring.<sup>128</sup> This comes to be with some going forth (*cum quadam egressione*): to wit, insofar as water, coming forth from a spring, pours itself forth (*se diffundit*) into many brooks.

#### 40.24. Degrees of Unity

As something is related to non-division, so is it related to unity, for, as ARISTOTLE says, a being is said (to be) *one* insofar as it is not divided.<sup>129</sup>

Hence, those (beings) that are undivided by themselves are more truly *one* than those that are undivided by accident, as white and Socrates, which are one by accident, (are *one* in a lesser degree than Socrates himself).<sup>130</sup>

Among those (beings) that are undivided by themselves, more truly *one* are those that are simply undivided than those that are undivided in respect of something (► 40.10), whether (in respect of) a genus, a species or a proportion.<sup>131</sup> Whence, (the latter) are not said (to be) *one* simply, but *one in genus, in species or in proportion*.

What is simply undivided is said (to be) **simply one**, which is *one in number*.<sup>132</sup> But in these, too, some degree is found. For there is something that, although it should be undivided in act, is nonetheless divisible in potency, whether by:

1. **Division of quantity**, as that which is *one* in continuity.<sup>133</sup>

2. **Essential division**, as in composites from matter and form; or (in essentially simple, subsistent forms, which are composites too, but composed) from being (*esse*) and that which is (*quod est*).<sup>134</sup>

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<sup>128</sup> *In De div. nom.*, c. 2, l. 6: "Tertio modo, multiplicatur apud nos aliquod unum per effusionem sicut ex uno fonte proveniunt multi rivuli, sed hoc fit cum quadam egressione, in quantum scilicet, aqua a fonte egrediens, se in multos rivulos diffundit."

<sup>129</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: "Secundum enim quod aliquid se habet ad indivisionem, ita se habet ad unitatem; quia, secundum Philosophum, ens dicitur unum in eo quod non dividitur."

<sup>130</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: "Et ideo illa quae sunt indivisa per se, verius sunt unum quam illa quae sunt indivisa per accidens, sicut albus et Socrates quae sunt unum per accidens."

<sup>131</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: "et inter illa quae sunt unum per se, verius sunt unum quae sunt indivisa simpliciter quam quae sunt indivisa respectu alicujus vel generis vel speciei vel proportionis. Unde etiam non dicuntur simpliciter unum, sed unum vel in genere vel in specie vel in proportione."

<sup>132</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: "et quod est simpliciter indivisum, dicitur simpliciter unum, quod est unum numero. Sed in istis etiam invenitur aliquis gradus. Aliquid enim est quod quamvis sit indivisum in actu, est tamen divisibile potentia, vel divisione quantitatis, vel divisione essentiali, vel secundum utrumque."

<sup>133</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: "Divisione quantitatis, sicut quod est unum continuitate."

<sup>134</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: "divisione essentiali, sicut in compositis ex forma et materia, vel ex esse et quod est."

### 3. Division according to both (i.e., quantity and essence), as in natural bodies.<sup>135</sup>

That some of them (i.e., some of those that are simply undivided) should not be divided in act occurs on account of something in them beyond (*praeter*) the nature of composition or division, as is evident in those bodies that are divisible in understanding even though they should not be divisible in act.<sup>136</sup>

Yet, there is something that is indivisible in act and in potency; and this is multiple.<sup>137</sup> For there is something that has in its *ratio* something apart from the *ratio* of *indivisibility*, as **the point**, which beyond *non-division* conveys (*importat*) *site*. And there is something that conveys nothing other; rather, it is its indivisibility itself, as **the unit** that is the principle of number; and yet, it inheres in something that is not unity itself—to wit, its subject (i.e., the substance, of which it is the first intrinsic measure).

Whence, evidently, that in which there is no composition of parts, no continuous dimensions, no variety of accidents, and inheres in nothing, maximally and truly is *one*, as BOETHIUS concludes.<sup>138</sup> Wherefrom, its unity is the principle of all unities, and the measure of everything; for that which is the maximum (in virtue) is the principle in whatever genus, and that which is most simple is the measure in whatever genus (►27).

#### 40.25. Union, United, Uniting

*One* is reduced to the genus of (dimensional, i.e., bulk) quantity as the principle of discrete quantity; and over it are founded (►37.8):<sup>139</sup>

1. **Identity** (*identitas*), insofar as it is *one* in (the genus of) substance.<sup>140</sup>

2. **Equality** (*aequalitas*), insofar as it is *one* in (the genus of) quantity.<sup>141</sup>

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<sup>135</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: “divisione secundum utrumque, sicut in naturalibus corporibus.”

<sup>136</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: “Et quod aliqua horum non dividantur in actu, est ex aliquo in eis praeter naturam compositionis vel divisionis, sicut patet in corpore caeli et huiusmodi; quae quamvis non sint divisibilia actu, sunt tamen divisibilia intellectu.”

<sup>137</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: “Aliquid vero est quod est indivisibile actu et potentia; et hoc multiplex est. Quoddam enim habet in sui ratione aliquid praeter rationem indivisibilitatis, ut punctum, quod praeter indivisionem importat situm: aliquid vero est quod nihil aliud importat, sed est ipsa sua indivisibilitas, ut unitas quae est principium numeri; et tamen inhaeret alicui quod non est ipsamet unitas, scilicet subjecto suo.”

<sup>138</sup> *In Sent.* 1, d. 24 q. 1 a. 1 co.: “Unde patet quod illud in quo nulla est compositio partium, nulla dimensionis continuitas, nulla accidentium varietas, nulli inhaerens, summe et vere unum est, ut concludit Boetius. Et inde est quod sua unitas est principium omnis unitatis et mensura omnis rei. Quia illud quod est maximum, est principium in quolibet genere, sicut maxime calidum omnis calidi, ut dicitur 2 Metaphysic., et illud quod est simplicissimum, est mensura in quolibet genere, ut 10 Metaphysic. dicitur.”

<sup>139</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “Unum autem reducitur ad genus quantitatis quasi principium quantitatis discretiae; et supra ipsam fundatur [...]”

<sup>140</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “identitas, secundum quod est unum in substantia.”

<sup>141</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “aequalitas, secundum quod est unum in quantitate.”

### 3. Likeness (*similitudo*), insofar as it is *one* in (the genus of) quality.<sup>142</sup>

**Union** (*unio*) is some relation.<sup>143</sup> Every relation, according to ARISTOTLE, is founded either over quantity—insofar as (something one) is reduced to the genus of quantity—or over action or affection (►37.1).

**United** (*unitum*) is *that which has been effected one from many (ex pluribus unum effectum est)*.<sup>144</sup> Thus, *united* and *one* differ. While *one* is said absolutely, *union* conveys some relation of many insofar as they agree (*conveniunt*) in one. And a posterior union presupposes a prior (union).

(The act of) **uniting** (*unitio*) is some action or affection by which *one* is—in some mode—effected (*efficitur*) from many (*ex multis*); and the relation that union is, follows upon this action (►37.9).<sup>145</sup>

Of these relations, some arise (*innascuntur*) from the motion of one or the other (of the two terms of the relation).<sup>146</sup> And then, the relations must really be in one and in the other of the extremities (►37.22). For example, paternity, and (other) such (relations are really something in both extremities).

Other (such relations) arise from the motion of one (extremity) without a mutation in (*sine immutatione*) the other.<sup>147</sup> This happens in those (relations) of which one (extremity) depends on the other, and not conversely (►37.22). For example, (in the relation of scientific) knowledge to the (scientifically) known. And in such (beings), the relation is in that which depends on the other according to the thing (*secundum rem*, i.e., really), while (the relation) is in the other (extremity) only according to ratio (*secundum rationem*). As ARISTOTLE says, some (things) are relative not because they themselves are referred (to others) but because others are referred to them.

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<sup>142</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “similitudo, secundum quod est unum in qualitate.”

<sup>143</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “unio relatio quaedam est. Omnis autem relatio, secundum Philosophum, fundatur vel supra quantitatem, secundum quod reducitur ad genus quantitatis, aut supra actionem vel passionem.”

<sup>144</sup> *In Sent.* 1, d. 31 q. 3 a. 1 ad 1: “differt unitum et unum; quia unitum est quod ex pluribus unum effectum est; unde unio importat relationem quamdam plurium secundum quod in uno conveniunt; sed unum absolute dicitur.” *In Sent.* 3, d. 18 q. 1 a. 4 qc. 4 co.: “posterior unio praesupponit priorem.”

<sup>145</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “Unitio autem est quaedam actio vel passio qua ex multis efficitur aliquo modo unum; et hanc actionem sequitur ista relatio quae est unio.”

<sup>146</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “Relationum autem tam harum quam illarum quaedam innascuntur ex motu utriusque: et tunc oportet quod illae relationes sint realiter in utroque extremorum, sicut paternitas, et hujusmodi.”

<sup>147</sup> *In Sent.* 3, d. 5 q. 1 a. 1 qc. 1 co.: “quaedam autem innascuntur ex motu unius sine immutatione alterius, quod accidit in his quorum unum dependet ad alterum, et non e converso, sicut scientia ad scitum; et in talibus relatio est secundum rem in eo quod dependet ad alterum, in altero vero est secundum rationem tantum. [...] dicit Philosophus quod aliqua sunt relativa, non quia ipsa referuntur, sed quia alia referuntur ad ipsa.”

## 41. The Parts of One and Many

*Here, we turn our attention to the parts of one and many.*

### 41.1. Division of One and Many

As already noted, *one* is analogically divided according to prior and posterior (*secundum prius et posterius*; ► 27.2, ¶2) into *simple* (► 38.13), which is prior (i.e., because it is *more one*), and *complex*, which is posterior (i.e., it is less *one* in intensity of unity; ► 40.24).<sup>1</sup>

On the other hand, as ARISTOTLE says, since *one* and *being* signify the same, and the species of (things that are) the same are (themselves) the same, it is necessary that the species of *being* (i.e., if *being* is understood *in common* as a divisible genus; ► 27.1, ¶2) be as many as the species of *one* and that they respond to each other.<sup>2</sup>

Thus, just as the parts of *being* are *substance*, *quantity*, *quality*, etc. (► 30.16; 33.1), so, too, **the parts of one** are *same*, *equal*, and *alike*, which follow upon *one*.<sup>3</sup> For **same** (*idem* = ταὐτό) is *one in substance*; **equal** (*aequale* = ἴσον), *one in quantity*; **alike** (*simile* = ὅμοιον), *one in quality* (as already noted; ► 21.16; 37.8; 37.18; 40.25); and, if names were posited (for them), other parts of *one* could be taken according to the other parts of *being*.

In turn, the **first parts of multitude** are their contraries: *diverse* (*diversum* = ἕτερον), *unequal* (*inaequale* = ἀνίσον), and *unlike* (*dissimile* = ἀνόμοιον).<sup>4</sup> These pertain to *plurality* because those are **diverse** (*diversa*) *whose substance is not one*; **unequal** (*inaequalia*), *which do not have one quantity*; and **unlike** (*dissimilia*), *which do not have one quality*.

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<sup>1</sup> *In Peri.* 1, l. 10, 179–183: “enunciationum quedam est una simpliciter, quedam coniunctione una, que quidem est diuisio analogi in ea de quibus predicatur secundum prius et posterius: sic enim unum diuiditur secundum prius in simplex et per posterius in compositum.”

<sup>2</sup> *In Metaph.* 4, l. 2, §561 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b33–34): “ex quo unum et ens idem significant, et eiusdem sunt species eadem, oportet quod tot sint species entis, quot sunt species unius, et sibiinvicem respondentem.”

<sup>3</sup> *In Metaph.* 4, l. 2, §561 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b35–36): “Sicut enim partes entis sunt substantia, quantitas et qualitas etc., ita et partes unius sunt idem, aequale et simile. Idem enim unum in substantia est. Aequale, unum in quantitate. Simile, unum in qualitate. Et secundum alias partes entis possent sumi aliae partes unius, si essent nomina posita.” *In Metaph.* 5, l. 11, §907: “Partes autem unius sunt idem, quod est unum in substantia: et simile, quod est unum in qualitate: et aequale, quod est unum in quantitate.” *In Metaph.* 10, l. 4, §1999 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a29–31): “sicut superius in quinto dictum est, ubi divisit [Philosophus] sive distinxit quot modis dicantur contraria, ad unum consequitur idem et simile et aequale. Nam idem est unum in substantia, simile unum in qualitate, aequale vero unum in quantitate.”

<sup>4</sup> *In Metaph.* 5, l. 11, §907: “Partes autem unius sunt [...]. Et e contrario partes multitudinis sunt diversum, dissimile et inaequale.” *In Metaph.* 10, l. 4, §2000 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a31–32): “Ad pluralitatem vero pertinent contraria horum, scilicet diversum et dissimile et inaequale. Nam diversa sunt quorum non est substantia una, et dissimilia quae non habent qualitatem unam, et inaequalia quae non habent unam quantitatem.” *In Metaph.* 10, l. 4, §2013 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b13–15): “Prosequitur [Philosophus] de illis quae consequuntur ad pluralitatem. Et primo de dissimili et de diverso. [...] Dicit ergo primo, quod quia idem et diversum opponuntur, et simile et dissimile: idem autem et simile multipliciter dicuntur; manifestum est quod diversum et dissimile multipliciter dicuntur, quia scilicet quando unum oppositorum dicitur multipliciter, et reliquum, ut dicitur in primo Topicorum.”

Speaking of those that follow upon plurality, ARISTOTLE says that, since *same* and *diverse*—and *alike* and *unlike*—are opposed, and *same* and *alike* are said in multiple (modes), it is manifest that *diverse* and *unlike* should be said in multiple (modes): to wit, because when one of (two) opposites is said in multiple (modes), so is the rest (►40.18).

The **secondary parts of plurality** are the **opposites** (discussed in the next chapter; ►42), contained under *diverse* and *different* (►41.29), which are (among the) first parts.<sup>5</sup> However, all contraries are necessarily reduced to *one* as to a principle because, in all contraries, one of them should have an included privation; and hence, there must come to be a reduction to a first privative—among which is, above all, *one* (i.e., because its *ratio* consists in the privation of division or distinction); and, again, *multitude*, which is caused from *one*, is the cause of the diversity of difference and (consequently) of contrariety.

ARISTOTLE determines (the truth) concerning those that are caused from *one* and *many*.<sup>6</sup> First, he posits those that follow upon *one* and *many*, distinguishing the modes in which the aforesaid are said: first, those that follow upon *one* (i.e., *same*, *equal*, and *alike*); then, those that follow upon many (i.e., *diverse*, *unequal*, and *unlike*).

#### 41.2. Naturally the Same by Itself

ARISTOTLE posits the modes of *same* by itself, saying that some (beings) are said (to be) **the same** (*eadem*, *idem* = ταῦτά) by themselves (*secundum se* = καθ' αὐτά) in as many modes as (they are said to be naturally) *one* by themselves (i.e., which is opposed to *one* by accident; ►38.17; and to *same* by accident; ►41.6).<sup>7</sup>

Thus, all the modes in which some (beings) are said (to be naturally) *one* by themselves are reduced to two:

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<sup>5</sup> In *Metaph.* 5, l. 11, §907: “Prima [pars, sc., in qua Philosophus distinguit nomina quae significant partes unius] dividitur in duas. In prima [sc., *Metaphysica* Δ.9, 1017b27–1018a19] distinguit nomina, quae significant primas partes unius et eius oppositi, scilicet multitudinis. In secunda distinguit nomina, quae significant quasdam secundarias partes [sc., *Metaphysica* Δ.10, 1018a20–b8].” Ibid., l. 12, §922: “distinguit [Philosophus] secundarias partes pluralitatis, quae scilicet continentur sub differenti et diverso, quae sunt partes primae.” In *Metaph.* 4, l. 2, §561 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b36–1004a1): “Et ad hoc «principium,» scilicet unum, reducuntur omnia contraria «fere.»” As St. Thomas explains, ARISTOTLE adds “roughly speaking” (*fere* = σχεδόν) because it is not manifest in some (of the categories). However, this necessarily is (the case). Ibid., §562: “Et hoc addit, quia in quibusdam non est ita manifestum. Et tamen hoc esse necesse est; quia cum in omnibus contrariis alterum habeat privationem inclusam, oportet fieri reductionem ad privativa prima, inter quae praecipue est unum. Et iterum multitudo, quae ex uno causatur, causa est diversitatis differentiae et contrarietatis.”

<sup>6</sup> In *Metaph.* 10, l. 4, §1999 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a29–31): “*Determinat* [Philosophus] de his quae causantur ex uno et multo; et circa hoc duo facit. Primo *ponit ea quae consequuntur unum et multa* [...]” Ibid., §2001 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a32–1055a3): “*Ostendit* [Philosophus] *quot modis dicantur praedicta*; et circa hoc duo facit. Primo *distinguit modos eorum, quae consequuntur ad unum*. Secundo distinguit modos eorum quae consequuntur pluralitatem.”

<sup>7</sup> In *Metaph.* 5, l. 11, §911 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a5–7): “*Ponit* [Philosophus] *modos eiusdem per se*; et dicit, quod aliqua dicuntur eadem secundum se eisdem modis, quibus dicitur unum per se. Omnes enim modi, quibus aliqua unum per se dicuntur, reducuntur ad duos. [...] Unde et his modis dicuntur aliqua esse idem.”



1. Insofar as those are said (to be naturally) **one** whose matter is one (*quorum materia est una* = ὧν ἡ ὕλη μία), whether we take (their) matter (to be) **the same (a) according to species** (*secundum speciem* = ἡ εἶδος) or **(b) according to number** (*secundum numerum* = ἡ ἀριθμῶ).<sup>8</sup> To which pertains the second and the third mode of (being naturally) *one* (i.e., *one in formally undifferentiated subject genus*; ► 38.5, ¶2; 38.9; and *in differentiated subject genus*; ► 38.5, ¶3; 38.10).

2. (Insofar as those) are said (to be naturally) **one** whose substance is one (*quorum substantia est una* = ὧν ἡ οὐσία μία; ► 41.4): either **(a) by reason of continuity** (*ratione continuitatis*), which pertains to the first mode (of being naturally *one*; i.e., *one in continuity*; ► 38.5, ¶1; 39.13); or **(b) due to unity or (c) indivisibility of ratio**, which pertains to the fourth (mode, i.e., *one in definition*; ► 38.5, ¶4; 38.11) and to the fifth (mode, i.e., *one in indivisible understanding*; ► 38.5, ¶5; 38.13).<sup>9</sup>

### 41.3. Identity

ARISTOTLE further concludes from this (i.e., from the modes in which beings are said to be naturally the same by themselves; ► 41.2) that **identity** (*identitas* = ἡ ταυτότης) is a *unity* (*unitas vel unio* < ἐνότης τις), either:<sup>10</sup>

1. Because those that are said (to be) **the same** are **many** (< ἡ πλειόνων τοῦ εἶναι) **according to being** (*secundum esse*), and yet they are said (to be) **the same** insofar as they agree (*conveniunt*) in something *one*.<sup>11</sup>

2. Because they are **one according to being**, but the intellect uses (the one) as many (< ἡ ὅταν χρῆται ὡς πλείοσιν) in order to understand a relation.<sup>12</sup> For a relation can only be understood (to exist) between two extremities, as when something is said to be **the same as itself** (*sicut cum dicitur aliquid esse idem sibiipsi* < οἶον ὅταν λέγη αὐτὸ αὐτῷ ταυτόν); for then the intellect uses as two (< ὡς δύοσι γὰρ χρῆται αὐτῷ) that which is one

<sup>8</sup> *In Metaph.* 5, l. 11, §911 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a6): “quorum unus est secundum quod dicuntur unum illa, quorum materia est una; sive accipiamus materiam eamdem secundum speciem, sive secundum numerum; ad quod pertinet secundus et tertius modus unius.”

<sup>9</sup> *In Metaph.* 5, l. 11, §911 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a7): “Alio modo dicuntur unum, quorum substantia est una: vel ratione continuitatis, quod pertinet ad primum modum: vel propter unitatem et indivisibilitatem rationis, quod pertinet ad quartum et quintum.”

<sup>10</sup> *In Metaph.* 5, l. 11, §911 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a7): “Ex hoc autem ulterius concludit [Philosophus], quod identitas est unitas vel unio.” The *Traslatio Anonyma* has *unio*, while MOERBEKE renders ἐνότης more adequately as *unitas*.

<sup>11</sup> *In Metaph.* 5, l. 11, §911 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a8): “aut ex eo quod illa quae dicuntur idem, sunt plura secundum esse, et tamen dicuntur idem in quantum in aliquo uno conveniunt.”

<sup>12</sup> *In Metaph.* 5, l. 11, §911 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a8–9): “Aut quia sunt unum secundum esse, sed intellectus utitur eo ut pluribus ad hoc quod relationem intelligat. Nam non potest intelligi relatio nisi inter duo extrema. Sicut cum dicitur aliquid esse idem sibiipsi. Tunc enim intellectus utitur eo quod est unum secundum rem, ut duobus. Alias eiusdem ad seipsum relationem designare non posset.”

according to the thing (*secundum rem*)—otherwise, it would not be able to designate a relation to itself.

Whence, it is evident that, if a relation always requires two extremities; and in such relations, there are not two extremities according to the thing (*secundum rem*) but only according to understanding (*secundum intellectum*); hence, the relation of identity will not be a real relation (*relatio realis*) but only (a relation) of *ratio* (*rationis*; ► 21.7; 37.21), insofar as something is said (to be) *the same* simply (*simpliciter*).<sup>13</sup>

However, it is otherwise when some two (beings) are said to be the same either in genus or in species.<sup>14</sup> For, if the relation of identity should be some-thing (*res aliqua*) other than (*praeter*) that which is said (to be) *the same*, since the thing (*res*) that the relation is, too, should be the same as itself, for the same reason, it would have another relation that would be the same as itself, and so on infinitely. And it is not possible to proceed infinitely in things. On the other hand, in these (relations) that are according to understanding, nothing prevents (such an infinite process), for, when the intellect is reflected over its (own) act, it understands that it understands (*intelligit se intelligere*); and it can also understand this; and so on, infinitely.

#### 41.4. Same According to Substance

*Substance* is said in two (modes): to wit, the suppositum itself, and the nature or species (► 15.2). And, since **same** is *one in substance*, *same* is, therefore, said in three (modes): either according to the suppositum alone (► ¶1, below), as *this white* (or) *this musical*, if Socrates should be white or musical; or only due to the nature of the suppositum or (its) *ratio* or species (► ¶3), as Socrates and Plato are the same in humanity; or according to one and the other (► ¶2), as Socrates is the same (as) Socrates.<sup>15</sup> Hence, assigning these three modes, ARISTOTLE says that *same* (*idem* = ταὐτό) is said in multiple (modes):

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<sup>13</sup> *In Metaph.* 5, l. 11, §911: “Unde patet, quod si relatio semper requirit duo extrema, et in huiusmodi relationibus non sunt duo extrema secundum rem sed secundum intellectum solum, relatio identitatis non erit relatio realis, sed rationis tantum, secundum quod aliquid dicitur idem simpliciter.”

<sup>14</sup> *In Metaph.* 5, l. 11, §911: “Secus autem est, quando aliqua duo dicuntur esse idem vel genere vel specie. Si enim identitatis relatio esset res aliqua praeter illud quod dicitur idem, res etiam, quae relatio est, cum sit idem sibi, pari ratione haberet aliam relationem, quae sibi esset idem, et sic in infinitum. Non est autem possibile in rebus in infinitum procedere. Sed in his quae sunt secundum intellectum nihil prohibet. Nam cum intellectus reflectatur super suum actum, intelligit se intelligere. Et hoc ipsum potest etiam intelligere, et sic in infinitum.”

<sup>15</sup> *In Metaph.* 10, l. 4, §2001: “ostendit [Philosophus] quot modis dicitur idem.” Ibid., §2002 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a32–b3): “Ponit ergo tres modos quibus dicitur idem. Cum enim idem sit unum in substantia, substantia autem dupliciter dicatur, scilicet ipsum suppositum, et natura sive species, tripliciter dicitur idem. Vel secundum suppositum solum, ut hoc album, hoc musicum, si Socrates sit albus vel musicus; vel solum per naturam suppositi sive rationem vel speciem eius, sicut Socrates et Plato sunt idem humanitate; vel secundum utrumque, sicut Socrates est idem Socrati.” Ibid., §2003 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a32–33): “Hos igitur tres modos Philosophus assignans dicit, quod cum idem multipliciter dicatur [...]”

1. **According to number** (*secundum numerum* = κατ' ἀριθμόν), which we sometimes call **itself** (*ipsum* = αὐτό), as if we say, "Socrates is a man, and is himself [*ipsum*] white."<sup>16</sup> Since the pronoun *itself* (*ipsum*) is relative, and the relative refers the same suppositum, wherever *itself* is posited it designates that it should be the same suppositum in number.

2. If it should be **one simultaneously in ratio and in number** (*simul ratione et numero* = καὶ λόγῳ καὶ ἀριθμῶ), and not only by the unity of the suppositum.<sup>17</sup> For example, not as *this* (*piece of*) *wood* and *this white*, but as *you* (and) *yourself* are the same *both in species and in matter*, such that *matter* should be referred to the suppositum that is the principle of individuation, and *species* should be taken for the nature of the suppositum.

3. When **the ratio** of the first substance (*ratio primae substantiae* = ὁ λόγος ὁ τῆς πρώτης οὐσίας)—that is, the suppositum—is *one*, even if the suppositum should not be one.<sup>18</sup> And this is *the same in species* or (*the same*) *in genus*, but not in number.

ARISTOTLE posits an example (of this third mode) in quantities, according to the opinion (of mathematicians): that multiple straight lines are like multiple supposita in the genus of substance; and (that) the measure of a line is like its species.<sup>19</sup>

Whence, many equal straight lines are *one*, according to this (mathematical) position, just like diverse supposita that communicate in one *ratio* of species are one.<sup>20</sup> And since mathematicians use lines in abstraction, to them (*apud eos*; i.e., among mathematicians), multiple equal straight lines are taken as one. Likewise, multiple tetragons—that is, figures of four angles—that are equal in quantity and of equal angles, are taken as (being) the same—and *equality* in them is as *unity* according to the *ratio* of the species.

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<sup>16</sup> *In Metaph.* 10, l. 4, §2003 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a33–34): "uno modo dicitur idem secundum numerum, quod aliquando dicimus ipsum, sicut si dicamus, Socrates est homo, et ipsum est album. Cum enim hoc pronomen, ipsum, sit relativum, relativum autem idem suppositum referat, ubicumque ponitur hoc quod dico ipsum, designat quod sit idem suppositum numero."

<sup>17</sup> *In Metaph.* 10, l. 4, §2004 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a34–35): "Alio modo dicitur idem si fuerit unum, non solum unitate suppositi, ut hoc lignum et hoc album, sed simul ratione et numero, ut tu tibiipsi es idem et specie et materia; ut materia referatur ad suppositum quae est individuationis principium, et species pro natura suppositi accipiatur."

<sup>18</sup> *In Metaph.* 10, l. 4, §2005 (cf. ARISTOTLE, *Metaphysica* I.3, 1054a35–b1): "Tertio modo dicitur idem quando «ratio primae substantiae,» idest suppositi est una, licet suppositum non sit unum. Et hoc est idem specie vel genere, sed non numero."

<sup>19</sup> *In Metaph.* 10, l. 4, §2005 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b1–3): "Ponit [Philosophus] autem exemplum in quantitibus, secundum opinionem eorum, qui ponebant quantitates esse substantias rerum: secundum quam quidem opinionem plures lineae rectae, sunt sicut plura supposita in genere substantiae: mensura autem lineae est sicut species eius."

<sup>20</sup> *In Metaph.* 10, l. 4, §2005 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b1–3): "Unde multae lineae rectae aequales, sunt unum secundum hanc positionem, sicut diversa supposita sunt unum quae communicant in una ratione speciei. Et quia mathematici utuntur lineis in abstractione, apud eos plures lineae aequales rectae accipiuntur ut una. Et similiter plura «tetragona,» scilicet figurae quatuor angulorum quae sunt aequalia quantitate, et sunt «isagona,» idest aequalium angulorum, accipiuntur ut idem. Et aequalitas in eis est quasi unitas secundum rationem speciei."

#### 41.5. Logically the Same

Speaking of intrinsic principles—namely, matter and form—, according to an agreement or difference of those-that-proceed-from-the-principle (*principiatorum*), (there) is also an agreement or difference of the principles (► 38.15), for:<sup>21</sup>

1. Some (i.e., of those-that-proceed-from-the-principle) are the same in number.<sup>22</sup> For example, Sortes and *this man*, (when) Sortes is indicated.
2. Some are diverse in number and are the same in species.<sup>23</sup> For example, Sortes and Plato, who, despite agreeing in the human species, they nonetheless differ in number.
3. Some differ in species but are the same in genus.<sup>24</sup> For example, *man* and *ass* agree in the genus of *animal*.
4. Some are diverse in genus but are the same only according to analogy.<sup>25</sup> For example, *substance* and *quality*, which do not agree in some genus, but agree only according to analogy, for they agree only in *being*, and *being* is not a genus because it is not predicated univocally but analogically.

#### 41.6. Same by Accident

As ARISTOTLE says, some (beings) are said (to be) **the same** (*eadem* = ταύτά) by accident (*per accidens* = κατὰ συμβεβηκός) in three modes (► 17.9):<sup>26</sup>

1. As two accidents.<sup>27</sup> For example, the white and the musical are said to be the same (< τὸ λευκὸν καὶ τὸ μουσικὸν τὸ αὐτὸ [λέγεται]) because they happen to the same subject (*accidunt eidem <subiecto>* < ὅτι τῷ αὐτῷ συμβέβηκε).
2. When the predicate is said (to be) the same as the subject insofar as (the predicate) is predicated of it. For example, when one says, “the man is musical [i.e., is a musician]”

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<sup>21</sup> *De prin. nat.* §6, 1–5: “loquendo de principiis intrinsecis, scilicet materia et forma, secundum conuenientiam principiatorum et differentiam est conuenientia et differentia principiorum.”

<sup>22</sup> *De prin. nat.* §6, 5–6: “Quedam enim sunt idem numero, sicut Sortes et ‘hic homo’ demonstrato Sorte.”

<sup>23</sup> *De prin. nat.* §6, 6–9: “quedam sunt diuersa numero et sunt idem in specie, ut Sortes et Plato, qui licet conueniant in specie humana, tamen differunt numero.”

<sup>24</sup> *De prin. nat.* §6, 9–11: “Quedam autem differunt specie sed sunt idem genere, sicut homo et asinus conueniunt in genere animalis.”

<sup>25</sup> *De prin. nat.* §6, 11–18: “quedam autem sunt diuersa in genere sed sunt idem solum secundum analogiam, sicut substantia et quantitas, que non conueniunt in aliquo genere sed conueniunt solum secundum analogiam: conueniunt enim in eo solum quod est ens, ens autem non est genus, quia non predicatur uniuoce sed analogice.”

<sup>26</sup> *In Metaph.* 5, l. 11, §908 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b27–1018a5): “Dicit ergo [Philosophus] quod aliqua dicuntur eadem per accidens tribus modis.”

<sup>27</sup> *In Metaph.* 5, l. 11, §908 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b27–28): “Uno modo sicut duo accidentia; ut album et musicum dicuntur idem, quia accidunt eidem subiecto.”

(< ἄνθρωπος καὶ μουσικὸν [τὸ αὐτὸ λέγεται]), which (i.e., man and musical) are said to be the same because musical happens to man—that is, the predicate (happens) to the subject (< ὅτι θάτερον θατέρω συμβέβηκεν).<sup>28</sup>

3. When the subject is said to be the same as the accident as though predicated of it.<sup>29</sup> For example, when one says, “the musical [i.e., the musician] is a man” (< τὸ... μουσικὸν [καὶ] ἄνθρωπος [τὸ αὐτὸ λέγεται]), one signifies that a man should be the same as the musical (< ὅτι τῷ ἀνθρώπῳ συμβέβηκεν).

Indeed, that which is predicated of something is signified to be *the same* as it.<sup>30</sup> And this *ratio of identity* is that *the subject happens to the predicate (subiectum accidit praedicato)*.

Besides these modes of *same* by accident, in which the accident is taken by itself (*per se*, i.e., alone; ► 17.6) and the subject (is taken) by itself (i.e., alone), there are other modes in which an accident is taken composed with a subject. And in this, two modes differ:<sup>31</sup>

4. When an accident simply is predicated of a composite from accident and subject.<sup>32</sup> And then, what is signified is that the accident is the same as both simultaneously taken. For example, (what is signified is that) the musical (is the same as) the musical man.

5. When a composite is predicated of a simple subject.<sup>33</sup> For example, when one says, “the man is a musical man.” For, then, the simple subject is signified to be the same as both simultaneously taken—namely, that which is said (to be) *a musical man*.

And if an accident is taken as simple and the subject (is taken) with composition, the reason is alike:<sup>34</sup> for example, if we say, “the musical is a musical man,” or conversely,

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<sup>28</sup> *In Metaph.* 5, l. 11, §908 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b29): “Secundo modo, quando praedicatum dicitur idem subiecto in quantum de eo praedicatur; ut cum dicitur, homo est musicus, quae dicuntur idem, quia accidit musicum homini, idest praedicatum subiecto.”

<sup>29</sup> *In Metaph.* 5, l. 11, §908 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b30): “Tertio modo dicuntur idem per accidens, quando subiectum dicitur esse idem accidenti quasi de eo praedicatum: ut cum dicitur, musicus est homo, significatur quod homo sit idem musico.”

<sup>30</sup> *In Metaph.* 5, l. 11, §908: “Quod enim praedicatur de aliquo, significatur idem esse illi. Et haec ratio identitatis est, quia subiectum accidit praedicato.”

<sup>31</sup> *In Metaph.* 5, l. 11, §909 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b30–33): “Praeter hos autem modos eiusdem per accidens, in quibus sumitur accidens per se et subiectum per se, sunt alii modi in quibus accipitur accidens cum subiecto compositum. Et in hoc variantur duo modi.”

<sup>32</sup> *In Metaph.* 5, l. 11, §909 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b30–33): “quorum unus significatur, quando accidens simpliciter praedicatur de composito ex accidente et subiecto. Et tunc significatur hoc, scilicet accidens esse idem utrique simul accepto; sicut musico homini, musicum.”

<sup>33</sup> *In Metaph.* 5, l. 11, §909 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b30–33): “Alius modus significatur quando compositum praedicatur de subiecto simplici, ut cum dicitur, homo est homo musicus. Tunc enim «illi,» idest subiecto simplici, significatur esse idem horum utrumque simul acceptum, scilicet hoc quod dicitur homo musicus.”

<sup>34</sup> *In Metaph.* 5, l. 11, §909 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b30–33): “Et similis ratio est, si accidens accipitur ut simplex, et subiectum cum compositione; ut si dicamus, musicus est homo musicus, aut e

since *man* and *musical* are said to be the same by accident as *musical man*, which is a composite, when the former two are predicated of the latter one; and conversely.

#### 41.7. Same Is Not Predicated Universally by Accident

From this (i.e., from the above modes of being *the same* by accident; ►41.6), ARISTOTLE further concludes that in all the aforesaid modes of predicating, in which the same is predicated by accident, some name is not predicated universally.<sup>35</sup> Indeed, it is not true to say that every man should be the same as the musical. This is evident as follows.

Only those are **universally predicated of universals** (< καθόλου [ἀπλῶς λέγεται]) *which are in the same according to themselves* (*quae secundum se insunt eidem* = τὰ... καθ' αὐτὰ ὑπάρχει).<sup>36</sup> Wherefrom, this mode of predicating, which is (for a predicate) to be predicated universally (of a subject), agrees with the condition of the subject—which is universal—because the predicate is predicated by itself of the subject.

On the other hand, accidents are not predicated according to themselves of universals, but by reason of singulars.<sup>37</sup> And hence, they are not predicated universally of universals. Rather, they are predicated simply of singulars, for *Socrates* seems to be the same in subject as *Socrates the musical*. However, (accidents) are not predicated of a singular universally, since only of that (subject) which is universal can (something) be predicated universally; and Socrates is not universal, for he is not in many (►13.5). Hence, nothing is universally predicated of Socrates: for example, if one were to say *every Socrates* as (one would say) *every man*.

#### 41.8. Naturally Diverse

As ARISTOTLE shows, (beings) are said (to be) **diverse** (*diversa* = ἕτερα) in three modes:<sup>38</sup>

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converso, quia et homini musico, quod est compositum, dicuntur idem per accidens et homo et musicum, quando haec duo de illo uno praedicantur, et e converso."

<sup>35</sup> *In Metaph.* 5, l. 11, §910 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b33–35): "Ex hoc autem concludit [Philosophus] ulterius conclusionem, quod in omnibus praedictis modis praedicandi, in quibus idem per accidens praedicatur, non praedicatur aliquod nomen universaliter. Non enim est verum dicere, quod omnis homo sit idem musico. Quod sic patet."

<sup>36</sup> *In Metaph.* 5, l. 11, §910 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b35): "Ea enim sola de universalibus praedicantur universaliter, quae secundum se insunt eidem. Propter hoc enim modus praedicandi, qui est universaliter praedicari, convenit cum conditione subiecti, quod est universale, quia praedicatum per se de subiecto praedicatur."

<sup>37</sup> *In Metaph.* 5, l. 11, §910 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1017b35–1018a4): "Sed accidentia non praedicantur secundum se de universalibus, sed ratione singularium. Et ideo de universalibus non praedicantur universaliter. Sed de singularibus praedicantur simpliciter, quia idem videtur esse subiecto Socrates et Socrates musicus; non tamen praedicantur de singulari universaliter, quia de nullo potest praedicari aliquid universaliter quod non est universale. Socrates autem non est universale: nam non est in multis. Et ideo non praedicatur universaliter aliquid de Socrate, ut dicatur, omnis Socrates sicut omnis homo. Igitur quae diximus sic dicuntur eadem, scilicet per accidens, ut dictum est."

<sup>38</sup> *In Metaph.* 5, l. 12, §913 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a9–11): "Hic ostendit [Philosophus] quot modis dicitur diversum; et dicit, quod diversa dicuntur aliqua tripliciter."

1. **Diverse in species** (*specie*; ►41.2, ¶1a), those whose species are multiple (*quorum species sunt plures* = ὧν... τὰ εἴδη πλείω).<sup>39</sup> For example, ass and ox.

2. **Diverse in number** (*numero*; ►41.2, ¶1b), because they differ according to matter (*quia differunt secundum materiam* < [ὧν] ἢ ὕλη [πλείω]).<sup>40</sup> For example, two individuals of one species.

Diversity according to number—in those things that are numbered simply (►34.4)—is (had) from the division of essence.<sup>41</sup> Whence, one individual is not another (i.e., because their individual matter is not the same); and something that is in one (subject) is not numerically the same in another (i.e., because their subject-matter is not the same).

3. **Diverse according to the ratio of the substance** (*secundum «rationem substantiae»* < ὁ λόγος τῆς οὐσίας; ►41.2, ¶2b&c): that is, (according to) the definition that declares the substance (i.e., essence) of the thing.<sup>42</sup> For it may happen that some (things) are the same in number—to wit, the subjects—but diverse in *ratio*, as Socrates and *this white*.

Thus, diverse modes of diversity can be taken.<sup>43</sup> For example, what should be said (to be) *diverse* (*diversum*) in genus; and (what should be said to be) *diverse* on account of the division of the continuum. Hence, ARISTOTLE adds that *diverse* (*diversum* = ἕτερον) is said totally in opposition to *same* (*oppositum totaliter ad idem* = ὁλως ἀντικειμένως τῷ ταύτῳ).

However, the other modes of *one*, or of *same*, can be reduced to the above.<sup>44</sup> For the diversity of genus is included in the diversity of species. And the diversity of continuity (►41.2, ¶2a, is included) in the diversity of matter insofar as the parts of quantity are related to the whole by the mode of matter (►13.9).

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<sup>39</sup> *In Metaph.* 5, l. 12, §913 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a10): “Dicuntur enim aliqua diversa specie, quorum species sunt plures, sicut asinus et bos.”

<sup>40</sup> *In Metaph.* 5, l. 12, §913 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a10): “Quaedam vero dicuntur diversa numero, quia differunt secundum materiam, sicut duo individua unius speciei.”

<sup>41</sup> *STh* I, q. 31 a. 2 ad 1: “diversitas requirit distinctionem substantiae quae est essentia.” *In Sent.* 1, d. 19 q. 5 a. 3 expos.: “diversitas secundum numerum in his quae simpliciter numerantur, est ex divisione essentiae; unde unum individuum non est alterum, nec aliquid quod est in uno, idem numero est in alio.” Here, evidently, diversity is caused from one part of the essence: the individuated matter or subject.

<sup>42</sup> *In Metaph.* 5, l. 12, §913 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a10–11): “Quaedam vero dicuntur diversa secundum «rationem substantiae,» idest definitionem declarantem substantiam rei. Contingit enim quaedam esse idem numero, scilicet subiecti, sed diversa ratione, sicut Socrates et hoc album.”

<sup>43</sup> *In Metaph.* 5, l. 12, §914 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a11): “Et quia plures modi diversitatis accipi possunt, sicut quod dicatur diversum genere et diversum propter continui divisionem, ideo subiungit [Philosophus], quod diversum dicitur oppositum totaliter ad idem. Cuilibet enim modo eius, quod est idem, opponitur aliquis modus eius quod est diversum. Et propter hoc, quot modis dicitur idem, tot modis diversum.”

<sup>44</sup> *In Metaph.* 5, l. 12, §915 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a9–11): “Et tamen alii modi unius, vel eius quod est idem, possunt reduci ad istos hic tactos. Diversitas enim generis includitur in diversitate speciei. Diversitas vero continuitatis in diversitate materiae, eo quod partes quantitatis se habent per modum materiae ad totum.”

### 41.9. Diverse According to Substance

Diversity requires a distinction of the substance that is the essence.<sup>45</sup> ARISTOTLE posits three modes of *diverse* (according to substance; ►41.4):

1. Everything that is another by opposition to *same* (►41.4, ¶1). Thus, just as everything that is itself was said (to be the) *same*, which is the relative of *identity*, so (too), that which is another is said to be *diverse*, which is the relative of *diversity*.<sup>46</sup> Wherefrom, any *one*, compared to another, is either the same or diverse (< ἅπαν πρὸς ἅπαν ἢ ταὐτὸ ἢ ἄλλο).
2. When matter and *ratio* is not one (< τὸ... ἐὰν μὴ καὶ ἡ ὕλη καὶ ὁ λόγος εἶς; ►41.4, ¶2).<sup>47</sup> For example, you and your neighbor are diverse (< σὺ καὶ ὁ πλησίον ἕτερος).

Those (natures) that are in diverse (subjects) according to the same *ratio* are common to them according to the *ratio* of *substance* or *quiddity* (*secundum rationem substantiae sive quidditatis*) but are discrete (*discreta*) according to being (*secundum esse*).<sup>48</sup> Thus, the (act of) being (*esse*) that is proper to one thing cannot be communicated to another. If *man* (*homo*, i.e., the essence of man) and *to be a man* (*hominem esse*) should not differ in Socrates, it would be impossible for *man* to be univocally said of him and of Plato, who have a diverse (act of) being.

3. As in mathematical (things; ►41.4, ¶3).<sup>49</sup> For example, if unequal lines should be said (to be) *diverse*.

And since ARISTOTLE had said that everything (in relation) to everything is the same or diverse (¶1), lest someone believe that this is true both in beings and in non-beings, he removes this (error), saying: *diverse* or *same* is said, everything (in relation) to everything, in those that are said (to be) *one* and *being*, but not in non-beings.<sup>50</sup> For *same* and *diverse*

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<sup>45</sup> *STh* I, q. 31 a. 2 ad 1: “diversitas requirit distinctionem substantiae quae est essentia.”

<sup>46</sup> *In Metaph.* 10, l. 4, §2014 (cf. ARISTOTLE, *Metaphysica* l.3, 1054b15–16): “Quorum *primus* est quod diversum dicitur omne quod est aliud per oppositum ad idem. Sicut enim idem dicebatur omne quod est ipsum, quod est relativum identitatis, ita diversum dicitur esse quod est aliud, quod est relativum diversitatis. Et propter hoc, unumquodque ad aliud comparatum, aut est idem aut diversum.”

<sup>47</sup> *In Metaph.* 10, l. 4, §2014 (cf. ARISTOTLE, *Metaphysica* l.3, 1054b16–17): “*Alius* modus est quando non est una materia et una ratio; sicut tu et propinquus tibi, diversi estis.”

<sup>48</sup> *De veritate*, q. 2 a. 11 co.: “illa enim quae secundum eandem rationem sunt in diversis, sunt eis communia secundum rationem substantiae sive quidditatis, sed sunt discreta secundum esse. [...] cum esse quod est proprium unius rei non possit alteri communicari [...]. Similiter etiam esset in nobis: si enim in Socrate non differret homo et hominem esse, impossibile esset quod homo univoce diceretur de eo et Platone, quibus est esse diversum.”

<sup>49</sup> *In Metaph.* 10, l. 4, §2014 (cf. ARISTOTLE, *Metaphysica* l.3, 1054b17–18): “*Tertius* autem modus est, sicut in mathematicis: ut si dicantur lineae inaequales diversae.”

<sup>50</sup> *In Metaph.* 10, l. 4, §2015 (cf. ARISTOTLE, *Metaphysica* l.3, 1054b18–20): “Et quia dixerat [Philosophus] quod omne ad omne est idem aut diversum, ne quis crederet hoc esse verum, tam in entibus quam in non entibus, removet hoc dicens: diversum aut idem dicitur omne ad omne in his quae dicuntur unum et ens, non autem in non entibus. Idem enim et diversum non opponuntur ut contradictoria, quorum alterum



are not opposed as contradictories, of which one or the other must be true of any being or non-being; rather, they are opposed as contraries, which are only verified of *being*. Hence, *diverse* is not said of *non-beings*.

On the other hand, *non-same* (*non idem* = μή ταυτό), which is opposed in contradiction to same, is also said of *non-beings*.<sup>51</sup> However, in all beings, *same* or *diverse* is said, for everything that is a being and one in itself, (if) compared to another, either *is one* with it, and in this way it is the same; or (*is*) *not one* (with it, or not) *naturally apt to be one*, and in this way it is diverse. Hence, *diverse* and *same* are thus opposed.

If someone should object that *diverse* and *same* are not in all beings, since *same* follows upon the *unity of substance*, while *diversity* (follows upon) *the plurality of substance*, it is to be said that, since substance is the root of the other genera, that which is (proper) of substance is transferred to all other genera, as ARISTOTLE says (► 18.11).<sup>52</sup>

#### 41.10. Logical Diversity

In the composite individual, there are only three (► 15.8): namely, matter, form, and the composite.<sup>53</sup> Hence, the cause of whatever (logical) diversities (in genus, in species or in number) must be found from some(thing) of these. Therefore, it ought to be known that **diversity** according to **genus** is reduced to diversity of *matter* (► 41.11); diversity according to **species**, into diversity of *form* (► 41.19); and diversity according to **number**, in part into diversity of *matter*, (and) in part into diversity of *accident* (► 41.21).

#### 41.11. Diversity in Genus

Since a genus should be a principle of knowing (*principium cognoscendi*)—to wit, as the first part of a definition—, and matter according to itself should be unknown, a diversity of genus cannot be taken from it by itself, but only in that mode in which it is knowable.<sup>54</sup>

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necesse est verum esse de quolibet ente aut non ente; sed opponuntur ut contraria, quae non verificantur nisi de ente. Et ideo diversum non dicitur de non entibus.”

<sup>51</sup> *In Metaph.* 10, l. 4, §2015 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b21–23): “Sed non idem, quod contradictorie opponitur eidem, dicitur etiam de non entibus. Sed in omnibus entibus dicitur idem aut diversum. Omne enim quod est ens et unum in se, comparatum alteri, aut est unum ei, et sic est idem; aut non unum, aptum natum esse unum, et sic est diversum. Sic igitur diversum et idem opponuntur.”

<sup>52</sup> *In Metaph.* 10, l. 4, §2016: “Si quis autem obiiciat quod diversum et idem non sunt in omnibus entibus, cum idem sequatur unitatem substantiae, diversitas autem substantiae pluralitatem; dicendum est, quod quia substantia radix est aliorum generum, illud quod est substantiae, transfertur ad omnia alia genera, sicut de eo quod quid est Philosophus dixit supra in septimo.”

<sup>53</sup> *In De Trin.*, q. 4 a. 2 co., 80–89: “Cum autem in indiuiduo composito in genere substantie non sint nisi tria, scilicet materia, forma, et compositum, oportet ex aliquo horum cuiuslibet harum diuersitatum causas inuenire. Sciendum est ergo quod diuersitas secundum genus reducitur in diuersitatem materie, diuersitas uero secundum speciem in diuersitatem forme, set diuersitas secundum numerum partim in diuersitatem materie, partim in diuersitatem accidentis.”

<sup>54</sup> *In De Trin.*, q. 4 a. 2 co., 90–94: “Cum autem genus sit principium cognoscendi, utpote prima diffinitionis pars, materia autem secundum se sit ignota, non potest secundum se ex ea accipi diuersitas generis, set solum illo modo, quo cognoscibilis est.”

Now, (matter) is knowable in two modes:<sup>55</sup>

1. Through **analogy** or proportion.<sup>56</sup> For example, if we should say that **matter** is *that which is related to natural things as*, (in artificial things), *wood (is related) to bed*.

Indeed, as ARISTOTLE says, the nature that first underlies mutation—that is, first matter—cannot be known by itself, since everything that is known, is known through its form; and first matter is considered (to be) the subject of every form.<sup>57</sup> However, (matter) is known by analogy (< κατ' ἀναλογίαν): that is according to proportion. For in this mode we know that wood is something apart from (*praeter*) the form of a bench and of a bed, because sometimes it is under one form (and) sometimes (it is) under another.

Hence, when we see that one (natural) element sometimes becomes another, we must say that something that exists under the (natural) form of one element sometimes is under the form of another.<sup>58</sup> And in this way, it is something apart from of the form of one element and apart from the form of the other element, just like wood is something apart from the form of a bench and apart from the form of a bed.

Thus, we say that **first matter** is *that which is related to natural substances themselves as bronze is related to statue* (< ὡς... πρὸς ἀνδριάντα χαλκός), and (*as*) *wood (is related) to bed* (< [ὡς] πρὸς κλίνην ξύλον); and (*as*) *whatever material (materiale < ἡ ὕλη) and formless (informe < τὸ ἄμορφον) [is related] to form*.<sup>59</sup>

Hence, this (i.e., first or prime matter) is one principle of nature, which is not *one* as *this something*—that is, as some determined individual (*aliquod individuum demonstratum*), such that it should have form and unity in act.<sup>60</sup> Rather, it is said (to be a) *being (ens)* and

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<sup>55</sup> *In De Trin.*, q. 4 a. 2 co., 94–95: “Est autem cognoscibilis dupliciter.”

<sup>56</sup> *In De Trin.*, q. 4 a. 2 co., 95–98: “uno modo per analogiam siue per proportionem, ut dicitur in I Phisicorum, hoc est ut dicamus illud esse materiam, quod hoc modo se habet ad res naturales sicut lignum ad lectum.” The reference is to ARISTOTLE, *Physica* A.7, 191a7–12, discussed directly below.

<sup>57</sup> *In Physic.* 1, l. 13, n. 9 (cf. ARISTOTLE, *Physica* A.7, 191a7–12): “dicit [Philosophus] quod natura quae primo subiicitur mutationi, idest materia prima, non potest sciri per seipsam, cum omne quod cognoscitur, cognoscatur per suam formam; materia autem prima consideratur subiecta omni formae. Sed scitur secundum analogiam, idest secundum proportionem. Sic enim cognoscimus quod lignum est aliquid praeter formam scamni et lecti, quia quandoque est sub una forma, quandoque sub alia.”

<sup>58</sup> *In Physic.* 1, l. 13, n. 9: “Cum igitur videamus hoc quod est aer quandoque fieri aquam, oportet dicere quod aliquid existens sub forma aeris, quandoque sit sub forma aquae: et sic illud est aliquid praeter formam aquae et praeter formam aeris, sicut lignum est aliquid praeter formam scamni et praeter formam lecti.” St. Thomas, based on ancient science, uses *air* and *water* as examples of elements, but the reasoning is valid regardless of what the first elements of natural substances should be—which is a question that even modern science must wrestle with.

<sup>59</sup> *In Physic.* 1, l. 13, n. 9 (cf. ARISTOTLE, *Physica* A.7, 191a7–12): “Quod igitur sic se habet ad ipsas substantias naturales, sicut se habet aes ad statuum et lignum ad lectum, et quodlibet materiale et informe ad formam, hoc dicimus esse materiam primam.”

<sup>60</sup> *In Physic.* 1, l. 13, n. 9 (cf. ARISTOTLE, *Physica* A.7, 191a12–14): “Hoc igitur est unum principium naturae: quod non sic unum est sicut hoc aliquid, hoc est sicut aliquod individuum demonstratum, ita

(something) *one* insofar as it is in potency (in relation) to form. And another principle (of nature) is the *ratio* (< ὁ λόγος) or form, while a third principle (of nature) is privation (< ἡ στέρησις), which is contrary to form (< τὸ ἐναντίον τοῦτω).

2. Through the **form** by which it has being in act, for each one (thing) is known insofar as it is in act and not insofar as it is in potency.<sup>61</sup> In this way, ARISTOTLE concludes that it is manifest that when some (things) are reduced from potency into act, then their truth is found.<sup>62</sup> The cause of this is that the intellect is an act; and hence, those (things) that are understood must be in act; therefrom, potency is known from act. Whence, those know who make something (to be) in act, as is evident (in demonstration), for act must be posterior to potency according to the order of generation and of time.

According to this, diversity in genus is taken from matter in two modes: (¶1) from a diverse analogy to matter (►41.12); (¶2) insofar as matter is perfected by form (►41.13).<sup>63</sup>

#### 41.12. Diversity in Genus from a Diverse Analogy to Matter

In this mode, the first genera of things are distinguished by virtue of (*penes*) matter, for:<sup>64</sup>

1. That which is in the genus of **substance** is compared to matter as to *its part*.<sup>65</sup>
2. That which is in the genus of **quantity** does not have a matter (that is) a part of it but is compared to it as *a measure*.<sup>66</sup>
3. (That which is in the genus of) **quality** (does not have a matter that is a part of it but is compared to it) as *a disposition*.<sup>67</sup>

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quod habeat formam et unitatem in actu; sed dicitur ens et unum in quantum est in potentia ad formam. Aliud autem principium est ratio vel forma: tertium autem est privatio, quae contrariatur formae.”

<sup>61</sup> *In De Trin.*, q. 4 a. 2 co., 99–102: “alio modo cognoscitur per formam, per quam habet esse in actu; unumquodque enim cognoscitur secundum quod est in actu et non secundum quod est in potentia, ut dicitur in IX Metaphisice.” The reference is to ARISTOTLE, *Metaphysica* Θ.9, 1051a29–33, discussed directly below.

<sup>62</sup> *In Metaph.* 9, l. 10, §1894 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a29–33): “Sic igitur concludit Philosophus manifestum esse, quod quando aliqua reducuntur de potentia in actum, tunc invenitur earum veritas. Et huius causa est, quia intellectus actus est. Et ideo ea quae intelliguntur, oportet esse actu. Propter quod, ex actu cognoscitur potentia. Unde facientes aliquid actu cognoscunt, sicut patet in praedictis descriptionibus. Oportet enim quod in eodem secundum numerum, posterius secundum ordinem generationis et temporis sit actus quam potentia, ut supra expositum est.”

<sup>63</sup> *In De Trin.*, q. 4 a. 2 co., 103–105: “Et secundum hoc dupliciter sumitur diuersitas generis ex materia. Vno modo ex diuersa analogia ad materiam.” *Ibid.*, 115–117: “Alio modo penes materiam sumitur diuersitas generis secundum quod materia est perfecta per formam.”

<sup>64</sup> *In De Trin.*, q. 4 a. 2 co., 105–106: “et sic penes materiam distinguuntur prima rerum genera.”

<sup>65</sup> *In De Trin.*, q. 4 a. 2 co., 106–108: “Id enim, quod est in genere substantie comparatur ad materiam sicut ad partem sui.”

<sup>66</sup> *In De Trin.*, q. 4 a. 2 co., 108–110: “quod uero est in genere quantitatis non habet materiam partem sui, set comparatur ad ipsam sicut mensura.”

<sup>67</sup> *In De Trin.*, q. 4 a. 2 co., 110–111: “et qualitas sicut dispositio.”

And by means these two genera (i.e., quantity and quality), all other genera obtain (*nanciscuntur*) diverse comparisons to the matter that is a part of substance (►¶1a), from which substance has the *ratio* of *subject* insofar as it is compared to accidents (►33.23).<sup>68</sup>

#### 41.13. Diversity in Genus Insofar as Matter Is Perfected by Form

Since (first) matter is pure potency, it is nothing other for matter to be perfected—in the act that form is—than the extent to which (*quatenus*) it participates (in) some likeness of the first, pure act—albeit imperfectly—, such that what is already composed from matter and form should be a mean between pure potency and pure act.<sup>69</sup>

However, matter does not equally receive from every part a likeness to the first act: rather, from some (parts it receives a likeness) imperfectly, while from some (other parts it receives a likeness to the first act) more perfectly.<sup>70</sup> To wit, some (substances) participate (in) a likeness (of the first act) insofar only as they subsist (e.g., a stone); others, insofar as they know (e.g., a horse); others, insofar as they understand (i.e., a man).

Hence, the likeness itself of the first act that exists in whatever matter is its form; but, in some (parts of matter), such a form—one and the same—produces (*facit*) only the (act of) being (*esse*); in some (other parts of matter, it produces the act of) being and living; and so on in the others.<sup>71</sup> For it has the likeness (of the first act) more perfectly than that which has a less perfect likeness—and then more. Therefore, something common is found in one and in the other likeness (i.e., something common is found in the forms themselves), which underlies, in one, an imperfection; and in another, a perfection—just as matter underlies privation (i.e., imperfection) and act (i.e., perfection). Hence, matter, taken simultaneously with this common (indeterminate form; ►14.12), is still material in respect of the aforesaid perfection or imperfection. And the genus is taken from this material.

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<sup>68</sup> *In De Trin.*, q. 4 a. 2 co., 111–115: “et his duobus generibus mediantibus omnia alia genera nanciscuntur diuersas comparationes ad materiam, que est pars substantie, ex qua substantia habet rationem subiecti, secundum quam ad accidentia comparatur.”

<sup>69</sup> *In De Trin.*, q. 4 a. 2 co., 117–123: “cum enim materia sit potentia pura et Deus actus purus, nichil est aliud materiam perfici in actum qui est forma, nisi quatenus participat aliquam similitudinem actus primi, licet imperfecte; ut sic illud quod est iam compositum ex materia et forma sit medium inter potentiam puram et actum purum.”

<sup>70</sup> *In De Trin.*, q. 4 a. 2 co., 124–131: “Non autem materia ex omni parte recipit equaliter similitudinem primi actus, set a quibusdam imperfecte, a quibusdam uero perfectius; utpote quedam participant diuinam similitudinem secundum hoc tantum quod subsistunt, quedam uero secundum quod uiuunt, quedam uero secundum quod cognoscunt, quedam secundum quod intelligunt.”

<sup>71</sup> *In De Trin.*, q. 4 a. 2 co., 131–143: “Ipsa igitur similitudo primi actus in quacumque materia existens est forma eius; set forma talis in quibusdam facit esse tantum, in quibusdam esse et uiuere, et sic de aliis, una et eadem: similitudo enim perfectior habet omne illud quod habet similitudo minus perfecta, et adhuc amplius. Aliquid ergo inuenitur commune in utraque similitudine, quod in una substernitur imperfectioni et in alia perfectioni; sicut materia substernebatur actui et priuationi; et ideo materia simul accepta cum hoc communi est adhuc materialis respectu perfectionis et imperfectionis predictae. Et ex hoc materiali sumitur genus.”

(As already noted, the material whence the genus is taken has in itself both matter and form; and the logician considers the genus only from its formal part, while the scientist considers the genus from the part of matter and form; ►21.11. This explains why *figure* is univocal to the logician but equivocal to the scientist. For example, a square number has a material genus that consists in a multitude of indivisible units that by themselves have no position, while a square magnitude has a material genus that consists in an infinitely divisible plane surface that has a position; ►7.4).

#### 41.14. Diversity of Form by Itself vs. by Accident

The diversity of things consists principally in a diversity of forms.<sup>72</sup> Yet, **formal diversity** is twofold:

1. Of the form **by itself** (*per se*), according to that which pertains to the *ratio* of the form.<sup>73</sup> And such a diversity of form leads to (*inducit*) the diversity of species. Formal diversity (of the form by itself) is according to contrariety, for the genus is divided into diverse species by contrary differences; and there needs to be an order in contrariety, for one of the contraries is always more perfect.
2. Of the form **by accident** (*per accidens*), resulting from the diversity of matter, insofar as a form is participated more fittingly (*dignius*) in a matter (that is) better disposed (to the reception of the form; ►26.3).<sup>74</sup>

#### 41.15. Diversity of Forms

The *ratio* of order of things is taken from the diversity of forms (by themselves; ►41.14).<sup>75</sup> Indeed, since form is (that) according to which a thing has being (*esse*); and whatever thing, insofar as it has being (*esse*), approaches the likeness of that which is its own simple (act of) being (*ipsum suum esse simplex*); hence, it is necessary that form be nothing other than a participated likeness of that simple being in things.

<sup>72</sup> *Comp. th.* 1, c. 73, 12–13: “diuersitas rerum principaliter in diuersitate formarum consistit.” *In Sent.* 2, d. 32 q. 2 a. 3 ad 1: “diuersitas formalis est duplex.”

<sup>73</sup> *In Sent.* 2, d. 32 q. 2 a. 3 ad 1: “Quaedam quae est formae per se, secundum id quod ad rationem formae pertinet: et talis diuersitas formae, diuersitatem speciei inducit.” *Comp. th.* 1, c. 73, 13–17: “Formalis autem diuersitas secundum contrarietatem est, diuiditur enim genus in diuersas species contrariis differentiis; in contrarietate autem ordinem necesse est esse, nam semper alterum contrariorum perfectius est.”

<sup>74</sup> *In Sent.* 2, d. 32 q. 2 a. 3 ad 1: “Est autem quaedam diuersitas formae non per se, sed per accidens, ex diuersitate materiae resultans, secundum quod in materia melius disposita dignius forma participatur; et talis diuersitas speciem non diuersificat.”

<sup>75</sup> *ScG* 3, 97 n. 3: “Ex diuersitate autem formarum sumitur ratio ordinis rerum. Cum enim forma sit secundum quam res habet esse; res autem quaelibet secundum quod habet esse, accedat ad similitudinem Dei, qui est ipsum suum esse simplex: necesse est quod forma nihil sit aliud quam diuina similitudo participata in rebus.” Whence, as St. Thomas explains, speaking of form, ARISTOTLE fittingly says that it is something divine and appetible (i.e., because form is a likeness of pure act). *Ibid.*: “unde convenienter Aristoteles, in I *Physic.*, de forma loquens, dicit quod est diuinum quoddam et appetibile.”

However, likeness, considered (in relation) to one simple (being), can only be diversified insofar as the likeness is more or less proximate or remote.<sup>76</sup> The more proximately something approaches the likeness of simple being, the more perfect it is. Whence, in forms, there can only be a difference insofar as one exists more perfectly than another. Wherefrom, ARISTOTLE assimilates the definitions—whereby the natures of things and forms are signified—to numbers, in which species are varied by the addition or subtraction of a unit (► 16.7), such that, from this, one should understand that the diversity of forms requires a diverse degree of perfection.

This appears more evidently in he who theorizes (about) the nature of things.<sup>77</sup> For, if he should consider (the question) diligently, he would find that a gradual diversity of things is completed. Indeed, over inanimate bodies, he would find plants; and over these, irrational animals; and over these, intellectual substances. And in each of these, he would find a diversity insofar as some are more perfect than others, while those that are the highest of the lower genera seem (to be) more proximate to the higher genus; and conversely. For example, immobile animals are similar to plants. Whence, it is evident that the diversity of things demands that they should not all be equal: rather, that there should be an order and degree in things.

#### **41.16. Diverse Relation of Matter to Thing**

From the diversity of forms follows also a diverse relation of matter to thing (*habitus materiae ad res*).<sup>78</sup> Thus, since there are diverse forms insofar as some are more perfect than others, there are some among them that are so perfect that they are subsistent and perfect by themselves, requiring no support of matter. On the other hand, some cannot

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<sup>76</sup> ScG 3, 97 n. 3: “Similitudo autem ad unum simplex considerata diversificari non potest nisi secundum quod magis vel minus similitudo est propinqua vel remota. Quanto autem aliquid propinquius ad divinam similitudinem accedit, perfectius est. Unde in formis differentia esse non potest nisi secundum quod una perfectior existit quam alia: propter quod Aristoteles, in VIII Metaphys., definitiones, per quas naturae rerum et formae significantur, assimilant numeris, in quibus species variantur per additionem vel subtractionem unitatis, ut ex hoc detur intelligi quod formarum diversitas diversum gradum perfectionis requirit.”

<sup>77</sup> ScG 3, 97 n. 3: “Et hoc evidenter apparet naturas rerum speculanti. Inveniet enim, si quis diligenter consideret, gradatim rerum diversitatem compleri: nam supra inanimata corpora inveniet plantas; et super has irrationalia animalia; et super has intellectuales substantias; et in singulis horum inveniet diversitatem secundum quod quaedam sunt aliis perfectiora, in tantum quod ea quae sunt suprema inferioris generis, videntur propinqua superiori generi, et e converso, sicut animalia immobilia sunt similia plantis; unde et Dionysius dicit, VII cap. de Div. Nom., quod divina sapientia coniungit fines primorum principii secundorum. Unde patet quod rerum diversitas exigit quod non sint omnia aequalia, sed sit ordo in rebus et gradus.”

<sup>78</sup> ScG 3, 97 n. 6: “Sequitur etiam ex diversitate formarum diversa habitus materiae ad res. Cum enim formae diversae sint secundum quod quaedam sunt aliis perfectiores, sunt inter eas aliquae in tantum perfectae quod sunt per se subsistentes et perfectae, ad nihil indigentes materiae fulcimento. Quaedam vero per se perfecte subsistere non possunt, sed materiam pro fundamento requirunt: ut sic illud quod subsistit non sit forma tantum, neque materia tantum, quae per se non est ens actu, sed compositum ex utroque.”

perfectly subsist by themselves, and require matter as a foundation, in such a way that what subsists should be not only the form—nor the matter, which is not in act by itself—but the composite from both.

#### 41.17. Diversity of Matters

There is a division according to matter only insofar as matter is distinguished according to itself (and) not on account of a diverse form or disposition—or quantity—, since this would be for matter to be distinguished according to form or disposition—or quantity. Hence, we must finally arrive at this: that the matter of all (essentially composite beings) should not be one, but that matters should be many, and distinct according to themselves (*distinctae secundum se ipsas*).<sup>79</sup>

Now, it is proper for matter to be in potency.<sup>80</sup> Hence, this distinction of matter must be taken not insofar as it is clad in (*vestita*) diverse forms or dispositions, for this is beyond (*praeter*) the essence of matter. Rather, (distinction of matter must be taken) according to the distinction of potency in respect of the diversity of forms. Indeed, since **potency** should be said (to be) *that which is (related) to act (id quod est ad actum)*, it is necessary that potency should be distinguished according to that (in relation) to which potency is first said (*secundum id ad quod primo potentia dicitur*).

For example, potency is first said (in relation) to something as the seeing potency (is said to be related) to color, and (it is) not (said to be related first) to white or black, since it is susceptible (of receiving) one and the other.<sup>81</sup> Likewise, surface is susceptible of white and of black according to one potency, which is first said in respect of color.

#### 41.18. Diversity in Separated Substances

In material things that are existents of diverse species of one genus, the ratio of the genus is taken from a material principle; (and) the difference of the species (is taken) from a formal principle.<sup>82</sup> Indeed, the sensitive nature from which the *ratio* of *animal* is taken, is

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<sup>79</sup> *De sub. sep.*, c. 6, 186–194: “Non est autem divisio secundum materiam nisi quia materia secundum se ipsam distinguitur, non propter diversam dispositionem vel formam aut quantitatem, quia hoc esset distingui materiam secundum quantitatem aut formam seu dispositionem; oportet igitur quod finaliter deveniatur ad hoc quod non sit una omnium materia, sed quod materiae sint multae et distinctae secundum se ipsas.”

<sup>80</sup> *De sub. sep.*, c. 6, 194–202: “Materiae autem proprium est in potentia esse; hanc igitur materiae distinctionem accipere oportet, non secundum quod est vestita diversis formis aut dispositionibus, hoc enim est praeter essentiam materiae, sed secundum distinctionem potentiae respectu diversitatis formarum: cum enim potentia id quod est ad actum dicatur, necesse est ut potentia distinguatur secundum id ad quod primo potentia dicitur.”

<sup>81</sup> *De sub. sep.*, c. 6, 202–208: “Dico autem ad aliquid primo potentiam dici sicut potentiam visivam ad colorem, non autem ad album aut nigrum, quia eadem est susceptiva utriusque; et similiter superficies est susceptiva albi et nigri secundum unam potentiam, quae primo dicitur respectu coloris.”

<sup>82</sup> *ScG* 2, 95 n. 1: “Oportet autem considerare secundum quid diversificatur species in substantiis separatis. In rebus enim materialibus quae sunt diversarum specierum unius generis existentes, ratio

material in man in respect of the intellectual nature from which the specific difference of man—namely, *rational*—is taken. Hence, if separated substances are not composed from matter and form, it is not apparent according to what, a genus and a specific difference could be taken.

Therefore, it must be known that diverse species of things gradually possess a nature of being.<sup>83</sup> In the first division of being, there is immediately found (something) perfect: that is, being by itself and being in act; and another (thing that is) imperfect: namely, being in another and being in potency.

And running through each (thing) in the same mode, it becomes apparent that one species adds some degree of perfection over another.<sup>84</sup> For example, animals over plants; and animals that move locally over immobile animals. Also, in colors, one species is found to be more perfect insofar as it is closer to whiteness. On account of this, ARISTOTLE says that the definitions of things are like a number, in which a unit subtracted or added varies the species of the number (► 16.7).<sup>85</sup> By which mode, in definitions, if one difference should be subtracted or added, a diverse species would be found.

Hence, the *ratio* of a determinate species consists in that a common nature is placed in a determinate degree of being.<sup>86</sup> And since, in things composed from matter and form, form is as a terminus, and that which is terminated by it is matter or material, the *ratio* of the genus must be taken from the material, while the specific difference (must be taken) from the formal.

And just as the nature that is constituted from matter and form, is one and the same, so the difference does not add some extraneous nature over the genus. Rather, it is some

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generis ex principio materiali sumitur, differentia speciei a principio formali: natura enim sensitiva, ex qua sumitur ratio animalis, est materiale in homine respectu naturae intellectivae, ex qua sumitur differentia specifica hominis, scilicet rationale. Si igitur substantiae separatae non sunt ex materia et forma compositae, ut ex praemissis, patet, non apparet secundum quid in eis genus et differentia specifica accipi possit.”

<sup>83</sup> ScG 2, 95 n. 2: “Scire igitur oportet quod diversae rerum species gradatim naturam entis possident. Statim enim in prima entis divisione invenitur hoc quidem perfectum, scilicet ens per se et ens actu: aliud vero imperfectum, scilicet ens in alio et ens in potentia.”

<sup>84</sup> ScG 2, 95 n. 2: “Et eodem modo discurrenti per singula apparet unam speciem super aliam aliquem gradum perfectionis adiicere: sicut animalia super plantas, et animalia progressiva super animalia immobilia; in coloribus etiam una species alia perfectior invenitur, secundum quod est albedini propinquior.”

<sup>85</sup> ScG 2, 95 n. 2: “Propter quod Aristoteles, in VIII Metaph., dicit quod *definitiones rerum sunt sicut numerus, in quo unitas subtracta vel addita speciem numeri variat*: per quem modum in definitionibus, si una differentia subtrahatur vel addatur, diversa species invenitur.”

<sup>86</sup> ScG 2, 95 n. 3: “Ratio igitur determinatae speciei consistit in hoc quod natura communis in determinato gradu entis collocatur. Et quia in rebus ex materia et forma compositis forma est quasi terminus, id autem quod terminatur per eam est materia vel materiale: oportet quod ratio generis sumatur ex materiali, differentia vero specifica ex formali. Et ideo ex differentia et genere fit unum sicut ex materia et forma.”



determination of the nature of the genus itself.<sup>87</sup> For example, if the genus *animal having feet* should be taken, its difference is *animal having two feet*, which manifestly is to add over the genus a difference (that is) nothing extraneous.

Whence, it is evident that, it happens to the genus and to the difference, that the determination which the difference conveys (*importat*) is caused from a principle other than the nature of the genus.<sup>88</sup> For the nature that the definition signifies is composed from matter and form as from the terminating and the terminated (►10.7).

Therefore, if there is some simple nature, it will certainly be terminated by itself, and it would not need to have two parts—one that should be terminating and another terminated.<sup>89</sup> Hence, the *ratio* of *genus* would be taken from the *ratio* itself of the nature; and its specific difference would be taken from its termination insofar as it is in such a degree of beings. Therefrom, it is also evident that if some nature is not terminated but (is) infinite in itself, neither genus nor species can be taken in it.

#### 41.19. Diversity in Species

Differences are taken from the aforesaid perfection and imperfection (i.e., the perfection and imperfection that the common, indeterminate form underlies; ►41.13).<sup>90</sup> Just as from the common material *to have life* is taken the genus *animated body*, (so, too) the difference *sensible* (is taken) from the added perfection; and the difference *insensible* (is taken) from an (added) imperfection. And in this way, the diversity of such materials leads to (*inducit*) a diversity of genus, as (the diversity of) *animal* from *plant*. Wherefrom, matter is said to be the principle of diversity according to genus.

For the same reason, form is the principle of diversity according to species. Indeed, the differences that constitute the species are taken from the aforesaid formals, which are

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<sup>87</sup> ScG 2, 95 n. 3: “Et sicut una et eadem est natura quae ex materia et forma constituitur, ita differentia non addit quandam extraneam naturam super genus, sed est quaedam determinatio ipsius naturae generis: ut, si genus accipiatur animal pedes habens, differentia eius est animal duos pedes habens; quam quidem differentiam nihil extraneum super genus addere, manifestum est.”

<sup>88</sup> ScG 2, 95 n. 4: “Unde patet quod accidit generi et differentiae quod determinatio quam differentia importat, ex alio principio causetur quam natura generis, ex hoc quod natura quam significat definitio, est composita ex materia et forma sicut ex terminante et terminato.”

<sup>89</sup> ScG 2, 95 n. 4: “Si igitur est aliqua natura simplex, ipsa quidem per seipsam erit terminata, nec oportebit quod habeat duas partes, quarum una sit terminans et alia terminata. Ex ipsa igitur ratione naturae sumetur ratio generis: ex terminatione autem eius secundum quod est in tali gradu entium, sumetur eius differentia specifica. Ex quo etiam patet quod, si aliqua natura est non terminata, sed infinita in se [...], non est in ea accipere neque genus neque speciem.”

<sup>90</sup> *In De Trin.*, q. 4 a. 2 co., 144–153: “differentie uero [sumuntur] ex perfectione et imperfectione predicta; sicut ex hoc communi materiali, quod est habere uitam sumitur hoc genus ‘animatum corpus’; ex perfectione uero superaddita hec differentia ‘sensible’, ex imperfectione uero hec differentia ‘insensible’; et sic diuersitas talium materialium inducit diuersitatem generis, sicut ‘animal’ a ‘planta’. Et propter hoc dicitur materia esse principium diuersitatis secundum genus.”

compared to the aforesaid materials whence the genera are taken, as form (is compared) to matter.<sup>91</sup>

Hence, every formal distinction is according to some opposition.<sup>92</sup> And every genus is divided by contrary differences, which are taken from the forms.<sup>93</sup> Thus, the diversity of species follows upon the diversity of formal principles.<sup>94</sup>

#### 41.20. Modes of the Diverse in Species

ARISTOTLE posits five modes in which some (things) are said (to be) **diverse in species** (*diversa specie* = ἕτερα... τῷ εἶδει):<sup>95</sup>

1. When some (things) are in the same genus and are not subaltern (*quando aliqua sunt in eodem genere, et non sunt subalterna* < ὅσα... ταύτου γένους ὄντα μὴ ὑπάλληλά ἐστι).<sup>96</sup> For example, *science* and *whiteness* (are) under *quality*, although they are not divided against each other (*contra se*) by opposite differences (i.e., they are not subaltern).

2. When they are in the same genus and are divided against each other by some difference (*quando sunt ea in eodem genere, et dividuntur contra invicem per aliquam differentiam* < ὅσα ἐν τῷ αὐτῷ γένει ὄντα διαφορὰν ἔχει), whether the differences should be contrary or not.<sup>97</sup> For example, *biped* and *quadruped*.

3. When their subjects have contrariety (*quando sua subiecta habent contrarietatem* < ὅσα ἐν τῇ οὐσίᾳ ἐναντίωσιν ἔχει):<sup>98</sup> namely, those that are divided by contrary differences, whether they (i.e., the subjects) should be contrary, as *white* and *black*, which are divided by *congregative* and *segregative* (► 18.16); or not (divided by contrary differences), as

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<sup>91</sup> *In De Trin.*, q. 4 a. 2 co., 153–158: “et eadem ratione forma est principium diuersitatis secundum speciem: quia a predictis formalibus, que habent ad dicta materialia unde genera sumuntur comparationem forme ad materiam, sumuntur differentie que constituunt species.”

<sup>92</sup> *In Sent.* 1, d. 13 q. 1 a. 2 co.: “omnis autem distinctio formalis est secundum aliquam oppositionem.”

<sup>93</sup> *In Physic.* 5, l. 3, n. 4: “in X Metaphys. probatur quod omne genus dividitur per contrarias differentias: differentiae autem sumuntur a formis, ut in VIII eiusdem libri habetur.”

<sup>94</sup> *In Sent.* 2, d. 17 q. 2 a. 2 co.: “ad diuersitatem formalium principiorum sequitur diuersitas specierum.”

<sup>95</sup> *In Metaph.* 5, l. 12, §931 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a38–b8): “Hic ostendit [Philosophus] quot modis dicantur aliqua diversa specie: et ponit quinque modos.”

<sup>96</sup> *In Metaph.* 5, l. 12, §931 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018b1): “quorum primus est, quando aliqua sunt in eodem genere, et non sunt subalterna, sicut scientia et albedo sub qualitate, licet non contra se dividantur oppositis differentiis.”

<sup>97</sup> *In Metaph.* 5, l. 12, §932 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018b2): “Secundus est, quando sunt ea in eodem genere, et dividuntur contra invicem per aliquam differentiam; sive differentiae sint contrariae, sive non, ut bipes et quadrupes.”

<sup>98</sup> *In Metaph.* 5, l. 12, §933 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018b2–4): “Tertius modus est, quando sua subiecta habent contrarietatem, utpote quae dividuntur per differentias contrarias; sive ipsa sint contraria, ut album et nigrum, quae dividuntur per congregativum et disgregativum; sive non, ut homo et asinus, quae dividuntur per rationale et irrationale. Contraria enim oportet esse diversa specie, vel omnia, vel illa quae principaliter dicuntur esse contraria.”

*man* and *ass*, which are divided by *rational* and *irrational* (i.e., and there are multiple other differences between *man* and *ass*). For contraries must be diverse in species (< τὰ ἐναντία ἕτερα τῷ εἶδει ἀλλήλων), either all (< ἢ πάντα; i.e., including those contraries that are not divided by contrary differences) or (at least) those that are principally said (to be) *contrary* (< ἢ τὰ λεγόμενα πρώτως; i.e., those contraries that are divided by contrary differences).

4. When they are diverse last species, and are most special in some same genus (*quando sunt diversae species ultimae, eademque specialissimae in aliquo genere* < ὅσων ἐν τῷ τελευταίῳ τοῦ γένους εἶδει οἱ λόγοι ἕτεροι; i.e., in some genus, they are among the lowest species, below which there are only individuals).<sup>99</sup> For example, *man* and *horse*. Indeed, those that differ only in species are more properly said to differ in species than those that (differ) in species and genus.

5. When some accidents should be in the same subject and, yet, they differ from each other (*quando aliqua accidentia sunt in eodem subiecto, et tamen differunt adinvicem* < ὅσα ἐν τῇ αὐτῇ οὐσίᾳ ὄντα ἔχει διαφοράν), since it is impossible for multiple accidents of one species to be in the same subject.<sup>100</sup>

On the other hand, (things) are said (to be the) **same in species** (*eadem specie* = ταῦτὰ... τῷ εἶδει) in opposition to (*per oppositum ad* < ἀντικειμένως) the aforesaid (modes).<sup>101</sup>

#### 41.21. Diversity in Number

Diversity between individuals of the same species is to be considered as follows.<sup>102</sup> According to ARISTOTLE, just as the parts of a genus and of a species are matter and form, so the parts of an individual are *this* matter and *this* form. Whence, just as diversity of matter or form absolutely (taken) produces (*facit*) diversity in genus or species, so *this* form and *this* matter produces diversity in number. However, no form—as such (*in*

<sup>99</sup> *In Metaph.* 5, l. 12, §934 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018b4–6): “Quartus modus est, quando sunt diversae species ultimae, eademque specialissimae in aliquo genere, ut homo et equus. Magis enim proprie dicuntur specie differre, quae solum specie differunt, quam quae specie et genere.”

<sup>100</sup> *In Metaph.* 5, l. 12, §935 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018b6–7): “Quintus modus est, quando aliqua accidentia sunt in eodem subiecto, et tamen differunt adinvicem, eo quod impossibile est plura accidentia unius speciei in eodem subiecto esse.”

<sup>101</sup> *In Metaph.* 5, l. 12, §935 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018b7–8): “Eadem vero specie dicuntur per oppositum ad praedicta.”

<sup>102</sup> *In De Trin.*, q. 4 a. 2 co., 186–195: “Inter indiuidua uero unius speciei hoc modo consideranda est diuersitas. Secundum Philosophum enim in VII Metaphisice, sicut partes generis et speciei sunt materia et forma, ita partes indiuidui sunt hec materia et hec forma; unde sicut diuersitatem in genere uel specie facit diuersitas materie uel forme absolute, ita diuersitatem in numero facit hec forma et hec materia. Nulla autem forma in quantum huiusmodi est hec ex se ipsa.” *Ibid.*, 202–203: “unde forma fit hec per hoc quod recipitur in materia.” As St. Thomas explains, he says, “as such,” on account of the rational soul, which in some mode is *this something* by itself—but not insofar as it is a form. *Ibid.*, 195–202: “dico autem in quantum huiusmodi propter animam rationalem, que quodammodo ex se ipsa est hoc aliquid, set non in quantum forma: intellectus enim quamlibet formam quam possibile est recipi in aliquo sicut in materia uel in subiecto natus est attribuere pluribus, quod est contra rationem eius quod est hoc aliquid.”

*quantum huiusmodi*)—is *this* by itself. Whence, form comes to be (*fit*) *this* because it is received in matter.

Yet, since matter is in itself indistinct, it is impossible for it to individuate the received form except insofar as it is distinguishable.<sup>103</sup> Form is individuated on account of being received in matter only as long as it is received in *this* matter, distinct and determined to the here and the now. And matter is divisible only by quantity; whence, ARISTOTLE says that (if) quantity (is) subtracted, substance remains indivisible (► 35.13); hence, matter is caused to be (*efficitur*) *this* and (is caused to be) designated insofar as it underlies dimensions.

Now, **dimensions** can be considered in two modes:<sup>104</sup>

**1. According to their termination** (► 34.20; 4).<sup>105</sup>

(Dimensions) are said to be terminated according to a determinate measure and figure.<sup>106</sup> And in this way, perfect beings are placed in the genus of quantity.

However, in this mode, (dimensions) cannot be the principle of individuation.<sup>107</sup> Since such termination of dimensions around an individual should be frequently varied, it would follow that the individual would not remain always the same in number.

**2. Without this determination** (of measure and figure; ► 35.12; 35.16).<sup>108</sup>

(In this mode, dimensions are considered) in the nature of dimension only, even though they could never be without some determination—as nor (can) the nature of color (be) without the determination of white and black.<sup>109</sup>

In this mode, (dimensions) are placed in the genus of quantity as the imperfect; and from these indeterminate dimensions, matter is caused to be (*efficitur*) *this* designated (*signata*)

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<sup>103</sup> *In De Trin.*, q. 4 a. 2 co., 203–213: “Set cum materia in se sit indistincta, non potest esse quod formam receptam indiuiduet nisi secundum quod est distinguibilis: non enim forma indiuiduatur per hoc quod recipitur in materia nisi quatenus recipitur in hac materia distincta et determinata ad hic et nunc. Materia autem non est diuisibilis nisi per quantitatem; unde Philosophus dicit in I Phisicorum quod subtracta quantitate remanebit substantia indiuisibilis; et ideo materia efficitur hec et signata secundum quod subest dimensionibus.”

<sup>104</sup> *In De Trin.*, q. 4 a. 2 co., 214–215: “Dimensiones autem iste possunt dupliciter considerari.”

<sup>105</sup> *In De Trin.*, q. 4 a. 2 co., 215–216: “Vno modo secundum earum terminationem.”

<sup>106</sup> *In De Trin.*, q. 4 a. 2 co., 216–218: “et dico eas terminari secundum determinatam mensuram et figuram, et sic ut entia perfecta collocantur in genere quantitatis.”

<sup>107</sup> *In De Trin.*, q. 4 a. 2 co., 219–222: “et sic non possunt esse principium indiuiduationis, quia cum talis terminatio dimensionum uarietur frequenter circa indiuiduum, sequeretur quod indiuiduum non remaneret semper idem numero.”

<sup>108</sup> *In De Trin.*, q. 4 a. 2 co., 223–224: “Alio modo possunt considerari sine ista determinatione.”

<sup>109</sup> *In De Trin.*, q. 4 a. 2 co., 224–227: “in natura dimensionis tantum, quamuis numquam sine aliqua determinatione esse possint, sicut nec natura coloris sine determinatione albi et nigri.”

matter; and in this mode, it individuates a form. Hence, in this mode, diversity according to number in the same species is caused from matter.<sup>110</sup>

Whence, it is evident that matter taken by itself is not the principle of diversity: neither according to species nor according to number.<sup>111</sup> On the other hand, just as it is the principle of diversity according to genus insofar as it underlies a common form, so is it the principle of diversity according to number insofar as it underlies untermiated dimensions.

Hence, since these dimensions should be of a genus of accident, sometimes diversity according to number is reduced into a diversity of matter, (and) sometimes into a diversity of accident; and this, by reason of the aforesaid dimensions.<sup>112</sup>

On the other hand, other accidents are not a principle of individuation, but are a principle of knowing the distinction of individuals.<sup>113</sup> And by this mode, individuation is attributed also to other accidents.

#### **41.22. Diversity of Agents and Patients**

The diversity of agents and patients follows upon a diverse relation to matter.<sup>114</sup> Since each thing acts by reason of a form (*ratione formae*), while it is affected and is moved by reason of matter (*ratione materiae*), it is necessary that those (beings) whose forms are more perfect and less material act on those that are more material, and whose forms are more imperfect.

#### **41.23. Diversity of Operations**

From the diversity of forms (►41.15), according to which the species of things are diversified, follows also the difference of operations.<sup>115</sup> Indeed, since each acts insofar as

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<sup>110</sup> *In De Trin.*, q. 4 a. 2 co., 227–231: “et sic collocantur in genere quantitatis ut imperfectum, et ex his dimensionibus indeterminatis materia efficitur hec materia signata, et sic individuat formam. Et sic ex materia causatur diuersitas secundum numerum in eadem specie.”

<sup>111</sup> *In De Trin.*, q. 4 a. 2 co., 231–237: “Vnde patet quod materia secundum se accepta nec est principium diuersitatis secundum speciem nec secundum numerum; set sicut est principium diuersitatis secundum genus prout subest forme communi, ita est principium diuersitatis secundum numerum prout subest dimensionibus interminatis.”

<sup>112</sup> *In De Trin.*, q. 4 a. 2 co., 238–242: “Et ideo, cum hee dimensiones sint de genere accidentium, quandoque diuersitas secundum numerum reducitur in diuersitatem materie, quandoque in diuersitatem accidentis, et hoc ratione dimensionum predictarum.”

<sup>113</sup> *In De Trin.*, q. 4 a. 2 co., 242–246: “Alia uero accidentia non sunt principium indiuiduationis, set sunt principium cognoscendi distinctionem indiuiduorum. Et per hunc modum etiam aliis accidentibus indiuiduatio attribuitur.”

<sup>114</sup> *ScG* 3, 97 n. 8: “Ex diversa autem habitudine ad materiam sequitur diuersitas agentium et patientium. Cum enim agat unumquodque ratione formae, patitur uero et moveatur ratione materiae, oportet quod illa quorum formae sunt perfectiores et minus materiales, agant in illa quae sunt magis materialia, et quorum formae sunt imperfectiores.”

<sup>115</sup> *ScG* 3, 97 n. 4: “Ex diuersitate autem formarum, secundum quas rerum species diuersificantur, sequitur et operationum differentia. Cum enim unumquodque agat secundum quod est actu, quae enim sunt in potentia, secundum quod huiusmodi, inveniuntur actionis expertia; est autem unumquodque ens

it (itself) is in act—for those (things) that are in potency, insofar as they are such (i.e., in potency), are found to be without actions—, and any one being is in act through form, the operation of the thing must follow upon its (own) form. Therefore, if there are diverse forms, there must be diverse operations.

#### 41.24. Diversity of Properties and Accidents

From the diversity of forms, matters, and agents, follows the diversity of properties and accidents.<sup>116</sup> Indeed, since substance should be the cause of accidents (► 15.16), as the perfect (is the cause) of the imperfect, diverse proper accidents must follow from diverse substantial principles. On the contrary, since diverse impressions in patients (*diversae impressiones in patientibus*, i.e., diverse affections in things that are acted upon) should be (caused) from diverse agents, there must be, according to the diverse agents, diverse accidents that are impressed by the agents.

#### 41.25. Different

ARISTOTLE distinguishes two modes in which the name **different** (*differens* = διάφορον) is said:<sup>117</sup>

1. Insofar as *different* is taken in common (*communiter*) for *diverse* (► 41.26).<sup>118</sup> In this mode, even those things that have a diverse genus and do not have anything in common are said (to be) *different*.

2. Properly, those are said (to be) **different** *which, being diverse, are some same thing* (*quaecumque diversa sunt idem aliquid entia* = ὅς' ἕτερά ἐστι τὸ αὐτό τι ὄντα; ► 41.27).<sup>119</sup> Whence, it is evident that every different is diverse.<sup>120</sup> But not contrarily, for those diverse (things) that do not agree in anything cannot properly said to be different, because they

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actu per formam: oportet quod operatio rei sequatur formam ipsius. Oportet ergo, si sunt diversae formae, quod habeant diversas operationes.”

<sup>116</sup> ScG 3, 97 n. 9: “Ex diversitate autem formarum et materiarum et agentium sequitur diversitas proprietatum et accidentium. Cum enim substantia sit causa accidentis, sicut perfectum imperfecti, oportet quod ex diversis principiis substantialibus diversa accidentia propria consequantur. Rursus, cum ex diversis agentibus sint diversae impressiones in patientibus, oportet quod secundum diversa agentia, diversa sint accidentia quae ab agentibus imprimuntur.”

<sup>117</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a12–15): “distinguit [Philosophus] quot modis dicitur hoc nomen differens. Assignat autem duos modos.”

<sup>118</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a13–14): “Secundus modus est prout differens communiter sumitur pro diverso; et sic differentia dicuntur etiam illa, quae habent diversum genus, et in nullo communicant.”

<sup>119</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a12): “quorum primus est, quod aliquid proprie dicitur differens secundum quod aliqua duo quae sunt *aliquid idem entia*, idest in aliquo uno convenientia, *sunt diversa*.” The Latin definition is taken from the version that St. Thomas is using.

<sup>120</sup> *In Metaph.* 5, l. 12, §916: “Ex quo patet, quod differens omne est diversum, sed non convertitur. Nam illa diversa, quae in nullo conveniunt, non possunt proprie dici differentia, quia non differunt aliquo alio, sed seipsis. Differens autem dicitur, quod aliquo alio differt.”

do not differ from another in something: rather, (they differ) by themselves (*seipsis*), and that is said (to be) different which differs from another in something.

#### 41.26. Different Taken in Common

(When *different* is taken in common, things are said to be different) whether they should agree in something *one*:<sup>121</sup>

1. According to number (*secundum numerum* = ἀριθμῶ).<sup>122</sup> For example, Socrates sitting (is said to be different) from Socrates not sitting (i.e., they are one in number but diverse in respect of sitting).
2. In species (*specie* = εἶδει).<sup>123</sup> For example, Socrates and Plato (are said to be different because they are distinct in number but agree) in *man*.
3. In genus (*genere* = γένει).<sup>124</sup> For example, *man* and *ass* (are said to be different because they are distinct in species but agree) in *animal*.
4. According to proportion (*secundum proportionem* = ἀναλογία).<sup>125</sup> For example, *quantity* and *quality* (are said to be different because they are distinct in genus but agree) in *being* (*in ente*).

#### 41.27. Different Properly Speaking

Those (beings) that are properly said (to be) different must agree in something one.<sup>126</sup>

1. Those that agree in species are only distinguished by accidental differences.<sup>127</sup> For example, Socrates (is) white or just; (and) Plato (is) black or musical.
2. Those things that agree in genus and are diverse according to species, differ according to substantial differences.<sup>128</sup>

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<sup>121</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a12–13): “Differens autem dicitur, quod aliquo alio differt sive convenient in aliquo uno [...]”

<sup>122</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a13): “sive convenient in aliquo uno secundum numerum, sicut Socrates sedens a Socrate non sedente.”

<sup>123</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a13): “sive convenient in aliquo uno specie, sicut Socrates et Plato in homine.”

<sup>124</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a13): “sive in aliquo uno genere, sicut homo et asinus in animali.”

<sup>125</sup> *In Metaph.* 5, l. 12, §916 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a13): “sive in aliquo uno secundum proportionem, sicut quantitas et qualitas in ente.”

<sup>126</sup> *In Metaph.* 5, l. 12, §917: “Cum enim oporteat ea, quae proprie dicuntur differentia, in uno aliquo convenire.”

<sup>127</sup> *In Metaph.* 5, l. 12, §917: “ea vero, quae conveniunt in specie, non distinguuntur nisi per accidentales differentias, ut Socrates albus vel iustus, Plato niger vel musicus.”

<sup>128</sup> *In Metaph.* 5, l. 12, §917: “quae vero conveniunt in genere et sunt diversa secundum speciem, differunt differentiis substantialibus.”

Therefore, those are most properly said (to be) *different* which are the same in genus and diverse according to species. And every genus is divided in contrary differences, but not every genus is divided in contrary species (► 41.20, ¶3).<sup>129</sup>

For example, the species of colors are contraries: namely, white (and) black; and (their) differences (are contraries) too: namely, able of congregating (*congregativum*) and able of segregating (*disgregativum*).<sup>130</sup> On the other hand, the differences of *animal* are indeed contrary—namely, *rational* and *irrational*—, but the species of *animal*—e.g., *man* and *horse*—are not contrary.

Therefore, ARISTOTLE teaches that those things are most properly said (to be) *different* which either are contrary species, such as white and black, or are non-contrary species of one genus but have contrariety in substance by reason (*ratione*) of contrary differences that are (proper) of the substance of the species.<sup>131</sup>

#### 41.28. Difference

**Difference** is *that which constitutes a species* (as already observed; ► 22.7).<sup>132</sup> Each thing is constituted in a species insofar as it is determined into some special degree in (i.e., among) beings, because the species of things are like numbers, which differ by addition and subtraction of a unit (► 16.7).

In material things, that which determines (something) in a special degree—namely, form—is other than that which is determined—namely, matter.<sup>133</sup> Whence, the genus is taken from one (i.e., from matter), and from the other (i.e., from form), the difference.

In immaterial things, on the other hand, that which determines is no other than that which is determined (► 41.18). Rather, each (thing) has, according to itself (*secundum seipsam*),

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<sup>129</sup> *In Metaph.* 5, l. 12, §917: “illa propriissime dicuntur differentia, quae sunt eadem genere et diversa secundum speciem. Omne autem genus dividitur in contrarias differentias; non autem omne genus dividitur in contrarias species.”

<sup>130</sup> *In Metaph.* 5, l. 12, §917: “Coloris enim species sunt contrariae, scilicet album, nigrum: et differentiae etiam, scilicet congregativum et disgregativum. Animalis autem differentiae quidem sunt contrariae, scilicet rationale et irrationale sed species animalis, ut homo et equus etc. non sunt contrariae.”

<sup>131</sup> *In Metaph.* 5, l. 12, §917: “Deinde docet [Philosophus] quibus conveniat esse differens secundum primum modum qui est proprius. [...] Illa igitur, quae propriissime dicuntur differentia, sunt quae vel sunt species contrariae, sicut album et nigrum: vel sunt species unius generis non contrariae, sed habentia contrarietatem in substantia ratione contrarii differentiarum quae sunt de substantia specierum.” Cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a14–15: “διάφορα δὲ λέγεται [...] ἐτι [...] καὶ τὰ ἐναντία, καὶ ὅσα ἔχει ἐν τῇ οὐσίᾳ τὴν ἑτερότητα.”

<sup>132</sup> *STh* I, q. 13 a. 5 co.: “differentia est quae constituit speciem. Unumquodque autem constituitur in specie, secundum quod determinatur ad aliquem specialem gradum in entibus, quia species rerum sunt sicut numeri, qui differunt per additionem et subtractionem unitatis, ut dicitur in VIII Metaphys.”

<sup>133</sup> *STh* I, q. 13 a. 5 co.: “In rebus autem materialibus aliud est quod determinat ad specialem gradum, scilicet forma, et aliud quod determinatur, scilicet materia, unde ab alio sumitur genus, et ab alio differentia.”



a determinate degree in beings. Hence, genus and difference are not taken in them according to other and other (i.e., according to that which determines and that which is determined), but according to one and the same.<sup>134</sup>

This also differs according to our consideration, for insofar as our intellect considers that thing as indeterminate, the *ratio* of *genus* is received in it; but insofar as (our intellect) considers it as determinate, the *ratio* of *difference* is received.<sup>135</sup>

#### 41.29. Difference vs. Diversity

ARISTOTLE shows in what *difference* and *diversity* differ. He says (firstly) that difference is other than diversity (< διαφορά... καὶ ἑτερότης ἄλλο).<sup>136</sup> Indeed, it is not necessary for two (beings), of which one is diverse from the other, to be diverse by something (< οὐκ ἀνάγκη εἶναι τιῶν ἕτερον), for they can be diverse by themselves. This is evident from what has been said: any being compared to another is either diverse or the same (► 41.9, ¶1).

On the other hand, that which is different from another must be different by something (< τὸ... διάφορον τινὸς τιῶν διάφορον).<sup>137</sup> Whence, that by which the differing (beings) differ must necessarily be some same thing in those that do not thus differ. And what is the same in many is either a genus or a species. Whence, **everything that differs, differs either in genus or in species.**

ARISTOTLE proves by induction what he had said about the *ratio* of *difference*. For all those (beings) that differ seem to be such: to wit, that they are not only diverse, but (are) diverse in some mode.<sup>138</sup> For example, *these* are diverse in genus, while *these* are in the same category and in the same genus but differ in species; and some are the same in species.

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<sup>134</sup> *STh* I, q. 13 a. 5 co.: "Sed in rebus immaterialibus non est aliud determinans et determinatum, sed unaquaeque earum secundum seipsam tenet determinatum gradum in entibus. Et ideo genus et differentia in eis non accipitur secundum aliud et aliud, sed secundum unum et idem."

<sup>135</sup> *STh* I, q. 13 a. 5 co.: "Quod tamen differt secundum considerationem nostram, in quantum enim intellectus noster considerat illam rem ut indeterminate, accipitur in eis ratio generis; in quantum vero considerat ut determinate, accipitur ratio differentiae."

<sup>136</sup> *In Metaph.* 10, l. 4, §2017 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b23–25): "Ostendit [Philosophus] *in quo differat differentia et diversitas*; dicens, quod aliud est differentia, aliud diversitas. Duo enim quorum unum est diversum ab altero, non est necesse per aliquid esse diversa. Possunt enim esse diversa seipsis. Et hoc ex praedictis patet; quia quodcumque ens alteri comparatum, aut est diversum, aut est idem."

<sup>137</sup> *In Metaph.* 10, l. 4, §2018 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b25–28): "Sed quod est differens ab aliquo, oportet quod per aliquid sit differens. Unde necesse est, ut id quo differentia differunt, sit aliquid idem in illis quae non sic differunt. Hoc autem quod est idem in pluribus, vel est genus, vel est species. Unde omne differens, differt aut genere, aut specie."

<sup>138</sup> *In Metaph.* 10, l. 4, §2022 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b32–1055a2): "*Probat* [Philosophus] *per inductionem quod dixerat de ratione differentiae*; quia omnia differentia videntur esse talia, scilicet quod non solum sint diversa, sed aliquo modo diversa: sicut haec quidem diversa sunt genere; haec autem sunt in eodem praedicamento, et in eodem genere, sed differunt specie; et quaedam sunt eadem specie."

### 41.30. Different, Diverse in Genus

Those are **different in genus** (*genere differunt*) of which the matter is not common (*quorum non est communis materia* = ὧν μὴ ἔστι κοινὴ ἡ ὕλη).<sup>139</sup> Indeed, as already said (► 16.8), although matter is not a genus, however, the *ratio* of the genus is taken from that which is material in the thing. For example, sensible nature is material in man in respect of reason; and hence, that which does not communicate with man in sensible nature is of another genus.

And since those that do not communicate in matter are not generated one to the other, it follows that those are **diverse in genus** (*genere diversa*) of which there is no generation to one another (*quorum non est generatio adinvicem* < μηδὲ γένεσις εἰς ἄλληλα), as are diverse in genus whatever (things that) are in diverse categories, as line and whiteness, of which one does not come to be from the other.<sup>140</sup>

### 41.31. Different in Species

Those are said (to be) **different in species** (*specie differentia*) of which the genus is the same (*quorum <est> idem genus* = ὧν τὸ αὐτὸ γένος) and differ according to form.<sup>141</sup> (That) is said (to be the) **genus** (*genus* = γένος) which is predicated of two (subjects) differing in species (*quod praedicatur de duobus specie differentibus* < *quod ambo idem dicuntur secundum substantiam differentia* = ὁ ἄμφω τὸ αὐτὸ λέγονται κατὰ τὴν οὐσίαν τὰ διάφορα), as (*animal* or *substance* is predicated) of *man* and of *horse*. For contraries differ (< τὰ... ἐναντία διάφορα), and contrariety is some difference (< ἡ ἐναντίωσις διαφορά τις).

### 41.32. Qualitative Differences

In sensible things, essential (i.e., substantial) differences are unknown.<sup>142</sup> Whence, they are signified by accidental differences that flow from the essential (principles), as a cause is signified by its effect. For example, *two-legged* is posited in the difference of *man*.

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<sup>139</sup> *In Metaph.* 10, I. 4, §2019 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b28): “Genere quidem differunt, quorum non est communis materia. Dictum est enim supra in octavo, quod licet materia non sit genus, tamen ab eo quod est materiale in re, sumitur ratio generis. Sicut natura sensibilis est materialis in homine respectu rationis. Et ideo illud quod non communicat in natura sensibili cum homine, est alterius generis.”

<sup>140</sup> *In Metaph.* 10, I. 4, §2020 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b29–30): “Et quia ea quae non communicant in materia, non generantur adinvicem, sequitur ea genere esse diversa, quorum non est generatio adinvicem. Quod etiam necesse fuit addere propter ea quae non habent materiam, sicut accidentia sunt. Ut sint genere diversa quaecumque sunt in diversis praedicamentis, ut linea et albedo, quorum unum non fit ex alio.”

<sup>141</sup> *In Metaph.* 10, I. 4, §2021 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b23–32): “Specie vero differentia dicuntur, quorum est idem genus, et secundum formam differunt. Dicitur autem genus quod praedicatur de duobus specie differentibus, sicut de homine et de equo. Contraria autem differunt, et contrarietas est differentia quaedam.”

<sup>142</sup> *De ente*, c. 5, 76–81: “In rebus enim sensibilibus etiam ipse differentie essentiales ignote sunt; unde significantur per differentias accidentales quae ex essentialibus oriuntur, sicut causa significatur per suum effectum: sicut bipes ponitur differentia hominis.”

In sensible substances, the genus is taken from that which is material in the thing; and the difference, from that which is formal in it.<sup>143</sup> Whence, AVICENNA says that, in things composed from matter and form, the form is the simple difference of that which is constituted from it: not, however, in such a way that the form itself should be a difference, but because it is the principle of difference. And such a difference is said to be a simple difference because it is taken from that which is a part of the quiddity of the thing: namely, from the form.

### 41.33. Equal

ARISTOTLE does not distinguish (the modes in which) *equal* (is said) because it is not said in multiple (modes)—except perhaps according to the diverse species of quantity.<sup>144</sup>

However, two (parts) are to be considered in equality:<sup>145</sup>

1. The plurality of **supposita**, between which the relation of equality is considered.<sup>146</sup>

The supposita of equality are many; and these are not presupposed (to be prior to) to the supposita of inequality: otherwise, twoness (*dualitas*, i.e., *duality* or, in a denominative way, *two*; ►40.1) would have to precede before every unity (*unitas*, i.e., *oneness* or, in a denominative way, the *one* that is the principle of number; ►38.1), since equality is found first in twoness, while there is inequality between unity and twoness.<sup>147</sup>

2. The **cause** of equality.<sup>148</sup>

The cause of equality is *the unity of quantity*, which is the *ratio* of **equality**, while (the cause) of other proportions (is) some number (►37.3).<sup>149</sup>

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<sup>143</sup> *De ente*, c. 5, 87–98: “in substantiis sensibilibus genus sumitur ab ea quod est materiale in re, differentia uero ab eo quod est formale in ipsa; unde dicit Auicenna in principio libri sui *De anima* quod forma in rebus compositis ex materia et forma «est differentia simplex eius quod constituitur ex illa»: non autem ita quod ipsa forma sit differentia, sed quia est principium differentie, ut idem dicit in sua *Methaphisica*. Et dicitur talis differentia esse differentia simplex quia sumitur ab eo quod est pars quidditatis rei, scilicet a forma.”

<sup>144</sup> *In Metaph.* 10, l. 4, §2001: “Aequale uero non distinguit, quia non dicitur multipliciter, nisi forte secundum diversas species quantitatis.”

<sup>145</sup> *In De Trin.*, q. 1 a. 4 ad 3, 116–117: “in equalitate est duo considerare.” *De ueritate*, q. 10 a. 13 ad 5: “in aequalitate duo considerantur.”

<sup>146</sup> *De ueritate*, q. 10 a. 13 ad 5: “et aequalitatis supposita.” *In De Trin.*, q. 1 a. 4 ad 3, 116–119: “in equalitate est duo considerare, scilicet pluralitatem suppositorum, inter que attenditur relatio, et unitatem quantitatis.”

<sup>147</sup> *De ueritate*, q. 10 a. 13 ad 5: “Sed supposita aequalitatis sunt multa; et haec non praesupponuntur ad supposita inaequalitatis; alias oporteret ante omnem unitatem dualitatem praecedere, quia in dualitate primo invenitur aequalitas, inter unitatem uero et dualitatem est inaequalitas.”

<sup>148</sup> *De ueritate*, q. 10 a. 13 ad 5: “scilicet aequalitatis causa.”

<sup>149</sup> *De ueritate*, q. 10 a. 13 ad 5: “Causa aequalitatis est unitas, aliarum uero proportionum aliquis numerus.” *In De Trin.*, q. 1 a. 4 ad 3, 116–119: “in equalitate est duo considerare, scilicet pluralitatem suppositorum [...] et unitatem quantitatis que est ratio equalitatis.”

Therefore, the reduction of inequality to equality does not come to be by reason of the plurality of the supposita (►¶1), but by reason of the cause, for just as unity is the cause of equality, so is plurality the cause of inequality.<sup>150</sup>

Whence, in this mode, from this part equality precedes inequality, just as unit (precedes) number.<sup>151</sup> Indeed, the cause of equality must be before the cause of inequality: (but) not (in such a way) that before any unequal (quantities) there should be some equal (quantities); otherwise, in the order of numbers, there would have to be something before *one* and *two* (*ante unitatem et dualitatem*), which are unequal; or plurality (would have) to be found in the in unity itself.

*Equal* is opposed to *great* and *small* as privation is opposed to habit (i.e., to be equal is to be one in quantity, while to be great or to be small is to be multiple).<sup>152</sup>

Where equality is considered according to virtual quantity, equality includes in itself likeness (*similitudo*) and something more, since it excludes excess.<sup>153</sup> Indeed, whatever (things that) communicate in one form can be said (to be) *alike*, even if they unequally (*inaequaliter*) participate (in) the form, as if one were to say, “air is like fire in heat,” but they could not be said to be equal if one were to more perfectly participate (in) the form.

#### 41.34. Alike

ARISTOTLE posits four modes in which **alike** is said:<sup>154</sup>

1. A mode that responds to the third mode of *same* (►41.4, ¶3).<sup>155</sup> Indeed, since **same** is *one in substance*, while **alike** is *one in quality*, *that (illud)*, insofar as it is said (to be the)

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<sup>150</sup> *In De Trin.*, q. 1 a. 4 ad 3, 119–123: “Reductio ergo inequalitatis ad equalitatem non fit ratione pluralitatis suppositorum set ratione cause, quia sicut unitas est causa equalitatis, ita inequalitatis causa est pluralitas.”

<sup>151</sup> *De veritate*, q. 10 a. 13 ad 5: “Unde hoc modo ex parte ista, aequalitas inaequalitatem praecedat, sicut unitas numerum.” *In De Trin.*, q. 1 a. 4 ad 3, 123–128: “et ideo oportet quod causa equalitatis sit ante causam inequalitatis, non quod ante quelibet inequalia sint aliqua equalia: alias oporteret in ordine numerorum esse aliquid ante unitatem et dualitatem, que sunt inequalia, uel in ipsa unitate inueniri pluralitatem.”

<sup>152</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 4: “opponitur [unum quod convertitur cum ente] multitudini, sicut privatio habitui, ut dicit Philosophus. Unde etiam aequale opponitur magno et parvo, sicut privatio. Nec unum est privatio illius multitudinis quam constituit; sed multitudinis quae negatur esse in ipso quod dicitur unum.”

<sup>153</sup> *STh I*, q. 42 a. 1 ad 2: “ubi attenditur aequalitas secundum quantitatem virtuales, aequalitas includit in se similitudinem, et aliquid plus, quia excludit excessum. Quaecumque enim communicant in una forma, possunt dici similia, etiamsi inaequaliter illam formam participant, sicut si dicatur aer esse similis igni in calore, sed non possunt dici equalia, si unum altero perfectius formam illam participet.”

<sup>154</sup> *In Metaph.* 10, l. 4, §2001: “ostendit [Philosophus...] quot modis dicitur simile.” *Ibid.*, §2006 (cf. ARISTOTLE, *Metaphysica* l.3, 1054b3–13): “Ostendit quot modis dicitur simile; et ponit quatuor modos.”

<sup>155</sup> *In Metaph.* 10, l. 4, §2006: “quorum primus respondet tertio modo eius, quod dicitur idem. Quia enim idem est unum in substantia, simile vero unum in qualitate, oportet illud, secundum quod dicitur simile, se habere ad id, secundum quod dicitur idem, sicut se habet qualitas ad substantiam. Et quia usus est aequalitate quasi unitate in substantia, utitur figura et proportione quasi qualitate.”

same, must be related to *it (id)*, as quality is related to substance. And since equality is used as unity in substance, **figure and proportion** is used as (unity in) quality.

It ought to be considered, too, that, since quality and quantity should be founded on substance, where(ever) there is unity of substance, it follows that there should be unity of quantity and of quality.<sup>156</sup> However, unity is not named from quantity and quality, but from the more principal—namely, (from) substance. Hence, where(ever) there is unity of substance, (there) is not said (to be a) *likeness* or *equality*, but only *identity*. Therefore, a diversity of substance is required for likeness or equality.

Wherefrom, ARISTOTLE says that some (beings) are said (to be) *alike* (*similia* = ὅμοια) even if they should not be simply the same according to the species of substance (< ἐὰν μὴ ταῦτὰ ἀπλῶς ὄντα), and (even) if they should not be also indifferent according to the subjected substance that is said (to be the) *suppositum* (< μηδὲ κατὰ τὴν οὐσίαν ἀδιάφορα τὴν συγκειμένην), but are the same according to species in some mode (< κατὰ τὸ εἶδος ταῦτὰ ᾗ).<sup>157</sup>

For example, a greater tetragon is said to be like a lesser tetragon: namely, when the angles of one are equal to the angles of the other, and the sides that contain equal angles are proportional.<sup>158</sup> And likewise, multiple unequal straight lines are not the same simply, even if they should be alike.<sup>159</sup> Hence, in this way, it is evident that this likeness is considered *according to the unity of figure and proportion*.<sup>160</sup>

It can also be considered here that *identity* is said when the unity is according to the perfect *ratio* of the species; and *likeness* is said when the unity is not according to the whole *ratio* of the species. For example, if someone should say that *those that are one in genus* are **alike**, while *those that are one in species* are the **same**, as the given examples seem to suggest. Indeed, ARISTOTLE says that equal straight lines—and equal tetragons—have

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<sup>156</sup> *In Metaph.* 10, l. 4, §2007: “Attendum etiam est, quod cum qualitas et quantitas fundentur in substantia: ubi est unitas substantiae, sequitur quod sit unitas quantitatis et qualitatis, non tamen unitas nominatur a quantitate et qualitate, sed a principaliori, scilicet substantia. Et ideo ubi est unitas substantiae, non dicitur similitudo vel aequalitas, sed identitas tantum.” *Ibid.*, §2008: “Ad similitudinem ergo vel aequalitatem requiritur diversitas substantiae.”

<sup>157</sup> *In Metaph.* 10, l. 4, §2008 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b3–5): “Et propter hoc dicit [Philosophus] quod similia dicuntur aliqua, licet non sint simpliciter eadem secundum speciem substantiae, et si non sint etiam indifferentia secundum substantiam subiectam quae dicitur suppositum, sed sunt eadem secundum speciem aliquo modo.”

<sup>158</sup> *In Metaph.* 10, l. 4, §2008 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b5–6): “sicut maius tetragonum dicitur esse simile minori tetragono, quando scilicet anguli unius sunt aequales angulis alterius, et latera aequales angulos continentia sunt proportionalia.”

<sup>159</sup> *In Metaph.* 10, l. 4, §2008 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b6): “Et similiter multae rectae lineae inaequales non sunt eadem simpliciter, licet sint similes.”

<sup>160</sup> *In Metaph.* 10, l. 4, §2008 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b6–7): “Sic igitur patet quod haec similitudo attenditur secundum unitatem figurae et proportionis.”

identity to each other; and that unequal straight lines—and unequal tetragons—have likeness.<sup>161</sup>

2. If some (things) **agree** (*conveniunt*) **in one form** that should be naturally susceptible of more or less (< ἐν οἷς τὸ μᾶλλον καὶ ἥττον ἐγγίγνεται), and yet it participates (in) that form **without more or less** (< μήτε μᾶλλον ἢ μήτε ἥττον; ►41.36, ¶1).<sup>162</sup>

For example, whiteness receives intension and remission.<sup>163</sup> Whence, if some (beings) are equally white, without more or less, they are said (to be) *alike*.

Therefore, being alike (*esse simile*) is said equivocally of figure and of color because the cause of likeness is not the same.<sup>164</sup> (As already noted, this can also be said of likeness in figures and numbers, as PROCLUS teaches; ►7.4.)<sup>165</sup>

In figures, being alike is only for sides to be proportionate to each other and for angles to be equal.<sup>166</sup> In colors, on the other hand, to be alike is for them to make the same alteration in sense.

3. When some (beings) **agree** (*conveniunt*) **in one form or affection** (*una forma aut passione* < *eadem passio et una specie* = τὸ αὐτὸ πάθος καὶ ἐν τῷ εἶδει), also **according to more or less** (►41.36, ¶2). For example, the whiter and the less white are said (to be) *alike* because the species—that is, their quality—is one (< ἐν τῷ εἶδος αὐτῶν).<sup>167</sup>

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<sup>161</sup> *In Metaph.* 10, l. 4, §2009: “Potest autem et hic considerari quod quando est unitas secundum rationem perfectam speciei, dicitur identitas; quando autem est unitas non secundum totam rationem speciei, dicitur similitudo. Ut si quis dicat quod ea quae sunt unum genere, sunt similia; ea vero quae sunt unum specie, sunt eadem; ut videntur innuere exempla posita. Nam lineas rectas aequales et tetragona aequalia dixit [Philosophus] habere identitatem adinvicem; tetragona autem inaequalia et rectas lineas inaequales habere similitudinem.”

<sup>162</sup> *In Metaph.* 10, l. 4, §2010 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b7–9): “Secundus modus est si aliqua conveniunt in una forma quae nata sit suscipere magis et minus, et tamen participant illam formam sine magis et minus.”

<sup>163</sup> *In Metaph.* 10, l. 4, §2010: “sicut albedo recipit intensionem et remissionem; unde si aliqua sunt alba aequaliter sine magis et minus, dicuntur similia.”

<sup>164</sup> *In Post. an.* 2, l. 19, 72–80 (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a11–15): “*eius quod est esse simile*, alia causa est in coloribus et in figuris, quia equivoce dicitur utrobique: in figuris enim nichil est aliud esse simile quam quod *latera* habeant analogiam, id est quod sint ad invicem proportionalia, et quod anguli sint aequales; set *in coloribus* esse simile est quod faciant eandem inmutationem in sensu, uel *aliquid aliud huiusmodi*.” Cf. *ibid.*, l. 16, 125–128: “dicitur enim simile in coloribus ex unitate coloris, dicitur autem simile in figuris ex eo quod anguli sunt aequales et latera proportionalia.”

<sup>165</sup> PROCLUS, *In primum Euclidis Elementorum librum commentarii*, 33.4–7: “πολλὰ δὲ τὴν μὲν αὐτὴν ἔχει κατηγορίαν, διαφέρει δὲ κατ’ εἶδος ἐφ’ ἐκάστων τὸ κοινόν, οἷον ἡ ὁμοιότης ἐν σχήμασι καὶ ἀριθμοῖς.”

<sup>166</sup> ARISTOTLE, *Analytica Posteriora* B.17, 99a13–14: “ἴσως τὸ ἀνάλογον ἔχειν τὰς πλευρὰς καὶ ἴσας τὰς γωνίας.” Cf. EUCLID, *Opera Omnia*, v.2, 72.2–4: “Ὅμοια σχήματα εὐθύγραμμά ἐστιν, ὅσα τὰς τε γωνίας ἴσας ἔχει κατὰ μίαν καὶ τὰς περὶ τὰς ἴσας γωνίας πλευρὰς ἀνάλογον.” HEIBERG’S version (*ibid.*, 73): “Figurae rectilineae similes sunt, quaecunque et angulos singulos aequales habent et latera aequales angulos comprehendunt proportionalia.”

<sup>167</sup> *In Metaph.* 10, l. 4, §2011 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b9–11): “Tertius modus est quando aliqua conveniunt in una forma aut passione, etiam secundum magis et minus; sicut magis album et minus album dicuntur similia, quia est una species, id est qualitas ipsorum.”

4. Not on account of only one quality, but **in consideration to many (qualities)**.<sup>168</sup> For example, if those should be said to be alike which agree (*conveniunt*) in many (more) than they would differ, whether simply (< ἢ ἀπλῶς) or in respect of those that appear more prominently (*in promptu* < ἢ τὰ πρόχειρα). For example, tin is said to be like silver because it agrees in many (qualities). Likewise, fire (agrees with) gold.

#### 41.35. Likeness According to Participation

Some (beings) are said (to be) *alike* (*similia*) in one of two modes:<sup>169</sup>

1. Because they participate (in) one form, as two white (things participate in) whiteness. And in this way, every like must be composite from that in which it agrees with the other like and from that in which it differs from it, since likeness only is of (i.e., pertains to) different (beings), according to BOETHIUS.<sup>170</sup>

2. Because one that has the form in a participative (mode) imitates that which has (the form) essentially (►26.11).<sup>171</sup> For example, if a white body should be said (to be) like separated whiteness; or a compound body (should be said to be like the separated form of its elements).

#### 41.36. Likeness in Those That Communicate in the Same Form

Likeness (*similitudo*) is considered according to an agreement or communication in a form. Whence, likeness is multiple according to the multiple modes of communicating in a form.<sup>172</sup>

(Therefore, beings are said to be **alike** [*similia*] in the following modes):

1. Those which communicate in the same form **according to the same ratio** and **according to the same mode**. These are not only said (to be) *alike*, but (also) *equal* in

<sup>168</sup> *In Metaph.* 10, l. 4, §2012 (cf. ARISTOTLE, *Metaphysica* I.3, 1054b11–13): “Quartus modus est secundum quod aliqua dicuntur similia, non propter unam qualitatem tantum, sed consideratione multorum: ut dicantur illa esse similia quae in pluribus conveniunt quam differant, vel simpliciter, vel quantum ad ea quae in promptu apparent. Sicut stannum argento dicitur simile, quia in multis convenit. Et similiter ignis auro, et crocus rubeo.” Omitting the last example, which is unclear in the Latin versions St. Thomas is using: the Greek refers to yellow and red as being qualities of fire and gold, while both Latin translations separate these qualities as a new example of likeness, taking ἢ for ἢ in “χρυσὸς δὲ πυρὶ ἢ ξανθὸν καὶ πυρρόν,” as the apparatus of the critical edition of the *Traslatio Anonyma* suggests.

<sup>169</sup> *In Sent.* 1, d. 48 q. 1 a. 1 co.: “Contingit autem aliqua dici similia dupliciter.”

<sup>170</sup> *In Sent.* 1, d. 48 q. 1 a. 1 co.: “Vel ex eo quod participant unam formam, sicut duo albi albedinem; et sic omne simile oportet esse compositum ex eo in quo convenit cum alio simili, et ex eo in quo differt ab ipso, cum similitudo non sit nisi differentium, secundum Boetium.”

<sup>171</sup> *In Sent.* 1, d. 48 q. 1 a. 1 co.: “Vel ex eo quod unum quod participative habet formam, imitatur illud quod essentialiter habet. Sicut si corpus album diceretur simile albedini separatae, vel corpus mixtum igneitate ipsi igni.”

<sup>172</sup> *STh* I, q. 4 a. 3 co.: “cum similitudo attendatur secundum convenientiam vel communicationem in forma, multiplex est similitudo, secundum multos modos communicandi in forma.”

their likeness. And this is the most perfect likeness. For example, two equally white things are said (to be) *alike in whiteness*.<sup>173</sup>

2. Those which communicate in a form **according to the same *ratio***, and not according to the same mode, but **according to more or less** (*secundum magis et minus*).<sup>174</sup> This is an imperfect likeness. For example, the less white is said (to be) *like* the whiter.

3. Those which communicate in the same form but **not according to the same *ratio***.<sup>175</sup>

This is evident in non-univocal agents.<sup>176</sup> Indeed, since *every agent*—insofar as it is an agent—*produces its like* (i.e., *omne agens agit sibi simile*; ► 10.1, ¶2), and *each (agent) acts according to its form* (*agit unumquodque secundum suam formam*), there necessarily is in the effect a likeness of the form of the agent.

Therefore, if the agent should be contained in the same species with its effect, the likeness in form between producer and product (*inter faciens et factum*) will be according to the same species.<sup>177</sup> For example, human generates human.

On the other hand, if the agent should not be contained in the same species, there will be a likeness, but not according to the same *ratio* of species.<sup>178</sup> For example, those that are generated by virtue of the sun attain some likeness to the sun; but not in such a way that they would receive the form of the sun according to a likeness of species, but according to a likeness of genus.

Therefore, if there should be some agent that would not be contained in a genus, its effects would even more remotely attain a likeness to the form of the agent. Not, however, in such a way that they would participate (in) a likeness to the form of the agent according to the same *ratio* of species or of genus, but according to some analogy, just as (the act of) being

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<sup>173</sup> *STh* I, q. 4 a. 3 co.: “Quaedam enim dicuntur similia, quae communicant in eadem forma secundum eandem rationem, et secundum eundem modum, et haec non solum dicuntur similia, sed aequalia in sua similitudine sicut duo aequaliter alba, dicuntur similia in albedine. Et haec est perfectissima similitudo.”

<sup>174</sup> *STh* I, q. 4 a. 3 co.: “Alio modo dicuntur similia, quae communicant in forma secundum eandem rationem, et non secundum eundem modum, sed secundum magis et minus; ut minus album dicitur simile magis albo. Et haec est similitudo imperfecta.”

<sup>175</sup> *STh* I, q. 4 a. 3 co.: “Tertio modo dicuntur aliqua similia, quae communicant in eadem forma, sed non secundum eandem rationem; ut patet in agentibus non univocis.”

<sup>176</sup> *STh* I, q. 4 a. 3 co.: “ut patet in agentibus non univocis. Cum enim omne agens agat sibi simile in quantum est agens, agit autem unumquodque secundum suam formam, necesse est quod in effectu sit similitudo formae agentis.”

<sup>177</sup> *STh* I, q. 4 a. 3 co.: “Si ergo agens sit contentum in eadem specie cum suo effectu, erit similitudo inter faciens et factum in forma, secundum eandem rationem speciei; sicut homo generat hominem.”

<sup>178</sup> *STh* I, q. 4 a. 3 co.: “Si autem agens non sit contentum in eadem specie, erit similitudo, sed non secundum eandem rationem speciei, sicut ea quae generantur ex virtute solis, accedunt quidem ad aliquam similitudinem solis, non tamen ut recipiant formam solis secundum similitudinem speciei, sed secundum similitudinem generis.”



itself (*ipsum esse*) is common to all (beings). And in this mode, those (beings) that are (i.e., proceed) from the first and universal principle of the whole (act of) being (*esse*) come to be like (*assimilantur*) it insofar as they are beings (*entia*).<sup>179</sup>

#### 41.37. Alike in Affection

It is evident (*constat*) that *one in quality* produces the *like* (*unum in qualitate facit simile*).<sup>180</sup> And affection is associated with quality (*passio est affinis qualitati*), since an affection is considered above all in **alteration**, which is *a mutation of quality*; whence, too, there is some species of quality that is an affection and a passible quality (e.g., color).

Wherefrom, likeness is considered not only according to an agreement in quality, but (also) according to an agreement in affection.<sup>181</sup> Which can happen in two (modes): either from the part of the affection or from the part of that at which the affection is terminated.

Hence, ARISTOTLE posits multiple modes of the like, for some (things) are said to be **alike** (*similia* = ὁμοία) in three modes:<sup>182</sup>

1. Those that undergo the same affection (*patiuntur idem < quae idem [sunt omnino] passa = τὰ... πάντῃ ταύτῳ πεπονθότα*).<sup>183</sup> For example, two (pieces of) wood that are being burned (*comburuntur*) can be said (to be) *alike*.
2. Those that undergo multiple affections, whether they undergo the same affection or diverse affections (*patiuntur aliqua plura... sive patiuntur idem, sive diversa < plura idem passa aut diversa = τὰ πλείω ταύτῳ πεπονθότα ἢ ἕτερα*).<sup>184</sup> Thus, two men, of which one is cudged and the other incarcerated, are said (to be) *alike* in undergoing an affection.

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<sup>179</sup> *STh* I, q. 4 a. 3 co.: “Si igitur sit aliquod agens, quod non in genere contineatur, effectus eius adhuc magis accedent remote ad similitudinem formae agentis, non tamen ita quod participant similitudinem formae agentis secundum eandem rationem speciei aut generis, sed secundum aliqualem analogiam, sicut ipsum esse est commune omnibus. Et hoc modo illa quae sunt a [primo et universali principio totius esse], assimilantur ei in quantum sunt entia.”

<sup>180</sup> *In Metaph.* 5, l. 12, §918: “Constat enim quod unum in qualitate facit simile. Passio autem est affinis qualitati, eo quod praecipue passio in mutatione qualitatis, quae est alteratio, attenditur. Unde et quaedam species qualitatis est passio et passibilis qualitas.”

<sup>181</sup> *In Metaph.* 5, l. 12, §918: “Et propter hoc similitudo non solum attenditur secundum convenientiam in qualitate, sed secundum convenientiam in passione. Quod quidem potest esse dupliciter. Aut ex parte passionis, aut ex parte eius ad quod passio terminatur.”

<sup>182</sup> *In Metaph.* 5, l. 12, §918 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a15–18): “Ostendit [Philosophus] *quot modis dicitur simile*. Circa hoc autem duo facit. Nam primo assignat *quot modis dicitur simile*. [...] Circa primum duo facit. Primo ostendit *quot modis dicitur simile*. [...] Ponit autem tres modos similitudinis.” Ibid., §919: “Sic igitur tripliciter aliqua sunt similia.”

<sup>183</sup> *In Metaph.* 5, l. 12, §919 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a15–16): “Uno modo, quia patiuntur idem, sicut duo ligna, quae comburuntur, possunt dici similia.” The *Traslatio Anonyma* has *sunt omnino*, which MOERBEKE omits.

<sup>184</sup> *In Metaph.* 5, l. 12, §919 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a16): “Alio modo ex hoc solo, quod patiuntur aliqua plura, similia dicuntur, sive patiuntur idem, sive diversa: sicut duo homines, quorum unus fugatur, et alter incarceratur, dicuntur similes in patiendo.”

3. Those of which a quality is one (*quorum una est qualitas* = ὧν ἡ ποιότης μία).<sup>185</sup> For example, two white (beings); and two stars in the sky, having like brightness or virtue.

#### 41.38. Degrees of Likeness

ARISTOTLE shows whence (*unde*), in what mode (*quomodo*), something is said (to be) *maximally alike*.<sup>186</sup> For when there are multiple contrarieties according to which alteration is considered, that is said (to be) more properly alike which is like something according to more of those contrarieties.

The same is (the case) between two (things) of which each is like some third (thing) according to one quality only: that which is alike according to a quality (that is) more proper to it, is more properly said (to be) like it.<sup>187</sup>

#### 41.39. Analogical Likeness

ARISTOTLE posits a twofold mode of (analogical) likeness.<sup>188</sup>

1. One that is found **in diverse genera**, and this is considered **according to proportion or proportionality**, as when one is related to the other as another to another.<sup>189</sup> For example, (e.g., science is to the knowable as sense is to the sensible).

2. Another mode (is found) in those that are **of the same genus**, as when the same is **in diverse** (things; i.e., as sight is in the eye, understanding is in the soul; and as tranquility is in the sea, serenity is in the air).<sup>190</sup>

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<sup>185</sup> *In Metaph.* 5, l. 12, §919 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a16–17): “Tertio modo dicuntur similia quorum una est qualitas; sicut duo albi, et duo sidera in caelo habentia similem splendorem aut virtutem.”

<sup>186</sup> *In Metaph.* 5, l. 12, §918 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a17–18): “Ostendit [Philosophus...] quomodo dicatur aliquid maxime simile.” Ibid., §920: “Ostendit unde aliquid maxime dicatur simile. Quando enim sunt plures contrarietates, secundum quas attenditur alteratio, illud, quod secundum plures illarum contrarietatum est alicui simile, dicitur magis proprie simile.” St. Thomas provides the example of garlic, which is warm and dry, and is said (to be) similar to fire more properly than sugar, which is warm and humid. Ibid.: “Sicut allium, quod est calidum et siccum, dicitur magis proprie simile igni, quam saccharum, quod est calidum et humidum.”

<sup>187</sup> *In Metaph.* 5, l. 12, §918: “Et idem est inter duo quorum utrumque est simile alicui tertio secundum unam qualitatem tantum: illud quod est simile secundum qualitatem magis sibi propriam, magis proprie dicitur simile ei.” St. Thomas provides an example: bronze is similar to fire more properly than earth, for bronze is similar to fire in color, which is a quality proper to it, more than dryness, in which it is similar to earth. Ibid.: “sicut aer magis proprie similis est igni, quam terra. Aer enim assimilatur igni in calore, quae est qualitas sibi propria, magis quam siccitas in qua assimilatur sibi terra.”

<sup>188</sup> *De veritate*, q. 2 a. 11 ad 2: “Philosophus, in I Topic. ponit duplicem modum similitudinis.” See ARISTOTLE, *Topica* A.17, 108a7–12: “Τὴν δὲ ὁμοιότητα σκεπτέον ἐπὶ τε [...]”

<sup>189</sup> *De veritate*, q. 2 a. 11 ad 2: “Unum qui invenitur in diversis generibus; et hic attenditur secundum proportionem vel proportionalitatem, ut quando alterum se habet ad alterum sicut aliud ad aliud, ut ipse ibidem dicit.” See ARISTOTLE, *Topica* A.17, 108a7–10: “τῶν ἐν ἑτέροις γένεσιν, ὡς ἕτερον πρὸς ἕτερόν τι, οὕτως ἄλλο πρὸς ἄλλο, οἷον ὡς ἐπιστήμη πρὸς ἐπιστητόν, οὕτως αἴσθησις πρὸς αἰσθητόν.”

<sup>190</sup> *De veritate*, q. 2 a. 11 ad 2: “Alium modum in his quae sunt eiusdem generis, ut quando idem diversis inest.” See ARISTOTLE, *Topica* A.17, 108a10–12: “καὶ ὡς ἕτερον ἐν ἑτέρῳ τινί, οὕτως ἄλλο ἐν ἄλλῳ, οἷον ὡς ὄψις ἐν ὀφθαλμῷ, νοῦς ἐν ψυχῇ, καὶ ὡς γαλήνη ἐν θαλάσσει, νηνεμία ἐν ἀέρι.”

The likeness that is said in the first mode does not require a comparison according to a determinate relation.<sup>191</sup> Only (the likeness that is said in) the second (mode requires a comparison according to a determinate relation).

Nevertheless, likeness is (in) more (things) than comparison, for whatever the distance (between them might be, those that are) of the same *ratio* are comparable as long as the distance is not infinite (*dummodo in infinitum non distent*).<sup>192</sup> On the other hand, neither (those things that are) alike (*similia*), should they participate (in) the same quality, nor all (things that participate in the same quality) would have equals, but only those of which one does not exceed the other in the participation of the quality.

#### **41.40. Likeness According to Order**

In those (beings) that are of one order, it can be said that some (things) are mutually alike to each other, such that the likeness is convertible in respect to the other in such a way that we would say that *this* is like *that* and *that* (is like) *this*.<sup>193</sup> Indeed, both can be said (to be) like each other because they are said (to be) alike according as they participate (in) one form that preexists in the common cause, to which one and the other of the coordinated (beings) has a like relation.

On the other hand, in causes and in (things) caused, a conversion of likeness must not be had (*non debet recipi*), for the (thing) caused, and what is brought forth (*deducitur*) from another, cannot be said to be like the cause from which it is brought forth.<sup>194</sup>

This is so because the cause does not depend upon an effect, such that it would give its likeness only *to this* or *to that* (effect).<sup>195</sup> Rather, the effect depends on the cause, from which alone it participates (in) the ratio of likeness. And this dependence is designated when it is said that the effect is in its cause. On the other hand, when it is said that

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<sup>191</sup> *De veritate*, q. 2 a. 11 ad 2: "Similitudo autem non requirit comparationem secundum determinatam habitudinem quae primo modo dicitur, sed solum quae secundo."

<sup>192</sup> *In Threnos*, c. 2 l. 13: "Similitudo plus est quam comparatio: quaelibet enim distantia ejusdem rationis comparabilia sunt, dummodo in infinitum non distent: nec tamen similia, si eandem qualitatem participant, nec omnia habeant aequalia; sed tantum illa quorum unum in participatione qualitatis alterum non excedit."

<sup>193</sup> *In De div. nom.*, c. 9, l. 3: "in his enim quae sunt unius ordinis potest dici quod aliqua mutuo sunt sibi invicem similia, ita quod similitudo ad alterutrum convertatur, ita quod dicamus hoc esse simile illi et illud isti: ambo enim possunt dici invicem similia, propter hoc quod similia dicuntur, secundum quod participant unam formam, quae praeexistit in causa communi, ad quam utrumque coordinatorum habet similem habitudinem."

<sup>194</sup> *In De div. nom.*, c. 9, l. 3: "Sed in causis et causatis non debet recipi conversio similitudinis: causatum enim et quod deducitur ex alio, non potest dici simile causae a qua deducitur."

<sup>195</sup> *In De div. nom.*, c. 9, l. 3: "et hoc ideo quia causa non dependet ab effectu, ut solum isti vel illi suam similitudinem donet, sed effectus dependet a causa, a qua sola participat similitudinis rationem. Et haec dependentia designatur cum dicitur effectus esse in sua causa. Cum vero dicitur quod coordinata sunt sibi invicem similia, designatur dependentia utriusque ad unam causam."

coordinated (things) are alike to each other, (what) is designated (is) a dependence of one and of the other upon one cause.

#### 41.41. The Relation of Comparison in Likeness and Conformity

Although likeness and conformity are relations of comparison (*aequiparantiae*), one of the extremities (of the relation) is not always denominated in respect to the other, but only when the form—according to which the likeness or conformity is considered—exists in one and in the other extremity according to the same *ratio* (*eadem ratione*).<sup>196</sup>

For example, (the form of) whiteness (exists) in two men (and is denominated in respect to one another), because either can be adequately (*convenienter*) said to have the form of the other, which is (what is) signified when something is said to be like another.<sup>197</sup>

On the other hand, when a form is principally in one (of the two extremities of a relation of likeness or conformity), while (it is) in the other as secondary, a reciprocity of likeness is not had (*non recipitur*).<sup>198</sup> Thus, it cannot be said that Hercules should have the form of the statue, but only that the statue would have the form of Hercules.

#### 41.42. Unlike

ARISTOTLE says that (beings) are said (to be) **unlike** (*dissimilia* = ἀνόμοια) oppositely to *alike* (*per oppositum ad similia* < *opposite... similibus* = ἀντικειμένως... τοῖς ὁμοίοις).<sup>199</sup> However, he omits (the analysis of) the multiplicity of *unlike* because it is easily apparent how its modes should be taken by opposition to the modes of *alike* (►41.34).

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<sup>196</sup> *De veritate*, q. 23 a. 7 ad 11: “similitudo et conformitas, quamvis sint relationes aequiparantiae, non tamen semper utrumque extremorum denominatur in respectu ad alterum; sed tunc tantum quando forma secundum quam attenditur similitudo vel conformitas, eadem ratione in utroque extremorum existit.”

<sup>197</sup> *De veritate*, q. 23 a. 7 ad 11: “sicut albedo in duobus hominibus, eo quod uterque convenienter potest dici alterius formam habere; quod significatur cum aliquid simile alteri dicitur.”

<sup>198</sup> *De veritate*, q. 23 a. 7 ad 11: “Sed quando forma est in uno principaliter, in altero vero quasi secundario, non recipitur similitudinis reciprocatio; sicut dicimus statuam Herculis similem Herculi, sed non e converso; non enim potest dici quod Hercules habeat formam statuae, sed solum quod statua habeat Herculis formam.”

<sup>199</sup> *In Metaph.* 5, l. 12, §921 (cf. ARISTOTLE, *Metaphysica* Δ.9, 1018a18–19): “Consequenter dicit [Philosophus], quod dissimilia dicuntur per oppositum ad similia.” *In Metaph.* 10, l. 4, §2014: “Omissa autem multiplicitate dissimilis quia facile apparet qualiter modi eius accipiantur per oppositum ad modos similis, ponit [Philosophus...].”

## 42. The Opposites

We examine here the secondary parts of plurality, contained under diverse and different: contradiction, privation-habit, contrariety, and relation. We have already treated of relation (► 37). Contrariety is more fully discussed in the next chapter.

### 42.1. Genera of Opposition

ARISTOTLE distinguishes the secondary parts of plurality—to wit, those that are contained under *diverse* and *different*, which are (among the) first parts (of plurality)—, saying that there are four genera of **opposition** (*oppositio* = ἀντίθεσις) insofar as (multiple things) are said (to be) **opposites** (*opposita* = ἀντικείμενα) in four modes:<sup>1</sup>

1. **Contradiction** (*contradictio* = ἀντίφασις; ► 42.4).
2. **Privation and habit [aka possession]** (*privatio et habitus* = στέρησις καὶ ἔξις), i.e., (opposed) **according to privation** (*secundum privationem* = κατὰ στέρησιν; ► 42.7).
3. **Contraries** (*contraria* = ἐναντία; discussed in the next chapter; ► 43).
4. **Relation** (*ad aliquid* = πρὸς τι; already discussed; ► 37.1, ¶1 & ¶2).

### 42.2. Reasons of Opposition: Removal vs. Dependence

Something is contraposed or opposed to another either:<sup>2</sup>

**I. By reason of removal** (*ratione remotionis*), because one removes the other; which can happen in (one of the following) three (modes):

1. **(Simple) negation**, if *it totally removes (the other opposite) leaving nothing (totaliter removet nihil relinquens)*.<sup>3</sup> Negation conveys (*dicit*), without determining a subject, only the absence (*absentia* = ἀπουσία) of that which it removes. Affirmation and negation are said to be *maximally opposed* (► 42.6) because, in them, no agreement (*convenientia*) is conveyed (*importatur*).

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<sup>1</sup> *In Metaph.* 10, l. 4, §1986: “cum quatuor sint oppositionis genera [...] secundum privationem; [...] contradictio, [...] ad aliquid, [...] contraria..” Cf. ARISTOTLE, *Metaphysica* I.3, 1054a23–26: “οἱ ἀντιθέσεις τετραχῶς [...] κατὰ στέρησιν [...] ἐναντία [...] ἀντίφασις [...] πρὸς τι.” *In Metaph.* 5, l. 12, §922 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a20–21): “distinguit [Philosophus] secundarias partes pluralitatis, quae scilicet continentur sub differenti et diverso, quae sunt partes primae: et circa hoc tria facit. Primo ostendit quot modis dicuntur opposita. [...] Primo enim dicit quot modis dicuntur opposita; quia quatuor modis; scilicet contradictoria, contraria, privatio et habitus, et ad aliquid.”

<sup>2</sup> *In Metaph.* 5, l. 12, §922: “Aliquid enim contraponitur alteri vel opponitur [...]. Aut ratione remotionis, quia scilicet unum removet alterum. Quod quidem contingit tripliciter.”

<sup>3</sup> *In Metaph.* 5, l. 12, §922: “Aut enim totaliter removet nihil relinquens, et sic est negatio.” *In Metaph.* 4, l. 3, §565 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004a9–16): “negatio dicit tantum absentiam alicuius, scilicet quod removet, sine hoc quod determinet subiectum.” *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “affirmatio et negatio dicuntur maxime opponi, quia in eis non importatur aliqua convenientia.”

Since contradiction is an opposition of affirmation and negation, one of its parts is an affirmation that predicates something of something; and the other (part is) a negation that removes something from something.<sup>4</sup>

**2. Privation (or negation in a subject genus),** if *it leaves only the subject (relinquit subiectum solum)*.<sup>5</sup> In opposites by privation, agreement is conveyed in respect of the subject because such opposites are naturally apt to come to be about the same.

Thus, **negation** (*negatio* = ἀπόφασις) is twofold:<sup>6</sup> (¶1) **simple negation** (< ἀπλω̄ς), whereby it is absolutely said that *this is not in that (hoc non inest illi)*; (¶2) **negation in a genus** (*in genere* = γένει), by which something is not absolutely negated (of a subject): rather, (it is negated) under the limits of some genus (*infra metas alicuius generis*).

Whence, absolute negation can be verified both of a non-being that is (not) naturally apt to have affirmation (predicated of it), and of a being which is naturally apt to have (affirmation predicated of it) and does not have it.<sup>7</sup> Thus, non-seer (or sightless) can be said (by absolute negation) of Chimaera, stone, and man.

In privation, on the other hand, there is some nature or determinate substance of which the privation is said, for not all non-seer can be said (to be) blind, but only the one that is naturally apt to have sight.<sup>8</sup> Hence, *that which does not have sight* is not simply said (to be) *blind*; rather, (that is said to be blind which does not have sight) under a genus of animal that is naturally apt to see.

**3. Contrary,** if *it leaves the subject and the genus (relinquit subiectum et genus)*, for contraries are not only in the same subject but also in the same genus.<sup>9</sup>

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<sup>4</sup> *In Post. an.* 1, l. 5, 88–93 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 72a13–14): “Exponit [Philosophus] etiam consequenter quid sit *pars contradictionis*: est enim contradictio oppositio affirmationis et negationis, unde altera pars eius est *affirmatio*, que predicat *aliquid de aliquo*, altera uero *negatio*, que remouet *aliquid ab aliquo*.”

<sup>5</sup> *In Metaph.* 5, l. 12, §922: “Aut relinquit subiectum solum, et sic est privatio.” *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “in privative enim oppositis importatur convenientia quantum ad subiectum, quia nata sunt fieri circa idem.”

<sup>6</sup> *In Metaph.* 4, l. 3, §565 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004a12–13): “Negatio autem est duplex: quaedam simplex per quam absolute dicitur quod hoc non inest illi. Alia est negatio in genere, per quam aliquid non absolute negatur, sed infra metas alicuius generis.”

<sup>7</sup> *In Metaph.* 4, l. 3, §565: “Unde absoluta negatio potest verificari tam de non ente, quod est natum habere affirmationem, quam de ente, quod est natum habere et non habet. Non videns enim potest dici tam Chimaera quam lapis quam etiam homo.”

<sup>8</sup> *In Metaph.* 4, l. 3, §565: “Sed in privatione est quaedam natura vel substantia determinata, de qua dicitur privatio: non enim omne non videns potest dici caecum, sed solum quod est natum habere visum.” *Ibid.*: “sicut caecum dicitur non simpliciter, quod non habet visum, sed infra genus animalis quod natum est habere visum.”

<sup>9</sup> *In Metaph.* 5, l. 12, §922: “Aut relinquit subiectum et genus, et sic est contrarium. Nam contraria non sunt solum in eodem subiecto, sed etiam in eodem genere.”

II. Or else (something is contraposed or opposed to another not by reason of *removal* but) **by reason of dependence** (*ratione dependentiae*):<sup>10</sup>

**4. Relatively opposites** (*opposita relative*), if (the other of the two opposites) *depends on it* (*dependet ab ipso*).<sup>11</sup>

In contraries and in relatives, there is agreement in respect of the genus because they are in the same genus.<sup>12</sup> Whence, in both oppositions, any extremity is signified according to the mode of some being and nature.

### 42.3. Opposites Are Not Predicated One of the Other

An opposite is not predicated of (its) opposite, since one of them is simply (*simpliciter*), and the other is according to something (*secundum quid*).<sup>13</sup>

Indeed, what is a being according to something—e.g., in potency—is not a being simply—i.e., in act. Likewise, what is being simply in the genus of substance is not a being according to something, in respect of some accidental being.<sup>14</sup> Likewise, therefore, that which is good according to something is bad simply; and conversely. And likewise, that which is one simply, is many according to something; and conversely (►40.11; 40.12).

### 42.4. Contradiction

ARISTOTLE shows what a **contradiction** (*contradictio* = ἀντίφασις) should be, saying that it is *an opposition that does not have a mean according to itself* (*oppositio cui non est medium secundum se* = ἀντίθεσις ἧς οὐκ ἔστι μεταξύ καθ' αὐτήν).<sup>15</sup>

Although there should not be a mean about a determinate subject in privation and habit, and in immediate contraries, there is, however, a mean simply.<sup>16</sup> Thus, a stone (i.e., some

<sup>10</sup> *In Metaph.* 5, l. 12, §922: “Aliquid enim contraponitur alteri vel opponitur aut ratione dependentiae.”

<sup>11</sup> *In Metaph.* 5, l. 12, §922: “qua dependet ab ipso, et sic sunt opposita relative.”

<sup>12</sup> *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “in contrariis autem relativis etiam quantum ad genus, quia scilicet sunt in eodem genere. Unde in utraque oppositione utrumque extremorum significatur per modum entis et naturae cujusdam.”

<sup>13</sup> *STh* I, q. 11 a. 2 ad 1: “Non tamen oppositum praedicatur de opposito, quia alterum horum est simpliciter, et alterum secundum quid.”

<sup>14</sup> *STh* I, q. 11 a. 2 ad 1: “Quod enim secundum quid est ens, ut in potentia, est non ens simpliciter, id est actu, vel quod est ens simpliciter in genere substantiae, est non ens secundum quid, quantum ad aliquod esse accidentale. Similiter ergo quod est bonum secundum quid, est malum simpliciter; vel e converso. Et similiter quod est unum simpliciter, est multa secundum quid; et e converso.”

<sup>15</sup> *In Post. an.* 1, l. 5, 73–75 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a12–13): “Quid autem sit contradictio consequenter ostendit [Philosophus], dicens quod <est> *oppositio cui non est medium secundum se*.”

<sup>16</sup> *In Post. an.* 1, l. 5, 75–85: “Quamuis enim in priuatione et habitu, et in contrariis immediatis non sit medium circa determinatum subiectum, tamen est medium simpliciter, nam lapis neque cecus neque uidens est, et albedo neque par neque impar est; et hoc etiam quod habent de inmediate circa determinatum subiectum, habent in quantum aliquid participant contradictionis: nam priuatio est negatio in subiecto determinato, et alterum etiam contrariorum habet aliquid priuationis.”

mean between privation and habit) is neither blind (i.e., deprived of sight) nor seer (i.e., having sight); and whiteness (i.e., some mean between contraries) is neither even nor odd (i.e., susceptible of contraries according to divisibility into two equal parts). And this, too, which they have of non-mediation about a determinate subject, they have insofar as they participate in some (degree) of contradiction. For **privation** is a *negation in a determinate subject*, and one and the other of two contraries has some (degree) of privation (i.e., the even has divisibility into two equal parts, while the odd is deprived of it).

On the other hand, contradiction simply (*simpliciter*) lacks a mean in all (things).<sup>17</sup> And it does not have this (property as participated) from another, but (essentially) from itself. Wherefrom, ARISTOTLE says that *there is no mean according to itself*.

#### 42.5. The Parts of a Contradiction

ARISTOTLE also explains what a **part of a contradiction** (*pars contradictionis* = μόριον... ἀντιφάσεως) should be.<sup>18</sup> Thus, a **contradiction** is an *opposition of affirmation and negation*. Whence, a **part** of it is an *affirmation*, which *predicates something of something* (*affirmatio, que <predicat> aliquid de aliquo* = τὸ... τὶ κατὰ τινὸς κατάφασις), while the other is a *negation*, which *removes something from something* (*negatio, que <remove> aliquid ab aliquo* = τὸ... τὶ ἀπὸ τινὸς ἀπόφασις).

#### 42.6. Priority of Contradiction

That in which something is found unmixed with a contrary is the maximum and first in that genus, and the cause of all others (► 27.4).<sup>19</sup> Hence, the opposition of affirmation and negation, in which no agreement is admixed, is the first and greatest opposition, and the cause of all oppositions and distinctions.

Even that which (other oppositions) have of immediateness (*de immediatione*) in respect of some determinate subject, they have insofar as they participate in something of contradiction (*aliquid participant contradictionis*);<sup>20</sup> for **privation** is *negation in a*

<sup>17</sup> *In Post. an.* 1, l. 5, 85–88 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a12–13): “Set contradictio simpliciter in omnibus caret medio, et hoc non habet ab alio, set ex seipsa; et propter hoc dicit [Philosophus] quod eius *non est medium secundum se*.”

<sup>18</sup> *In Post. an.* 1, l. 5, 88–93 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a13–14): “Exponit etiam consequenter [Philosophus] quid sit *pars contradictionis*: est enim contradictio oppositio affirmationis et negationis, unde altera pars eius est *affirmatio, que predicat aliquid de aliquo*, altera uero *negatio, que remouet aliquid ab aliquo*.”

<sup>19</sup> *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “Illud autem in quo inuenitur aliquid non permixtum contrario, est maximum et primum in genere illo, et causa omnium aliorum; et ideo oppositio affirmationis et negationis, cui non admiscetur aliqua convenientia, est prima et maxima oppositio, et causa omnis oppositionis et distinctionis.”

<sup>20</sup> *In Post. an.* 1, l. 5, 80–85: “et hoc etiam quod habent de immediatione circa determinatum subiectum, habent in quantum aliquid participant contradictionis: nam priuatio est negatio in subiecto determinato, et alterum etiam contrariorum habet aliquid priuationis.”



*determinate subject*; and either of the contraries has something of privation (*habet aliquid privationis*; for example, even deprives of odd).

Contradiction, on the other hand, altogether lacks a mean, and it does not have this (property) from another (*ab alio*), but from itself (*ex se ipsa*).<sup>21</sup>

Hence, in whatever other opposition, affirmation and negation must be included as the first is included in the posterior (► 27.6).<sup>22</sup> Whence, more (things) are required for other oppositions than for the opposition of contradiction because they are related to it by addition (► 18.5).

Whence, even if contrariety should be found only in (things that are) diverse really (*realiter*), it is not necessary for affirmation and negation to be found in (things that are) diverse really.<sup>23</sup> Rather, a distinction of *ratio* suffices for affirmation and negation, since any distinction includes affirmation and negation (► 40.9).

#### **42.7. Privation**

**Privation** is some *negation in a determinate subject*.<sup>24</sup>

No privation totally takes away the (act of) being (*esse*), since privation is a negation in a subject.<sup>25</sup> However, every privation takes away some (act of) being.

Hence, in *being* (*in ente*), by reason of its community, it happens that the privation of being (*privatio entis*) is founded on being (*fundatur in ente*); which does not happen in the privations of special forms, as sight, whiteness, or other such.<sup>26</sup>

And just as (this) is (the case) concerning *being*, so it is of *one* and of *good*, which is convertible with *being*, for the privation of a good is founded in some good; and likewise,

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<sup>21</sup> *In Post. an.* 1, l. 5, 85–88 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 72a12–13): “Set contradictio simpliciter in omnibus caret medio, et hoc non habet ab alio, sed ex se ipsa; et propter hoc dicit quod eius non est medium secundum se.”

<sup>22</sup> *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “et ideo oportet quod in qualibet alia oppositione includatur affirmatio et negatio, sicut primum in posteriori. Unde plura requiruntur ad alias oppositiones quam ad oppositionem contradictionis, quia se habent ex additione ad ipsam.”

<sup>23</sup> *In Sent.* 1, d. 5 q. 1 a. 1 ad 1: “Unde non oportet quod, si contrarietas non inveniatur nisi in diversis realiter, quod affirmatio et negatio inveniatur in diversis realiter; immo sufficit etiam distinctio rationis ad affirmationem et negationem, cum quaelibet distinctio, ut dictum est, includat affirmationem et negationem.”

<sup>24</sup> *ScG* 1, 71 n. 5: “Privatio autem negatio quaedam est in subiecto determinato, ut in IV Metaphys. ostenditur.”

<sup>25</sup> *STh* I, q. 11 a. 2 ad 1: “nulla privatio tollit totaliter esse, quia privatio est negatio in subiecto, secundum Philosophum. Sed tamen omnis privatio tollit aliquod esse.”

<sup>26</sup> *STh* I, q. 11 a. 2 ad 1: “Et ideo in ente, ratione suae communitatis, accidit quod privatio entis fundatur in ente, quod non accidit in privationibus formarum specialium, ut visus vel albedinis, vel alicuius huiusmodi.”

the removal of unity is founded on something one.<sup>27</sup> Wherefrom, it happens that a multitude is some(thing) one; and bad is some(thing) good, and non-being is some being.

Since *being* (*ens*) is in some mode said of privations (► 30.14, ¶5) and negations (¶7), there can be of them (i.e., of privations and negations) some most incomplete mode of definition, which is as exposing the signification of the name without indicating the essence—which they do not have at all.<sup>28</sup> Indeed, privation is not some essence; rather, it is a negation in a substance. Hence, privations do not have an essence in the nature of things.

ARISTOTLE distinguishes the modes in which *privation* is said.<sup>29</sup> Since privation includes in its *ratio* an *aptitude of a subject* and a *negation*, he distinguishes the modes of privation from the part of the **aptitude** (► 42.8) and the from the part of the **negation** (► 42.9).

#### 42.8. Modes of Privation from the Part of the Aptitude of the Subject

ARISTOTLE posits four modes of **privation** (*privatio* = στέρησις) from the part of the aptitude of the subject, insofar as it is considered:<sup>30</sup>

**1. From the part of the thing deprived** (*ex parte rei privatae*), and not from the part of the subject.<sup>31</sup> In this mode, *privation* is said (to exist) when that which is naturally apt to be had is not had by some (subject), even though (the subject) is not naturally apt to have that which it lacks.

Thus, *whatever does not have something* (< τὸ μὴ ἔχον) can be said to be deprived.<sup>32</sup>

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<sup>27</sup> *STh* I, q. 11 a. 2 ad 1: “Et sicut est de ente, ita est de uno et bono, quae convertuntur cum ente, nam privatio boni fundatur in aliquo bono, et similiter remotio unitatis fundatur in aliquo uno. Et exinde contingit quod multitudo est quoddam unum, et malum est quoddam bonum, et non ens est quoddam ens.”

<sup>28</sup> *In Sent.* 2, d. 35 q. 1 a. 2 ad 1: “cum ens quodammodo dicatur de privationibus et negationibus, ut in 4 *Metaph.* dicitur, earum etiam potest esse aliquis modus definitionis incompletissimus, qui est quasi exponens nominis significationem, non essentiam indicans, quam nullam habet.” *ScG* 3, 7 n. 2: “Privatio autem non est aliqua essentia, sed est negatio in substantia.” *In Sent.* 3, d. 37 q. 1 a. 2 ad 3: “privationes enim essentiam non habent in rerum natura.”

<sup>29</sup> *In Metaph.* 5, l. 20, §1070 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b22–1023a7): “Hic distinguit [Philosophus] modos, quibus dicitur *privatio*; et quia privatio includit in sua ratione negationem et aptitudinem subiecti, ideo primo distinguit modos privationis *ex parte aptitudinis*. Secundo ex parte negationis.”

<sup>30</sup> *In Metaph.* 5, l. 20, §1070 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b22–32): “Hic distinguit [Philosophus] modos, quibus dicitur *privatio*; et quia privatio includit in sua ratione negationem et aptitudinem subiecti, ideo primo distinguit modos privationis *ex parte aptitudinis*. [...] Et circa primum ponit quatuor modos.” *In Metaph.* 9, l. 1, §1785 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a31–32): “sciendum est quod privatio dicitur multipliciter.”

<sup>31</sup> *In Metaph.* 5, l. 20, §1070 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b22–23): “*Primus modus* est, secundum quod aptitudo consideratur ex parte rei privatae, non ex parte subiecti. Dicitur enim hoc modo privatio, quando ab aliquo non habetur id quod natum est haberi, licet hoc quod ipso caret non sit natum habere.”

<sup>32</sup> *In Metaph.* 9, l. 1, §1785 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a32): “Uno enim modo quicquid non habet aliquid, potest dici esse privatum.”

For example, a plant is said to be deprived of an eye because an eye is apt to be had, but not by a plant.<sup>33</sup> Or, if we should say that a stone is deprived of sight because it does not have sight.

On the other hand, something cannot be said to be deprived of those that are naturally apt to be had by none: for example, (if something should be said to be deprived of) an eye that penetrates through opaque bodies by (its) sight.<sup>34</sup>

**2. According to the aptitude of the subject** (*secundum aptitudinem subiecti*).<sup>35</sup> In this mode, universally (speaking, ὁλως), only that is said to be deprived which is naturally apt to have (something and) it does not have (it).

This can be either: (a) according to itself; or (b) according to its genus. For example: (a) according to itself, as a blind man or dog, which—according to itself—is naturally apt to have sight, is said to be deprived of it; (b) as a mole is said to be deprived of sight not because it should be naturally apt to have sight but because its genus—namely, *animal*—is naturally apt to have sight. Indeed, there are many (beings) that are not prevented from (having) something by reason of the genus, but by reason of a difference: for example, man is not prevented from having wings by reason of the genus, but by reason of a difference.<sup>36</sup>

**3. From the part of the circumstances** (*ex parte circumstantiarum*).<sup>37</sup> Whence, in this mode, something is said to be deprived of something if it does not have the thing had itself when it is naturally apt to have it.

For example, blindness, is some privation; and yet, an animal is not said (to be) *blind*

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<sup>33</sup> *In Metaph.* 5, l. 20, §1070 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b23–24): “sicut planta dicitur privari oculis, quia oculi nati sunt haberi, licet non a planta.” *In Metaph.* 9, l. 1, §1785: “sicut si dicamus lapidem privatum visu, eo quod non habet visum.”

<sup>34</sup> *In Metaph.* 5, l. 20, §1070: “In his vero, quae a nullo nata sunt haberi, non potest dici aliquid privari, sicut oculus visu penetrante per corpora opaca.”

<sup>35</sup> *In Metaph.* 5, l. 20, §1071 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b24–25): “*Secundus* modus attenditur secundum aptitudinem subiecti. Hoc enim modo dicitur privari hoc solum quod natum est illud habere.” *In Metaph.* 9, l. 1, §1785 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a32–33): “Alio modo dicitur privatum solum quod est aptum natum habere, et non habet. Et hoc dupliciter. Uno modo universaliter quando non habet [...]. Alio modo si non habet, quando aptus natus est habere.”

<sup>36</sup> *In Metaph.* 5, l. 20, §1071 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b25–27): “aut secundum se, aut secundum genus suum: secundum se, sicut homo caecus dicitur privari visu, quem natus est habere secundum se. Talpa autem dicitur privari visu, non quia ipsa secundum se sit nata habere visum; sed quia genus eius, scilicet animal, natum est habere visum. Multa enim sunt a quibus aliquid non impeditur ratione generis, sed ratione differentiae; sicut homo non impeditur quin habeat alas ratione generis, sed ratione differentiae.” *In Metaph.* 9, l. 1, §1785: “sicut si dicatur canis privatus visu, quando non habet visum.”

<sup>37</sup> *In Metaph.* 5, l. 20, §1072 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b27–28): “*Tertius* modus attenditur ex parte circumstantiarum. Unde hoc modo dicitur aliquid privari aliquo, si non habet ipsum habitum cum natum sit habere.”

according to every age, but only if it does not have sight in that age in which it is naturally apt to have it.<sup>38</sup> Whence, a dog is not said (to be) *blind* before the ninth day.

And just as (this) is (the case) concerning the circumstance *when* (*quando* = ὅτε), so is it also (the case) concerning other circumstances, namely: (a) *in what* (*in quo* = ἐν ᾧ), as in a place: for example, night is said to be a privation of light in a place that is naturally apt to have light, and not in caves, where sunlight cannot reach; (b) *according to something* (*secundum quid* = καθ' ὅ), as a man is not said (to be) *toothless* if he does not have teeth in a hand, but if he does not have (teeth) according to that part according to which he is naturally apt to have (teeth); (c) (*in relation*) *to what* (*ad quod* = πρὸς ὅ), as a man is not said to be small or deficient in height if he is not tall in respect of mountains or in respect of any other thing (in relation) to which comparison it is not naturally apt to have a magnitude; and thus, a man is not said (to be) *slow* in motion if he does not run as fast as a hare or (as) the wind; or *ignorant*, if he does not understand like God.<sup>39</sup>

**4.** Insofar as **the taking away of anything by violence** is said (to be a) *privation*.<sup>40</sup> Indeed, (that which is) violent is against a natural impetus; and thus, taking away by violence is (said) in respect of that which something is naturally apt to have.

#### **42.9. Modes of Privation from the Part of the Negation**

Greeks use the preposition ἀ in compositions (of words) to designate negations and privations, just as we (Latins) use the preposition *in* (e.g., just as in Greek the negation of δυνατόν is ἀδύνατον < ἀ + δυνατόν, so in Latin the negation of *possibile* is *impossibile* < *in* + *possibile*; which we inherit in English as though *impossible* < *in* + *possible*).<sup>41</sup>

Therefore, ARISTOTLE distinguishes the modes of privation from the part of negation saying

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<sup>38</sup> *In Metaph.* 5, l. 20, §1072 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b28–29): “Sicut caecitas, quae est quaedam privatio, et tamen animal non dicitur caecum secundum omnem aetatem, sed solum si non habeat visum in illa aetate in qua natum est habere; unde canis non dicitur caecus ante nonum diem.”

<sup>39</sup> *In Metaph.* 5, l. 20, §1072 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b30–31): “Et sicut est de hac circumstantia quando, ita est et de aliis circumstantiis, scilicet in quo, ut in loco; sicut nox dicitur privatio lucis in loco ubi nata est esse lux, non in cavernis, ad quas lumen solis pervenire non potest; «Et secundum quid,» sicut homo non dicitur edentulus, si non habet dentes in manu; sed si non habet secundum illam partem, secundum quam natus est habere; «Et ad quod,» sicut homo non dicitur parvus, vel deficientis staturae si non est magnus respectu montis, vel respectu cuiuscumque alterius rei, ad cuius comparationem non est natus habere magnitudinem: et sic homo non dicitur tardus esse motu, si non currat ita velociter sicut lepus vel ventus; vel ignorans, si non intelligit sicut Deus.”

<sup>40</sup> *In Metaph.* 5, l. 20, §1073 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b31–32): “*Quartus* modus est secundum quod ablatio cuiuslibet rei per violentiam, dicitur privatio. Violentum enim est contra impetum naturalem, ut habitum est supra. Et ita ablatio per violentiam est respectu eius quod quis natus est habere.” *In Metaph.* 9, l. 1, §1785 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a34–35): “Quandoque vero in ratione privationis includitur violentia. Unde quaedam dicimus privari, quando per violentiam amiserunt ea quae nata sunt habere.”

<sup>41</sup> *In Metaph.* 5, l. 20, §1074: “Graeci enim utuntur hac praepositione ἀ in compositionibus ad designandas negationes et privationes, sicut nos utimur hac praepositione in.”

that, in as many modes in which negations are designated from the preposition ἀ posited by composition in the beginning of a word, in that many modes, too, are privations said.<sup>42</sup> Thus, something is signified privatively or negatively on account of:

**1. (Not having altogether, if it is naturally apt to have [si aptum natum est habere... omnino non habere < πεφυκὸς... τῷ ὅλως μὴ ἔχειν]).**<sup>43</sup> For example, *unequal (inaequale = ἄνισον)* is said (to be) that which does not have equality if it is naturally apt to have (it); *invisible (invisible = ἀόρατον)*, that which does not have color; and *footless (sine pede = ἄπου)*, that which does not have feet.

**2. Having badly (prave vel turpiter < τῷ φαύλως).**<sup>44</sup> For example, (something) is said not to have color because it has a bad or unbecoming color; and (something is said) not to have feet because it has small or unbecoming (feet).

**3. Having little (parum habere = μικρὸν ἔχειν).**<sup>45</sup> For example, ἀπύρηνον (i.e., unignited) is said in Greek where there is little fire. This mode is in some mode contained under the second (< τοῦτο δ' ἐστὶ τὸ φαύλως πως ἔχειν; ► ¶2) because to have little (*parum habere*) is in some mode to have badly (*prave et turpiter habere*).

**4. Not being easily or well (non est facile, vel non bene < τῷ μὴ ῥαδίως ἢ τῷ μὴ καλῶς).**<sup>46</sup> For example, something is said (to be) uncuttable (*insecabile = ἄμητον*) not only because it is not cut (*quia non secatur = τῷ μὴ τέμνεσθαι*; or, insofar as it cannot be cut), but (also) because (it is) not easily or well (cut).

<sup>42</sup> *In Metaph.* 5, l. 20, §1074 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b32–33): “Distinguit [Philosophus] modos privationis ex parte negationis. [...] Dicit ergo quod quoties dicuntur negationes designatae ab hac praepositione ἀ posita in principio dictionis per compositionem, toties dicuntur etiam privationes.” Ibid., §1075: “dicuntur huiusmodi negationes [...] per hoc quod [...]” Ibid., §1076: “significatur aliquid privative vel negative ex hoc, quod [...]” Ibid., §1077: “dicitur aliquid privative vel negative, ex eo quod [...]” Ibid., §1078: “dicitur aliquid negative vel privative, ex eo quod [...]”

<sup>43</sup> *In Metaph.* 5, l. 20, §1074 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b33–36): “Dicitur enim inaequale uno modo, quod non habet aequalitatem, si aptum natum est habere; et invisibile, quod non habet colorem; et sine pede, quod non habet pedes.” *In Metaph.* 9, l. 1, §1785 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046a33–34): “Alio modo si non habet, quando aptus natus est habere. [...] Et iterum hoc diversificatur. Nam uno modo dicitur privatum eo quod non habet aliquo modo determinato, scilicet perfecte et bene; sicut cum vocamus caecum eum qui non bene videt. Alio modo quando non habet omnino; sicut dicimus privatum visu, qui omnino visum non habet.”

<sup>44</sup> *In Metaph.* 5, l. 20, §1075 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b33–36): “Secundo modo dicuntur huiusmodi negationes non per hoc quod est omnino non habere; sed per hoc quod est prave vel turpiter habere; sicut dicitur non habere colorem, quia habet malum colorem vel turpem; et non habere pedes, quia habet parvos vel turpes.”

<sup>45</sup> *In Metaph.* 5, l. 20, §1076 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1022b36–1023a2): “Tertio modo significatur aliquid privative vel negative ex hoc, quod est parum habere; sicut dicitur in Graeco ἀπύρηνον, idest non ignitum, ubi est modicum de igne: et hic modus quodammodo continetur sub secundo, quia parum habere est quodammodo prave et turpiter habere.”

<sup>46</sup> *In Metaph.* 5, l. 20, §1077 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1023a2–4): “Quarto modo dicitur aliquid privative vel negative, ex eo quod non est facile, vel non bene; sicut aliquid dicitur insecabile, non solum quia non secatur, sed quia non facile, aut non bene.”

**5. Not having at all** (*omnino non habere* = τῷ πάντῃ μὴ ἔχειν).<sup>47</sup> Whence, the one-eyed is not said (to be) *blind*, but (only) that which lacks sight in both eyes.

ARISTOTLE draws some corollary (from the above modes): namely, that between good and bad, just and unjust, there is some mean (*medium* = μεταξύ; ▶44.9).<sup>48</sup> Thus, someone is not caused to be bad from any defect in goodness—as the Stoics used to say, positing all faults to be of the same rank—, but (only) when he recedes much from virtue and is drawn to the contrary habit.

#### 42.10. Matter vs. Form and Privation

Matter differs from form and from privation according to *ratio*.<sup>49</sup> Matter is *that in which* form and privation are understood, as *figure* and *formless* is understood *in bronze*. Sometimes, matter is named with privation; sometimes, without privation. Thus, since bronze is the matter of the statue, it does not convey (*non importat*) *privation*, because when I say *bronze*, (something) indisposed or in-figured (▶42.9) is not understood (*non intelligitur indispositum seu infiguratum*). On the other hand, *flour*, which is matter in respect of bread, conveys in itself the privation of the form of bread, because, from my saying *flour*, an indisposition or non-ordination opposed to the form of bread is signified.

#### 42.11. Priority of Form vs. Privation

Just as form is in some mode the cause of matter insofar as it gives it being in act, while matter is in some mode the cause of form insofar as it sustains it, so too, in some mode, those that are from the part of form are prior to those that are from the part of matter; while others, conversely.<sup>50</sup>

And since privation is had from the part of matter, hence, the removal of privation is

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<sup>47</sup> *In Metaph.* 5, l. 20, §1078 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1023a4–5): “Quinto modo dicitur aliquid negative vel privative, ex eo quod est omnino non habere. Unde monocolus non dicitur caecus, sed ille qui in ambobus oculis caret visu.”

<sup>48</sup> *In Metaph.* 5, l. 20, §1079 (cf. ARISTOTLE, *Metaphysica* Δ.22, 1023a5–7): “Ex hoc inducit [Philosophus] quoddam corollarium; scilicet quod inter bonum et malum, iustum et iniustum, est aliquid medium. Non enim ex quocumque defectu bonitatis efficitur aliquis malus, sicut Stoici dicebant ponentes omnia peccata esse paria; sed quando multum a virtute recedit, et in contrarium habitum inducitur. Unde in secundo Ethicorum dicitur: ex eo quod homo recedit parum a medio virtutis, non vituperatur.”

<sup>49</sup> *De prin. nat.* §2, 53–69: “materia differt a forma et a priuatione secundum rationem. Materia enim est id in quo intelligitur forma et priuatio, sicut in cupro intelligitur figura et infiguratum; quandoque quidem materia nominatur cum priuatione, quandoque sine priuatione: sicut es cum sit materia ydoli non importat priuationem, quia ex hoc quod dico ‘es’ non intelligitur indispositum seu infiguratum; sed farina cum sit materia respectu panis, importat in se priuationem forme panis, quia ex hoc quod dico farinam significatur indispositio siue inordinatio opposita forme panis. Et quia in generatione materia siue subiectum permanet, priuatio uero non, neque compositum ex materia et priuatione, ideo materia que non importat priuationem est permanens, que autem importat est transiens.”

<sup>50</sup> *De veritate*, q. 9 a. 3 ad 6: “sicut forma est quodammodo causa materiae in quantum dat ei esse actu, quodam vero modo materia est causa formae, in quantum sustentat ipsam; ita etiam quodammodo ea quae sunt ex parte formae, sunt priora his quae sunt ex parte materiae, quodam vero modo e converso.”

naturally prior to the introduction of a form according to the order in which matter is prior to form, which is said (to be) the *order of generation*; but the introduction of form is prior in the order in which form is prior to matter, which is the *order of perfection*.<sup>51</sup>

#### 42.12. The Genus of Privations and Negations

No negation or privation is by itself in a genus, for it has neither some quiddity nor being (*esse*).<sup>52</sup> Rather, it is reduced (► 29.9, ¶2; 29.10) to the genus of *affirmation* insofar as *being* (*esse*) is understood in *non-being* (*non esse*), and *affirmation* (is understood) in *negation*, for every privation is known by a habit, and (every) removal (is known) by a position. In this mode, too, *non-relation* (*non relatio*) is in the genus of *relation*, even though those (subjects) of which this negation is said should not be in that genus.

#### 42.13. To Have

The name habit (*habitus*) is derived from having (*ab habendo est sumptum, derivatur*).<sup>53</sup>

ARISTOTLE posits four modes of **to have** [or to hold, to possess] (*habere* = τὸ ἔχειν):<sup>54</sup>

1. Insofar as **to have** is *to draw* [*something forward*] (*ducere* = τὸ ἄγειν) *according to its nature* (*secundum suam naturam* = κατὰ τὴν αὐτοῦ φύσιν), in natural things, or *according to its impetus* (*secundum suum impetum* = κατὰ τὴν αὐτοῦ ὀρμήν), in voluntary things.<sup>55</sup>

In this mode, a fever is said to have a man because the man is drawn through (*traducitur*) from the natural disposition into a febrile disposition.<sup>56</sup> Also, in this mode, tyrants have

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<sup>51</sup> *De veritate*, q. 9 a. 3 ad 6: “Et quia privatio se tenet ex parte materiae, ideo remotio privationis est prior introductione formae naturaliter, secundum ordinem quo materia est prior forma, qui dicitur ordo generationis; sed introductio formae est prior illo ordine quo forma est prior materia, qui est ordo perfectionis.”

<sup>52</sup> *In Sent.* 1, d. 28 q. 1 a. 1 ad 3: “in genere continetur aliquid dupliciter: vel per se et proprie, sicut species, et ea quae recipiunt praedicationem generis; vel per reductionem, sicut principia generis, ut materia et forma ad substantiam; et unitas et punctus ad quantitatem; quamvis neutrum sit quantitas. Ita etiam nulla negatio vel privatio est in genere per se: quia non habet aliquam quidditatem nec esse; sed reducitur ad genus affirmationis, secundum quod in non esse intelligitur esse, et in negatione affirmatio, ut dicit Philosophus, quia omnis privatio per habitum cognoscitur, et remotio per positionem; et sic etiam non relatio est in genere relationis, quamvis ea de quibus dicitur ista negatio, non sint in illo genere.”

<sup>53</sup> *STh* I-II, q. 49 a. 1 co.: “hoc nomen *habitus* ab habendo est sumptum. A quo quidem nomen habitus [...] derivatur.”

<sup>54</sup> *In Metaph.* 5, l. 20, §1080 (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a8–25): “Hic ponit [Philosophus] quatuor modos eius, quod est habere.”

<sup>55</sup> *In Metaph.* 5, l. 20, §1080 (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a8–9): “quorum *primus* est, secundum quod habere aliquid est ducere illud secundum suam naturam in rebus naturalibus, aut secundum suum impetum in rebus voluntariis.”

<sup>56</sup> *In Metaph.* 5, l. 20, §1080 (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a9–11): “Et hoc modo febris dicitur habere hominem, quia homo traducitur a naturali dispositione in dispositionem febrilem. Et hoc modo habent tyranni civitates, quia secundum voluntatem et impetum tyrannorum res civitatum aguntur. Et hoc etiam modo induti dicuntur habere vestimentum, quia vestimentum coaptatur induto ut accipiat figuram eius. Et ad hunc modum reducitur etiam habere possessionem, quia homo re possessa utitur secundum suam voluntatem.”

states, since the things of the states are done according to the will and impetus of tyrants. In this mode, too, those who are clothed are said to have clothing, since clothing is fitted to the one who wears it so that it receives his figure. To this mode is reduced, also, to have a possession, since a man uses the thing possessed according to his will.

2. As that in which something exists as **in a proper susceptible [subject]** (*in quo existit aliquid ut in <proprio> susceptibili* = ἐν ᾧ ἄν τι ὑπάρχη ὡς δεκτικῶ) is said to have it.<sup>57</sup>

For example, as bronze has the species of a statue; and a body has an illness.<sup>58</sup> Under this mode is comprehended, also, to have a science, a quantity, and whatever accident; or (to have) any form.

3. As the **container** is said to have the **contained** (*secundum quod continens <dicitur habere> contentum* = ὡς τὸ περιέχον τὰ περιεχόμενα); and the contained (is said) to be had by the container (*et contentum haberi a continente* < ἐν ᾧ γὰρ ἐστι περιέχοντι, ἔχεσθαι ὑπὸ τούτου λέγεται).<sup>59</sup>

For example, as we say that a vessel (*lagena* = ἀγγεῖον) has a fluid, e.g., water or wine; that a city has men; and that a ship (has) sailors. According to this mode, too, it is said that the whole has the parts (*totum habet partes* = τὸ ὅλον ἔχειν τὰ μέρη), for the whole contains the part, just as the place, too, (has) the placed. However, place differs from whole in that a place is divided from the placed, while the whole (is) not (divided) from the parts. Whence, the placed is as a divided part, as ARISTOTLE says (►29.2, ¶1).<sup>60</sup>

4. Insofar as something is said to have another because **it prevents** it from being moved or acted upon according to its impetus (*prohibet ipsum operari vel moveri secundum suum impetum* < τὸ κωλύον κατὰ τὴν αὐτοῦ ὀρμὴν τι κινεῖσθαι ἢ πράττειν).<sup>61</sup>

For example, columns are said to have heavy bodies imposed over them, because they

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<sup>57</sup> *In Metaph. 5, l. 20, §1081* (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a11–12): “*Secundus* modus est, prout illud, in quo existit aliquid ut in proprio susceptibili, dicitur habere illud.”

<sup>58</sup> *In Metaph. 5, l. 20, §1081* (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a12–13): “sicut aes habet speciem statuæ, et corpus habet infirmitatem. Et sub hoc modo comprehenditur habere scientiam, quantitatem, et quodcumque accidens, vel quamcumque formam.”

<sup>59</sup> *In Metaph. 5, l. 20, §1082* (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a13–15): “*Tertius* modus est, secundum quod continens dicitur habere contentum, et contentum haberi a continente.”

<sup>60</sup> *In Metaph. 5, l. 20, §1082* (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a15–17): “sicut dicimus quod lagena «habet humidum,» idest humorem aliquem, ut aquam vel vinum; et quod civitas habet homines, et navis nautas. Et secundum hunc modum etiam dicitur quod totum habet partes. Totum enim continet partem, sicut et locus locatum. In hoc enim differt locus a toto, quia locus est divisus a locato, non autem totum a partibus. Unde locatum est sicut pars divisa, ut habetur in quarto Physicorum.”

<sup>61</sup> *In Metaph. 5, l. 20, §1083* (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a17–18): “*Quartus* modus est secundum quod aliquid dicitur habere alterum, ex eo, quod prohibet ipsum operari vel moveri secundum suum impetum.”



prevent them from descending according to (their own) inclination.<sup>62</sup> In this mode, the poets said that Atlas has the heavens, for the poets imagined that Atlas is some giant who holds the heavens lest they fall on Earth.

This mode differs from the first (¶1).<sup>63</sup> In the first, the thing-that-has (*habens*) compelled the thing-had (*habitum*) from following according to its impetus; and thus, it was a cause of violent motion. Here, the thing-that-has prevents the thing-had from being moved according to natural motion; whence, it is a cause of violent rest.

The third mode (¶3),<sup>64</sup> whereby the container is said to have the contained, is reduced to this mode, for the reason that, otherwise, the (things) contained would be separated from each other, each by its (own) impetus, if the container should not prevent (this from happening). This is evident in a vessel that contains water, which prevents the parts (of water) from being separated from each other.

#### **42.14. To Have and to Be in Something Are Alike**

As ARISTOTLE says, *to be in something* (*esse in aliquo* = τὸ ἐν τινι... εἶναι) is said in a similar mode (ὁμοιότροπως) as *to have*; and, in something, the modes of being follow upon (ἐπιμένως) the modes of having.<sup>65</sup> He posits eight modes of *being in something* (►29.1, which are reduced to modes of having as follows):<sup>66</sup>

1. The modes according to which the integral whole is in the parts (►29.1, ¶2) and conversely (►29.1, ¶1),<sup>67</sup> the modes according to which a universal whole is in (its

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<sup>62</sup> *In Metaph.* 5, l. 20, §1083 (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a19–21): “sicut columnae dicuntur habere corpora ponderosa imposita super eas, quia prohibent ea descendere deorsum secundum inclinationem. Et hoc etiam modo poetae dixerunt quod Atlas habet caelum. Fingunt enim poetae quod Atlas est quidam gigas qui sustinet caelum ne cadat super terram.” St. Thomas adds: “Quod etiam quidam naturales dicunt, qui ponebant quod caelum quandoque corrumpetur et resolutum cadet super terram. Quod patet praecipue ex opinione Empedoclis, qui posuit mundum infinities corrumpi et infinities generari. Habuit autem poetica fictio ex veritate originem. Atlas quidem magnus astrologus, subtiliter motus caelestium corporum perscrutatus est, ex quo fictio processit quod ipse caelum sustineret.”

<sup>63</sup> *In Metaph.* 5, l. 20, §1083: “Differt autem hic modus a primo. Nam in primo habens, habitum cogebat sequi secundum suum impetum, et sic erat causa motus violenti. Hic autem habens, prohibet habitum moveri motu naturali, unde est causa quietis violentae.”

<sup>64</sup> *In Metaph.* 5, l. 20, §1083 (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a21–23): “Ad hunc autem modum reducitur tertius modus quo continens dicitur habere contenta; ea ratione quia aliter contenta suo proprio impetu singula separarentur abinvicem, nisi continens prohiberet; sicut patet in lagena continente aquam, quae prohibet partes abinvicem separari.”

<sup>65</sup> *In Metaph.* 5, l. 20, §1084 (cf. ARISTOTLE, *Metaphysica* Δ.23, 1023a23–25): “Dicit autem [Philosophus] in fine, quod esse in aliquo similiter dicitur sicut et habere; et modi essendi in aliquo consequuntur ad modos habendi.”

<sup>66</sup> *In Metaph.* 5, l. 20, §1084: “Octo autem modi essendi in aliquo in quarto Physicorum positi sunt.”

<sup>67</sup> *In Metaph.* 5, l. 20, §1084: “quorum duo, scilicet secundum quod totum integrale est in partibus et e converso: duo etiam, scilicet secundum quod totum universale est in partibus, et e converso, et alius modus secundum quod locatum est in loco, consequuntur ad tertium modum habendi, secundum quod totum habet partes, et locus locatum.”

subjective) parts (►29.1, ¶4), and conversely (►29.1, ¶3), and the mode according to which a placed is in a place (►29.1, ¶8), follow upon the third mode of having (►42.13, ¶3), according to which a whole has parts, and a place (has) a placed.

2. The mode according to which something is said to be in something as in an efficient or moving (cause; ►29.1, ¶6), as the (affairs) that are of a kingdom (are said to be) in the king, follows upon the first mode of having posited above (►42.13, ¶1).<sup>68</sup>

3. The mode according to which form is in matter (►29.1, ¶5), is reduced to the second mode of having posited above (►42.13, ¶2).<sup>69</sup>

4. The mode in which something is in an end (►29.1, ¶7), is reduced to the fourth mode of having posited above (►42.13, ¶4; i.e., insofar as something is said to have another because it prevents it from being moved or acted upon according to its impetus); or also to the first (►42.13, ¶1; i.e., insofar as to have is to draw something forward according to its nature, in natural things, or according to its impetus, in voluntary things), for those that are (related) to an end are moved and rest according to the end.<sup>70</sup>

#### 42.15. Derivation of *Habit*

The name *habit* (*habitus*) is derived from *having* in two modes:<sup>71</sup>

1. Insofar as man or any other thing is said **to have something** (*dicitur aliquid habere*).<sup>72</sup>

To have (*habere*), insofar as it is said in respect of anything that is had, is common to diverse genera.<sup>73</sup> Whence, ARISTOTLE posits (in his *Categories*) *to have* among the post-categories (*postpraedicamenta*)—to wit, those that follow upon the diverse genera of things, such as *opposites*, *prior* and *posterior*, and other such.

<sup>68</sup> *In Metaph.* 5, l. 20, §1084: “Modus autem secundum quod aliquid dicitur esse in aliquo, ut in efficiente vel movente, sicut quae sunt regni in rege, consequitur primum modum habendi hic positum.”

<sup>69</sup> *In Metaph.* 5, l. 20, §1084: “Modus autem essendi in, secundum quod forma est in materia, reducitur ad secundum modum habendi hic positum.”

<sup>70</sup> *In Metaph.* 5, l. 20, §1084: “Modus autem quo aliquid est in fine, reducitur ad modum habendi quartum hic positum; vel etiam ad primum, quia secundum finem moventur et quiescunt ea quae sunt ad finem.”

<sup>71</sup> *STh* I-II, q. 49 a. 1 co.: “hoc nomen *habitus* ab habendo est sumptum. A quo quidem nomen *habitus* dupliciter derivatur.”

<sup>72</sup> *STh* I-II, q. 49 a. 1 co.: “uno quidem modo, secundum quod homo, vel quaecumque alia res, dicitur aliquid habere.”

<sup>73</sup> *STh* I-II, q. 49 a. 1 co.: “Circa primum autem, considerandum est quod habere, secundum quod dicitur respectu cuiuscumque quod habetur, commune est ad diversa genera. Unde Philosophus inter postpraedicamenta habere ponit, quae scilicet diversa rerum genera consequuntur; sicut sunt *opposita*, et *prius et posterius*, et alia huiusmodi.” See ARISTOTLE, *Categoriae* 10, 11b15–16: “Υπὲρ μὲν οὖν τῶν προτεθέντων γενῶν ἰκανὰ τὰ εἰρημένα· περὶ δὲ τῶν ἀντικειμένων, ποσαχῶς εἴωθε ἀντιτίθεσθαι, ῥητέον. λέγεται δὲ ἕτερον ἐτέρῳ ἀντικεῖσθαι τετραχῶς, ἢ ὡς τὰ πρὸς τι, ἢ ὡς τὰ ἐναντία, ἢ ὡς στέρησις καὶ ἕξις, ἢ ὡς κατάφασις καὶ ἀπόφασις”; *ibid.*, 12b1–3: “ἀντικεῖσθαι δὲ καὶ ταῦτα δοκεῖ, τὸ ἐστερηῆσθαι καὶ τὸ τὴν ἕξιν ἔχειν ὡς στέρησις καὶ ἕξις”; *ibid.* 12, 14a26: “Πρότερον ἕτερον ἐτέρου λέγεται τετραχῶς.”

However, among those (things) that are had, there seems to be a distinction such that:<sup>74</sup>

**(a)** There are some in which there is no mean between that-which-has (*habens*) and that-which-is-had (*id quod habetur*).<sup>75</sup> For example, there is no mean between the subject and (its) quality or quantity.

**(b)** There are some in which there is some mean between one and the other, but only a relation.<sup>76</sup> For example, someone is said to have a partner or a friend.

**(c)** There are some (others) between which there is some mean—not indeed an action or an affection, but something by the mode of an action or an affection: namely, insofar as one decorates or covers and the other is decorated or covered (► 33.7).<sup>77</sup>

**2.** Insofar as something (*aliqua res*), in some mode (*aliquo modo*), **is had in itself** (*se habet in seipsa*) or **(is had in relation) to something else** (*vel ad aliquid aliud*).<sup>78</sup>

Since this mode of having oneself is according to some quality, this mode of habit is some quality (i.e., a disposition to act well or badly; ► 36.3, ¶2),<sup>79</sup> of which ARISTOTLE says that **habit** is said (to be) *a disposition according to which that-which-is-disposed is well or badly disposed, either according to itself or in respect of another* (► 22.9). For example, health is some habit.

#### **42.16. Habit as a Mean Action between That-Which-Has and That-Which-Is-Had**

As ARISTOTLE says, the name **habit** (*habitus* = ἔξις, i.e., that-which-is-had, possession) is said, in one mode, as some mean action between that-which-has and that-which-is-had (*actio quaedam habentis et habitus, medium inter habentem et habitum* < τοῦ ἔχοντος... καὶ τῆς ἐχομένης... ἔστι μεταξὺ ἔξις), as is in those (things) that we have around us.<sup>80</sup>

<sup>74</sup> *STh* I-II, q. 49 a. 1 co.: “Sed inter ea quae habentur, talis videtur esse distinctio, quod [...]”

<sup>75</sup> *STh* I-II, q. 49 a. 1 co.: “quaedam sunt in quibus nihil est medium inter habens et id quod habetur, sicut inter subiectum et qualitatem vel quantitatem nihil est medium.”

<sup>76</sup> *STh* I-II, q. 49 a. 1 co.: “Quaedam vero sunt in quibus est aliquid medium inter utrumque, sed sola relatio, sicut dicitur aliquis habere socium vel amicum.”

<sup>77</sup> *STh* I-II, q. 49 a. 1 co.: “Quaedam vero sunt inter quae est aliquid medium, non quidem actio vel passio, sed aliquid per modum actionis vel passionis, prout scilicet unum est ornans vel tegens, et aliud ornatum aut tectum.”

<sup>78</sup> *STh* I-II, q. 49 a. 1 co.: “alio modo, secundum quod aliqua res aliquo modo se habet in seipsa vel ad aliquid aliud.”

<sup>79</sup> *STh* I-II, q. 49 a. 1 co.: “Si autem sumatur habere prout res aliqua dicitur quodam modo se habere in seipsa vel ad aliud; cum iste modus se habendi sit secundum aliquam qualitatem, hoc modo habitus quaedam qualitas est, de quo Philosophus, in *V Metaphys.*, dicit quod *habitus dicitur dispositio secundum quam bene vel male disponitur dispositum, et aut secundum se aut ad aliud, ut sanitas habitus quidam est*. Et sic loquimur nunc de habitu. Unde dicendum est quod habitus est qualitas.”

<sup>80</sup> *STh* I-II, q. 49 a. 1 co.: “unde Philosophus dicit, in *V Metaphys.*, quod *habitus dicitur tanquam actio quaedam habentis et habitus*, sicut est in illis quae circa nos habemus.” In *Metaph.* 5, l. 20, §1062 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b4–14): “Hic prosequitur [Philosophus] *de nomine habitus*; et primo

Even if *to have* should not be an action, it nonetheless signifies by the mode of an action.<sup>81</sup> And hence, between that-which-has and that-which-is-had, the habit is understood to be a mean and, as it were, some action. For example, *heating* (*calefactio*, i.e., the act of heating) is understood to be a mean and, as it were, an action, whether that mean should be taken as an act (< ἐνέργειά τις, πρᾶξις τις)—as when *heating* is taken actively—or as a motion (< κίνησις)—as when *heating* is taken passively.

Indeed, when *this* produces (*hoc facit* < τὸ μὲν ποιῆ) and *that* is produced (*illud fit* < τὸ δὲ ποιῆται), there is a mean production (*est media factio* = ἔστι ποιήσις μεταξύ).<sup>82</sup> And if one should proceed from the agent into the patient, there is an active mean production, which is the act of the producer. On the other hand, (if) one should proceed from that-which-is-produced into the producer, in this mode, there is a passive mean production, which is the motion of that-which-is-produced.

In this mode, too, between a man that has clothing and the clothing had, there is a mean habit.<sup>83</sup> For if it should be considered by proceeding from man to clothing, it will be as an action, insofar as (*habit*) is signified (to be) in that which is said to have. If, on the other hand, (the habit is considered) conversely (i.e., from clothing to man), it will be as an affection of motion, insofar as (*habit*) is signified (to be) in that which is said to be had.

Although a habit is understood to be a mean between man and clothing insofar as he has it, however, it is manifest that there does not happen to be another mean between the habit itself and that-which-has, as though there should be, again, another mean habit between that-which-has and the mean habit itself.<sup>84</sup> Indeed, in this way, one would

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distinguit ipsum nomen habitus. [...] *Ponit ergo primo duos modos*, quibus hoc nomen dicitur. Quorum primus est aliquid medium inter habentem et habitum.”

<sup>81</sup> *In Metaph.* 5, l. 20, §1062 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b4–5): “Habere enim, licet non sit actio, significat tamen per modum actionis. Et ideo inter habentem et habitum intelligitur habitus esse medius, et quasi actio quaedam; sicut calefactio intelligitur esse media inter calefactum et calefaciens; sive illud medium accipiat ut actus, sicut quando calefactio accipitur active; sive ut motus, sicut quando calefactio accipitur passive.”

<sup>82</sup> *In Metaph.* 5, l. 20, §1062 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b5–6): “Quando enim hoc facit, et illud fit, est media factio. In Graeco habetur ποιήσις, quod factionem significat. Et siquidem ulterius procedatur ab agente in patiens, est medium factio activa, quae est actus facientis. Si vero procedatur a facto in facientem, sic est medium factio passiva, quae est motus facti.”

<sup>83</sup> *In Metaph.* 5, l. 20, §1062 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b6–8): “Ita etiam inter hominem habentem vestem, et vestem habitam, est medius habitus; quia si consideretur procedendo ab homine ad vestem, erit ut actio, prout significatur in hoc quod dicitur habere: si vero e converso, erit ut passio motus, prout significatur in hoc quod dicitur haberi.”

<sup>84</sup> *In Metaph.* 5, l. 20, §1063 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b8–10): “Quamvis autem habitus intelligatur esse medius inter hominem et vestem, in quantum habet eam; tamen manifestum est, quod non contingit inter ipsum habitum et habentem esse aliud medium, quasi adhuc sit alius habitus medius inter habentem et ipsum medium habitum. Sic enim procederetur in infinitum, si dicatur quod convenit habere habitum habitum, id est rei habitae. Homo enim habet rem habitam, id est vestem. Sed illum habitum rei habitae non habet homo, alio medio habitu, sicut homo faciens facit factum factione media; sed ipsam mediam factionem non facit aliqua alia factione media.”

proceed infinitely, if it should be said that it is befitting to have a habit of a habit (*convenit habere habitum habiti*), that is, of the thing had (*rei habitae*). Thus, the man has a thing had: i.e., the clothing. However, the man does not have the habit of the thing had, through another mean had, just as a producer man produces the product through a mean product, but he does not produce the mean product itself through some other mean product.

On account of this, too, relations whose subject is referred to another are not referred to the subject through some other mean relation; nor (are they related) to the opposite.<sup>85</sup> For example, paternity is referred neither to father nor to son through some other mean relation. And if some relations are said (to be a) *mean*, they are (relations) of *ratio* only, and not of thing.

However, *habit* thus taken is one category, for a special genus of things is constituted (► 33.7).<sup>86</sup>

#### 42.17. Habit as a Disposition

As ARISTOTLE says, the name **habit** is said, in another mode, as a *disposition according to which something is well or badly disposed* (*dispositio, secundum quam aliquid disponitur bene et male* < διάθεσις καθ' ἣν ἢ εὖ ἢ κακῶς διακείται τὸ διακείμενον).<sup>87</sup>

For example, something is well disposed by health; by illness, badly. By one and by the other—namely, by illness and by health—something is well or badly disposed in two modes:<sup>88</sup>

1. **According to itself** (*secundum se* = καθ' αὐτό).<sup>89</sup> For example, **healthy** is *that which is well disposed according to itself*.

2. **In respect to something** (*per respectum ad aliquid* = πρὸς ἄλλο).<sup>90</sup> For example, **robust** is that which is well disposed to do something.

<sup>85</sup> *In Metaph.* 5, l. 20, §1063: “Et propter hoc etiam relationes, quibus subiectum refertur ad aliud, non referuntur ad subiectum aliqua alia relatione media, nec etiam ad oppositum; sicut paternitas neque ad patrem neque ad filium refertur aliqua alia relatione media: et si aliquae relationes mediae dicantur, sunt rationis tantum, et non rei.”

<sup>86</sup> *In Metaph.* 5, l. 20, §1063: “Habitus autem sic acceptus est unum praedicamentum.” *STh* I-II, q. 49 a. 1 co.: “Et ideo in his constituitur unum speciale genus rerum, quod dicitur praedicamentum habitus, de quo dicit Philosophus, in V Metaphys., quod inter habentem indumentum, et indumentum quod habetur, est habitus medius.”

<sup>87</sup> *In Metaph.* 5, l. 20, §1064 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b10–11): “Secundo modo dicitur habitus dispositio, secundum quam aliquid disponitur bene et male.”

<sup>88</sup> *In Metaph.* 5, l. 20, §1064 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b11–12): “sicut sanitate aliquid disponitur bene, aegritudine male. Utroque autem, scilicet aegritudine et sanitate, aliquid disponitur bene vel male dupliciter; scilicet aut secundum se aut per respectum ad aliquid.”

<sup>89</sup> *In Metaph.* 5, l. 20, §1064: “Sicut sanum est quod est bene dispositum secundum se.”

<sup>90</sup> *In Metaph.* 5, l. 20, §1064: “robustum autem quod est bene dispositum ad aliquid agendum.”

Hence, health is some habit because it is a disposition such as has been said.<sup>91</sup>

Not only the disposition of a whole is said (to be a) *habit*, but also the disposition of a part, which is a part of the disposition of the whole.<sup>92</sup> For example, the good dispositions of a parts of an animal are parts of good habitude in the whole animal. Also, the virtues of the parts of the soul are some habits: for example, temperance (is a habit) of the concupiscible (appetite); fortitude (is a habit) of the irascible (appetite); and prudence (is a habit) of the rational (appetite).

#### 42.18. Affection

While *privation* is opposed to *habit* in direct opposition, *affection* is opposed to *habit* as imperfect to perfect.<sup>93</sup> ARISTOTLE posits four modes of **affection** (*passio* = πάθος):

1. The **quality** according to which **alteration** comes to be (*qualitas, secundum quam fit alteratio* < ποιότης καθ' ἣν ἀλλοιοῦσθαι ἐνδέχεται).<sup>94</sup>

For example, white, black, and other such (qualities).<sup>95</sup>

This is the third species of quality, for ARISTOTLE proves that there can be alteration only in the third species of quality.<sup>96</sup>

2. Insofar as such **actions of quality and alteration**,<sup>97</sup> which come to be according to

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<sup>91</sup> *In Metaph.* 5, l. 20, §1064 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b12): “Et ideo sanitas est habitus quidam, quia est talis dispositio qualis dicta est.”

<sup>92</sup> *In Metaph.* 5, l. 20, §1064 (cf. ARISTOTLE, *Metaphysica* Δ.20, 1022b13–14): “Et non solum habitus dicitur dispositio totius, sed etiam dispositio partis, quae est pars dispositionis totius; sicuti bonae dispositiones partium animalis, sunt partes bonae habitudinis in toto animali. Et virtutes etiam partium animae, sunt quidam habitus; sicut temperantia concupiscibilis, et fortitudo irascibilis, et prudentia rationalis.”

<sup>93</sup> *In Metaph.* 5, l. 20, §1062: “distinguit [Philosophus...] quaedam nomina quae habent propinquam considerationem ad hoc nomen [sc., *habitus*].” Ibid., §1065 (cf. ARISTOTLE, *Metaphysica* Δ.21, 1022b15–21): “Hic *prosequitur de illis quae consequuntur ad habitum*; et primo de *his quae se habent ad ipsum per modum oppositionis*. Secundo de eo quod se habet ad ipsum per modum effectus, scilicet de habere, quod ab habitu denominatur [...]. Habitui autem opponitur aliquid, scilicet *passio*, sicut imperfectum perfecto. Privatio autem oppositione directa. Unde primo determinat *de passione*. Secundo de privatione [...]. Ponit ergo primo, quatuor modos, quibus *passio* dicitur.”

<sup>94</sup> *In Metaph.* 5, l. 20, §1065 (cf. ARISTOTLE, *Metaphysica* Δ.21, 1022b15–16): “*Uno modo* dicitur *qualitas*, secundum quam fit *alteratio*.”

<sup>95</sup> *In Metaph.* 5, l. 20, §1065 (cf. ARISTOTLE, *Metaphysica* Δ.21, 1022b16–18): “sicut album et nigrum et huiusmodi.”

<sup>96</sup> *In Metaph.* 5, l. 20, §1065: “Et haec est tertia species qualitatis. Probatum enim est in septimo *Physicorum*, quod in sola tertia specie qualitatis potest esse *alteratio*.” See ARISTOTLE, *Categoriae* 8, 9a28–31: “Τρίτον δὲ γένος ποιότητος παθητικαὶ ποιότητες καὶ πάθη. ἔστι δὲ τὰ τοιάδε οἷον γλυκύτης τε καὶ πικρότης καὶ στρυφνότης καὶ πάντα τὰ τούτοις συγγενῆ, ἔτι δὲ θερμότης καὶ ψυχρότης καὶ λευκότης καὶ μελανία.” On alteration occurring only in the third species of quality, see ARISTOTLE, *Physica* H.2.

<sup>97</sup> *In Metaph.* 5, l. 20, §1066 (cf. ARISTOTLE, *Metaphysica* Δ.21, 1022b18–19): “*Secundus* modus est, secundum quod huiusmodi actiones qualitatis et alterationis, quae fiunt secundum eas, dicuntur *passiones*; et sic *passio* est unum praedicamentum, ut calefieri et infrigidari et huiusmodi.”

them (< αἱ τοῦτων ἐνέργειαι καὶ ἀλλοιώσεις ἤδη), are said (to be) *affections*. And in this mode, *affection* is one of the categories (► 33.5, ¶1), as *to be heated*, *to be cooled*, etc.

3. Not whatever **alterations**, but those **that are harmful** and (are) terminated at (something) **bad**; and those that are sorrowful or sad.<sup>98</sup> For, according to this mode, someone who heals is not said to be affected; rather, someone who falls ill, or to whoever a nuisance occurs. And this is reasonable, for the affected is drawn, through the action of the agent (that is) contrary to it, from its natural disposition into a disposition similar to the agent. And hence, more properly is it said to be affected when something is subtracted of that which was congruent to it, and while a contrary disposition is acted in it, that when the contrary comes to be—for then, rather, it is said to be perfected.

4. And since those (things) that are small (*modica*) are pondered as nothing (*quasi nulla reputantur*), hence, not whatever harmful **alterations** are said (to be) *affections*, but (only) those **that have a (great) magnitude of sorrow**, such as great calamities and great sadness.<sup>99</sup>

#### 42.19. Opposition as a Principle of Formal Distinction

As ARISTOTLE says, every distinction or division is either by quantity or by form (► 40.4).<sup>100</sup>

The principle of every formal distinction is some opposition, (if) *opposition* is taken widely, such that *imperfect* and *perfect*, too, are opposed insofar as in one (of them) is (found) the negation or privation of the other.<sup>101</sup> For in all oppositions, except relation, one (of the

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<sup>98</sup> *In Metaph.* 5, l. 20, §1067 (cf. ARISTOTLE, *Metaphysica* Δ.21, 1022b19–20): “*Tertio modo dicuntur passiones, non quaelibet alterationes, sed quae sunt nocivae, et ad malum terminatae, et quae sunt lamentabiles, sive tristes: non enim dicitur aliquid pati secundum hunc modum quod sanatur, sed quod infirmatur; vel etiam cuicumque aliquod nocumentum accidit: et hoc rationabiliter. Patiens enim per actionem agentis sibi contrarii, trahitur a sua dispositione naturali in dispositionem similem agentis. Et ideo magis proprie dicitur pati, cum subtrahitur aliquid de eo quod sibi congruebat, et dum agitur in ipso contraria dispositio, quam quando fit e contrario. Tunc enim magis dicitur perfici.*”

<sup>99</sup> *In Metaph.* 5, l. 20, §1068 (cf. ARISTOTLE, *Metaphysica* Δ.21, 1022b21–22): “*Et quia illa, quae sunt modica, quasi nulla reputantur, ideo quarto modo dicuntur passiones, non quaecumque nocivae alterationes, sed quae habent magnitudinem nocuenti, sicut magnae calamitates et magnae tristitiae.*” Following other renderings of the text, St. Thomas gives an alternative explanation. Thus, since also those that exceed in pleasure (*laetitia*) come to be harmful, since whenever, on account of an excess of pleasure, some have died or fell ill; and likewise, a superabundance of prosperity is turned into sorrow for those who do not know how to use it well; hence, another version has (great) magnitudes of lamentation and exultation are said (to be) affections; with which agrees another version, which says magnitudes of pain and of prosperities. *Ibid.*: *In Metaph.* 5, l. 20, §1068: “*Quia etiam excedens laetitia fit nociva, cum quandocumque propter excessum laetitiae aliqui mortui sint et infirmati; et similiter superabundantia prosperitatis in nocumentum vertitur his qui ea bene uti nesciunt: ideo alia litera habet magnitudines lamentationum et exultationum passiones dicuntur. Cui concordat alia litera, quae dicit magnitudines dolorum et prosperorum.*”

<sup>100</sup> *In Sent.* 1, d. 26 q. 2 a. 2 co.: “*omnis distinctio vel divisio est vel per quantitatem vel per formam, secundum Philosophum.*”

<sup>101</sup> *In Sent.* 1, d. 26 q. 2 a. 2 co.: “*Omnis autem distinctionis formalis principium est aliqua oppositio, ut largo modo sumatur oppositio, secundum quod etiam imperfectum et perfectum opponuntur, in quantum in uno est negatio vel privatio alterius. In omnibus autem oppositionibus alterum est ut perfectum, alterum*

two opposites) is as perfect (and) the other (is) as imperfect, as is evident by itself (*per se*) in affirmation and negation, and in privation and habit. This is evident also in contrariety (►43), for, according to ARISTOTLE, one of the (two) contraries is always as nobler; and the other, as worse, and as a privation: for example, white and black, cold and hot, and all such.

In relatives, however, neither (extremity) is as a privation of the other, nor does it convey some defect.<sup>102</sup> The reason for this is that, in relatives, there is no opposition insofar as the relative is *in* something, but insofar as it is said (to be in relation) *to another* (*ad aliud*). Whence, although one relation should have an adjoined negation of the other (extremity) of the relation in the same suppositum, however, this negation does not convey some defect, because there is defect only insofar as something is naturally apt to be in something. Whence, since that which has a relative opposition to it does not posit, according to the ratio of opposition, *something* (*aliquid*) but (*in relation*) *to something* (*ad aliquid*), no imperfection or defect follows.

#### 42.20. Knowing Opposites

ARISTOTLE posits two modes according to which it can be known that some (beings) are opposites:<sup>103</sup>

##### 1. By comparison to motion (*per comparationem ad motum*).<sup>104</sup>

In any motion (i.e., continuous change) or mutation (i.e., instantaneous change), the terminus from which (*terminus a quo*, i.e., the terminus whence change begins) is opposed to the terminus towards which (*terminus ad quem*, i.e., the terminus at which change ends).<sup>105</sup> Hence, those (termini or extremities, ἔσχατα) from which (*ex quibus* = ἐξ ὧν) there is motion and in(to) which (*in quae* < εἰς ἃ) there is motion are opposites. This is

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ut imperfectum, praeter relationem; quod patet per se in affirmatione et negatione et privatione et habitu. Patet etiam in contrarietate: quia secundum Philosophum, semper alterum contrariorum est sicut nobilius, et alterum sicut vilius et sicut privatio, ut album et nigrum, frigidum et calidum et huiusmodi omnia.”

<sup>102</sup> *In Sent.* 1, d. 26 q. 2 a. 2 co.: “In relativis autem neutrum est sicut privatio alterius, vel defectum aliquem importans. Cujus ratio est, quia in relativis non est oppositio secundum id quod relativum in aliquo est: sed secundum id quod ad aliud dicitur. Unde quamvis una relatio habeat annexam negationem alterius relationis in eodem supposito, non tamen ista negatio importat aliquem defectum, quia defectus non est nisi secundum aliquid quod in aliquo natum est esse: unde cum id quod habet oppositionem relativam ad ipsum, secundum rationem oppositionis non ponat aliquid, sed ad aliquid, non sequitur imperfectio vel defectus.”

<sup>103</sup> *In Metaph.* 5, l. 12, §923 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a21–25): “ponit [Philosophus] duos modos, secundum quos potest cognosci, quod aliqua sunt opposita.”

<sup>104</sup> *In Metaph.* 5, l. 12, §923: “primus est per comparationem ad motum.”

<sup>105</sup> *In Metaph.* 5, l. 12, §923 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a21–24): “Nam in quolibet motu vel mutatione, terminus a quo, opponitur termino ad quem. Et ideo ex quibus est motus, et in quae est motus, sunt opposita, ut patet in generationibus. Nam generatio albi est ex non albo, et ignis ex non igne.”



evident in generations (and in corruptions, γενέσεις καὶ φθοραί), for the generation of the white is from the non-white (likewise, on the other hand, the corruption of the white is towards the non-white); and the generation of fire is from non-fire.

## 2. By comparison to the subject (*per comparationem ad subiectum*).<sup>106</sup>

It is necessary that those (beings) that cannot be simultaneously in the same (subject that is) susceptible (of receiving either, *illa quae non possunt inesse simul eidem susceptibili* = ὅσα μὴ ἐνδέχεται ἅμα παρεῖναι τῷ ἀμφοῖν δεκτικῷ) be opposed to one another: either they themselves (should be opposites) or those in (or, rather, *from*) which they are (*vel ipsa, vel ea in quibus sunt < aut ipsa aut ex quibus sunt* = ἢ αὐτὰ ἢ ἐξ ὧν ἐστίν).<sup>107</sup>

It should be noted that ARISTOTLE says *in the same (subject) susceptible (of receiving either, τῷ ἀμφοῖν δεκτικῷ)* because some (beings) cannot simultaneously be in the same subject not because of the opposition that they would have to each other, but because the subject is not susceptible of (receiving) one and the other.<sup>108</sup> For example, whiteness and (the art of) music cannot simultaneously be in an ass, yet they can simultaneously be in man.

Thus, the same body cannot be at once white and black, which are (themselves) contraries.<sup>109</sup> On the other hand, *man* and *ass* cannot be said of the same (subject) because they have opposite differences in their *ratios* (i.e., they have opposite differences in the *ratios* from which their definitions are composed): to wit, *rational* and *irrational* (i.e., *man* is defined from *rational* and *animal*, while *ass* is defined from *irrational* and *animal*).

Likewise (i.e., like the example of *man* and *ass*), *grey* and *white* (cannot be said of the same subject) because grey is composed from black, which is the opposite of white (< διὸ ἐξ ὧν ἐστίν ἀντίκειται).<sup>110</sup>

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<sup>106</sup> *In Metaph.* 5, l. 12, §924: “Secundo modo per comparationem ad subiectum.”

<sup>107</sup> *In Metaph.* 5, l. 12, §924 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a22–24): “Nam illa, quae non possunt inesse simul eidem susceptibili, oportet quod adinvicem opponantur, vel ipsa, vel ea in quibus sunt.”

<sup>108</sup> *In Metaph.* 5, l. 12, §924 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a22–24): “Et notandum, quod signanter dicit [Philosophus], eidem susceptibili: quia quaedam non possunt alicui eidem subiecto simul inesse, non propter oppositionem quam habeant adinvicem, sed quia subiectum non est susceptibile utriusque; sicut albedo et musica non possunt simul inesse asino, possunt autem simul inesse homini.”

<sup>109</sup> *In Metaph.* 5, l. 12, §924: “Non enim potest idem corpus simul esse album et nigrum, quae sunt contraria. Homo vero et asinus non possunt de eodem dici, quia habent in suis rationibus differentias oppositas, scilicet rationale et irrationale.”

<sup>110</sup> *In Metaph.* 5, l. 12, §924 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a24–25): “Et similiter pallidum et album; quia pallidum componitur ex nigro, quod est oppositum albo.”



## 43. Contrariety

*In this chapter, we examine contrary opposition in more detail. This question is especially important, given that the principles of all things should be contraries.*

### 43.1. Contrariety as Diversity and Difference

As ARISTOTLE says, since *being* and *one* are said in multiple (modes), those that are said according to them (*secundum ea* < κατὰ ταῦτα)—such as *same* and *diverse*, which follow upon *one* and *many*, and *contrary*, which is contained under *diverse*—must (also) be said in multiple modes.<sup>1</sup> In this way, *diverse* must be divided according to the ten categories, just as *being* and *one*.

Having determined (the truth) about *one* and *many*, and about those that follow upon them—one of which is *contrariety*, which is some *difference*—, ARISTOTLE determines (the truth) about *contrariety*, for its special consideration has (some) difficulty.<sup>2</sup> He first shows that **contrariety** is *the greatest difference* (*differentia maxima*), determining (the truth) about contraries (► 43.2) and about means (► 43.17). Secondly, he inquires whether contraries differ in species (► 43.21) or in genus (► 43.25).

### 43.2. Contraries

ARISTOTLE assigns the (two) modes in which some (beings) are principally said (to be) **contraries** (*contraria* = ἐναντία):<sup>3</sup>

1. Those that cannot simultaneously be present in the same [subject] (*quae non possunt simul adesse eidem* = τὰ μὴ δυνατὰ ἅμα τῷ αὐτῷ παρεῖναι) even if they should differ according to genus (*licet differant secundum genus* < τῶν διαφερόντων κατὰ γένος).<sup>4</sup> However, this mode is improper, for—properly (speaking)—contraries are those which are of one genus.

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<sup>1</sup> *In Metaph.* 5, l. 12, §930 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a35–38): “Et ostendit *qua de causa praedicta dicuntur multipliciter*. Quia enim unum et ens dicuntur multipliciter, oportet quod ea quae dicuntur secundum ea, multipliciter dicantur; sicut idem et diversum, quae consequuntur unum et multa, et contrarium, quod sub diverso continetur. Et ita oportet, quod diversum dividatur secundum decem praedicamenta, sicut ens et unum.”

<sup>2</sup> *In Metaph.* 10, l. 5, §2023 (cf. ARISTOTLE, *Metaphysica* I.4–8, 1055a3–1058b26): “Postquam Philosophus determinavit de uno et multo, et de his quae ad ea consequuntur, quorum unum est contrarietas, quae est differentia quaedam, ut dictum est, hic *determinat de contrarietate*, quia eius consideratio specialem habet difficultatem. Et dividitur in partes duas. In prima ostendit quod *contrarietas est differentia maxima*. In secunda inquit, utrum contraria differant genere, aut specie. [...] Prima dividitur in duas. In prima determinat de contrariis. In secunda de mediis.”

<sup>3</sup> *In Metaph.* 5, l. 12, §925 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a25–35): “ostendit [Philosophus] *quot modis contraria dicuntur*: et circa hoc tria facit. Quorum *primum* est, quod *assignat modos*, quibus aliqua principaliter dicuntur contraria.”

<sup>4</sup> *In Metaph.* 5, l. 12, §925 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a26–27): “inter quos ponit unum *primum* improprium: scilicet quod aliqua dicuntur contraria, quae non possunt simul adesse eidem, licet differant secundum genus: proprie enim contraria sunt quae sunt unius generis.”

For example, if we were to say that heaviness and circular motion (are contraries because they) are not in the same subject (i.e., according ancient astronomy of celestial bodies).<sup>5</sup>

**2. Properly,** (those) are said (to be) **contraries** (*which*) *agree in something (in aliquo convenientia* < τὰ πλεῖστον διαφέροντα τῶν ἐν τῷ αὐτῷ..., ὑπὸ τὴν αὐτήν).<sup>6</sup>

### 43.3. Agreement of True Contraries

ARISTOTLE makes known those that are truly contraries according to the three (things) in which they can agree:<sup>7</sup>

**1.** In the same **genus** (*in eodem genere* = ἐν τῷ αὐτῷ γένει).<sup>8</sup> Of those that are in the same genus, those are said (to be) **contraries** *which differ the most (quae plurimum differunt* = τὰ πλεῖστον διαφέροντα).

For example, *white* and *black* in the genus of *color*.<sup>9</sup> And it is manifest that *alike* and *unlike* are contraries (in the genus of *quality*).

**2.** In the same **subject** (*in eodem subiecto* < *in eodem susceptibili* = ἐν ταύτῳ δεκτικῷ).<sup>10</sup> Of those that exist in the same (subject that is) susceptible (of receiving them, those are said to be **contraries**) *which differ the most*.

Thus, the (subject-)matter of contraries is the same.<sup>11</sup> For example, great and small are contraries over quantity; therefore, the matter of the great and of the small is the same. Likewise, *healthy* and *ill* (are contraries) in an animal (subject).

What is indivisible according to subject, but not according to *ratio*,<sup>12</sup> can certainly have contraries according to potency (e.g., the same subject can be white in act and black in

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<sup>5</sup> *In Metaph.* 5, l. 12, §925: “sicut si diceretur, quod gravitas et motus circularis non sunt in eodem subiecto.”

<sup>6</sup> *In Metaph.* 5, l. 12, §926 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a27–30): “Alium modum ponit [Philosophus] proprium secundum quod contraria dicuntur in aliquo convenientia.”

<sup>7</sup> *In Metaph.* 5, l. 12, §926 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a27–30): “Conveniunt enim contraria in tribus: scilicet in eodem genere, et in eodem subiecto, et in eadem potestate. Et ideo notificat [Philosophus] secundum ista tria, illa quae sunt vere contraria; dicens, quod [...] dicuntur contraria [...]”

<sup>8</sup> *In Metaph.* 5, l. 12, §926 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a27–28): “illa, quae plurimum differunt eorum quae sunt in eodem genere, dicuntur contraria.”

<sup>9</sup> *In Metaph.* 5, l. 12, §926: “sicut album et nigrum in genere coloris.” *In De anima* 2, c. 28, 172–173: “Manifestum est enim quod simile et dissimile sunt contraria.”

<sup>10</sup> *In Metaph.* 5, l. 12, §926 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a28–29): “Et iterum illa, quae plurimum differunt in eodem susceptibili existentia.”

<sup>11</sup> *In Physic.* 4, l. 14, n. 11 (cf. ARISTOTLE, *Physica* Δ.9, 217a26–33): “Eadem numero est materia contrariorum: magnum autem et parvum sunt contraria circa quantitatem: ergo eadem numero est materia magni et parvi.” *In Metaph.* 5, l. 12, §926: “sicut sanum et aegrum in animali.”

<sup>12</sup> *In De anima* 2, c. 27, 150–158 (cf. ARISTOTLE, *De anima* Γ.2, 427a6–9): “Quod enim est *idem et indivisibile* secundum subiectum, set *non secundum esse*, id est secundum rationem, potest quidem habere *contraria* secundum potenciam, set quod habet contraria *in operari*, id est secundum actum,

potency). However, what has contraries according to act must be divisible: it is impossible for the same indivisible (subject) to be at once white and black, as it is impossible for something one and indivisible to undergo at once its (multiple) species.

**3.** In the same **power** (*in eadem potestate* < ὑπὸ τὴν αὐτὴν δύναμιν). Of those that are contained in the same power, (those are said to be **contraries**) *which differ the most*.<sup>13</sup>

For example, the congruent and the incongruent (*congruum et incongruum*) in (the art of) grammar, for rational powers (*potestates rationabiles*) are (related) to opposites.<sup>14</sup>

#### 43.4. The Ratio of Contraries

(In each of the above modes in which things are truly said to be contraries), ARISTOTLE says *the most* (*plurimum* = [τὰ] πλεῖστον [διαφέροντα]) to differentiate (*contraries* from) *means between contraries* (► 43.17), which also agree in the same genus, subject, or power, but do not differ *the most*.<sup>15</sup>

Whence, he adds the universal *ratio* according to which some (things) are said (to be) **contraries**: namely, because *their difference is greatest* (*eorum differentia est maxima* < ὧν ἡ διαφορά μεγίστη), either:<sup>16</sup>

**1. Simply** (*vel simpliciter* = ἢ ἀπλῶς).<sup>17</sup> For example, the maximally distant extremities in local motion are the extremities of the diameter of the whole universe.

**2. In the same genus** (*vel in eodem genere* < ἢ κατὰ γένος).<sup>18</sup> For example, the specific differences that divide a genus (i.e., *rational* and *irrational* in the genus of *animal*).

**3. In the same species** (*vel in eadem specie* < ἢ κατ' εἶδος).<sup>19</sup> For example, the contrary accidental differences whereby individuals of the same species differ.

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oportet quod sit *diuisibile, et impossibile est idem et indiuisibile simul et semel esse album et nigrum, quare neque possibile aliquod unum et indiuisibile simul pati species ipsorum.*"

<sup>13</sup> *In Metaph.* 5, l. 12, §926 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a29–30): "Et iterum, quae plurimum differunt in eadem potestate contenta."

<sup>14</sup> *In Metaph.* 5, l. 12, §926: "sicut congruum et incongruum in grammatica. Potestates enim rationabiles ad opposita sunt."

<sup>15</sup> *In Metaph.* 5, l. 12, §926 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a27–30): "Dicit autem [Philosophus] «plurimum» ad differentiam mediorum inter contraria, quae etiam conveniunt in eodem genere, subiecto et potestate, non tamen sunt plurimum differentia."

<sup>16</sup> *In Metaph.* 5, l. 12, §927 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a30–31): "Unde subiungit [Philosophus] universalem rationem, secundum quam aliqua dicuntur contraria; quia scilicet eorum differentia est maxima, vel simpliciter, vel in eodem genere, vel in eadem specie."

<sup>17</sup> *In Metaph.* 5, l. 12, §927: "Simpliciter quidem, sicut in motu locali extrema sunt maxime distantia, sicut punctus orientis et occidentis, quae sunt extrema diametri totius orbis."

<sup>18</sup> *In Metaph.* 5, l. 12, §927: "In eodem genere, sicut specificae differentiae, quae dividunt genus."

<sup>19</sup> *In Metaph.* 5, l. 12, §927: "In eadem specie, sicut accidentales differentiae contrariae per quae differunt individua eiusdem speciei."

### 43.5. Contraries in a Secondary Mode

ARISTOTLE also shows how some (beings) are said (to be) *contraries* in a secondary mode because they have a relation to those that are principally contraries—i.e., since either:<sup>20</sup>

1. They **have contraries in act** (< τῷ τὰ τοιαῦτα ἔχειν).<sup>21</sup> For example, fire and water are said (to be) *contraries* (according to ancient science) because one of them is hot and the other is cold.

2. They **are in potency susceptible of contraries** (< τῷ δεκτικὰ εἶναι τῶν τοιοῦτων).<sup>22</sup> For example, that which can be healed or sickened (*sanativum et aegrotativum*).

3. They **are in potency of acting or being acted upon by contraries** (< τῷ ποιητικὰ ἢ παθητικὰ εἶναι τῶν τοιοῦτων).<sup>23</sup> For example, the capable-of-heating and the capable-of-cooling (*calefactivum et infrigidativum*); (and) the heatable and the coolable (*calefactibile et infrigidabile*).

4. They **are agents or patients in act of contraries** (< ποιοῦντα ἢ πάσχοντα).<sup>24</sup> For example, the heater and the cooler (*calefaciens et infrigidans*); (and) the heated and the cooled (*calefactum et infrigidatum*).

5. They **are expulsions or rejections** (*expulsiones, sive abiectioes* < ἀποβολαί), **or receptions** (*acceptiones* < λήψεις), **of contraries; or, also, their habits** (< ἔξεις) **or privations** (< στέρησεις).<sup>25</sup> For example, the privation of white is opposed to the privation of black as the habit (of white is opposed) to the habit (of black).

It is therefore evident that ARISTOTLE touches upon a threefold relation about contraries:<sup>26</sup> **(a)** of the subject in act (¶1) or in potency (¶2); **(b)** of the active and of the passive in

<sup>20</sup> *In Metaph.* 5, l. 12, §928 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a25–35): “Et ostendit [Philosophus] qualiter aliqua secundo modo dicuntur contraria, propter hoc quod habent habitudinem ad ea quae principaliter sunt contraria; scilicet quia [...]”

<sup>21</sup> *In Metaph.* 5, l. 12, §928 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a31–32): “quia vel habent contraria in actu, sicut ignis et aqua dicuntur contraria, quia alterum est calidum et alterum frigidum.”

<sup>22</sup> *In Metaph.* 5, l. 12, §928 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a32): “vel quia sunt susceptibilia contrariorum in potentia, sicut sanativum et aegrotativum.”

<sup>23</sup> *In Metaph.* 5, l. 12, §928 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a33): “Vel quia sunt activa vel passiva contrariorum in potentia, ut calefactivum et infrigidativum, calefactibile et infrigidabile.”

<sup>24</sup> *In Metaph.* 5, l. 12, §928 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a33–34): “Vel quia sunt contrariorum agentia et patientia in actu, sicut calefaciens et infrigidans, calefactum et infrigidatum.”

<sup>25</sup> *In Metaph.* 5, l. 12, §928 (cf. ARISTOTLE, *Metaphysica* Δ.10, 1018a34–35): “Vel quia sunt expulsiones, sive abiectioes, sive acceptiones contrariorum, vel etiam habitus aut privationes eorum. Nam privatio albi opposita est privationi nigri, sicut habitus habitui.”

<sup>26</sup> *In Metaph.* 5, l. 12, §929: “Patet ergo quod tangit [Philosophus] triplicem habitudinem circa contraria. Una quae est subiecti in actu, vel in potentia. Alia quae est activi et passivi in actu et potentia. Tertia quae est generationis et corruptionis, vel secundum se, vel quantum ad eorum terminos, qui sunt habitus et privatio.”

potency (¶3) or in act (¶4); (c) of generation and corruption (¶5), either according to itself or in respect of its termini, which are habit and privation.

### 43.6. The Nature of Contrariety

ARISTOTLE shows the nature of contrariety—i.e., what contrariety should be, the definition of contrariety—doing two (things):<sup>27</sup>

1. He shows that **there is some greatest difference**, in the following mode.<sup>28</sup>

In whatever there is to be found a greater and a less, there is to be found a greatest, since one should not proceed infinitely; and something happens to differ from another more or less; therefore, some two (extremities) happen to maximally differ.<sup>29</sup> And thus, there is some greatest difference.

2. He shows by induction that **contrariety** (*contrarietas* = ἐναντιότης) should be *the greatest difference* (*maxima differentia* = ἡ μεγίστη... διαφορά).<sup>30</sup>

Thus, whatever (things) differ, they differ either in genus or in species.<sup>31</sup> Now, those that differ in genus are not comparable to each other (► 21.9): rather, they differ more than it would be possible, in them, to accept that they differ more or less (< ἀπέχει πλεον και ἀσύμβλητα), for this is accepted in those of which there is transmutation towards each other (< τὰ... γένει διαφέροντα οὐκ ἔχει ὁδὸν εἰς ἄλληλα).

Indeed, some process—and a way of transmutation from one into another—is understood through this: that they differ more first, and thereafter less; and thus, in that extent, one is transmuted into the other.<sup>32</sup> Whence, in them (i.e., in those that differ in genus), it is not to

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<sup>27</sup> *In Metaph.* 10, l. 5, §2023 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a3–10): “Prima dividitur in duas. In prima ostendit [Philosophus] naturam contrarietatis. [...]. Prima dividitur in duas partes. In prima ostendit quid sit contrarietas. [...]. Circa primum duo facit. Primo ostendit definitionem contrarietatis. [...]. Circa primum duo facit. Primo ponit definitionem contrarietatis. [...]. Circa primum duo facit.”

<sup>28</sup> *In Metaph.* 10, l. 5, §2023 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a3–4): “Primo ostendit [Philosophus] aliquam esse differentiam maximam, hoc modo.”

<sup>29</sup> *In Metaph.* 10, l. 5, §2023 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a3–4): “In quibuscumque est invenire magis et minus, est invenire maximum, cum non sit procedere in infinitum: sed contingit differre aliquid ab altero magis et minus: ergo et contingit aliqua duo maxime differre. Et ita est aliqua differentia maxima.”

<sup>30</sup> *In Metaph.* 10, l. 5, §2024 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a4–6): “Ostendit [Philosophus], quod contrarietas sit maxima differentia, per inductionem.”

<sup>31</sup> *In Metaph.* 10, l. 5, §2024 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a6–7): “Quaecumque enim differunt, aut differunt genere, aut differunt specie. Illa autem, quae differunt genere, non sunt comparabilia adinvicem, sed magis distant quam possit in eis accipi magis et minus differre. Hoc enim accipitur in illis quorum est transmutatio invicem.”

<sup>32</sup> *In Metaph.* 10, l. 5, §2024: “Intelligitur enim processus quidam et via transmutationis de uno in aliud per hoc, primo quod magis differunt, et postea minus, et sic quousque unum transmutatur in alterum. In illis autem quae differunt genere, non est accipere huiusmodi viam transmutationis unius in alterum. Unde in eis non est accipere magis et minus differre, et per consequens nec maxime differre: et sic in differentibus genere non est maxima differentia.”

be accepted that they differ more or less; nor, consequently, that they maximally differ. And thus, in those that differ in genus, there is no greatest difference.

(E.g., white and black can be compared because the subject of whiteness can change from whiter to less white and vice-versa; on the other hand, white and sweet are not comparable because the subject of whiteness does not become more or less sweet when it becomes more or less white, except perhaps by accident).

On the other hand, in those that differ in species, there must be a greatest difference between contraries, for there are mutual generations from contraries as from extremities (*ex ultimis*).<sup>33</sup> Thus, some mean is generated from an extremity (*ex extremo*); or conversely; or also a mean from a mean: for example, grey from black or from red. However, such generations are not from two (*termini*) as (from two) extremities (*ex duobus quasi ultimis*): when generation proceeds from black to grey, it, again, can further proceed to something that differs more; but when it should have already arrived at white, it cannot further proceed to something that differs more from black; and thus, it rests there as in an extremity.

Wherefrom, ARISTOTLE says that generations come to be from contraries as from extremities (*sicut ex ultimis = ὡς ἐσχάτων*).<sup>34</sup> Yet, it is manifest that the greatest distance is always between extremities (< τὸ... τῶν ἐσχάτων διάστημα μέγιστον). Therefore, it remains that, among those that differ in species, contraries maximally differ.

Since we have shown that those that differ in genus are not said to differ maximally, and nonetheless there is some greatest difference, it follows that **contrariety** (*contrarietas*) should be nothing other than *the greatest difference*.<sup>35</sup>

### 43.7. Contrariety Is the Perfect Difference—Only One Contrary to One Being

From the definition assigned (to *contrariety*), ARISTOTLE draws two corollaries:<sup>36</sup>

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<sup>33</sup> *In Metaph.* 10, I. 5, §2025: “In illis vero quae differunt specie, oportet maximam differentiam esse inter contraria, quae generationes mutuae sunt ex contrariis sicut ex ultimis. Generatur quidem medium ex extremo aut e converso, aut etiam medium ex medio, ut pallidum ex nigro vel ex rubeo: non tamen huiusmodi generationes sunt ex duobus quasi ultimis. Cum enim in generatione, ex nigro procedit ad pallidum, adhuc ulterius potest procedere ad aliquid magis differens. Sed cum iam pervenerit ad album, non potest ulterius procedere ad aliquid magis differens a nigro. Et sic ibi est status sicut in ultimo.”

<sup>34</sup> *In Metaph.* 10, I. 5, §2025 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a8–10): “Et propter hoc dicit [Philosophus] quod generationes fiunt ex contrariis sicut ex ultimis. Sed manifestum est, quod distantia ultimorum semper est maxima. Relinquitur ergo, quod inter ea quae differunt specie, maxime differunt contraria.”

<sup>35</sup> *In Metaph.* 10, I. 5, §2026: “Cum autem ostenderimus quod ea quae differunt genere non dicuntur maxime differre, et tamen est aliqua maxima differentia, sequitur quod contrarietas non sit aliud quam maxima differentia.”

<sup>36</sup> *In Metaph.* 10, I. 5, §2027 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a8–10): “Inducit [Philosophus] duo corollaria ex praemissis.” *Ibid.*, §2023: “ex definitione assignata quaedam corollaria concludit.”



**1. Contrariety** should be *the perfect difference* (*perfecta differentia* = τελεία διαφορά).<sup>37</sup>

This is proven as follows.<sup>38</sup> The maximum in any genus is the same as that which is perfect (►27.5). This is evident from this: that **greatest** (*maximum*) is *that which is not exceeded* (*quod non exceditur* < οὐ μὴ ἔστιν ὑπερβολή), and **perfect** is *that outside of which nothing can be taken* (*extra quod non potest aliquid sumi* = οὐ μὴ ἔστιν ἔξω λαβεῖν τι δυνατόν; ►23.1). Thus, it seems that the difference of the greatest (*differentia maximi*) is the same (as the difference) of the perfect.

Thus, since contrariety should be the greatest difference, as has been proven, it follows that it should be the perfect difference.<sup>39</sup> However, since *contraries* are said in multiple modes, not all contraries are said to differ perfectly. (This) follows, rather, in such a way that any contraries differ perfectly just as it befits them to be contraries: namely, to some, first (►43.4); to some (others), secondarily (►43.5).

**2. It is not befitting for many to be contrary to one** (*non convenit plura esse contraria uni* = οὐκ ἐνδέχεται ἐνὶ πλείω ἐναντία εἶναι).<sup>40</sup>

He proves this in two modes.<sup>41</sup> Firstly, because contrariety is the greatest and perfect difference as of extremities; and the extremities of one distance (< τοῦ ἐνὸς διαστήματος) cannot be more than two: e.g., we see that one straight line has two extreme points. Moreover, there is nothing beyond the last. Whence, if contrariety is a distance, it is impossible that some two (things) should, as extremities, equally (*ex aequo*) be contraries to one (of many) contraries; or that one should be more contrary and another less, for that which would be less contrary would not be last: rather, there would be something farther.

<sup>37</sup> *In Metaph.* 10, l. 5, §2027 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a10–11): “quorum primum est quod contrarietas sit perfecta differentia.”

<sup>38</sup> *In Metaph.* 10, l. 5, §2027 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a11–12): “Quod sic probatur. Maximum in unoquoque genere est idem quod perfectum est. Quod patet ex hoc, quod maximum est quod non exceditur; et perfectum est, extra quod non potest aliquid sumi. Et sic eadem videtur esse differentia maximi et perfecti.”

<sup>39</sup> *In Metaph.* 10, l. 5, §2029 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a11–19): “Et sic, cum contrarietas sit maxima differentia, ut probatum est, sequitur quod sit differentia perfecta. Sed quia contraria dicuntur multipliciter, ut postmodum dicitur, non omnia contraria dicuntur perfecte differentia. Sed ita consequitur quaelibet contraria perfecte differre, sicut competit eis esse contraria; quibusdam scilicet primo, et quibusdam secundo.”

<sup>40</sup> *In Metaph.* 10, l. 5, §2030 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a19–20): “Secundum corollarium ponit [Philosophus] dicens, quod cum praedicta sint vera, manifestum est quod non convenit plura esse contraria uni.”

<sup>41</sup> *In Metaph.* 10, l. 5, §2030 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a20–21): “Quod quidem probat dupliciter. Primo, quia contrarietas est maxima et perfecta differentia quasi ultimorum. Unius autem distantiae non possunt esse plura ultima quam duo. Sicut videmus quod unius rectae lineae sunt duo puncta extrema. Nec iterum ultimo est aliquid ulterius. Unde impossibile est, si contrarietas est una distantia, quod uni contrariorum contrarientur aliqua duo ex aequo quasi ultima. Nec quod unum contrarietur magis, et alterum minus: quia id quod contrarietur minus, non esset ultimum, sed aliquid haberet ulterius.”

Secondly, he proves the same in another mode, saying that contrariety is some difference, and every difference is of some two (things).<sup>42</sup> Whence, the perfect difference is of two (things). And thus, there is only one contrary to one (being).

### 43.8. Reduction of Other Definitions of Contraries

ARISTOTLE shows that four definitions of **contraries** given by other (philosophers) are reducible to the aforesaid definition:<sup>43</sup>

1. *Those that differ most (quae plurimum differunt < πλεῖστον διαφέρει).*<sup>44</sup> This is verified according to the aforesaid, since contrariety should be the perfect difference, which causes (*facit*) to differ most. Indeed, it is manifest from the aforesaid that, in those (things) that differ in genus, there cannot be taken something that differs more than those that differ in species, for there is no difference (in relation) to those that are outside a genus (< πρὸς τὰ ἔξω τοῦ γένους οὐκ ἔστι διαφορά). On the other hand, the greatest difference of those that differ in species, is (the difference) of contraries. Thus, it follows that **contraries** are *those that differ most*.

2. *Those that differ most in the same genus (quae plurimum differunt in eodem genere = τὰ ἐν ταύτῳ γένει πλεῖστον διαφέροντα).*<sup>45</sup> This (definition) is also verified according to the aforesaid, since contrariety is the perfect difference; and the greatest difference of those that are in the same genus is the perfect difference. Whence, it remains that **contraries** are *those that differ most in the same genus*.

3. *Those that differ most in the same susceptible [subject genus] (quae plurimum differunt in eodem susceptibili = τὰ ἐν τῷ αὐτῷ δεκτικῷ πλεῖστον διαφέροντα).*<sup>46</sup> This

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<sup>42</sup> *In Metaph.* 10, l. 5, §2031 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a22–23): “Probat idem *alio modo*; dicens, quod contrarietas est differentia quaedam. Omnis autem differentia est aliquorum duorum. Unde et perfecta differentia est duorum. Et sic unum uni tantum est contrarium.”

<sup>43</sup> *In Metaph.* 10, l. 5, §2032 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a23–33): “Ostendit [Philosophus], quod omnes definitiones de contrariis datae, secundum praedictam definitionem contrarietatis verificantur. Et ponit [Philosophus] «quatuor terminos,» id est definitiones contrariorum ab aliis assignatas.” *In Metaph.* 10, l. 5, §2023: “ad definitionem assignatam reducit omnes alias definitiones, quae de contrariis assignantur.”

<sup>44</sup> *In Metaph.* 10, l. 5, §2032 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a24–27): “quarum prima est, quod contraria sunt quae plurimum differunt. Hoc enim verificatur secundum praedicta, cum contrarietas sit perfecta differentia, quae facit plurimum differre. Manifestum est enim ex praedictis, quod in his quae differunt genere non est accipere quid magis differens his quae differunt specie: quia ad ea quae sunt extra genus, non est differentia, ut dictum est. Eorum vero, quae differunt specie, maxima differentia est contrariorum. Et sic sequitur quod contraria sunt quae plurimum differunt.”

<sup>45</sup> *In Metaph.* 10, l. 5, §2033 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a27–29): “Secunda definitio est, quod contraria sunt quae plurimum differunt in eodem genere. Quae etiam verificatur secundum praedicta: quia contrarietas est perfecta differentia. Maxima autem differentia eorum quae sunt in eodem genere est perfecta differentia. Unde relinquitur quod contraria sunt quae plurimum differunt in eodem genere.”

<sup>46</sup> *In Metaph.* 10, l. 5, §2034 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a29–30): “Tertia definitio est quod contraria sunt quae plurimum differunt in eodem susceptibili. Quod etiam verificatur ex praedictis; quia eadem est materia contrariorum, cum ex invicem generentur.”

(definition), too, is verified from the aforesaid, since the matter of contraries is the same (< ἢ... ἕλη ἢ αὐτὴ τοῖς ἐναντίοις), for they are generated from each other.

4. *Those that differ most under the same potency (quae plurimum differunt «sub eadem potentia» = τὰ ὑπὸ τὴν αὐτὴν δύναμιν πλεῖστον διαφέροντα):* that is, (under the same) art or science (*idest arte vel scientia*), for science is a rational potency.<sup>47</sup> Hence, since contraries should be in the same genus, they must be under the same potency or science. And since contrariety is the perfect difference in the same genus, those contraries that are under the same science must differ most.

The same rational potencies are related to contraries.<sup>48</sup> For example, the art of medicine, which is some potency, is related to illness and causing health. On the other hand, irrational potencies are not related to opposites: rather, one (potency) is (related) only to one effect, speaking by itself. For example, the hot sun heats by itself, even though it could be a cause of cooling by accident (e.g., by its absence; ► 10.11).

ARISTOTLE assigns the cause of this difference as follows.<sup>49</sup> Science (*scientia* = ἐπιστήμη), which is a rational potency, is some *ratio* (*ratio* = λόγος) of the thing known in the soul. And the same *ratio* manifests the thing and its privation (< ὁ... λόγος ὁ αὐτὸς δηλοῖ τὸ πρᾶγμα καὶ τὴν στέρησιν), although not likewise (< πλὴν οὐχ ὡσαύτως); since it manifests first the existing thing, and posteriorly its privation—just as the potency of sight itself is known through the *ratio* of the (thing) *seen* (*per rationem visus*), while from the consequent (is known) blindness, which is nothing other than the lack of sight in that which is naturally apt to have sight. Whence, if science is some *ratio* of the thing known in the soul, it is necessary that the science of contraries be the same—of one: indeed, priorly and

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<sup>47</sup> *In Metaph.* 10, l. 5, §2035 (cf. ARISTOTLE, *Metaphysica* I.4, 1055a31–33): “Quarta definitio est, quod contraria sunt, quae plurimum differunt «sub eadem potentia,» idest arte vel scientia. Nam scientia est potentia rationalis, ut in nono dictum est. Et haec etiam definitio ex praedictis verificatur; quia una scientia est circa unum genus. Cum igitur contraria sint in eodem genere, oportet quod sint sub eadem potentia sive scientia. Et quia contrarietas est perfecta differentia in eodem genere, oportet quod contraria plurimum differant eorum quae sunt sub eadem scientia.”

<sup>48</sup> *In Metaph.* 9, l. 2, §1789 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046b4–7): “potentiae rationales eadem se habent ad contraria; sicut ars medica quae est quaedam potentia, ut dictum est, se habet ad infirmitatem et sanitatem faciendam. Potentiae autem irrationales non se habent ad opposita, sed una est ad unum effectum tantum, per se loquendo. Sicut calidum solis calefacit per se, etsi per accidens possit esse causa frigiditatis.”

<sup>49</sup> *In Metaph.* 9, l. 2, §1790 (cf. ARISTOTLE, *Metaphysica* Θ.1, 1046b7–15): “Assignat Philosophus causam praedictae differentiae; quae talis est. Nam scientia, quae est potentia rationalis, est quaedam ratio rei scitae in anima. Eadem autem ratio rem manifestat et eius privationem, licet non similiter; quia primo manifestat eam rem existentem, per posterius autem eius privationem. Sicut per rationem visus per se cognoscitur ipsa visiva potentia, ex consequenti vero caecitas; quae nihil aliud est, quam ipsa carentia visus in eo quod natum est habere visum. Unde necessarium est, si scientia est quaedam ratio rei scitae in anima, quod eadem sit scientia contrariorum. Unius quidem per prius et secundum se, alterius vero per posterius. Sicut medicina per prius est cognoscitiva et factiva sanitatis, per posterius autem infirmitatis; quia et hoc, ut iam dictum est, est de ratione rei scitae in anima, quae est unius oppositorum secundum se, et alterius secundum accidens.”

according to itself, while of the other posteriorly. For example, (the art of) medicine is priorly cognitive and effective of health, while (it is) posteriorly (cognitive and effective) of illness, because this, too, is proper of the *ratio* of the thing known in the soul: that it belongs to one of the opposites according to itself; and to the other, according to accident.

### 43.9. The First Contrariety: Privation and Habit/Having/Possession

After defining contrariety, ARISTOTLE compares it to the other species of opposition.<sup>50</sup> He intends (to show) that the principle of contrariety is the opposition of privation and habit, saying that **the first contrariety** is *privation and habit* (< πρώτη... ἐναντίωσις ἕξις καὶ στέρησις ἐστίν): to wit, because privation and habit is included in every contrariety.

However, lest someone believe that to be opposed according to privation and habit should be the same as (to be opposed) according to contrariety, he adds that not every privation should be a contrary, since privation is said in multiple modes (► 42.7).<sup>51</sup> Indeed, sometimes, there is said to be a privation in whatever mode if (a subject) should not have what is naturally apt to be had. Yet, such a privation is not a contrary, since such a privation does not posit some nature opposed to the habit, even though it would suppose a determinate subject. Rather, that privation is said to be a contrary which would be a **perfect privation** (< ἥτις ἂν τελεία ᾗ).

Since privation, according to what it is (*secundum id quod est*), should not receive more or less (e.g., someone who can see may be able to see more or less, but there is no seeing more or less in the blind), it can only be said (to be a) *perfect privation* by reason of some nature that would have a perfect distance to a habit.<sup>52</sup> For example, not every privation of white is contrary to white, but (only) the privation that is more distant from white, which must be founded on some nature of the same genus that is maximally distant from white; and, according to this, we say that black is the contrary of white.

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<sup>50</sup> *In Metaph.* 10, l. 6, §2036 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a33): “Postquam Philosophus definivit contrarietatem, hic comparat ipsam ad alias species oppositionis; et circa hoc duo facit. Primo proponit quod intendit; scilicet quod contrarietatis principium est oppositio privationis et habitus. [...] Circa primum duo facit. Primo enim proponit quod principium contrarietatis est privatio et habitus; dicens, quod prima contrarietas est privatio et habitus, quia scilicet in omni contrarietate privatio et habitus includitur.” Ibid., §2023: “determinat de contrarietate per comparisonem ad alias species oppositionis.”

<sup>51</sup> *In Metaph.* 10, l. 6, §2037 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a34–35): “Sed ne aliquis crederet quod idem esset opponi secundum privationem et habitum, et secundum contrarietatem, subiungitur quod non omnis privatio sit contrarium; quia privatio, sicut in superioribus habitum est, multipliciter dicitur. Aliquando enim quocumque modo, si non habeat quod natum est haberi, dicitur esse privatio. Sed talis privatio non est contrarium, quia talis privatio non ponit aliquam naturam oppositam habitui, licet supponat subiectum determinatum. Sed privatio dicitur esse contrarium, quaecumque fuerit perfecta privatio.”

<sup>52</sup> *In Metaph.* 10, l. 6, §2038: “Cum autem privatio secundum id quod est, non recipiat magis et minus, non potest dici perfecta privatio nisi ratione alicuius naturae, quae perfectam distantiam habeat ad habitum. Sicut non omnis privatio albi est contraria albo; sed privatio magis distans ab albo, quam oportet fundari in aliqua natura eiusdem generis, maxime distante ab albo. Et secundum hoc dicimus quod nigrum est contrarium albo.”

### 43.10. Derivation of Other Contraries from the First Contrariety

ARISTOTLE shows how other contraries are derived from the first contrariety.<sup>53</sup> He says that other contraries (►43.5) are said according to privation and habit in diverse modes:

1. Some (< τὰ μὲν τῷ ἔχειν) are said (to be) *contraries* in that they have privation and habit included in themselves.<sup>54</sup> For example, white and black; and hot and cold.
2. Others (< τὰ δὲ τῷ ποιεῖν ἢ ποιητικὰ εἶναι, are said to be contraries) because they produce privation and habit in act, as that-which-heats and that-which-cools (*calefaciens et infrigidans*); or because they are virtually active of privation and habit, as that-which-can-heat and that-which-can-cool (*calefactivum et infrigidativum*).<sup>55</sup>
3. Others (< τὰ δὲ τῷ λήψεις εἶναι καὶ ἀποβολαὶ τούτων ἢ ἄλλων ἐναντίων, are said to be contraries) because they are receptions of the aforesaid, as to be heated and to be cooled; or because they are rejections of them, as the corruption of heat and of coldness.<sup>56</sup>

And some (things) are said (to be) *contraries* not only because they convey (*dicunt*) the same aforesaid habitudes to the first contraries, but also because they have the same relations (*habitudines*) to the (con)sequent contraries.<sup>57</sup> For example, if we should say that fire and water are contraries (i.e., as elements in ancient physics) because they have hot and cold, which are also said (to be) *contraries* because they include privation and habit.

### 43.11. Contrariety and Contradiction Are Not the Same

ARISTOTLE shows that the first contrariety is (that of) privation and habit in two ways.<sup>58</sup> First, through a syllogism, showing that contrariety is not contradiction. Thus, he says that

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<sup>53</sup> *In Metaph.* 10, l. 6, §2039 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a35–38): “Secundo ostendit [Philosophus] qualiter ab ista prima contrarietate, alia contraria deriventur; dicens, quod alia contraria «dicuntur secundum hoc,» scilicet secundum privationem et habitum diversimode.”

<sup>54</sup> *In Metaph.* 10, l. 6, §2039 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a36): “Quaedam enim dicuntur contraria in eo quod habent in se inclusam privationem et habitum; sicut album et nigrum, et calidum et frigidum.”

<sup>55</sup> *In Metaph.* 10, l. 6, §2039 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a36–37): “Alia per hoc quod actu faciunt privationem et habitum, sicut sunt calefaciens et infrigidans. Aut per hoc quod sunt virtute activa privationis et habitus, sicut calefactivum et infrigidativum.”

<sup>56</sup> *In Metaph.* 10, l. 6, §2039 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a37–38): “Alia vero per hoc quod sunt acceptiones dictorum, sicut calefieri et infrigidari. Aut per hoc quod sunt abiectiones eorum, sicut corruptio caliditatis et frigiditatis.”

<sup>57</sup> *In Metaph.* 10, l. 6, §2039: “Et non solum aliqua dicuntur contraria per hoc, quod dicunt dictas habitudines ad prima contraria; sed etiam per hoc, quod habent habitudines easdem ad contraria sequentia. Sicut si dicamus quod ignis et aqua sunt contraria, quia habent calidum et frigidum, quae etiam dicebantur contraria per hoc quod includunt privationem et habitum.”

<sup>58</sup> *In Metaph.* 10, l. 6, §2040 (cf. ARISTOTLE, *Metaphysica* l.4, 1055a38–b1): “Manifestat [Philosophus] quod supposuerat, scilicet quod prima contrarietas est privatio et habitus: et hoc dupliciter. Primo per syllogismum. [...] Circa primum duo facit. Primo ostendit quod *contrarietas non est contradictio*; dicens, quod cum quatuor modis aliqua alicui opponantur: uno modo ut contradictio, sicut sedens non sedenti; alio modo ut privatio, sicut caecus videnti: tertio modo ut contrarietas, sicut nigrum albo: quarto modo ad

some (beings) are opposed (*opponantur* = ἀντίκειται) to something in four modes, as: **(1) contradiction** (*contradictio* = ἀντίφασις), as sitting (is opposed) to non-sitting (*sedens non sedenti*); **(2) privation** (*privatio* = στέρησις), as blind (is opposed) to sighted (*caecus videnti*); **(3) contrariety** (*contrarietas* = ἐναντιότης), as black (is opposed) to white (*nigrum albo*); **(4) relation** (*ad aliquid* = πρὸς τι), as son (is opposed) to father (*filius patri*). And among these four genera of opposition, the first is contradiction.

The reason for this (i.e., for contradiction to be first among the four genera of opposition) is that contradiction is included in all other (opposites) as prior and simpler (►27.5).<sup>59</sup> Indeed, it is impossible for opposites—according to any genus of opposition—to exist simultaneously. This happens because each of the opposites has, of its (own) *ratio* (*de sui ratione*), the negation of the other. For example, it belongs to the *ratio* of *blind* to be non-sighted (*quod sit non videns*); to the *ratio* of *black*, that it should not be white (*quod non sit album*); and likewise, it belongs to the *ratio* of *son* not to be the father of that (person) whose son (he) is (*quod non sit pater eius cuius est filius*).

Now, it is manifest that there is not some mean in contradiction (< ἀντιφάσεως... μηδὲν ἔστι μεταξύ; ►42.4), for it is necessary either to affirm or to negate.<sup>60</sup> On the other hand, it is befitting (though not necessary) for there to be a mean (between) contraries. And thus, it is manifest that contrariety and contradiction are not the same.

### 43.12. Privation Is Some Contradiction

ARISTOTLE shows how privation is related to contradiction, manifesting how they should agree and how they should differ.<sup>61</sup> Therefore, he says that privation is some contradiction, for privation is said in multiple modes: when something does not have that which it is not in any mode naturally apt to have (►42.8, ¶1), as if we were to say that a stone does not

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aliquid, sicut filius patri; — inter ista quatuor genera oppositionis primum est contradictio." Ibid., §2036: "manifestat quod supposuerat."

<sup>59</sup> *In Metaph.* 10, l. 6, §2041: "Cuius ratio est, quia contradictio includitur in omnibus aliis tamquam prius et simplicius. Opposita enim secundum quodcumque oppositionis genus impossibile est simul existere. Quod quidem contingit ex hoc, quod alterum oppositorum de sui ratione habet negationem alterius. Sicut de ratione caeci est quod sit non videns. Et de ratione nigri, quod non sit album. Et similiter de ratione filii est quod non sit pater eius cuius est filius."

<sup>60</sup> *In Metaph.* 10, l. 6, §2042 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b1–3): "Manifestum est autem quod in contradictione non est aliquod medium. Necesse est enim aut affirmare aut negare, ut supra in quarto manifestum fuit. Contrariorum autem convenit esse medium. Et sic manifestum est quod contrarietas et contradictio non sunt idem."

<sup>61</sup> *In Metaph.* 10, l. 6, §2043 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b3–7): "Ostendit [Philosophus] qualiter se habeat privatio ad contradictionem, manifestans qualiter convenient et qualiter differant. Dicit ergo, quod privatio est quaedam contradictio. Dicitur enim privatio uno modo, quando aliquid non habet quod nullo modo natum est habere; ut si diceremus quod lapis non habet visum. Alio modo dicitur aliquid privari, si non habeat quod natum est habere; sicut animal si non habeat visum. Et hoc dupliciter: uno modo qualitercumque non habeat. Alio modo si non habeat cum aliqua determinatione, puta in tempore determinato, aut aliquo modo determinato; quia privatio multipliciter dicitur, sicut supra habitum est in quinto et nono."

have sight; something is said to be deprived if it should not have what it is naturally apt to have, as an animal (is said to be deprived) if it does not have sight; and this in two modes: howsoever it should not have (► 42.8, ¶2), or if it should not have with some determination (► 42.8, ¶3), as in a determinate time or in some determinate mode.

From these (modes), it is therefore evident that **privation** is *some contradiction* (*privatio est quaedam contradictio* = ἡ... στέρησις ἀντίφασίς τίς ἐστίν, ἐστὶν ἡ στέρησις ἀντίφασίς τις).<sup>62</sup>

That it should be a contradiction is evident from this: that something is said (to be) **deprived** because *it does not have*.<sup>63</sup>

On the other hand, that it should not be an absolute contradiction but some contradiction, is evident from this: that contradiction, of its (own) *ratio*, requires neither an aptitude nor the existence of some subject, for it is verified of whatever being and non-being.<sup>64</sup> Thus, we say that an animal does not see, that (a piece of) wood does not see, and that non-being does not see. On the other hand, of necessity, privation requires some subject; and sometimes, it also requires an aptitude in the subject. Thus, what is altogether non-being is not said (to be) *deprived* (*privatum*).

Hence, ARISTOTLE says that privation is either in a determinate potency—to wit, with an aptitude (in relation) to a habit—or at least comprehended with a susceptible subject, even if not having an aptitude (in relation) to a habit.<sup>65</sup> For example, if we should say (that a) voice (is) *invisible*, or (that a) stone (is a) *dead thing*.

Hence, contradiction cannot have a mean (► 42.4); but privation in some mode has a mean.<sup>66</sup> Indeed, (according to contradiction), it is necessary for everything to be either *equal* (*aequale* = ἴσον) or *non-equal* (*non aequale* = οὐκ ἴσον), whether it is a being or a

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<sup>62</sup> *In Metaph.* 10, l. 6, §2044 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b4–5; 7): “Ex his ergo patet quod privatio est quaedam contradictio.”

<sup>63</sup> *In Metaph.* 10, l. 6, §2044: “Et quidem, quod sit contradictio patet ex hoc, quod aliquid dicitur privatum ex hoc quod non habet.”

<sup>64</sup> *In Metaph.* 10, l. 6, §2045: “Sed quod non sit contradictio absoluta, sed contradictio quaedam, patet ex hoc quod contradictio de sui ratione non requirit neque aptitudinem, neque etiam existentiam alicuius subiecti. Verificatur enim de ente et de non ente quocumque. Dicimus enim quod animal non videt, et lignum non videt, et quod non ens non videt. Sed privatio de necessitate requirit aliquod subiectum, et quandoque etiam requirit aptitudinem in subiecto: quod enim est omnino non ens non dicitur privatum.”

<sup>65</sup> *In Metaph.* 10, l. 6, §2046 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b7–8): “Et ideo dicit [Philosophus] quod privatio aut est in determinata potentia, scilicet cum aptitudine ad habitum, aut saltem «concepta cum susceptivo,» idest cum subiecto, licet non habente aptitudinem ad habitum. Sicut si dicamus vocem invisibilem, aut lapidem rem mortuam.”

<sup>66</sup> *In Metaph.* 10, l. 6, §2047 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b8–11): “Et ideo contradictio non potest habere medium: sed privatio aliquo modo medium habet. Necesse est enim omne aut aequale aut non aequale esse, sive sit ens sive non ens. Sed non necesse est dici de omni, quod sit aequale aut inaequale; sed solum hoc necesse est in susceptivo aequalitatis.”

non-being. On the other hand, (according to privation), it is not necessary for everything to be said to be *equal* (*aequale* = ἴσον) or *unequal* (*inaequale* = ἄνισον; i.e., with a privative ἄ; ►42.9); rather, this is necessary only in that which is susceptible of equality.

Hence, in this mode, the opposition of contradiction is altogether immediate, while the opposition of privation is immediate in a determinate susceptible (subject); however, it is not simply immediate.<sup>67</sup> Therefrom, it is evident that contrariety, which is naturally apt to have a mean, is more proximate to privation than to contradiction. However, (the demonstration) that contrariety should be a privation is not yet had.

### 43.13. Contrariety Is a Privation: Proof by Syllogism

It remains to show that contrariety should be a privation.<sup>68</sup> About this, ARISTOTLE does two (things, the second of which is to prove the same by induction; ►43.15). First, he shows through a syllogism that contrariety should be a privation in this mode: Everything from which a generation (*generatio* = γενέσεις) comes to be is either (1) a species or a habit of whatever species (< ἢ ἐκ τοῦ εἶδους καὶ τῆς τοῦ εἶδους ἕξεως); or it is (2) a privation of a species or of whatever form (< ἢ ἐκ στερήσεώς τινος τοῦ εἶδους καὶ τῆς μορφῆς).

He says *everything* (*omne* = πᾶσα), certainly, because generation is twofold: something is *simply* generated in the genus of substance; and (something is generated) *according to something* in a genus of the accidents.<sup>69</sup>

Indeed, generations are from contraries in (the same) matter.<sup>70</sup> Therefore, it is manifest that every contrariety is some privation. Thus, if one and the other of the extremities in any generation is a privation; and (if) one and the other of the contraries is an extremity of the generation, for contraries are generated from each other, as the white from the black, and the black from the white; it is (therefore) necessary that one of the contraries always be a privation.

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<sup>67</sup> *In Metaph.* 10, I. 6, §2048: "Sic igitur oppositio contradictionis omnino est immediata: oppositio vero privationis est immediata in determinato susceptivo; non autem est immediata simpliciter. Ex quo patet quod contrarietas, quae nata est habere medium, propinquior est privationi quam contradictioni. Nondum tamen habetur, quod privatio sit contrarietas."

<sup>68</sup> *In Metaph.* 10, I. 6, §2049 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b11–14): "Restat tertio ostendendum, quod contrarietas sit privatio; et circa hoc duo facit [Philosophus]. Primo ostendit per syllogismum quod contrarietas sit privatio, hoc modo. Omne illud ex quo fit generatio, aut est species sive quicumque habitus speciei; aut est privatio speciei, sive cuiuscumque formae."

<sup>69</sup> *In Metaph.* 10, I. 6, §2049 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b14): "Omne quidem dicit, quia est duplex generatio. Generatur enim aliquid simpliciter in genere substantiae, et secundum quid in genere accidentium."

<sup>70</sup> *In Metaph.* 10, I. 6, §2049 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b11–14): "Generationes enim sunt ex contrariis in materia. Manifestum est ergo, quod omnis contrarietas est aliqua privatio. Si enim alterum extremorum in qualibet generatione est privatio, et utrumque contrariorum est extremum generationis, quia contraria generantur ex invicem, sicut album ex nigro, et nigrum ex albo; necesse est quod semper alterum contrariorum sit privatio."



#### 43.14. Not Every Privation Is a Contrariety

As ARISTOTLE says, not every privation is a contrariety.<sup>71</sup> The cause of this is that the deprived can happen to be deprived in multiple modes. For that which is naturally apt to have some form—in whatever mode it should not have it—can be said to be deprived—whether it should be in proximate or in remote disposition to that form. On the other hand, the contrary is always in remote disposition, since contraries are those from which permutations come to be as from extremities; whence, they are said to be maximally distant (►43.4). Thus, something is said to be deprived of whiteness if it should not be white, whether it should be grey or (it should be) colored in whatever other color; but it is thus said to be a contrary only when it is maximally distant from white: namely, when it is black. Whence, it is manifest that not every privation is a contrariety.

Privation requires nothing but the absence of a form (if) only the habitude (is) supposed in the subject without it determining a disposition in the subject by which the subject would be proximate to—or distant from—the form.<sup>72</sup> Hence, it is also apparent that privation does not signify some nature in the subject: rather, it presupposes a subject with an aptitude. On the other hand, the contrary requires a determinate disposition of the subject that is of the same genus as the absent form, just as black is in the genus of white.

It is to be considered, too, that privation is twofold:<sup>73</sup> (1) (there is) some (privation) that has an immediate order to the subject of the form, as darkness has an immediate order (in relation) to the transparent (subject); and between such privation and opposite form there is mutual transmutation, for air becomes dark from (being) luminous, and from (being) dark it becomes luminous; (2) there is some privation that is compared to the

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<sup>71</sup> *In Metaph.* 10, l. 6, §2050 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b14–17): “Ostendit quod *non omnis privatio est contrarietas*, quod etiam supra dixerat, dicens: Non omnis privatio est contrarietas. Et causa huius est, quia privatum contingit multipliciter privari. Quocumque enim modo id quod natum est habere aliquam formam, non habeat illam, dici potest esse privatum; sive sit in dispositione propinqua ad formam illam, sive remota. Sed contrarium est semper in dispositione remota: quia contraria sunt ex quibus fiunt permutationes sicut ex extremis. Unde supra dictum est, quod sunt maxime distantia. Aliquid enim privari dicitur albedine si non sit album, sive sit pallidum, sive quocumque alio colore coloratum. Sed non ideo dicitur esse contrarium nisi quando est maxime distans ab albo, scilicet quando est nigrum. Unde manifestum est quod non omnis privatio est contrarietas.”

<sup>72</sup> *In Metaph.* 10, l. 6, §2051: “Ex hoc etiam apparet quod, cum privatio nihil aliud requirat nisi absentiam formae, supposita tantum habitudine in subiecto, sine hoc quod determinet aliquam dispositionem in subiecto, per quam subiectum sit propinquum formae vel distans ab ea: quod privatio non significat aliquam naturam in subiecto, sed praesupponit subiectum cum aptitudine. Contrarium vero requirit determinatam dispositionem subiecti, secundum quam maxime distet a forma. Unde de necessitate aliquam naturam significat in subiecto, quae est eiusdem generis cum forma absente; sicut nigrum est in genere albi.”

<sup>73</sup> *In Metaph.* 10, l. 6, §2052: “Considerandum est etiam quod est duplex privatio. Quaedam quae habet immediatum ordinem ad subiectum formae, sicut tenebra habet immediatum ordinem ad diaphanum. Et inter huiusmodi privationem et formam oppositam est mutua transmutatio. Aer enim de lucido fit tenebrosus, et de tenebroso fit lucidus. Quaedam autem privatio est quae non comparatur ad subiectum formae nisi mediante forma, cum sit ut quaedam corruptio eius; sicut caecitas est corruptio visus, mors est corruptio vitae. Et in talibus non est mutua conversio, sicut supra in nono habitum est.”

subject of the form only by means of a form, since it would be some corruption of it, as blindness is the corruption of sight, (and) death is the corruption of life; and in such (privations) there is not a mutual conversion (►42.8, ¶2).

Hence, since contrariety is shown here to be a privation from mutual transmutation, which is in contraries and in the privation of a form, it is manifest that this corruption of a form (i.e., without mutual conversion) is not said to be a contrariety, but (only) the one that has an immediate order to the subject of the form.<sup>74</sup> And thus, the objection that is posited in (ARISTOTLE'S) *Categories* ceases—i.e., that a return from privation to habit does not come to be—, for contraries are transmuted into each other.

#### 43.15. Contrariety Is a Privation: Proof by Induction

ARISTOTLE shows by induction that contrariety should be a privation.<sup>75</sup> He says that what has been shown through syllogistic reasoning above (►43.13) is also evident through induction, since every contrariety is found to have the privation of one of the contraries. Thus, of the two contraries, one is always defective in respect of the other. That one of the contraries should be the privation of the other is apparent (through induction, διὰ τῆς ἐπαγωγῆς) because **inequality** is the *privation of equality*, **unlikeness** (is the *privation of likeness*, and **vice** (is the *privation of virtue*). However, one is not always similarly found to be the privation of the other in all contraries.

#### 43.16. Diverse Contrarieties According to Diverse Ratios of Privation

ARISTOTLE shows that one of the contraries<sup>76</sup> is the privation of the other diversely.<sup>76</sup> This happens according to a diverse *ratio of privation*. This diversity is, certainly, considered in

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<sup>74</sup> *In Metaph.* 10, l. 6, §2053: “Cum igitur hic ostenditur contrarietatem esse privationem ex mutua transmutatione, quae est in contrariis et privatione et forma, manifestum est quod non dicitur ista esse contrarietas quae est corruptio formae, sed quae habet immediatum ordinem ad subiectum formae. Et sic cessat illa obiectio quae ponitur in Praedicamentis, quod a privatione ad habitum non fit reversio. Contraria autem transmutantur invicem.” See ARISTOTLE, *Categoriae* 10, 13a31–36: “ἐπὶ δὲ γε τῆς στερήσεως καὶ τῆς ἕξεως ἀδύνατον εἰς ἄλληλα μεταβολὴν γενέσθαι· ἀπὸ μὲν γὰρ τῆς ἕξεως ἐπὶ τὴν στέρησιν γίνεταί μεταβολή, ἀπὸ δὲ τῆς στερήσεως ἐπὶ τὴν ἕξιν ἀδύνατον· οὔτε γὰρ τυφλὸς γενόμενός τις πάλιν ἔβλεπεν, οὔτε φαλακρὸς ὦν κομῆτης ἐγένετο, οὔτε νωδὸς ὦν ὀδόντας ἔφυσεν.”

<sup>75</sup> *In Metaph.* 10, l. 6, §2054 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b17–20): “Ostendit [Philosophus] *per inductionem* quod contrarietas sit privatio; et hoc dupliciter. Primo *inducendo in singulis contrariis*. [...] Circa primum duo facit. Primo *ostendit per inductionem quod contrarietas sit privatio*; dicens, quod hoc quod supra ratione syllogistica ostensum est palam est etiam per inductionem. Quia omnis contrarietas invenitur habere privationem alterius contrariorum. Semper enim duorum contrariorum unum est defectivum respectu alterius. Sed tamen non in omnibus contrariis similiter invenitur unum privatio alterius, ut infra dicitur. Et quod unum contrariorum sit privatio alterius, ex hoc apparet, quia inaequalitas est privatio aequalitatis, et dissimilitudo similitudinis, et malitia virtutis.” Ibid., §2040: “*Manifestat* [Philosophus] *quod supposuerat*, scilicet quod prima contrarietas est privatio et habitus [...] per inductionem.”

<sup>76</sup> *In Metaph.* 10, l. 6, §2055 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b20–22): “Ostendit [Philosophus] quod *diversimode unum contrariorum est privatio alterius*. Hoc enim contingit secundum diversam rationem privationis. Quae quidem diversitas attenditur dupliciter. Uno modo ex hoc quod privatio potest dici, vel quia solum aliquod privatum est modo quocumque. Vel quia est privatum in aliquo tempore determinato, vel in aliqua parte determinata. In tempore quidem determinato, sicut si sit privatum in aliqua aetate. In

two modes: **(1)** because privation can be said either only because something is deprived in whatever mode; or **(2)** because it is deprived in some determinate time or in some determinate part. In a determinate time, for example, if it should be deprived at some age. In a determinate part, if it should be deprived in some principal part—or even in the whole. Thus, someone is said (to be) senseless (*insensatus*) if he lacks discretion in the perfect age, but not in the puerile age. Likewise, someone (is said to be) naked not if some part of his (body) should not be covered, but if many or the principal parts remain uncovered.

Due to this diversity of privation, which is included in contrariety, it happens that there is a mean of (i.e., between) some contraries (►43.17), while (there is) not (a mean) of some (others).<sup>77</sup> Thus, there is a mean between good and bad (►44.9), for there is some man who is neither good nor bad. Indeed, a man is said (to be) *good* according to virtue, for virtue is what makes good the one who has it (►22.9), but not everyone who lacks virtue is bad, since a child lacks virtue and yet is not said (to be) *bad*. Yet, if (someone) should not have virtue at the age in which he ought to have it, he is said (to be) *bad*. Or, also, if someone should lack virtue in respect of some acts (that are) minimal and as indifferent to life, he is not said (to be) *bad*: rather, (he would be said to be bad) only if he should lack virtue in respect of the acts (that are) principal and necessary to life.

On the other hand, in numbers, *even* and *odd* do not have a mean because a **number** is said (to be) **odd** because it *lacks evenness* in whatever mode.<sup>78</sup>

Another diversity of privation is that some privation determines a subject to itself, while some (other privation) does not.<sup>79</sup> Indeed, as noted above (►42.8, ¶1), that which lacks something, even if it should not naturally have (it), is sometimes said (to be) *deprived*. And

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parte autem determinata, sicut si sit privatum in aliqua parte principali. Aut «etiam in omni,» idest in toto. Dicitur enim aliquis insensatus, si in aetate perfecta discretionem careat, non autem in puerili aetate. Et similiter aliquis nudus, non si aliqua pars eius non sit tecta, sed si plures aut principales partes intactae remaneant.”

<sup>77</sup> *In Metaph.* 10, l. 6, §2056 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b23–24): “Et propter istam diversitatem privationis, quae in contrarietate includitur, contingit quod quorundam contrariorum est medium, et quorundam non. Inter bonum enim et malum, medium est. Est enim aliquis homo neque bonus neque malus. Dicitur enim bonus homo secundum virtutem. Nam virtus est quae bonum facit habentem. Non autem omnis qui caret virtute malus est. Nam puer caret virtute, et tamen non dicitur malus. Sed si in aetate, in qua debet habere virtutem, non habeat, malus dicitur. Vel etiam si aliquis virtute careat quantum ad aliquos actus minimos et quasi indifferentes ad vitam, non dicitur malus; sed solum si careat virtute quantum ad actus principales et necessarios ad vitam.”

<sup>78</sup> *In Metaph.* 10, l. 6, §2056 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b24–25): “Sed par et impar in numeris non habent medium: quia numerus dicitur impar ex hoc quod quocumque modo caret paritate.”

<sup>79</sup> *In Metaph.* 10, l. 6, §2057 (cf. ARISTOTLE, *Metaphysica* I.4, 1055b25–26): “Alia vero diversitas privationis est, quod privatio quaedam determinat sibi subiectum, quaedam vero non. Dictum est enim supra, quod id quod caret aliquo, etiam si non natum sit habere, quandoque dicitur privatum. Ex hac autem diversitate privationis potest contingere in aliquibus contrariis, quod habeant medium vel non habeant: sicut si dicamus, quod cum homo dicatur bonus secundum virtutes politicas, si malum quod includit privationem boni requirat determinatum subiectum, rusticus qui non participat conversatione civili, nec bonus nec malus est bonitate vel malitia civili.”

from this diversity of privation, it can happen in some contraries that they would have or would not have a mean. For example, a man is said (to be) *good* according to political virtues; hence, if the bad that includes the privation of good should require a determinate subject, we would say that the rustic (man), who does not participate in the conversation of the state, is neither good nor bad in the goodness or badness of the state.

Hence, it is evident from the aforesaid that one of the (two) contraries is said according to privation.<sup>80</sup>

### 43.17. Means between Contraries

As ARISTOTLE says, since something can be a mean of (i.e., between) contraries, and some contraries have a mean, it is necessary to show that means are (composed) from contraries, which requires (us) to show some other (reasons) that are necessary to prove this.<sup>81</sup> Thus, he shows first that means are in the same genus with the contraries (► 43.18). Then, he shows that means are only between contraries (► 43.19). Finally, he shows that means are composed from contraries, which is what he principally intends (► 43.20).

### 43.18. Means Are in the Same Genus with the Contraries

As ARISTOTLE says, all means are in the same genus with those of which they are means.<sup>82</sup> He proves this as follows: The definition of means is that **means** (*media* = τὰ μεταξύ) are *those between which that which is mutated from one extremity arrives at priorly than into the other extremity (inter quae prius venit illud quod mutatur de uno extremorum, quam in alterum extremum < in quaecumque permutari prius est necesse quod permutatur* = εἰς ὅσα μεταβάλλειν ἀνάγκη πρότερον τὸ μεταβάλλον).

For example, there are some low-pitch, some high-pitch, and some mean(-pitch) sounds.<sup>83</sup> And, according to this distinction of sounds, strings are distinguished in musical

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<sup>80</sup> *In Metaph.* 10, l. 6, §2057 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b26–27): “Sic igitur patet ex praedictis, quod alterum contrariorum dicitur secundum privationem.”

<sup>81</sup> *In Metaph.* 10, l. 9, §2097 (cf. ARISTOTLE, *Metaphysica* l.7, 1057a18–19): “Postquam Philosophus determinavit de contrariis, hic determinat *de mediis contrariorum*; et circa hoc duo facit. Primo proponit *de quo est intentio*; dicens: quia contrariorum contingit aliquid esse medium, ut supra dictum est, et quaedam contrariorum medium habent, ostendendum est quod necesse est media esse ex contrariis. Non autem hoc solum ostendit, sed etiam quaedam alia quae ad huius probationem sunt necessaria.” *Ibid.*, §2098: “*Prosequitur suam intentionem*; et circa hoc tria facit. Primo ostendit, quod *media sunt in eodem genere cum contrariis*. Secundo ostendit, quod media sunt inter contraria tantum [...]. Tertio vero ostendit, quod media componuntur ex contrariis, quod est principaliter intentum.”

<sup>82</sup> *In Metaph.* 10, l. 9, §2098 (cf. ARISTOTLE, *Metaphysica* l.7, 1057a19–22): “ostendit [Philosophus], quod *media sunt in eodem genere cum contrariis*. [...] Dicit ergo primo, quod omnia media sunt in eodem genere cum his quorum sunt media. Quod sic probat. Quia haec est diffinitio mediorum, quod media sunt inter quae prius venit illud quod mutatur de uno extremorum, quam in alterum extremum.”

<sup>83</sup> *In Metaph.* 10, l. 9, §2099 (cf. ARISTOTLE, *Metaphysica* l.7, 1057a22–26): “Et hoc manifestat per duo exempla. *Primo* quidem in sonis. Sunt enim quidam soni graves, et quidam acuti, et quidam medii. Et secundum hanc distinctionem sonorum, distinguuntur chordae in musicis instrumentis. Illae enim chordae, quae reddunt graves sonos, dicuntur hypatae, quia principales. Illae vero quae reddunt acutos

instruments (►6.3), for those strings that render low-pitch sounds are called *hypatē* (ὑπάτη), while those that render high-pitch sounds are called *nētē* (νήτη). Therefore, if a musician wants to gradually descend (i.e., from higher to lower strings) from low-pitched to high-pitched (sounds), which is to traverse through a mean ratio, it is necessary that he arrive at mean sounds. Likewise, if something is mutated from white to black, it must arrive at mean colors first, before (it arrives) at black. And likewise, in other means.

Thus, it is evident that transmutation comes to be from means into extremities; and conversely.<sup>84</sup> On the other hand, in those that are in diverse genera, there comes to be a transmutation only by accident, as is evident in color and figure. For nothing is mutated from a color into a figure, or conversely: rather, (something is mutated) from a color to a color, and from a figure to a figure. Whence, it is necessary that means be in the same genus as extremities.

#### 43.19. There Are Means Only between Contraries

ARISTOTLE shows first that means must be between opposites thus: Speaking by itself (►17.8), mutations only come to be from opposites; and something comes to be, speaking by itself, from black to white, while the sweet comes to be from the black only by accident, insofar as it befits the sweet to be white; now, means are between those from which there is mutual transmutation, as is evident from the above-positing definition (►43.6); therefore, it is impossible for means not to be from opposites, for it would follow that there would not be a permutation from opposites.<sup>85</sup>

He then manifests between which (genera of) opposites there can be means, saying (first) that there can be no mean between opposites in contradiction.<sup>86</sup> Indeed, contradiction is

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sonos, dicuntur netae. Si igitur musicus paulatim a gravibus ad acutos descendere velit, quod est transire per mediam rationem, necesse est quod prius veniat ad sonos medios. *Secundo* autem manifestat in coloribus. Si enim aliquid mutatur ex albo in nigrum, oportet quod primum veniat ad medios colores quam ad nigrum. Et similiter est in aliis mediis.”

<sup>84</sup> *In Metaph.* 10, l. 9, §2100 (cf. ARISTOTLE, *Metaphysica* I.7, 1057a26–30): “Sic igitur patet quod de mediis fit transmutatio ad extrema, et e converso. Sed in his quae sunt in diversis generibus, non fit transmutatio in invicem nisi per accidens, sicut patet in colore et figura. Non enim mutatur aliquid de colore in figuram aut e converso; sed de colore in colorem, et de figura in figuram. Unde necesse est quod media et extrema sint in eodem genere.”

<sup>85</sup> *In Metaph.* 10, l. 9, §2101 (cf. ARISTOTLE, *Metaphysica* I.7, 1057a30–33): “Ostendit [Philosophus] quod *media sunt inter contraria*; et circa hoc duo facit. Primo *ostendit quod media necesse est esse inter opposita*. Secundo inter quae opposita, quia inter contraria [...]. Dicit ergo primo, quod omnia media necesse est esse inter opposita. Quod sic probat. Quia solum ex oppositis, per se loquendo, fiunt mutationes, ut probatur in primo Physicorum. Ex nigro enim aliquid fit album per se loquendo. Dulce autem non fit ex nigro nisi per accidens, in quantum dulce convenit esse album. Sed media sunt inter illa ex quibus est mutua transmutatio, sicut per definitionem mediorum suprapositam patet. Impossibile est ergo quod media sint non oppositorum; quia sequeretur quod esset permutatio non ex oppositis.” *Ibid.*, §2098: “ostendit, quod media sunt inter contraria tantum.”

<sup>86</sup> *In Metaph.* 10, l. 9, §2102 (cf. ARISTOTLE, *Metaphysica* I.7, 1057a33–36): “Manifestat [Philosophus] *inter quae opposita possint esse media*; dicens, quod inter opposita in contradictione nullo modo potest esse medium. Contradictio enim est oppositio, cuius altera pars ex necessitate adest cuicumque

an opposition of which one part (of the two) of necessity applies to (*adest*) the subject of anything—whether it should be a being (*ens*) or a non-being (*non ens*). Thus, it is necessary to say, of whatever being or non-being, that it is sitting or is not sitting. Hence, it is evident that contradiction has no mean.

Of the other opposites, on the other hand, some are (in relation) to something; others (are) privation and form; (and) others are contraries.<sup>87</sup> Of those that are (in relation) to something, some are related as contraries, which are equally (*ex aequo*) referred to each other (► 37.1, ¶1; ¶2); and these have a mean. Some (others), however, are not related as contraries, which are not equally referred to each other (► 37.1, ¶3), such as (scientific) knowledge and (scientifically) knowable; and these do not have a mean.

The cause of this (i.e., that some relations are not contraries) is that extremities and means are in the same genus; and these are not in the same genus, since one—e.g., science—is referred according to itself, but not the other—e.g., the knowable.<sup>88</sup> Therefore, how can there be some mean of (i.e., between, scientific) knowledge and the (scientifically) known?

On the other hand, of the great and the small, there can be some mean—namely, the equal.<sup>89</sup> And likewise, (there can be a mean) of those that are referred to each other, as contraries. And in what mode those that are opposed privatively should have or not have means, and how this opposition pertains in some mode to contrariety, has already been explained (► 43.12; 43.13; 43.14).

#### 43.20. Means Are Composed from Contraries

ARISTOTLE shows that means are composed from contraries.<sup>90</sup> He says that, if means should be in the same genus as the extremities, as has been shown (► 43.18), and if,

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subiecto, sive sit ens, sive non ens. De quolibet enim ente vel non ente necesse est dicere quod sedet, vel non sedet. Et sic patet, quod contradictio nullum habet medium.”

<sup>87</sup> *In Metaph.* 10, l. 9, §2103 (cf. ARISTOTLE, *Metaphysica* l.7, 1057a36–38): “Sed aliorum oppositorum alia sunt ad aliquid, alia privatio et forma, alia ut contraria. Eorum autem, quae sunt ad aliquid, quaedam se habent ut contraria, quae ex aequo adinvicem referuntur; et ista habent medium. Quaedam vero non se habent ut contraria, quae non ex aequo adinvicem referuntur, sicut scientia et scibile; et ista non habent medium.”

<sup>88</sup> *In Metaph.* 10, l. 9, §2103 (cf. ARISTOTLE, *Metaphysica* l.7, 1057a36–b1): “Cuius causa est, quia media et extrema sunt in eodem genere. Haec autem non sunt in eodem genere, cum unum secundum se referatur, ut scientia, non autem aliud, ut scibile. Quomodo ergo scientiae et scibilis potest aliquid esse medium?”

<sup>89</sup> *In Metaph.* 10, l. 9, §2103 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b1): “Sed magni et parvi potest esse «aliquid medium,» idest aequale, ut supra dictum est. Et similiter eorum quae referuntur adinvicem, ut contraria. Quomodo autem ea quae opponuntur privative habeant media vel non habeant, et quomodo haec oppositio aliquo modo pertinet ad contrarietatem, hic tacet, quia supra exposuit.”

<sup>90</sup> *In Metaph.* 10, l. 9, §2104 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b2–4): “Ostendit [Philosophus] tertium quod principaliter intendit, scilicet quod *media sunt composita ex contrariis*. Et circa hoc duo facit. Primo *proponit quod intendit*; dicens, quod si media in eodem genere sint cum extremis, sicut ostensum est, et si iterum media sint solum contrariorum, ut etiam ostensum est; necesse est media componi ex his

again, means should only be of contraries, as has also been shown (►43.19), it is necessary for means to be composed from the contraries between which they are.

ARISTOTLE then proves that contrary species have prior contraries from which they are constituted.<sup>91</sup> Thus, of contraries, there must either be a genus, or (there must be) none. And if there should be no genus of contraries, they would not have a mean, since there is a mean only of those that are of one genus, as is evident from has been said (►43.18). Yet, if, of the contraries of which a mean is posited, there should be some genus prior to the contraries themselves, it is necessary, too, that there be contrary differences—prior to the species of the contraries—that would produce and constitute contrary species from the one genus itself, for species are constituted from genus and differences (►13.16).

For example, if *white* and *black* should be contrary species and should have one genus, which is *color*, it is necessary that they have some constitutive differences, such that white would be capable of segregating (*disgregativum*) sight, while black (would be) capable of congregating (*congregativum*).<sup>92</sup> Thus, these differences—*capable of segregating* and *capable of congregating*—are prior to *white* and *black*. Whence, since there should be contrariety in one and in the other, it is manifest that contraries are prior to each other, for contrary differences are prior to contrary species; and they are also more contrary, since they (i.e., differences) are the causes of the contrariety of the species themselves.

(Pace ARISTOTLE), it is to be considered, however, that *capable of segregating (sight)* and *capable of congregating sight* are not true constitutive differences of *white* and *black*; rather, (they are) their effects.<sup>93</sup> The segregation of sight comes from the intensity

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contrariis inter quae sunt.” *In Metaph.* 10, l. 9, §2098: “ostendit, quod media componuntur ex contrariis, quod est principaliter intentum.”

<sup>91</sup> *In Metaph.* 10, l. 9, §2105 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b4–7): “Probat [Philosophus] propositum. Et circa hoc tria facit. Primo ostendit quod *contrariae species habent priora contraria* ex quibus constituuntur. Quod sic probat. Oportet enim quod contrariorum, aut sit aliquod genus, aut nullum. Si autem nullum genus esset contrariorum, non haberent medium; quia medium non est nisi eorum quae sunt unius generis, ut ex dictis patet. Sed si contrariorum, quorum ponitur medium, sit aliquod genus prius ipsis contrariis, necesse est etiam quod sint differentiae contrariae priores speciebus contrariis, quae faciant et constituent species contrarias ex ipso genere uno. Species enim ex genere et differentiis constituuntur.”

<sup>92</sup> *In Metaph.* 10, l. 9, §2106 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b8–11): “Et hoc manifestat [Philosophus] per exemplum. Sicut si album et nigrum sint contrariae species, et habeant unum genus quod est color, necesse est quod habeant aliquas differentias constitutivas; ita quod album sit color disgregativus visus, nigrum vero color congregativus. Et sic hae differentiae congregativum et disgregativum sunt priores albo et nigro. Unde, cum utrobique sit contrarietas, manifestum est quod contraria sunt seinvicem priora. Contrariae enim differentiae sunt priores contrariis speciebus. Et sunt etiam magis contrariae, quia sunt causae contrarietatis ipsis speciebus.”

<sup>93</sup> *In Metaph.* 10, l. 9, §2107: “Considerandum tamen quod disgregativum et congregativum visus, non sunt verae differentiae constitutivae albi et nigri, sed magis effectus eorum. Ponuntur tamen loco differentiarum, signa earum. Sicut interdum per accidentia, designantur differentiae et formae substantiales. Disgregatio enim visus provenit ex vehementia lucis, cuius plenitudo albedinem constituit. Et congregatio visus provenit ex causa contraria.”

(*vehementia*) of light, whose plenitude constitutes the (color) white; and the congregation of sight comes from the opposite cause. However, they are posited instead of differences (as) their signs, just as, sometimes, differences and substantial forms are designated by accidents (►41.32).

ARISTOTLE shows that also mean species have prior means from which they are constituted.<sup>94</sup> He says that, since mean species should be of the same genus, and all species should be constituted from a genus and a difference, it is necessary for mean (species) to be constituted from a genus and differences.

For example, any colors (that) are means between white and black must be defined from a genus, which is *color*, and some differences.<sup>95</sup> And these differences, from which mean colors are constituted, cannot immediately be the first contraries (< οὐκ ἔσονται τὰ πρῶτα ἐναντία): to wit, the contrary differences that constituted the contrary species *white* and *black*. Otherwise, any mean color would have to be white or black, for the color that is capable of congregating is black; and (the color that is) capable of segregating is white.

Therefore, the differences constitutive of mean colors must be other than the contrary differences that are constitutive of contrary species.<sup>96</sup> And just as species are related to species, so are related differences to differences. Hence, just as mean colors are species between contrary species, so must their constitutive differences be means between the contrary differences that are said (to be the) *first contraries*.

ARISTOTLE shows that mean differences are composed from contrary differences.<sup>97</sup> He says that the first, contrary differences are *capable of segregating* and *capable of congregating sight* (< αἱ πρῶται... διαφοραὶ τὸ διακριτικὸν καὶ συγκριτικόν). Whence,

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<sup>94</sup> *In Metaph.* 10, l. 9, §2108 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b11–13): “Ostendit [Philosophus] quod etiam *mediae species habent priora media*, ex quibus constituuntur; dicens, quod cum media sint species eiusdem generis, et omnes species ex genere et differentia constituuntur, necesse est quod media constituentur ex genere et differentiis.”

<sup>95</sup> *In Metaph.* 10, l. 9, §2108 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b13–17): “Sicut quicumque colores sunt medii inter album et nigrum, oportet hos definiri ex genere, quod est color, et ex quibusdam differentiis. Et hae differentiae, ex quibus constituuntur medii colores, non possunt esse «immediate prima contraria,» scilicet differentiae contrariae quae constituebant contrarias species albi et nigri. Aliter oportet quod quilibet color medius esset albus aut niger. Nam color congregativus est niger, et disgregativus est albus.”

<sup>96</sup> *In Metaph.* 10, l. 9, §2108 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b17–18): “Oportet igitur quod differentiae constitutivae mediorum colorum sint alterae a differentiis contrariis, quae sunt constitutivae contrariarum specierum. Et quia, sicut se habent species ad species, ita se habent differentiae ad differentias: oportet quod sicut medii colores sunt species mediae inter species contrarias, ita differentiae constitutivae earum sint mediae inter differentias contrarias quae dicuntur prima contraria.”

<sup>97</sup> *In Metaph.* 10, l. 9, §2109 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b18–19): “Ostendit [Philosophus], quod *mediae differentiae ex differentiis contrariis componuntur*; dicens, quod differentiae primae contrariae sunt disgregativum visus et congregativum. Unde istae differentiae sunt illud primum, ex quo componimus omnes species generis.”



these differences are the first (principle) from which we compose every species of the genus (of color).

On the other hand, if some contraries should not be in the same genus, it would remain to be inquired from what their means should be constituted.<sup>98</sup> Yet, in these that are in the same genus, it is not difficult to accept this, for it is necessary for all that are in the same genus to either be incomposite (< ἀσύνθετα), that is, simple, or to be composed from incomposites (< ἐκ τῶν ἀσυνθέτων) that are in that genus. Indeed, contraries are incomposite from each other (< ἀσύνθετα ἐξ ἀλλήλων). Thus, neither is white composed from black nor is black (composed) from white; nor is *capable of congregating* (composed) from *capable of segregating*, nor conversely. Whereby, contraries would have to be principles (< ἀρχαί), since, in whatever genus, the simple are principles (►27.9).

Of means, it must be said that either all or none should be composed from simple (principles)—that is, from contraries.<sup>99</sup> However, it cannot be said that none, for there is some mean that is composed from contraries; wherefrom, it happens that a transmutation arrives first at a mean before (arriving at either of) the extremities.

This is apparent thus: because that into which a permutation first arrives is more or less in respect to one and to the other of the extremities.<sup>100</sup> Indeed, something comes to be less white or less black prior to (becoming) totally white or totally black. The less white (comes to be less white prior) to the simply white. The less black (comes to be less black prior) to the simply black. Also, it approaches white more than (it approaches) black simply; or it approaches black more than (it approaches) white simply. And thus, evidently, that into which a transmutation first arrives is more or less in respect of one and of the other of the extremities. Therefore, (that into which a transmutation first arrives) would have to be a mean of (i.e., between) contraries.

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<sup>98</sup> *In Metaph.* 10, l. 9, §2109 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b19–23): “Sed, si aliqua contraria non essent in eodem genere, quaerendum restaret ex quo eorum media constituerentur. Sed in his quae sunt in eodem genere, non est difficile hoc accipere; quia necesse est omnia quae sunt in eodem genere «aut esse incomposita,» idest simplicia, aut componi «ex incompositis,» idest simplicibus, quae sunt in genere illo. Contraria enim sunt incomposita ex invicem; quia nec album componitur ex nigro, neque nigrum ex albo, neque congregativum ex disgregativo, neque e converso. Quare oportet quod contraria sint principia, quia simplicia in quolibet genere sunt principia.”

<sup>99</sup> *In Metaph.* 10, l. 9, §2110 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b23–25): “Sed de mediis oportet dicere, quod aut omnia componantur «ex simplicibus,» idest ex contrariis, aut nullum; quia eadem ratio videtur de omnibus. Sed non potest dici, quod nullum: quia aliquod est medium quod componitur ex contrariis: ex quo contingit quod transmutatio primo pervenit ad media quam ad extrema.”

<sup>100</sup> *In Metaph.* 10, l. 9, §2110 (cf. ARISTOTLE, *Metaphysica* l.7, 1057b25–26): “Hoc autem sic apparet: quia illud in quod primo pervenit transmutatio, est magis et minus respectu utriusque extremorum. Prius enim aliquid fit minus album et minus nigrum, quam totaliter album et totaliter nigrum: et hoc ipsum quod est minus album, quam album simpliciter, et minus nigrum quam nigrum simpliciter. Est etiam magis accedens ad album quam nigrum simpliciter; et magis accedens ad nigrum quam album simpliciter. Et sic patet, quod illud in quod primo venit transmutatio, est magis et minus respectu utriusque extremorum. Et propter hoc oportet quod sit medium contrariorum.”

It follows, thus, that all means should be composed from contraries.<sup>101</sup> Indeed, the same mean that is more or less in respect of one and of the other extremity must be composed from the simple extremities in respect of which it is said (to be) more or less.

And since there are no extremities prior to contraries in the same genus, it remains that two contrary differences constitutive of means should be composed from contrary differences.<sup>102</sup> And thus, means will be (constituted) from contraries. Which is evident because all inferiors (< τὰ κάτω πάντα), that is, all the species of a genus, both contraries and means, are (constituted) from first contraries (< ἐκ τῶν πρώτων ἐναντίων ἔσονται): to wit, (all the species of a genus are constituted from first) differences.

### 43.21. Contraries in Species

Having shown that contrariety is some difference, and that difference is either according to genus or according to species, ARISTOTLE shows in what mode contraries are related such that they differ in species and in genus.<sup>103</sup> Thus, he shows first that difference according to species—i.e., the difference that causes to differ in species—pertains to contrariety, and that this difference is, according to itself, of the same genus—as though dividing the nature itself of the genus into diverse species.

Thus, as ARISTOTLE says, in every diversity according to species, two must be taken: **(1)** that *this* should be diverse from something; and **(2)** that it should be diversified by *these two*.<sup>104</sup> And what is diversified by these two must be in both. For example, *animal* is that which is diversified into diverse species: to wit, *man* and *horse*. And both—namely, *man* and *horse*—must be animals. Whence, it is evident that it is necessary for those that are diverse to each other in species to be in the same genus.

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<sup>101</sup> *In Metaph.* 10, l. 9, §2110 (cf. ARISTOTLE, *Metaphysica* I.7, 1057b26–29): “Et sic sequitur quod omnia media sint composita ex contrariis. Nam idem medium quod est magis et minus respectu utriusque extremorum, oportet esse compositum ex extremis simplicibus, respectu quorum dicitur magis et minus.”

<sup>102</sup> *In Metaph.* 10, l. 9, §2110 (cf. ARISTOTLE, *Metaphysica* I.7, 1057b29–32): “Et quia non sunt aliqua extrema priora contrariis in eodem genere, relinquitur quod duae differentiae contrariae constitutivae mediorum sint compositae ex contrariis differentiis. Et ita media erunt ex contrariis. Quod patet, quia «omnia inferiora,» idest omnes species generis, tam contraria quam media, sunt ex primis contrariis, scilicet differentiis.”

<sup>103</sup> *In Metaph.* 10, l. 10, §2112 (cf. ARISTOTLE, *Metaphysica* I.8, 1057b35–1058a28): “Quia Philosophus superius ostendit contrarietatem esse differentiam quamdam, differentia autem vel est secundum genus, vel secundum speciem; intendit hic Aristoteles ostendere *quomodo contraria se habeant ad hoc, ut differant genere et specie*. [...] ostendit quod *differentia secundum speciem pertinet ad contrarietatem*. [...] ostendit quod *differentia quae facit differre specie, est secundum se ipsius generis*, quasi ipsam naturam generis in diversas species dividens.”

<sup>104</sup> *In Metaph.* 10, l. 10, §2112 (cf. ARISTOTLE, *Metaphysica* I.8, 1057b35–37): “Dicit ergo [Philosophus] primo, quod in omni diversitate secundum speciem oportet duo accipere: scilicet ut hoc sit diversum ab aliquo, et ut sit aliquid diversificatum per haec duo. Et hoc quod est diversificatum per haec duo, oportet inesse ambobus. Sicut animal est quod est diversificatum in diversas species, scilicet in hominem et equum: et oportet quod ambo, scilicet homo et equus, sint animalia. Unde patet quod necesse est ea quae sunt diversa specie adinvicem, in eodem genere esse.”

Indeed, that is called *genus*, which is one and the same for both (species), (but) not predicated according to accident of one or of the other, nor diversified according to accident in one or in the other.<sup>105</sup> Whence, it is evident that it should not have a difference according to accident, whether the genus should be posited to be as matter or in whatever other mode (*sive genus ponatur ens quasi materia, sive qualitercumque aliter*).

ARISTOTLE says this because matter is diversified by forms in one way, and the genus (is diversified) by differences in another way.<sup>106</sup> Indeed, form is not what matter is; rather, it makes composition with it. Whence, matter is not the composite itself, but something of it. On the other hand, the difference is added to the genus not as a part (is added) to a part, but as a whole (is added) to a whole. Whence, the genus is the same as the species and not only something of it; for if it should be a part, it would not be predicated of it.

However, since the whole can be denominated from one part of it only—e.g., if *man* should be denominated (as) *that which has a head* or *that which has hands*—, the composite itself from matter and form would happen to be denominated.<sup>107</sup> And indeed, a name by which some whole is denominated from that which is material in it, is the name of a genus. On the other hand, a name by which (some whole) is denominated from a formal principle is the name of a difference. For example, man is named *animal* from the sensible nature, while (man is named) *rational* from the intellectual nature. Hence, just as *that which has a hand* pertains to the whole—even though *hand* should be a part—, so the genus and the difference agree in the whole—even though they should be taken from the parts.

Therefore, if we should consider in a genus and in a difference that from which one and the other is taken, genus is related to differences as matter to forms.<sup>108</sup> And if we should

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<sup>105</sup> *In Metaph.* 10, l. 10, §2113 (cf. ARISTOTLE, *Metaphysica* l.8, 1057b37–1058a2): “Id enim vocatur genus, quod est unum et idem ambobus, non secundum accidens de utroque praedicatum, neque secundum accidens diversificatum in utroque. Unde oportet, quod habeat differentiam non secundum accidens: sive genus ponatur ens quasi materia, sive qualitercumque aliter.”

<sup>106</sup> *In Metaph.* 10, l. 10, §2114 (cf. ARISTOTLE, *Metaphysica* l.8, 1057b37–1058a2): “Hoc autem ideo dicit [Philosophus], quia aliter diversificatur materia per formas et aliter genus per differentias. Forma enim non est hoc ipsum quod est materia, sed facit compositionem cum ea. Unde materia non est ipsum compositum, sed aliquid eius. Differentia vero additur generi non quasi pars parti, sed quasi totum toti. Unde genus est hoc ipsum quod est species, et non solum aliquid eius. Si autem esset pars, non praedicaretur de ea.”

<sup>107</sup> *In Metaph.* 10, l. 10, §2115: “Sed tamen, quia totum potest denominari ab una sola parte sua, puta si homo denominetur habens caput, vel habens manus, contingit ipsum compositum ex materia et forma denominari. Et quidem nomen, quo aliquid totum denominatur ab eo quod est materiale in ipso, est nomen generis. Nomen autem, quo denominatur a principio formali, est nomen differentiae. Sicut homo nominatur animal a natura sensibili, rationale vero a natura intellectiva. Sicut igitur habens manum competit toti, licet manus sit pars, ita genus et differentia conveniunt toti, licet sumantur a partibus.”

<sup>108</sup> *In Metaph.* 10, l. 10, §2116: “Si ergo consideretur in genere et differentia id a quo utrumque sumitur, hoc modo genus se habet ad differentias, sicut materia ad formas. Si autem consideretur secundum quod nominant totum, sic aliter se habent. Hoc tamen commune est utrobique, quod sicut ipsa essentia materiae dividitur per formas, ita ipsa natura generis diversificatur per differentias. Sed hoc utrobique

consider (that from which each is taken) insofar as it names a whole, in this way, they are otherwise related. However, this is common to one and to the other: that just as the essence itself of matter is divided by forms, so the nature itself of the genus is diversified by differences. Yet, one is distant from the other in this: that matter is in one and in the other of the (things) divided, but it is neither of them, while the genus is one and the other of them, since *matter* names a part, while *genus* (names) a whole.

Hence, explaining what he had said—that the genus is that whereby both species and difference are said (to be) one and the same—, ARISTOTLE adds that not only the genus must be common to two (things) that differ in species—e.g., that one and the other should be *animal*—, as something undivided is common to diverse (things)—e.g., the same house or possession—, but that itself which is an animal must be other than one and the other, such that *this* animal would be a horse and *that* animal would be a man.<sup>109</sup>

ARISTOTLE says this against the Platonists, who posited commons (to be) separated, as though the common nature itself would not be diversified if the nature of the species should be something other, beyond (*praeter*) the nature of the genus.<sup>110</sup> Whence, against this he concludes, from what has been said, that this itself which is common (i.e., the genus) is diversified according to species. Whence, the common—such as *animal*—, according to itself, must be *this such* according to one difference, and *that such* according to another difference, just as *this* would be a horse; and *that*, a man. And thus, it follows that, if animal should, according to itself, be *this such* and *this (other) such*, what makes different (things) to differ in species would be some diversity of genus. And (thus) he explains the diversity of genus that diversifies the nature itself of the genus.

By that which ARISTOTLE says here, is excluded not only the opinion of PLATO, which posits that the common—one and the same—exists by itself; but it also excludes the opinion of those who say that what pertains to the nature of the genus does not differ in species in

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distat, quia materia est in utroque divisorum, non tamen est utrumque eorum; genus autem utrumque eorum est: quia materia nominat partem, genus autem totum.”

<sup>109</sup> *In Metaph.* 10, l. 10, §2117 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a2–4): “Et ideo exponens [Philosophus] quod dixerat, genus esse quo ambo specie differentia dicuntur unum et idem, subiungit quod non solum oportet genus esse commune duobus differentibus secundum speciem, sicut quod utrumque sit animal, sicut aliquid indivisum est commune diversis, ut eadem domus aut possessio; sed oportet hoc ipsum quod est animal esse alterum utrumque; ita quod hoc animal sit equus et hoc animal sit homo.”

<sup>110</sup> *In Metaph.* 10, l. 10, §2118 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a4–8): “Et hoc dicit [Philosophus] contra Platonicos, qui ponebant communia separata, quasi ipsamet natura communis non diversificaretur, si natura speciei esset aliquid aliud praeter naturam generis. Unde contra hoc concludit ex dictis, quod hoc ipsum quod est commune, diversificatur secundum speciem. Unde oportet quod commune, ut animal, ipsum secundum se sit hoc tale secundum unam differentiam, et illud tale secundum aliam differentiam, sicut quod hoc sit equus, et illud homo. Et ita sequitur, quod si animal sit secundum se hoc tale et hoc tale, quod differentia faciens differre specie, sit quaedam diversitas generis. Et exponit diversitatem generis, quae ipsam naturam generis diversificat.”

diverse species: for example, that the sensible soul does not differ in species in man and horse.<sup>111</sup>

#### 43.22. Contrariety is the Difference that Diversifies a Genus

ARISTOTLE shows that contrariety is the difference that diversifies according to itself a genus in the aforesaid mode.<sup>112</sup> He says that, since difference according to species is according to itself what diversifies a genus, it is manifest that this difference is contrariety.

He shows this first from induction.<sup>113</sup> Thus, we see that all genera are divided by opposites (< πάντα... διαίρεται τοῖς ἀντικειμένοις); which is necessary, for those that are not opposites can simultaneously exist in the same (subject); and those that are such cannot be diverse, since they would not be in diverse (subjects) of necessity. Whence, something common would have to be divided only by opposites.

The division of a genus into diverse species cannot come to be by other opposites.<sup>114</sup> Thus, contradictory opposites are not in the same genus, for negation posits nothing. Likewise, (this) is (the case) concerning privative opposites, since privation is but negation in some subject. Relatives, too, are not of the same genus—except those that refer according to themselves to each other, which in some mode are contraries, as has been said (► 43.19). And thus, it remains that contraries alone make those that are in one genus to differ in species.

ARISTOTLE manifest the same through reasoning, saying that contraries are in the same genus (< τὰναντία ἐν ταύτῳ γένει), as has been shown (► 43.18; 43.20).<sup>115</sup> Indeed, it has

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<sup>111</sup> *In Metaph.* 10, l. 10, §2119 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a4–8): “Per hoc autem quod hic Philosophus dicit, non solum excluditur opinio Platonis ponentis commune unum et idem per se existere: sed etiam excluditur opinio eorum qui dicunt, quod illud quod pertinet ad naturam generis, non differt specie in speciebus diversis; sicut quod anima sensibilis non differt specie in homine et equo.”

<sup>112</sup> *In Metaph.* 10, l. 10, §2120 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a8–9): “Ostendit [Philosophus] quod differentia diversificans secundum se genus modo praedicto, est contrarietas; dicens: cum differentia secundum speciem sit secundum se diversificans genus, manifestum est quod haec differentia est contrarietas.” Ibid., §2112: “Aristoteles [...] ostendit quod hoc [sc., quod differentia quae facit differre specie, est secundum se ipsius generis, quasi ipsam naturam generis in diversas species dividens] convenit contrarietati.”

<sup>113</sup> *In Metaph.* 10, l. 10, §2120 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a9–10): “Et hoc primo manifestat ex inductione. Videmus enim quod omnia genera dividuntur per opposita. Quod quidem necesse est. Nam ea quae non sunt opposita, possunt simul existere in eodem. Quae autem huiusmodi sunt, non possunt esse diversa, cum non ex necessitate sint in diversis. Unde oportet quod solum oppositis aliquid commune dividatur.”

<sup>114</sup> *In Metaph.* 10, l. 10, §2121: “Non autem divisio generis in diversas species potest fieri per alia opposita. Nam contradictorie opposita non sunt in eodem genere, cum negatio nihil ponat. Et simile est de privative oppositis, cum privatio non sit nisi negatio in subiecto aliquo. Relativa etiam, ut supra habitum est, non sunt eiusdem generis, nisi quae secundum se adinvicem referuntur, quae quodammodo sunt contraria, ut supra dictum est. Et sic relinquitur quod sola contraria faciunt differre specie, ea quae sunt unius generis.”

<sup>115</sup> *In Metaph.* 10, l. 10, §2122 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a10–14): “Manifestat [Philosophus] idem per rationem; dicens, quod contraria sunt in eodem genere, sicut ostensum est. Dictum est enim

been said that contrariety is the perfect difference (< διαφορὰ τελεία; ►43.7). And, again, it has been said that difference according to species is something of something (< τινὸς τί): that is, from something. And, apart from this, (it has been said) that, in both (of the things) that differ in species, the genus must be the same (< τοῦτο τὸ αὐτό τε καὶ γένος ἐπ' ἄμφοῖν; ►43.21). From the latter two (reasons), it follows that all contraries should be in the same categorical ordination (*in eadem ordinatione praedicamentali* < *in eadem coelevatione cathegorie* ... = ἐν τῇ αὐτῇ συστοιχίᾳ... τῆς κατηγορίας), but such that this should be understood of any contraries that differ in species and not in genus (< ὅσα εἶδει διάφορα καὶ μὴ γένει), which ARISTOTLE says to except the corruptible and the incorruptible, which are diverse in genus (►43.25).

Not only are contraries in one genus, but they are also diverse from each other (< ἕτερά τε ἀλλήλων μάλιστα).<sup>116</sup> This is evident because those that differ perfectly, as contraries (do), are not simultaneous to each other. Whence, difference according to species should be a contrariety, since what is required for (there to be) a difference according to species is: (a) identity in genus; and (b) the diversification of the genus by diverse species; and one and the other is found in contrariety.

This is evident because to be diverse according to species—for some (things) that exist in the same genus—is to have a contrariety of differences, since they are not further divided into species—as are (undivided) the most special species.<sup>117</sup> These (most special species) are said (to be) *individuals* (*individua* = ἄτομα) insofar as they are not further divided formally, while particulars are said (to be) *individuals* insofar as they are not further divided—neither materially nor formally.

Just as those are diverse in species which have contrariety, so are those the same in species which do not have contrariety, since they should be individuals according to formal difference. Indeed, contrarieties come to be in division: not only in the supreme genera

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quod contrarietas est differentia perfecta. Et iterum dictum est quod differentia secundum speciem est «aliquid alicujus,» idest ab aliquo. Et quod praeter hoc, idem genus oportet esse in ambobus differentibus specie. Et ex his duobus sequitur, quod omnia contraria sint in eadem «coelevatione categoriae,» idest in eadem ordinatione praedicamentali. Ut hoc tamen intelligatur de contrariis, quaecumque sunt differentia specie, et non genere. Quod quidem dicit praeservando se a corruptibili et incorruptibili, de quibus post dicitur quod sunt diversa genere.”

<sup>116</sup> *In Metaph.* 10, l. 10, §2123 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a15–16): “Et non solum contraria sunt in uno genere, sed sunt etiam diversa abinvicem. Quod patet: quia ea quae perfecte differunt, sicut contraria, non sunt invicem simul. Unde, cum ad differentiam secundum speciem requiratur identitas generis, et diversificatio generis per diversas species, et cum utrumque in contrarietate reperiatur, sequitur quod differentia secundum speciem sit contrarietas.”

<sup>117</sup> *In Metaph.* 10, l. 10, §2123 (cf. ARISTOTLE, *Metaphysica* l.8, 1058a17–18): “Quod manifestum est; quia hoc est aliqua esse diversa secundum speciem existentia in eodem genere, habere contrarietatem differentiarum, «cum sint individua,» idest non ulterius divisa in species, sicut sunt species specialissimae. Quae quidem dicuntur individua, inquantum ulterius non dividuntur formaliter. Particularia vero dicuntur individua, inquantum nec materialiter nec formaliter ulterius dividuntur.”

but, also, in the means (< ἐν τοῖς μεταξὺ) before arriving at the individuals (< πρὶν εἰς τὰ ἄτομα ἐλθεῖν): that is, at the last species. Thus, it is manifest that, even though there should not be contrariety of species in every genus, however, in every genus there is contrariety of differences.<sup>118</sup>

### 43.23. Nothing Is the Same or Diverse in Species in Relation to a Genus

ARISTOTLE concludes some corollary from what has been said: to wit, that none of those (things) that agree (*conveniunt*) in genus—as do the species of a genus—is said (to be) *the same in species* (in relation only to the genus itself).<sup>119</sup> Nor (is a thing that agrees with others in genus said to be) *diverse in species* (in relation) to the genus. For that (in relation) to which something is said (to be) *the same in species* has one and the same difference; and that (in relation) to which something is said (to be) *diverse in species* has an opposite difference. Therefore, if some of (i.e., any one of) the species should be said (to be) *the same in species* or *diverse (in species in relation)* to the genus, it would follow that the genus would have in its *ratio* some difference—but this is false.

This is evident as follows.<sup>120</sup> Matter is shown through negation (< ἡ... ὕλη ἀποφάσει δηλοῦται): that is, the nature of matter is understood by the negation of all forms. And the genus is in some mode matter, as has been explained (► 43.21). We speak now of the genus that is found in the natures of things—not of the genus that is said in men, such as the genus of Romans or of Heracliteans (► 14.1, note 2, ¶1, ¶2). Whence, it is evident that a genus does not have a difference in its *ratio*.

And thus, it is evident that no species differs from its genus in species; nor is it the same in species with it.<sup>121</sup> Likewise, some (things) do not differ in species from those (things)

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<sup>118</sup> *In Metaph.* 10, l. 10, §2123 (cf. ARISTOTLE, *Metaphysica* I.8, 1058a18–21): “Et sicut diversa specie sunt quae contrarietatem habent, ita eadem specie sunt, quae non habent contrarietatem, cum sint individua secundum formalem differentiam. Contrarietates enim fiunt in divisione, non solum in supremis generibus, sed etiam in mediis, «prius quam veniatur ad individua,» idest ad ultimas species. Sic igitur manifestum est, quod licet non in omni genere sit contrarietas specierum, in omni tamen genere est contrarietas differentiarum.”

<sup>119</sup> *In Metaph.* 10, l. 10, §2124 (cf. ARISTOTLE, *Metaphysica* I.8, 1058a21–23): “Concludit [Philosophus] quoddam corollarium ex dictis; scilicet quod nihil eorum quae conveniunt in genere, sicut sunt species generis, dicitur idem specie, nec diversum specie ad genus; quia id ad quod aliquid dicitur specie idem, habet unam et eandem differentiam; illud autem ad quod aliquid dicitur diversum specie, habet oppositam differentiam. Si igitur aliqua specierum diceretur idem specie vel diversum ad genus, sequeretur quod genus haberet in sui ratione aliquam differentiam. Sed hoc falsum est.” Ibid., §2112: “Aristoteles [...] concludit quoddam corollarium ex dictis.”

<sup>120</sup> *In Metaph.* 10, l. 10, §2125 (cf. ARISTOTLE, *Metaphysica* I.8, 1058a23–25): “Quod sic patet. Materia enim «ostenditur negatione,» idest natura materiae intelligitur per negationem omnium formarum. Genus autem est quodammodo materia, sicut expositum est. Et loquimur nunc de genere quod invenitur in naturis rerum, non de genere quod in hominibus dicitur, sicut genus Romanorum vel Heraclidarum. Unde patet quod etiam genus in sua ratione non habet differentiam aliquam.”

<sup>121</sup> *In Metaph.* 10, l. 10, §2126 (cf. ARISTOTLE, *Metaphysica* I.8, 1058a25–28): “Et sic patet, quod nulla species a suo genere differt specie, nec est cum eo idem specie: et similiter non differunt aliqua specie ab illis quae non sunt in eodem genere, proprie loquendo, sed differunt genere ab eis. Specie vero

that are not in the same genus properly speaking: rather, they differ in genus from them. On the other hand, they differ in species from those that are in the same genus, since contrariety is the difference whereby some (things) differ in species, as has been shown (►43.22): not because the contrariety of differences should itself differ in species, although contraries differ in species: rather, there is contrariety only in those that are of the same genus. Whence, it remains that to differ in species should not properly be in those (subjects) that are of other genera.

#### 43.24. Contraries That Do Not Differ in Species

Having shown that contrariety is the difference according to species (►43.22), ARISTOTLE shows in what (things) a contrariety should not be a difference according to species.<sup>122</sup> For there are contraries that do not cause to differ according to species; rather, they are the same in species.

Thus, ARISTOTLE poses the question of whether *female* would not differ in species from *male*, since *female* and *male* should be contraries; and difference according to species should be caused from contrariety (►43.22).<sup>123</sup> Indeed, since it has been shown that the nature itself of the genus should be diversified into diverse species by differences that are differences by themselves of the genus, (he asks) why the male animal and the female animal are not diverse according to species, since *masculine* and *feminine* are differences by themselves of *animal*, and are not related by accident to *animal*, as (are) *whiteness* and *blackness*.<sup>124</sup> Rather, *male* and *female* are predicated of *animal* insofar as it is *animal*, just as *even* and *odd* (are predicated) of *number*; (and) *number* is posited in their definition, just as *animal* (is posited) in the definition of *male* and of *female*.

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differunt ab his quae sunt in eodem genere: quia contrarietas est differentia qua aliqua differunt specie, ut ostensum est: non quia ipsa contrarietas differentiarum differat specie, licet contraria differant specie; sed contrarietas est solum in his quae sunt eiusdem generis. Unde relinquitur quod differre specie non sit proprie in his quae sunt alterius generis.”

<sup>122</sup> In *Metaph.* 10, l. 11, §2127 (cf. ARISTOTLE, *Metaphysica* I.9, 1058a29–b25): “Quia Philosophus iam ostendit quod differentia secundum speciem est contrarietas, hic ostendit in quibus contrarietas non sit differentia secundum speciem; [...] ostendit quod sunt contraria, quae non faciunt differre secundum speciem, sed sunt in eadem specie.” Ibid., l. 10, §2112: “Aristoteles [...] ostendit quomodo de quibusdam contrariis aliter est [sc., quomodo, de quibusdam contrariis, differentia secundum speciem non pertineat ad contrarietatem].”

<sup>123</sup> In *Metaph.* 10, l. 11, §2127 (cf. ARISTOTLE, *Metaphysica* I.9, 1058a29–31): “Philosophus [...] movet dubitationem. [...] Dicit ergo primo, quod dubitatio est quare femina non differt specie a viro, cum femininum et masculinum sint contraria, et differentia secundum speciem causetur ex contrarietate, ut supra ostensum est.”

<sup>124</sup> In *Metaph.* 10, l. 11, §2128 (cf. ARISTOTLE, *Metaphysica* I.9, 1058a31–34): “Et iterum cum ostensum sit, quod ipsa natura generis diversificetur in diversas species per differentias, quae sunt per se differentiae generis, quare animal masculinum et animal femininum non sunt diversa secundum speciem, cum masculinum et femininum sint per se differentiae animalis, et non se habeant per accidens ad animal, sicut albedo et nigredo, sed masculinum et femininum praedicentur de animali in quantum est animal, sicut par et impar de numero, in quorum definitione ponitur numerus, sicut in definitione masculini et feminini animal.”



Therefore, the question is rendered doubtful for two reasons: both because contrariety causes to differ in species, and because differences that divide a genus into diverse species are differences by themselves of the genus, each of which has been shown (► 43.22).<sup>125</sup>

And, since ARISTOTLE had raised this question in special terms (i.e., *male vs. female*), he reduces them to a more general form.<sup>126</sup> He says that this question is almost the same as if it were asked whether some contrariety causes to differ in species and some (other contrariety does) not. For example, *capable of walking* and *capable of flying* (*ambulativum et volativum, sive gressibile et volatile* = τὸ πεζὸν καὶ τὸ πτερωτόν) cause animals to differ in species; but *whiteness* and *blackness* do not.

ARISTOTLE solves the proposed question, first, in general.<sup>127</sup> Thus, he says that it happens that some contrariety causes to differ in species, and some (other contrariety) does not, because some contraries are proper affections (< οἰκεῖα πάθη; ► 15.17) of the genus, and some (others) are less (< ἥττον) proper.

Thus, since the genus is taken from matter, and matter has by itself an order to form, those are **proper differences of a genus** which are taken from diverse forms that perfect matter.<sup>128</sup> On the other hand, since the form of the species is, again, multiplied into diverse (individuals) according to designated matter, which is the subject of individual properties (► 35.10), the contrariety of individual accidents is less properly related to the genus than the contrariety of formal differences.

Hence, ARISTOTLE adds that, since in a composition there is matter and form,<sup>129</sup> the latter is the *ratio* (< λόγος)—that is, the form—that constitutes the species, while the former is

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<sup>125</sup> *In Metaph.* 10, l. 11, §2129: “Ex duplici ergo ratione quaestio dubitabilis redditur: tum quia contrarietas facit differre specie: tum quia differentiae dividentes genus in diversas species sunt per se differentiae generis: quorum utrumque supra ostensum est.”

<sup>126</sup> *In Metaph.* 10, l. 11, §2130 (cf. ARISTOTLE, *Metaphysica* I.9, 1058a34–36): “Et quia hanc dubitationem in specialibus terminis moverat [Philosophus], reducit eam ad generaliore formam; et dicit quod haec dubitatio fere est eadem, sicut si quaeratur, quare quaedam contrarietas facit differre specie, et quaedam non: sicut ambulativum et volativum, sive gressibile et volatile, faciunt differre specie animalia, sed albedo et nigredo non.”

<sup>127</sup> *In Metaph.* 10, l. 11, §2131 (cf. ARISTOTLE, *Metaphysica* I.9, 1058a36–37): “Solvit [Philosophus] propositam quaestionem. [...] Primo solvit eam in generali, ad quod quaestionem reducerat. [...] Dicit ergo, quod ideo contingit quod quaedam contrarietas facit differre specie et quaedam non, quia quaedam contraria sunt propriae passionis generis, et quaedam sunt minus propriae.” Ibid., §2127: “Philosophus [...] dubitationem [...] solvit.”

<sup>128</sup> *In Metaph.* 10, l. 11, §2131: “Quia enim genus a materia sumitur, materia autem per se habet ordinem ad formam; illae propriae sunt differentiae generis, quae sumuntur a diversis formis perficientibus materiam. Sed quia forma speciei iterum multiplicatur in diversa secundum materiam signatam, quae est subiecta individualibus proprietatibus, contrarietas accidentium individualium minus proprie se habet ad genus, quam contrarietas differentiarum formalium.”

<sup>129</sup> *In Metaph.* 10, l. 11, §2131 (cf. ARISTOTLE, *Metaphysica* I.9, 1058a37–b3): “Et ideo subiungit [Philosophus], quod quia in composito est materia et forma, haec «quidem est ratio,» idest forma quae

the matter which is the principle of individuation. And whatever contrarieties are in the *ratio* (< ἐν τῷ λόγῳ)—that is, from the part of the form—cause to differ according to species, while those that are from the part of matter, which are proper of the individual that is taken with matter, do not cause to differ according to species.

Therefrom, *whiteness* and *blackness* do not cause men to differ according to species.<sup>130</sup> Indeed, a white man and a black man do not differ in species, even if a name should be imposed to one and to the other: for example, if one should call a white man *A*, and a black man *B*. ARISTOTLE adds this because *white man* does not seem to be something *one*; yet, if a name should be imposed, there would seem to be something *one*. And likewise, it is (the same case) concerning a black man.

Hence, ARISTOTLE says that a white man and a black man do not differ in species, because a man—to wit, a particular (man), to which white and black befit—is as matter.<sup>131</sup> Indeed, man is said to be white only because *this* man is white. And thus, since a conceived particular man is with matter, and matter does not cause a difference according to species, it follows that *this* man and *that* man should not differ in species; for multiple men are not multiple species of man on account of this (i.e., on account of being *multiple* men), since they are multiple only on account of the diversity of matter: to wit, because there are diverse flesh and bones from which *this* (man) and *that* (man) are constituted).

The simultaneous whole (< τὸ σύνολον)—that is, the individual congregated from matter and form—is diverse; but not diverse in species, since there is no contrariety from the part of the form.<sup>132</sup> On the other hand, *man* is the last individual (< τὸ ἔσχατον ἄτομον) according to species, since it is not further divisible by formal division; and *this*—

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constituit speciem, haec autem est materia quae est individuationis principium: quaecumque «contrarietates sunt in ratione,» idest ex parte formae, faciunt differre secundum speciem. Illae vero quae sunt ex parte materiae, quae sunt propriae individui, quod est acceptum cum materia, non faciunt differre secundum speciem.”

<sup>130</sup> *In Metaph.* 10, l. 11, §2132 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b3–5): “Et propter hoc albedo et nigredo non faciunt homines differre secundum speciem. Non enim homo albus et homo niger differunt specie, etiam si utriusque imponatur aliquod nomen; ut si homo albus dicatur A et homo niger B. — Hoc autem addit [Philosophus], quia homo albus non videtur esse aliquid unum. Sed si imponeretur nomen, videtur esse aliquid unum. Et similiter est de homine nigro.”

<sup>131</sup> *In Metaph.* 10, l. 11, §2132 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b5–8): “Et ideo dicit [Philosophus], quod homo albus et homo niger non differunt specie, quia homo, scilicet particularis, cui conveniunt album et nigrum, est quasi materia. Non enim dicitur quod homo sit albus, nisi quia hic homo est albus. Et sic, cum homo particularis conceptus sit cum materia, et materia non facit differentiam secundum speciem, sequitur quod hic homo et ille homo non differant specie: quia plures homines non propter hoc sunt plures species hominis, quia sunt plures; quia non sunt plures nisi propter diversitatem materiae, quia scilicet sunt diversae carnes et ossa ex quibus est hic et ille.”

<sup>132</sup> *In Metaph.* 10, l. 11, §2132 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b8–10): “Sed «simul totum,» idest individuum congregatum ex materia et forma, est diversum: sed non est diversum specie, quia non est contrarietas ex parte formae. Sed hoc, scilicet homo, est ultimum individuum secundum speciem, quia non dividitur ulterius divisione formali. Vel hoc, scilicet particulare, est ultimum individuum, quia non dividitur ulterius, nec materiali nec formali differentia.”

*particular—man* is the last individual because it is no further divisible: neither by a material nor by a formal difference.

On the other hand, although in diverse individuals there is no contrariety from the part of the form, there is nonetheless a diversity of particular individuals, since some particular, such as Callias, is not only a form, but is a form with individuated matter.<sup>133</sup> Thus, just as a diversity of form causes a difference of species, so a diversity of individual matter causes a difference of individuals. And *white* is predicated of man only by reason of the individual, for man is said (to be) *white* only because some (individual) man—such as Callias—is said (to be) *white*.

And thus, it is evident that man is said (to be) *white* by accident, for it is said (to be) *white* not insofar as (it is a) *man* but insofar as (it is) *this* man.<sup>134</sup> Whence, it is evident that *white* and *black* do not pertain to a formal difference of *man* but only to a material (difference). Therefrom, *white man* and *black (man)* do not differ in species, just as a bronze circle and a wooden (circle) do not differ in species. And in these (things) that differ in species, too, there is no difference in species on account of matter but on account of form, just like a bronze triangle and a wooden circle do not differ in species on account of matter, but on account of a diversity of form.

Whence, if one should ask whether matter causes (things to be) diverse in species in some mode, it seems that it does.<sup>135</sup> Indeed, *this horse* is diverse in species from *that man*, and yet, it is manifest that the *ratio* of one and of the other is with individual matter (< σὺν τῇ ὕλῃ οἱ λόγοι αὐτῶν). And thus, it seems that matter equally causes to differ in species. However, it is manifest that this does not happen on account of the diversity of

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<sup>133</sup> *In Metaph.* 10, l. 11, §2132 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b9–11): “Sed quamvis in diversis individuis non sit contrarietas ex parte formae, est tamen diversitas individuorum particularium; quia particulare aliquod, ut Callias, non solum est forma, sed est forma cum materia individuata. Et ita, sicut diversitas formae facit differentiam specierum, ita diversitas materiae individualis facit differentiam individuorum. Album autem non praedicatur de homine nisi ratione individui. Non enim dicitur homo albus, nisi quia aliquis homo dicitur albus, ut Callias.”

<sup>134</sup> *In Metaph.* 10, l. 11, §2132 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b12–15): “Et sic patet, quod homo per accidens dicitur albus; quia non in quantum homo, sed in quantum hic homo, albus dicitur. Hic autem homo dicitur propter materiam. Unde patet quod album et nigrum non pertinent ad differentiam formalem hominis, sed solum ad materialem. Et propter hoc non differunt specie homo albus et niger, sicut nec circulus aereus et ligneus differunt specie. Et in his etiam quae differunt specie, non est differentia speciei propter materiam, sed propter formam; sicut triangulus aereus et circulus ligneus non differunt specie propter materiam, sed propter diversitatem formae.”

<sup>135</sup> *In Metaph.* 10, l. 11, §2133 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b15–21): “Unde si quaeratur, utrum materia faciat diversa specie aliquo modo, videtur quod faciat; quia hic equus ab hoc homine est diversus specie, et tamen manifestum est quod ratio utriusque est cum materia individuali. Et sic videtur quod materia aequaliter faciat differre specie. Sed tamen manifestum est, quod hoc non contingit propter diversitatem materiae, sed quia contrarietas est ex parte formae, quia homo albus et equus niger differunt specie. Sed hoc non est propter album et nigrum, quia si ambo essent albi, adhuc specie differrent. Sic igitur apparet quod contrarietas quae est ex parte ipsius formae, facit differre specie; non autem illa quae est ex parte materiae.”

matter, but because there is a contrariety from the part of the form, since *white man* and *black horse* differ in species and, yet, this is not on account of *white* and *black*; for if both should be white, they would still differ in species. Therefore, it is thus apparent that the contrariety that is from the part of the form itself causes to differ in species; but not that (contrariety) that is from the part of matter.

(Finally), ARISTOTLE adapts the general solution posited to the special terms in which the question was first raised: namely, to *male* and *female*.<sup>136</sup> Thus, he says that *male* and *female* are proper affections of *animal*, since *animal* is posited in the definition of one and of the other. However, they do not befit *animal* according to substance and form, but from the part of matter and body.

### 43.25. Contraries in Genus

ARISTOTLE determines (the truth concerning) which contraries cause to differ in genus and not only in species (►43.21).<sup>137</sup> Thus, *corruptible* and *incorruptible* are contraries, which he proves as follows: The impotence (that is) opposite to a determinate potency is some privation (►31.16); and privation is the principle of contrariety; whence, it follows that *impotence* should be the contrary of *potency*.

Now, *corruptible* and *incorruptible* are opposed according to *potency* and *impotence*, but diversely (►31.3; 31.18).<sup>138</sup>

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<sup>136</sup> *In Metaph.* 10, l. 11, §2134 (cf. ARISTOTLE, *Metaphysica* l.9, 1058b21–24): “*Solutionem generalem positam adaptat [Philosophus] ad terminos speciales, in quibus primo quaestionem moverat, scilicet ad masculum et feminam; dicens, quod masculus et femina sunt proprie passiones animalis, quia animal ponitur in definitione utriusque. Sed non conveniunt animali secundum substantiam et formam, sed ex parte materiae et corporis.*” Ibid., §2131: “*adaptat [Philosophus] generalem solutionem ad speciales terminos, in quibus primo moverat quaestionem.*” ARISTOTLE and St. Thomas offer an explanation drawn from ancient science, according to which the sperm can come to be male or female insofar as it diversely undergoes some affection. While they were wrong about the way in which sexual reproduction occurs, the principles are nonetheless valid, since it is from the part of matter that a human being comes to be male or female. Ibid., §2134 (cf. ARISTOTLE, *Metaphysica* l.9, 1058b23–24): “*Quod patet ex hoc, quod idem sperma potest fieri masculus et femina, secundum quod diversimode patitur aliquam passionem; quia cum fuerit calor operans fortis, fiet masculus; cum autem erit debilis, fiet femina. Hoc autem non posset esse vel contingere, si masculus et femina differrent specie. Non enim ex uno semine diversa secundum speciem producuntur. Quia in semine vis est activa, et omne agens naturale agit ad determinatam speciem, quia agit sibi simile. Unde relinquitur quod masculus et femina non differant secundum formam, nec sunt diversa secundum speciem.*”

<sup>137</sup> *In Metaph.* 10, l. 11, §2127 (cf. ARISTOTLE, *Metaphysica* l.10, 1058b26–28): “*Philosophus [...] ostendit quae sunt contraria quae faciunt genere differre, non solum specie.*” Ibid., l. 12, §2136: “*Postquam Philosophus ostendit quae sunt contraria quae non faciunt differre specie, hic ostendit quae sunt contraria quae etiam genere differre faciunt. Et circa hoc tria facit. Primo determinat veritatem. [...] Primo ergo praemittit duo ad ostendendum propositum: quorum primum est, quod contraria sunt diversa specie, ut supra ostensum est.*” Ibid., §2137: “*Secundum est, quod corruptibile et incorruptibile sunt contraria. Quod probat ex hoc, quod impotentia opposita determinatae potentiae est quaedam privatio, ut in nono habitum est. Privatio autem est principium contrarietatis. Unde sequitur, quod impotentia sit contrarium potentiae.*”

<sup>138</sup> *In Metaph.* 10, l. 12, §2137: “*Corruptibile autem et incorruptibile opponuntur secundum potentiam et impotentiam. Sed diversimode.*”

1. If *potency* should be taken in common (*communiter*) insofar as it is related to a being capable of doing or undergoing whatever action (*secundum quod se habet ad posse agere vel pati quodcumque*; ► 31.3, ¶1; ¶2), in this way, *corruptible* would be said according to *potency*, (while) *incorruptible* (would be said) according to *impotence* (i.e., *corruptible* would be *that which is capable of corrupting or of being corrupted*, while *incorruptible* would be *that which is incapable of corrupting or of being corrupted*).<sup>139</sup>

2. If, on the other hand, *potency* should be said insofar as something cannot be deteriorated (*secundum quod non est posse aliquid deterius*; ► 31.3, ¶4), in this way, conversely, *incorruptible* would be said according to *potency*, while *corruptible* (would be said) according to *impotence* (i.e., *corruptible* would be *that which cannot resist change for the worse*, while *incorruptible* would be *that which is impassible*; ► 31.7).<sup>140</sup>

Since from these (two modes of taking *potency*) one would seemingly have to conclude that *corruptible* and *incorruptible* differ in species, ARISTOTLE shows that they are diverse in genus.<sup>141</sup> This is so because just as form and act pertain to species, so matter and potency pertain to genus.<sup>142</sup> Whence, just as the contrariety that is according to forms and acts causes a difference according to species, so the contrariety that is according to potency causes a diversity of genus.

*Corruptible* is not (found) in some of those (subjects) of which it is predicated according to accident, since that which is according to accident may happen not to be in (a subject), while (to be) corruptible is necessarily (found) in those (subjects) in which (*corruptible*) is (predicated).<sup>143</sup> If this should not be true, it would follow that one and the same (thing)

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<sup>139</sup> *In Metaph.* 10, l. 12, §2137: “Nam si accipiatur potentia communiter, secundum quod se habet ad posse agere vel pati quodcumque, sic corruptibile secundum potentiam dicitur, incorruptibile secundum impotentiam.”

<sup>140</sup> *In Metaph.* 10, l. 12, §2137: “Si autem dicatur potentia secundum quod non est posse aliquid deterius, sic e converso, incorruptibile dicitur secundum potentiam, corruptibile vero secundum impotentiam.”

<sup>141</sup> *In Metaph.* 10, l. 12, §2137<sup>2</sup> (cf. ARISTOTLE, *Metaphysica* l.10, 1058b28–29): “Cum autem ex his videretur concludendum quod corruptibile et incorruptibile differunt specie, concludit [Philosophus] quod sunt diversa genere.”

<sup>142</sup> *In Metaph.* 10, l. 12, §2137<sup>2</sup>: “Et hoc ideo, quia sicut forma et actus pertinent ad speciem, ita materia et potentia pertinent ad genus. Unde sicut contrarietas quae est secundum formas et actus, facit differentiam secundum speciem, ita contrarietas quae est secundum potentiam, facit generis diversitatem.”

<sup>143</sup> *In Metaph.* 10, l. 12, §2140 (cf. ARISTOTLE, *Metaphysica* l.10, 1059a1–6): “Non enim corruptibile inest secundum accidens alicui eorum de quibus praedicatur; quia quod est secundum accidens, contingit non inesse. Corruptibile autem ex necessitate inest his quibus inest. At si hoc non sit verum, sequeretur, quod unum et idem sit quandoque corruptibile et quandoque incorruptibile: quod est impossibile secundum naturam. (Licet per hoc non excludatur, quin virtus divina possit aliqua corruptibilia secundum suam naturam, incorruptibiliter conservare).” This argumentation follows a response to a false opinion that ARISTOTLE raises and then excludes. As St. Thomas explains, ARISTOTLE says that the afore-posed proof concerning *corruptible* and *incorruptible* is taken by reason of these universal names: to wit, insofar as one signifies *potency* and the other (signifies) *impotence*; but, as it seems to some (philosophers), it is not necessary for *corruptible* and *incorruptible* to differ in species, just as this (i.e., to differ in species)

would sometimes be corruptible and sometimes incorruptible—which is impossible according to nature, though this should not exclude that an (external) virtue could incorruptibly preserve some (things that are) incorruptible according to their nature.

Therefore, since *corruptible* is not predicated according to accident, it is necessary that it signify either the substance of that of which it is predicated, or something that is in the substance.<sup>144</sup> Indeed, any one (thing) is corruptible by matter, which is of the substance of the thing. And a like reason is (true) concerning *incorruptible*, since one and the other is of necessity in (a substance). Hence, it is thus evident that *corruptible* and *incorruptible* are opposed as predicates according to themselves, which are—to wit—predicated of something insofar as they are such (*inquantum huiusmodi, secundum quod tale*) and first.

Therefrom, it follows of necessity that *corruptible* and *incorruptible* should be diverse in genus, for it is manifest that contraries that are in one genus are not of the substance of

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is not necessary in *white* and *black*. Indeed, it befits the same (subject) to be white or black, though diversely, for if that which is said (to be) *black* or *white* should be something universal, *white* and *black* are (then) simultaneous (in relation) to diverse (subjects): for example, it is simultaneously true to say that man is white on account of Socrates and (to say that man is) black on account of Plato (i.e., if Socrates should be white; and Plato, black). On the other hand, if it should be something singular, it will not be simultaneously white and black; but it can nonetheless be white now and thereafter black, since white and black should nevertheless be contraries. And, in this mode, some say that some corruptible (things) and some incorruptible (things) can simultaneously be in the same species; and (that) the same (thing) singularly (can) sometimes (be) corruptible and sometimes incorruptible. Ibid., §2136 (cf. ARISTOTLE, *Metaphysica* I.10, 1058b29–35): “Philosophus [...] excludit quorundam falsam opinionem.” Ibid., §2138: “*Excludit quorundam falsam opinionem*. Et circa hoc duo facit. Primo *proponit eam*. Secundo *improbat* [...]. Dicit ergo primo, quod probatio praemissa de corruptibili et incorruptibili est accepta ex ratione horum universalium nominum, secundum scilicet quod unum significat potentiam, et aliud impotentiam. Sed sicut quibusdam videtur, non necesse est quod corruptibile et incorruptibile differant specie, sicut non est hoc necesse in albo et nigro. Convenit enim idem esse album et nigrum. Sed diversimode. Quia si illud quod dicitur album et nigrum sit aliquod universale, simul est album et nigrum quantum ad diversos. Sicut simul verum est dicere, quod homo est albus propter Socratem et niger propter Platonem. Si vero fuerit aliquid singularium, non erit simul album et nigrum. Sed tamen potest nunc esse album, postea nigrum, cum tamen album et nigrum sint contraria. Et hoc modo dicunt quidam, quod simul in eadem specie possunt esse quaedam corruptibilia et quaedam incorruptibilia. Et idem singulariter quandoque corruptibile, et quandoque incorruptibile.” As St. Thomas further explains, ARISTOTLE excludes the aforesaid opinion, saying that, of contraries, some are in those of which they are said according to accident, such as white and black (are said according to accident) of man, about which has been said now; many others are contraries to such a mode, in which what has been said—namely, that they can simultaneously be in the same species, and successively in the same singular—does not have a place. On the other hand, there are some contraries of which this is impossible—among which are the corruptible and the incorruptible. Ibid., §2138 (cf. ARISTOTLE, *Metaphysica* I.10, 1058b36–1059a1): “*improbat* [Philosophus quorundam falsam opinionem].” Ibid., §2139: “*Excludit praedictam opinionem*; dicens, quod contrariorum quaedam sunt in his de quibus dicuntur secundum accidens, sicut album et nigrum homini, de quibus nunc dictum est: et alia multa sunt huiusmodi contraria, in quibus locum habet quod dictum est, scilicet quod possunt simul esse in eadem specie, et successive in eodem singulari. Sed quaedam contraria sunt, de quibus hoc est impossibile; de quorum numero sunt corruptibile et incorruptibile.”

<sup>144</sup> *In Metaph.* 10, I. 12, §2141 (cf. ARISTOTLE, *Metaphysica* I.10, 1059a6–8): “Sic igitur necesse est, cum corruptibile non praedicetur secundum accidens, quod aut significet substantiam eius de quo praedicatur, aut aliquid quod est in substantia. Est enim unumquodque corruptibile per materiam, quae est de substantia rei. Et similis ratio est de incorruptibili; quia utrumque ex necessitate inest. Sic igitur patet, quod corruptibile et incorruptibile opponuntur sicut secundum se praedicata; quae scilicet praedicantur de aliquo inquantum huiusmodi, secundum quod tale, et primo.”

that genus. Thus, *rational* and *irrational* are not of the substance of *animal*: rather, *animal* is one and the other in potency. And whatever genus should be taken, *corruptible* and *incorruptible* would have to belong to its understanding. Whence, it is impossible for them to communicate in (i.e., to have in common) some genus. And this happens reasonably, for the matter of the corruptible and of the incorruptible cannot be one.<sup>145</sup>

However, **physically speaking**, the genus is taken from matter; whence, those (things) that do not communicate in matter are diverse in genus (►43.23).<sup>146</sup> On the other hand, **logically speaking**, nothing prevents them from agreeing in genus insofar as they agree in one common *ratio*—whether (it should be the common *ratio*) of *substance*, of *quality*, or of something such (►21.11).

### 43.26. There Can Be No Separated Species

From what has been said, ARISTOTLE infers some corollary: namely, that there can be no separated species, as Platonists posited.<sup>147</sup> For they posit two men: one sensible, which is corruptible; and one separated, which is incorruptible, (and) which they call the Species or Idea of *man*. Thus, according to the Platonists, Species or Ideas are said to be the same in species as singulars; and the name *species* is not predicated equivocally of the Species and of the singular, even though *incorruptible* and *corruptible* should differ even in genus—and those that are diverse in genus are more distant than those that differ in species.

### 43.27. All Contraries Cause to Differ in Species in Some Mode

It is to be considered that, although ARISTOTLE shows that some contraries do not cause to differ in species, while some (other contraries) cause to differ even in genus, however, all contraries cause to differ in species in some mode. Thus, *white* and *black*, even if they should not cause to differ in species in the genus of *animal*, they nonetheless cause to

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<sup>145</sup> *In Metaph.* 10, l. 12, §2142 (cf. ARISTOTLE, *Metaphysica* I.10, 1059a9–10): “Et ex hoc sequitur ex necessitate, quod corruptibile et incorruptibile sint genere diversa. Manifestum est enim quod contraria quae sunt in uno genere, non sunt de substantia illius generis. Non enim rationale et irrationale sunt de substantia animalis. Sed animal est potentia utrumque. Quodcumque autem genus accipiatur, oportet quod corruptibile et incorruptibile sint de intellectu eius. Unde impossibile est quod communicent in aliquo genere. Et hoc rationabiliter accidit. Nam corruptibilium et incorruptibilium non potest esse materia una.”

<sup>146</sup> *In Metaph.* 10, l. 12, §2142: “Genus autem, physice loquendo, a materia sumitur. Unde supra dictum est, quod ea quae non communicant in materia, sunt genere diversa. Logice autem loquendo, nihil prohibet quod convenient in genere, in quantum conveniunt in una communi ratione, vel substantiae, vel qualitatis, vel alicuius huiusmodi.”

<sup>147</sup> *In Metaph.* 10, l. 12, §2136 (cf. ARISTOTLE, *Metaphysica* I.10, 1059a10–14): “Philosophus [...] infert quoddam corollarium ex dictis.” Ibid., §2143: “Infert quoddam corollarium ex dictis; scilicet quod non possunt esse species separatae, sicut Platonici posuerunt. Ponunt enim duos homines, unum sensibilem qui est corruptibilis, et unum separatum qui est incorruptibilis, quem dicunt speciem vel ideam hominis. Species autem sive ideae dicuntur esse eadem specie, secundum Platonicos, cum singularibus. Et nomen speciei non aequivoce praedicatur de specie et de singulari, cum tamen incorruptibile et corruptibile etiam genere differant. Et ea quae sunt diversa genere plus distant, quam quae differunt specie.”

differ in species in the genus of *color*; and *male* and *female* cause to differ in the genus of *sex*.<sup>148</sup>

In turn, *animate* and *inanimate*, even though they should cause to differ in genus in respect of the lowest species, they cause to differ only in species, for all differences of a genus are constitutive of some species, even if those species could be diverse in genus.<sup>149</sup>

Finally, *corruptible* and *incorruptible* divide by themselves *being* (*ens*), since **corruptible** is *that which is capable of not being* (*quod potest non esse*), while **incorruptible** (is) *that which is not capable of not being* (*quod non potest non esse*).<sup>150</sup> Whence, since *being* should not be a genus, it is not astonishing that *corruptible* and *incorruptible* would not agree in some one genus.

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<sup>148</sup> *In Metaph.* 10, l. 12, §2144: "Attendendum est autem, quod licet Philosophus ostenderit, quod quaedam contraria non faciunt differre specie, et quaedam faciunt differre etiam genere; tamen omnia contraria aliquo modo faciunt differre specie, si fiat comparatio contrariorum ad aliquod determinatum genus. Nam album et nigrum, licet non faciant differre specie in genere animalis, faciunt tamen differre specie in genere coloris. Et masculinum et femininum faciunt differre specie in genere sexus."

<sup>149</sup> *In Metaph.* 10, l. 12, §2144: "Et animatum et inanimatum, licet faciant differre genere quantum ad infimas species, tamen quantum ad genus quod per se dividitur in animatum et inanimatum, faciunt differre specie tantum. Nam omnes differentiae generis sunt constitutivae specierum quarumdam, licet illae species possint genere esse diversa."

<sup>150</sup> *In Metaph.* 10, l. 12, §2145: "Corruptibile autem et incorruptibile dividunt per se ens: quia corruptibile est quod potest non esse, incorruptibile autem quod non potest non esse. Unde, cum ens non sit genus, non mirum si corruptibile et incorruptibile non conveniant in aliquo uno genere."



## 44. Opposition of One and Many

Here, we examine at greater depth the opposition of one and many.

### 44.1. Reduction of All Contraries to the First Contraries: *One* and *Many*

As ARISTOTLE says, to show that one of (two) contraries should be a privation—and that (therefore) contrariety is a privation—it suffices to show by reduction whether this is found in the first contraries, which are the genera of the other contraries—as are *one* and *many*.<sup>1</sup>

That these (i.e., *one* and *many*) should be the first contraries is evident from this: that all other contraries are reduced to them.<sup>2</sup> Thus, to *one* and *many* are reduced *equal* and *unequal*, *like* and *unlike*, *same* and *diverse*; *difference* is some *diversity* (► 41.28; 41.29); and *contrariety* (is) some *difference* (► 43.1; 43.7). Thus, it is evident that every contrariety is reduced to *one* and *many*. And *one* and *many* are *opposed* as *divisible* and *indivisible* (► 40). Hence, it remains that every contrary includes privation.

### 44.2. Why *One* and *Many* Should Be Opposed as Contraries

Although *one* and *many* are opposed in multiple modes, there is one (mode) that is more principal: insofar as *one* and *multitude* are opposed as *divisible* and *indivisible*, for this mode of opposition is considered according to the proper *ratio* of each of them.<sup>3</sup>

Thus, according to ARISTOTLE, *one* and *many* are opposed as contraries (*contraria* = ἐναντία), and not as contradiction or relation (*ad aliquid* = πρὸς τι).<sup>4</sup>

That *one* and *many* are not opposed according to contradiction is manifest because neither of them is verified of *non-being*, for (*non-being*) is neither *one* nor *many*; and the

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<sup>1</sup> *In Metaph.* 10, l. 6, §2058 (cf. ARISTOTLE, *Metaphysica* l.4, 1055b27–29): “Ostendit [Philosophus] idem reducendo ad prima contraria; dicens quod sufficit ad ostendendum quod alterum contrariorum sit privatio, si hoc invenitur in primis contrariis, quae sunt genera aliorum contrariorum, sicut sunt unum et multa.” Ibid., §2054: “Ostendit [...] quod contrarietas sit privatio [...] reducendo ad prima contraria.”

<sup>2</sup> *In Metaph.* 10, l. 6, §2058: “Et quod ista sint prima contraria, patet ex hoc, quod omnia alia contraria reducuntur ad illa. Nam ad unum et multa reducuntur aequale et inaequale, simile et dissimile, idem et diversum. Differentia autem, diversitas quaedam est, et contrarietas differentia quaedam, ut supra habitum est. Et sic patet quod omnis contrarietas reducitur ad unum et multa. Unum autem et multa opponuntur ut divisibile et indivisibile, ut supra habitum est. Et ita relinquitur, quod omnia contraria privationem includant.” Cf. ARISTOTLE, *Metaphysica* l.3, 1054a29–32.

<sup>3</sup> *In Metaph.* 10, l. 4, §1983 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a20–22): “Postquam Philosophus determinavit de uno secundum se, hic determinat de uno per comparisonem ad multitudinem; [...] ostendit quomodo unum opponitur multitudini. [...] ostendit secundum quid accipienda sit oppositio quae est inter unum et multa; dicens, quod licet unum et multa multis modis opponantur, ut patet infra; eorum tamen unus et principalior est secundum quod unum et multitudo opponuntur ut divisibile et indivisibile; quia hic oppositionis modus attenditur secundum propriam rationem utriusque.”

<sup>4</sup> *In Metaph.* 10, l. 4, §1986 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a23–24): “Ostendit [Philosophus] ad quod genus oppositionis praedictus modus oppositionis reducatur; dicens, quod cum quatuor sint oppositionis genera, quorum unum est oppositio, quae dicitur secundum privationem; manifestum est quod unum et multa non opponuntur ut contradictio, neque ad aliquid, quae sunt duo genera oppositionis, sed opponuntur ut contraria.”

other part of a contradiction must be verified both of *being* and of *non-being*.<sup>5</sup> Likewise, it is manifest that they are not opposed as those that are said (in relation) to something (*ad aliquid*), for *one* and *multitude* are said absolutely (*absolute*). Thus, since the negation that is included in the *ratio* of *one* is a negation in a subject—otherwise non-being could be said (to be) *one*—, it is evident that *one* differs from negation simply (►42.2), and (that) it rather draws itself forth to the nature of privation.<sup>6</sup>

Hence, since *one* and *multitude* are opposed as *indivisible* and *divisible*, they would seem to be opposed according to privation and habit.<sup>7</sup> However, ARISTOTLE concludes that they are opposed as contraries, for the opposition that is according to privation and habit is the principle of the opposition that is according to contrariety (►43.9).

Indeed, one of the (two) contraries is always a privation—but not a pure privation.<sup>8</sup> Otherwise, it would not participate in the nature of the genus (►26.5, ¶1; 27.1, ¶2; 27.2, ¶2; 27.3, ¶2), since contraries should be in the same genus (►43.22). Therefore, it is necessary for each of the (two) contraries to be some nature, even if one of them should participate in the nature of the genus with some defect, as black is related to white.

Indeed, we seek something that is *one* like (we seek) *white*, which is first among colors.<sup>9</sup> Whence, if in whatever genus there is a *one* that is first, *white* should be *one* in the genus of colors. And (it should be) as the measure of other colors, since any one color is more perfect the more it approaches white.

Moreover, ARISTOTLE shows that white should be the first in (the genus of) colors because mean colors are generated from white and black—and thus, they are posterior (►43.20).

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<sup>5</sup> *In Metaph.* 10, l. 4, §1987 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a25–26): “Et quidem quod non opponantur [unum et multa] secundum contradictionem, manifestum est, quia neutrum eorum verificatur de non ente. Non ens enim neque unum neque multa est. Oporteret autem alteram partem contradictionis verificari tam de ente quam de non ente. Similiter etiam manifestum est, quod non opponuntur ut ad aliquid dicta. Nam unum et multitudo dicuntur absolute.”

<sup>6</sup> *In Metaph.* 4, l. 3, §565 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004a9–16): “cum negatio, quae in ratione unius includitur, sit negatio in subiecto (alias non ens, unum dici posset): patet, quod unum differt a negatione simpliciter, et magis trahit se ad naturam privationis, ut infra decimo huius habetur.”

<sup>7</sup> *In Metaph.* 10, l. 4, §1988 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a23–26): “Sed cum dixerit [Philosophus] quod unum et multitudo opponuntur ut indivisibile et divisibile, quae videntur opponi secundum privationem et habitum, concludit tamen quod unum et multitudo opponuntur ut contraria. Oppositio enim quae est secundum privationem et habitum, est principium oppositionis quae est secundum contrarietatem, ut infra patebit.”

<sup>8</sup> *In Metaph.* 10, l. 4, §1988: “Alterum enim contrariorum semper est privatio, sed non privatio pura. Sic enim non participaret naturam generis, cum contraria sint in eodem genere. Oportet igitur quod utrumque contrariorum sit natura quaedam, licet alterum eorum participet naturam generis cum quodam defectu, sicut nigrum se habet ad album, ut supra dictum est.”

<sup>9</sup> *In Metaph.* 10, l. 3, §1968 (cf. ARISTOTLE, *Metaphysica* l.3, 1053b28–30): “Quaerimus enim aliquid quod est unum, sicut album quod est primum inter colores. Unde si in quolibet genere est unum id quod est primum, oportet quod album sit unum in genere colorum, et quasi mensura aliorum colorum; quia unusquisque color tanto perfectior est, quanto magis accedit ad album.”

Likewise, black is posterior to white because it is the privation of white, just like darkness is the privation of light. However, this is not to be understood as though black should be pure privation, as (is) darkness, since black is a species of color and, consequently, the nature of color is preserved in it: rather, (we should understand) that in black there is a minimum of light, which (light is what) produces colors (*facit colores*); and in this way, (black) is compared to white as defect of light (is compared) to light.<sup>10</sup>

Likewise, since *one* does not signify pure privation, for it does not signify *non-division* itself (*ipsam indivisionem*) but the *undivided being* itself (*ipsum ens indivisum*), it is manifest that *one* and *multitude* are not opposed according to pure privation and habit, but as contraries.<sup>11</sup>

#### 44.3. Priority of One

Since *one* is related to *multitude* as *divisible* to *indivisible*, and *indivisible* is seemingly the privation of *divisible*, for privation is posterior to habit and form, it would seem to follow that *one* is posterior to *multitude*; but *one* is the principle of *multitude*, from which it is known (*ex quo cognoscitur*).<sup>12</sup> However, we define the first principles of things only by negation of the posterior, for we apprehend the simple through the composite (► 8.10).

Thus, even though *one* should be prior to *multitude* according to nature, it is nonetheless defined and named from the privation of *division* according to our (mode of) cognition.<sup>13</sup> This is why ARISTOTLE says that *one* itself (<*ipsum*> *unum* = τὸ ἓν) is named and known from its contrary (*ex suo contrario*) just like *non-divisible* (is known and named) from *divisible*. Whence, *multitude* is prior in *ratio* to *non-divisible*: not indeed according to the order of nature, but on account of sense, which is the principle of our cognition.

<sup>10</sup> *In Metaph.* 10, l. 3, §1968 (cf. ARISTOTLE, *Metaphysica* l.3, 1053b30–32): “Et quod album sit primum in coloribus, ostendit [Philosophus], quia colores medii generantur ex albo et nigro, et ita sunt posteriores. Nigrum etiam est posterius albo, quia est privatio albi, sicut tenebrae privatio lucis. Non autem sic est intelligendum, quod nigrum sit pura privatio, sicut tenebrae; cum nigrum sit species coloris, et per consequens natura coloris in eo servetur; sed quia in nigro est minimum de luce, quae facit colores. Et sic comparatur ad album, sicut defectus lucis ad lucem.” Cf. *In Metaph.* 11, l. 11 §2375, *in fine*.

<sup>11</sup> *In Metaph.* 10, l. 4, §1988: “Quia igitur unum non significat privationem puram, non enim significat ipsam indivisionem, sed ipsum ens indivisum, manifestum est quod unum et multitudo non opponuntur secundum privationem puram et habitum, sed sicut contraria.”

<sup>12</sup> *In Metaph.* 10, l. 4, §1989: “Quia enim dixerat [Philosophus] quod unum se habet ad multitudinem ut divisibile ad indivisibile, indivisibile autem videtur privatio esse divisibilis, cum privatio sit posterior habitu et forma, videtur sequi, quod unum sit posterius multitudinem: cum tamen supra dixerit, quod unum est principium multitudinis, ex quo cognoscitur.” Cf. *ibid.*, §1990.

<sup>13</sup> *In Metaph.* 10, l. 4, §1991 (cf. ARISTOTLE, *Metaphysica* l.3, 1054a26–29): “Sic igitur licet unum prius secundum naturam sit multitudine, tamen secundum cognitionem nostram definitur et nominatur ex privatione divisionis. Et propter hoc Philosophus dicit quod «ipsum unum dicitur,» idest nominatur et «ostenditur,» idest cognoscitur ex suo contrario, sicut indivisibile ex divisibili: propter hoc quod multitudo est magis sensibilis quam unum, et divisibile magis quam indivisibile. Unde multitudo ratione prius est quam indivisibile, non quidem secundum ordinem naturae, sed propter sensum qui est principium nostrae cognitionis.”

#### 44.4. Questions Concerning Aristotle's Conclusions

Against those (conclusions) that ARISTOTLE determines, a twofold question emerges:<sup>14</sup>

1. Concerning ARISTOTLE's saying that *one* and *many* should be opposed as contraries (► 44.2): for this seems impossible, since *one* (is the principle that) constitutes *multitude*, and yet one contrary does not constitute another—rather it destroys (it).<sup>15</sup>

It should therefore be known that, since contraries differ according to form, when we say that some (beings) are contrary, we must take one and the other insofar as it has a form and not insofar as it is a part having a form.<sup>16</sup>

Thus, insofar as *body*—without soul—is taken as having a form, it is opposed to *animal* as *inanimate* (is opposed) to *animate* (► 14.12, ¶1).<sup>17</sup> On the other hand, insofar as it is not taken as something perfect and formed, it is not opposed to *animal*: rather, it is its material part (► 14.12, ¶2).

Likewise, we see (the same) in numbers, for *two*, insofar as it is some whole having a determinate species and form, is diverse in species from *three*; on the other hand, if it is considered without being perfected by a form, it is a (material) part of three.<sup>18</sup>

Likewise, *one* itself, insofar as it is considered as perfect in itself and having some species, is opposed to *multitude*, for that which is one is not many; nor the contrary (i.e., many is not one).<sup>19</sup> On the other hand, insofar as it is considered as not completed according to species and form, in this way it is not opposed to *multitude*: it is rather a part of it.

2. Concerning ARISTOTLE's saying that *multitude* is prior in *ratio* to *one* (► 44.3).<sup>20</sup> Thus, since *one* belongs to the ratio of *multitude*, for **multitude** is nothing other than *an*

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<sup>14</sup> *In Metaph.* 10, l. 4, §1992: "Sed contra ea quae hic Philosophus determinat, duplex dubitatio consurgit."

<sup>15</sup> *In Metaph.* 10, l. 4, §1992: "Prima quidem circa hoc quod dicit, quod unum et multa opponuntur ut contraria. Hoc enim videtur impossibile, quia unum constituit multitudinem. Unum autem contrariorum non constituit aliud, sed magis destruit."

<sup>16</sup> *In Metaph.* 10, l. 4, §1993: "Sciendum igitur est, quod cum contraria differant secundum formam, ut infra dicetur, cum dicimus aliqua esse contraria, accipiendum est utrumque eorum secundum quod habet formam, non autem secundum quod est pars habentis formam."

<sup>17</sup> *In Metaph.* 10, l. 4, §1993: "Corpus enim secundum quod absque anima accipitur ut formam habens, opponitur animali ut inanimatum animato. Secundum vero quod accipitur non quasi aliquod perfectum et formatum, non opponitur animali, sed est pars materialis ipsius."

<sup>18</sup> *In Metaph.* 10, l. 4, §1993: "Et sic etiam videmus in numeris. Nam binarius secundum quod est quoddam totum, speciem et formam determinatam habens, est diversum specie a ternario; si vero consideretur absque hoc quod sit perfectum per formam, est pars ternarii."

<sup>19</sup> *In Metaph.* 10, l. 4, §1994: "Sic igitur et ipsum unum secundum quod consideratur ut in se perfectum et speciem quamdam habens, opponitur multitudini; quia quod est unum, non est multa neque e contra. Prout vero consideratur ut non completum secundum speciem et formam, sic non opponitur multitudini, sed est pars eius."

<sup>20</sup> *In Metaph.* 10, l. 4, §1995: "Secunda autem dubitatio oritur circa hoc quod dicit, quod multitudo est prior ratione quam unum. Cum enim unum sit de ratione multitudinis, eo quod multitudo non est aliud

*aggregation of units*, hence, if *one* itself is posterior in ratio to *multitude*, it follows that in the *ratio* of *one* and of *multitude* there is some circle, in such a way that it would be necessary to understand *unity* through *multitude*—and conversely. But a circle is unacceptable in the *ratios* of things, for the more knowable would be the same as the less knowable, which is impossible.

Therefore, it is to be said that nothing prevents something from being prior and posterior to the same (thing) according to *ratio* insofar as diverse (principles are) considered in it.<sup>21</sup> Thus, in *multitude* we can consider both:

**(a) That which *multitude* is**, and then (*multitude*) is posterior to *one*, since **multitude** is said (to be) *an aggregation of units* (i.e., *one* is prior to *multitude* because *one* is in the *ratio* of *multitude* as its principle).<sup>22</sup>

**(b) The division itself**, and then, according to the *ratio* of *division*, (*multitude*) is prior to *one* according to *ratio*, for **one** is *that which is not divided* (i.e., *multitude* is prior to *one* because the *ratio* of *division* is in *multitude* first, and the affirmation of *division* is prior to its negation).<sup>23</sup>

However, the division that is presupposed for the *ratio* of *one*, insofar as it is convertible with *being*, is not the division of continuous quantity, which is understood before the *one* that is the principle of *number*: rather, it is the division that causes contradiction, insofar as *this being* and *that (being)* are said (to be) divided because *this* is not *that* (► 40.7).<sup>24</sup>

In this way, therefore, the first that falls in our intellect is *being (ens)*; then, *division*; and after this, the *one* that deprives of division; and last, the *multitude* that is constituted from *units*.<sup>25</sup> For although (beings) things that are divided should be many, they only have the

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quam aggregatio unitatum, si ipsum unum est posterius ratione quam multitudo, sequitur quod in ratione unius et multitudinis, est quidam circulus; ita quod necesse sit per multitudinem intelligi unitatem, et e converso. Circulus autem in rationibus rerum non suscipitur, quia esset idem eodem notius et minus notum, quod est impossibile.”

<sup>21</sup> *In Metaph.* 10, l. 4, §1996: “Dicendum igitur quod nihil prohibet aliquid esse prius et posterius eodem secundum rationem, secundum diversa in eo considerata. In multitudine enim considerari potest, et quod multitudo est, et ipsa divisio.”

<sup>22</sup> *In Metaph.* 10, l. 4, §1996: “Secundum autem quod est multitudo, posterius est uno secundum rationem, cum multitudo dicatur aggregatio unitatum.”

<sup>23</sup> *In Metaph.* 10, l. 4, §1996: “Ratione igitur divisionis prior est quam unum secundum rationem. Nam unum est quod non dividitur.”

<sup>24</sup> *In Metaph.* 10, l. 4, §1997: “Divisio autem quae praesupponitur ad rationem unius, secundum quod convertitur cum ente, non est divisio quantitatis continuae, quae praeintelligitur uni quod est principium numeri. Sed est divisio quam causat contradictio, prout hoc ens et illud, dicuntur divisa, ex eo quod hoc non est illud.”

<sup>25</sup> *In Metaph.* 10, l. 4, §1998: “Sic ergo primo in intellectu nostro cadit ens, et deinde divisio; et post hoc unum quod divisionem privat, et ultimo multitudo quae ex unitatibus constituitur. Nam licet ea quae sunt divisa, multa sint, non habent tamen rationem multorum, nisi postquam huic et illi attribuitur quod sit

*ratio* of *many* after it is attributed to *this* and to *that* that it is one—even though, moreover, nothing would prevent us from saying that the *ratio* of *multitude* should depend on (that of) *one* insofar as (multitude) is measured by *one*, which already pertains to the *ratio* of *number*.

#### 44.5. Questions on the Uniqueness of Contraries

ARISTOTLE raises some questions that spring from what has been said: that there is (only) one contrary to one (being; ►43.7).<sup>26</sup> For this opposition seems to fail in two (cases): (1) *one* and *many* are opposed; but also, *few* is opposed to *many*; likewise, (2) *equal* seems to be opposed to two (things): namely, to *great* and to *small*. Whence, there remains the question of how the aforesaid (beings) are opposed. If they should be opposed according to contrariety, what has been said seems (to be) false: that there is (only) one contrary to one (thing).

Thus, ARISTOTLE deals first with the question of (the opposition) of *equal* to *great* and to *small*; and then, with the question of the opposition of *one* to *many*.<sup>27</sup>

#### 44.6. It Would Seem That *Equal* Is the Contrary of *Great* and of *Small*

ARISTOTLE posits three objections to show that *equal* is the contrary of *great* and *small*.<sup>28</sup>

1. We always use the word *whether* (*utrum* = πότερον) in opposites.<sup>29</sup> For example, when we ask *whether* something should be *white* or *black*, which are opposites according to contrariety; and *whether* (something) should be *white* or *non-white*, which are opposites according to contrariety.

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unum. Quamvis etiam nihil prohiberet dici rationem multitudinis dependere ex uno, secundum quod est mensurata per unum, quod iam ad rationem numeri pertinet.”

<sup>26</sup> In *Metaph.* 10, l. 5, §2023 (cf. ARISTOTLE, *Metaphysica* I.5, 1055b30–32): “moveret [Philosophus] quasdam dubitationes circa praedeterminata.” Ibid., l. 7, §2059: “Postquam Philosophus ostendit quid est contrarietas, hic determinat quasdam dubitationes circa praedeterminata; et circa hoc duo facit. Primo moveret dubitationes. [...] Oriuntur autem dubitationes ex hoc quod supra dictum est, quod unum uni contrarium est. Quod quidem in duplici oppositione fallere videtur. Nam unum et multa opponuntur, cum tamen et multis opponantur pauca. Similiter autem et aequale videtur opponi duobus, scilicet magno et parvo. Unde relinquitur dubitatio quomodo praedicta opponuntur. Si enim opponantur secundum contrarietatem, videtur falsum esse quod dictum est, quod unum uni contrarium est.”

<sup>27</sup> In *Metaph.* 10, l. 7, §2059 (cf. ARISTOTLE, *Metaphysica* I.5, 1055b32–1057a17): “Philosophus [...] prosequitur eas [sc., quasdam dubitationes].” Ibid., §2060: “Prosequitur praedictas dubitationes; et primo dubitationem aequalis ad magnum et parvum. Secundo prosequitur dubitationem de oppositione unius ad multa.”

<sup>28</sup> In *Metaph.* 10, l. 7, §2060 (cf. ARISTOTLE, *Metaphysica* I.5, 1055b32–1056a7): “Prosequitur [Philosophus] praedictas dubitationes; et primo dubitationem aequalis ad magnum et parvum. [...] Primo disputat quaestionem. [...] Primo obiicit ad ostendum aequale esse contrarium magno et parvo. [...] Circa primum tres ponit rationes.”

<sup>29</sup> In *Metaph.* 10, l. 7, §2060 (cf. ARISTOTLE, *Metaphysica* I.5, 1055b32–34): “In prima quarum duo facit. Primo manifestat quoddam ex quo ratio procedit; dicens, quod hac dictione, utrum, semper utimur in oppositis. Ut cum quaerimus utrum aliquid sit album aut nigrum, quae sunt opposita secundum contrarietatem; et utrum sit album aut non album, quae sunt opposita secundum contradictionem.”

On the other hand, we do not say *whether* (something) should be *man* or *white*—except under the supposition that something could not possibly be (both) white and man.<sup>30</sup> Indeed, we ask whether (something) should be white or man as we ask whether Cleon or Socrates should come, supposing that both should not come simultaneously. Yet, this mode of inquiring—in those (things) that are not opposites—is not in any genus according to necessity: rather, (it is) only according to supposition.

This is so because we use the word *whether* only in (those that are) opposites of necessity, while (we use the word *whether*) in others (i.e., in non-opposites) only under a supposition, since only (those that are) opposites from (their own) nature cannot simultaneously exist.<sup>31</sup> Thus, whoever asks whether Socrates or Cleon should come, uses a (supposition): to wit, (only) if one and the other should not be simultaneously true, for the question of whether Socrates or Cleon should come would be ridiculous if they could come together.

And if it is thus, that both cannot simultaneously come, it affects the aforesaid question in the opposition that there is between *one* and *many*.<sup>32</sup> For it must be asked, concerning Socrates and Cleon, whether both should come or only one of them; which question is according to the opposition of *one* to *many*. And (if it is) supposed that one of them should come, then, precisely, the question whether Socrates or Cleon should come has a place.

Hence, ARISTOTLE argues as follows.<sup>33</sup> When asking, we always use the particle *whether* in opposites, as has been said; and we use this particle in *equal*, *great*, and *small*, for we ask whether *this* should be greater, less or equal to *that*; therefore, there is some opposition of *equal* to *great* and to *small*. Yet, it cannot be said that one or the other of

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<sup>30</sup> *In Metaph.* 10, l. 7, §2060 (cf. ARISTOTLE, *Metaphysica* l.5, 1055b34–37): “Sed utrum aliquid sit homo aut album non dicimus, nisi ex hac suppositione, quod non possit aliquid esse album et homo. Et sic quaerimus, utrum sit album vel homo, sicut quaerimus utrum veniat Cleon aut Socrates, supponentes quod non ambo simul veniant. Sed hic modus quaerendi in his quae non sunt opposita, in nullo genere est secundum necessitatem, sed solum secundum suppositionem.”

<sup>31</sup> *In Metaph.* 10, l. 7, §2060 (cf. ARISTOTLE, *Metaphysica* l.5, 1055b37–1056a1): “Et hoc ideo, quia hac dictione, utrum, utimur solum in oppositis ex necessitate; in aliis autem ex suppositione tantum, quia sola opposita ex natura non contingit simul existere. Et hoc, scilicet si non simul sit verum utrumque quo utitur qui quaerit, utrum veniat Socrates aut Cleon; quia si contingeret eos simul venire, derisoria esset interrogatio.”

<sup>32</sup> *In Metaph.* 10, l. 7, §2060 (cf. ARISTOTLE, *Metaphysica* l.5, 1056a1–3): “Et si ita est quod simul non contingat eos venire, incidet praedicta quaestio in oppositione quae est inter unum et multa. Oportet enim quaerere de Socrate et Cleone, utrum ambo veniant, vel alter tantum. Quae quidem quaestio est secundum oppositionem unius ad multa. Et supposito quod alter veniat, tunc demum habet locum quaestio, utrum veniat Socrates aut Cleon.”

<sup>33</sup> *In Metaph.* 10, l. 7, §2061 (cf. ARISTOTLE, *Metaphysica* l.5, 1056a3–7): “Ex propositione iam manifesta *argumentatur* hoc modo. Hac particula, utrum, interrogantes, in oppositis semper utimur, ut supra dictum est. Sed utimur hac particula in aequali, magno et parvo. Quaerimus enim utrum hoc illo sit maius, aut minus, aut aequale. Est ergo aliqua oppositio aequalis ad magnum et parvum. Sed non potest dici, quod alterum horum sit contrarium magno vel parvo; quia nulla ratio est quare magis sit contrarium magno quam parvo. Nec iterum secundum praedicta videtur quod ambobus sit contrarium, quia unum uni est contrarium.”

these (extremities) should be the contrary of *great* or of *small*, since there is no reason why it would be the contrary of *great* rather than of *small*. Nor does it seem, again, according to what has been said, that it should be contrary to both, since one (thing) is the contrary of (only) one (being; ►43.7).

2. *Equal* is the contrary of *unequal*; and *unequal* signifies that something is in both (subjects): namely, in the great and in the small; therefore, equal is contrary to both.<sup>34</sup>

3. *Equal* is opposed to *unequal*; and—following the opinion of Pythagoras, who attributed *inequality* and *otherness* to *twoness* and to the *even number*, while (he attributed) *identity* to the *odd number*—*unequal* befits *twoness*; therefore, *equal* is the contrary of *two*.<sup>35</sup>

#### 44.7. It Would Seem That *Equal* Is Not the Contrary of *Great* and of *Small*

ARISTOTLE then objects to (reach) the opposite (conclusion) through two reasons:<sup>36</sup>

1. *Great* and *small* are *two*.<sup>37</sup> Hence, if *equal* is the contrary of *great* and of *small*, *one* is the contrary of *two*; which is indeed impossible (►44.4, ¶3).

2. There is no contrariety of a mean to an extremity.<sup>38</sup> This is both apparent according to sense and is manifested from the definition of contrariety, since **contrariety** is *the perfect distance*; and what is a mean of some two things is not perfectly distant from either of them, since the extremities differ more one from the other than (they differ) from the mean.

Thus, it remains that there is no contrariety of means to extremities.<sup>39</sup> Rather, there is contrariety of those that have between themselves some mean. And *equal* seems to be the mean of *great* and *small*. Therefore, *equal* is not contrary to *great* and to *small*.

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<sup>34</sup> *In Metaph.* 10, l. 7, §2062 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a7–10): “*Secundam rationem* ponit [Philosophus...] Quae talis est. Aequale est contrarium inaequali. Sed inaequale significat aliquid inesse ambobus, scilicet magno et parvo; ergo aequale est contrarium ambobus.”

<sup>35</sup> *In Metaph.* 10, l. 7, §2063 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a10–11): “*Tertiam rationem* ponit [Philosophus...] Quae procedit ex opinione Pythagorae, qui attribuebat inaequalitatem et alteritatem dualitatibus et numero pari, identitatem vero numero impari. Et est ratio talis. Aequale opponitur inaequali. Sed inaequale competit dualitatibus. Ergo aequale est contrarium duobus.”

<sup>36</sup> *In Metaph.* 10, l. 7, §2060 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a11–16): “obiicit [Philosophus] ad oppositum.” *In Metaph.* 10, l. 7, §2064: “*Obiicit* [Philosophus] *in oppositum* duabus rationibus.”

<sup>37</sup> *In Metaph.* 10, l. 7, §2064 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a11): “quarum *prima* talis est. Magnum et parvum sunt duo. Si igitur aequale est contrarium magno et parvo, unum est contrarium duobus. Quod quidem est impossibile, ut supra ostensum est.”

<sup>38</sup> *In Metaph.* 10, l. 7, §2065 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a12–13): “*Secundam rationem* ponit [Philosophus.] Quae talis est. Non est contrarietas medii ad extrema. Quod quidem et secundum sensum apparet, et ex definitione contrarietatis manifestatur, quia contrarietas perfecta est distantia. Quod autem est medium duorum aliquorum, non est perfecte distans ab altero eorum, quia extrema magis differunt ab invicem quam a medio.”

<sup>39</sup> *In Metaph.* 10, l. 7, §2065 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a14–15): “Et sic relinquitur quod contrarietas non est mediorum ad extrema; sed magis contrarietas est eorum quae habent inter se aliquod medium. Aequale autem videtur esse medium magni et parvi. Non igitur aequale est contrarium magno et parvo.”



#### 44.8. The Contrariety of *Great* and *Small*

ARISTOTLE determines the truth concerning the opposition of *equal* to *great* and *small* (by doing three (things)):<sup>40</sup>

1. He shows that ***equal* is opposed to *great* and to *small*** in a mode other than contrariety, concluding this from the above-positing reasons (that argue to conclude) to one or to the other part.<sup>41</sup> For the former reasons showed that *equal* is opposed to *great* and to *small* (► 44.6), while the latter (reasons showed) that there is no contrary to them (► 44.7). Hence, it remains that it should be opposed to them in another mode of opposition. And (if) the reason of opposition according to which *equal* is said (in relation) to *unequal* (and) not (in relation) to *great* and to *small* (is) removed, it remains that *equal* should be opposed to *great* and to *small* either as their negation or as their privation.

ARISTOTLE shows in two (ways) that (*equal*) should be opposed to one and to the other of these (i.e., to *great* and to *small*) in one or in the other of these modes (i.e., according to negation or according to privation):<sup>42</sup>

(a) Because there is no reason why *equal* should be the negation or the privation of *great* rather than of *small*; or conversely.<sup>43</sup> Whence, it must be the negation or the privation of both.

(b) Because we use the particle *whether* on account of *equal* being opposed to one and to the other (i.e., to *great* and to *small*), inquiring about *equal* by comparison to both, and not only (by comparison) to one or to the other.<sup>44</sup> Thus, we do not ask *whether* this should be greater or equal to that; or (*whether* this should be) equal or less (than that). Rather, we always posit the three: to wit, *whether* it should be *greater* or *less* or *equal*.

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<sup>40</sup> *In Metaph.* 10, I. 7, §2060 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a15–30): “veritatem determinat [Philosophus] quaestionis [sc., de oppositione aequalis ad magnum et parvum].” Ibid., §2066: “*Determinat veritatem quaestionis. Et circa hoc tria facit.*”

<sup>41</sup> *In Metaph.* 10, I. 7, §2066 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a15–16): “Primo ostendit [Philosophus] *aequale opponi magno et parvo, alio modo quam secundum contrarietatem*, concludens hoc ex rationibus supra positis ad utramque partem. Nam primae rationes ostenderunt quod aequale opponitur magno et parvo. Secundae autem quod non est contrarium eis. Restat igitur quod opponatur eis alio modo oppositionis. Et remota ratione oppositionis secundum quam aequale dicitur ad inaequale, non ad magnum et parvum, restat quod aequale opponatur magno et parvo, aut sicut negatio eorum aut sicut privatio.”

<sup>42</sup> *In Metaph.* 10, I. 7, §2067 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a16–20): “Et quod altero istorum modorum opponatur utrique eorum, et non alteri tantum, ostendit [Philosophus] dupliciter.”

<sup>43</sup> *In Metaph.* 10, I. 7, §2067 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a16–18): “Primo quidem, quia non est ratio quare aequale sit magis negatio aut privatio magni quam parvi, aut e converso. Unde oportet quod sit negatio aut privatio amborum.”

<sup>44</sup> *In Metaph.* 10, I. 7, §2068 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a18–20): “Item ostendit [Philosophus] hoc per signum. Quia enim aequale opponitur utrique, propter hoc utimur hac particula utrum, interrogantes de aequali per comparationem ad ambo, et non ad alterum tantum. Non enim quaerimus utrum hoc illo sit maius vel aequale, aut aequale vel minus. Sed semper ponimus tria; scilicet utrum sit maius aut minus aut aequale.”

2. ARISTOTLE shows determinately in what genus (of opposition) *equal* should be opposed to *great* and to *small*.<sup>45</sup> He says that the particle *no* (*non* = οὐ), which is included in the *ratio* of *equal* when we say that **equal** is *that which is neither more nor less*, is not simply a negation: rather, it is of necessity **privation**. Indeed, absolutely, negation is said of whatever (subject) in which its opposite affirmation is not (predicated); which does not happen in the proposed (case). For we do not say that everything that is not greater or less is equal: rather, we say this only in those that are naturally apt to be greater or less.

Hence, this is the *ratio* of *equal*: that **equal** (*aequale* = ἴσον) is *that which is neither great nor small, yet (it is) naturally apt to be great or small* (*quod nec magnum nec parvum est, aptum tamen natum est esse aut magnum aut parvum* = τὸ μήτε μέγα μήτε μικρόν, πεφυκὸς δὲ ἢ μέγα ἢ μικρόν εἶναι), just like other privations are defined.<sup>46</sup> It is thus manifest that *equal* is opposed to both—to *great* and to *small*—as a privative negation.

3. ARISTOTLE concludes that *equal* is the mean of *great* and *small*.<sup>47</sup>

From what has been said—that **equal** is *that which is neither great nor small, yet (is) naturally apt to be either the latter or the former*—, he concludes (this): what is related to contraries in this mode is a mean between them, just as that which is neither bad nor good is opposed to both, and is a mean between *good* and *bad*.<sup>48</sup> Whence, it follows that *equal* should be a mean between *great* and *small*. However, this is the difference between one and the other: that, since it is neither great nor small, it is named, for it is said (to be) *equal*; on the other hand, that which is neither good nor bad is nameless.

The reason for this (naming or lack thereof) is that, sometimes, both privations of two contraries fall over some determinate one thing, and then the mean is only one and can

<sup>45</sup> *In Metaph.* 10, l. 7, §2069 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a20–22): “*Ostendit* [Philosophus] *determinate, quo genere opponatur aequale magno et parvo*; dicens, quod haec particula non, quae includitur in ratione aequalis, cum dicimus aequale esse quod nec est maius neque minus, non est negatio simpliciter, sed ex necessitate est privatio. Negatio enim absolute, de quolibet dicitur cui non inest sua opposita affirmatio. Quod non accidit in proposito. Non enim esse dicimus aequale omne id quod non est maius, aut minus; sed solum hoc dicimus in illis, in quibus aptum natum est esse maius aut minus.”

<sup>46</sup> *In Metaph.* 10, l. 7, §2070 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a22–24): “Haec est igitur ratio aequalis, quod aequale est quod nec magnum nec parvum est, aptum tamen natum est esse aut magnum aut parvum, sicut aliae privationes definiuntur. Et ita manifestum est quod aequale opponitur ambobus, scilicet magno et parvo, ut negatio privativa.”

<sup>47</sup> *In Metaph.* 10, l. 7, §2071 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a24–30): “Tertio concludendo [...] *Ostendit* [Philosophus], *quod aequale est medium magni et parvi*.”

<sup>48</sup> *In Metaph.* 10, l. 7, §2071 (cf. ARISTOTLE, *Metaphysica* I.5, 1056a24–25): “Primo *concludit* [Philosophus] *ex dictis propositum*. Cum enim dictum sit, quod aequale est quod nec magnum nec parvum est, aptum tamen natum est esse aut hoc aut illud; — quod autem hoc modo se habet ad contraria, medium est inter ea: sicut quod nec malum nec bonum est, opponitur ambobus, et est medium inter bonum et malum. Unde sequitur, quod aequale sit medium inter magnum et parvum. — Sed haec est differentia inter utrumque: quia quod nec magnum nec parvum est, est nominatum. Dicitur enim aequale. Sed quod nec bonum nec malum est, innominatum est.”

easily be named, as (happens in the case of) *equal*.<sup>49</sup> Indeed, something is neither greater nor less because it has one and the same quantity.

Sometimes, on the other hand, that over which two privations of contraries fall is said in multiple modes; and the (subject) susceptible of both conjoined privations is not only one.<sup>50</sup> Then, it does not have one name: rather, it either remains altogether unnamed, just as that which is neither good nor bad, which happens in multiple modes; or it has diverse names. For example, what we say that is neither white nor black, for this is not something one: rather, there are indeed indeterminate colors in which the aforesaid privative negation (i.e., neither white nor black) is said. Thus, that which is neither white nor black is necessarily grey, yellow or something such.

#### 44.9. Means between Good and Bad

ARISTOTLE excludes, according to the aforesaid (►44.8), the derision of (those who criticize) this: that what is neither good nor bad is posited (to be) a mean between good and bad.<sup>51</sup> For they used to say that, for the same reason, a mean could be assigned between whatever (beings).

Therefore, he says that it has been said that there must be something susceptible, in which one and the other of the extremities is naturally apt to be.<sup>52</sup> In these, a mean is assigned in the aforesaid mode by the denial of one and of the other. Hence, it is manifest that those who opine that it follows that (the same) can be likewise said in all (things)—for example, that there should be a mean of shoe and of hand that would be neither shoe nor hand—, do not rightly rebuke the assignment of such a mean, (saying that if) that which is neither good nor bad is a mean of good and of bad, therefrom, there will be a mean of whatever (things).

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<sup>49</sup> *In Metaph.* 10, l. 7, §2072: “Et ratio huius est, quia quandoque ambae privationes duorum contrariorum cadunt super aliquid unum determinatum, et tunc est unum tantum medium, et potest de facili nominari sicut aequale. Ex eo enim est aliquid nec maius nec minus, quod habet unam et eandem quantitatem.”

<sup>50</sup> *In Metaph.* 10, l. 7, §2072 (cf. ARISTOTLE, *Metaphysica* l.5, 1056a26–30): “Sed quandoque illud super quod cadunt duae privationes contrariorum dicitur multipliciter, et non est unum tantum susceptivum utriusque privationis coniunctae; et tunc non habet unum nomen, sed vel omnino remanet innominatum, sicut quod nec bonum nec malum est, quod multipliciter contingit: vel habet diversa nomina. Sicut hoc quod dicimus quod neque album neque nigrum est. Hoc enim non est aliquid unum. Sed sunt quidam colores indeterminati, in quibus praedicta negatio privativa dicitur. Necesse est enim quod id quod neque est album nec nigrum, aut esse pallidum, aut croceum, aut aliquid tale.”

<sup>51</sup> *In Metaph.* 10, l. 7, §2073: “*Excludit* [Philosophus] *secundum praedicta quorundam irrisionem* de hoc, quod id, quod nec bonum nec malum est, ponitur medium inter bonum et malum. Dicebant enim, quod pari ratione posset assignari medium inter quaecumque.”

<sup>52</sup> *In Metaph.* 10, l. 7, §2073 (cf. ARISTOTLE, *Metaphysica* l.5, 1056a30–34): “Dicit ergo quod, cum dictum sit, quod oportet esse aliquid susceptivum, quod natum est esse utrumlibet extremorum in his, in quibus medium praedicto modo assignatur per abnegationem utriusque, manifestum est quod non recte increpant in assignatione huiusmodi medii, illi qui opinantur sequi quod similiter posset dici in omnibus, puta: quod calcei et manus sit medium, quod nec calceus nec manus est, quia quod nec bonum nec malum est, medium est boni et mali: quod propter hunc modum quorumlibet sit futurum aliquid medium.”

However, it is not necessary for this to happen, since this conjunction of negations that perfects (i.e., completes) the mean is of opposites that have some mean, and which are in one distance as extremities of one genus.<sup>53</sup> On the other hand, there is no such difference that would be one distance of the other (terms) that they bring in, since they are in another genus, whose negations are simultaneously taken: for example, of shoe and hand (i.e., there is no difference between shoe and hand that would be one distance, since they are not in the same genus).

Thus, bad, insofar as (it is) bad, is opposed to good only as privation (is opposed) to habit.<sup>54</sup> However, there is an opposition of contrariety, since the being over which such a privation is founded does not undergo with itself something good that is simply good. For example, an immoderate delectation in food does not undergo with itself the good of sobriety, which is simply good; and hence, that immoderate delectation is joined with the privation of a good—and in this mode, it is said (to be) *bad*.

Therefore, if a mean is found between good and bad (in some beings), this will only be insofar as good and bad are contraries or insofar as bad is a privation of good.<sup>55</sup> For (it is) not insofar as (beings) are contraries (that) there can be in them a mean that should be neither good nor bad. Thus, (beings) are said (to be) *contraries* insofar as something is positively considered in one and in the other; wherefrom, the *ratio* of *bad* cannot be taken (in them).

Whence, since a mean is distant from the extremities, it is not caused to be distant from the *ratio* of *good* and (from the *ratio*) of *bad*—such that (a mean) could be said (to be) *neither good nor bad*—insofar as it posits something positive.<sup>56</sup> Indeed, the opposition of

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<sup>53</sup> *In Metaph.* 10, l. 7, §2074 (cf. ARISTOTLE, *Metaphysica* l.5, 1056a34–b2): “Sed hoc non est necesse accidere: quia ista coniunctio negationum quae perficit medium, est oppositorum quae habent aliquod medium, et quae sunt in una distantia, quasi unius generis extrema etc. Sed aliorum de quibus ipsi inducunt, sicut calcei et manus, non est talis differentia quod sint in una distantia, quia sunt in alio genere, quorum negationes simul accipiuntur. Unde non est aliquid unum quod subiiciatur huiusmodi negationibus; et sic inter talia non est accipere medium.”

<sup>54</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “malum, inquantum malum, non opponitur bono, nisi sicut privatio habitui: sed oppositio contrarietatis est ex hoc quod illud ens supra quod fundatur talis privatio, non compatitur secum aliquod bonum quod est simpliciter bonum; sicut immoderata delectatio in cibis non compatitur secum bonum sobrietatis, quod est simpliciter bonum; et ideo illa immoderata delectatio adjungitur cum privatione boni, et sic mala dicitur.” Although the text refers mostly to actions, the doctrine expressed clearly applies to all genera of beings insofar as they are beings.

<sup>55</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “Si ergo in actionibus invenitur medium inter bonum et malum, hoc non erit nisi inquantum bonum et malum sunt contraria, vel inquantum malum est privatio boni. Non autem inquantum sunt contraria, potest in eis esse medium quod sit neque bonum neque malum. Dicuntur enim contraria, secundum quod in utroque aliquid positive consideratur; ex quo non potest sumi ratio mali.”

<sup>56</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “unde propter hoc quod medium distat ab extremis, inquantum aliquid positive ponit, non efficitur distans a ratione boni et mali, ut possit dici neque bonum neque malum; non enim ex eodem est in eis oppositio contrarietatis et distinctio boni et mali; sed primum est ex parte positionis in utroque; secundum autem ex parte privationis in malo, et positionis in bono.”

contrariety, and the distinction of *good* and *bad*, is not in them from the same: rather, the former (i.e., the opposition of contrariety) is in one and in the other (of the extremities) from the part of position; but the latter (i.e., the distinction of good and bad) is in *bad* from the part of privation, and in *good* (from the part) of position.

Therefore, if there should be a mean between *good* and *bad*, this will only be insofar as *bad* is opposed to *good* privatively; but in privatively opposed (beings) there is found a mean only because the subject is not susceptible of a habit, as a stone is said (to be) neither endowed with sight nor blind because it is not susceptible of sight.<sup>57</sup> And it is through this mode that a mean between *good* and *bad* must be taken, such that, if there is something that is not susceptible of the goodness of something, there will be no badness opposed to it; whence, it will remain indifferent. And this can happen in two modes:

**1. By the mode of abstraction**, insofar as something universal is signified as abstracted from different contraries that divide it.<sup>58</sup> Whence, in its community, that which is signified, is signified as being related indifferently to whichever of the differences. For example, *animal* is signified neither as *rational* nor as *irrational*, and yet, every particular animal must be either rational or irrational.

**2.** Insofar as some designated particular **lacks the susceptibility** of some perfection.<sup>59</sup> For example, a stone (lacks) the susceptibility of sight.

#### **44.10. Questions on the Opposition of *One* to *Many***

As ARISTOTLE says, just as the opposition of *equal* to *great* and to *small* raises questions, likewise, it can be questioned whether *one* and *many* are opposed to each other.<sup>60</sup> For if

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<sup>57</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “Si ergo sit medium inter bonum et malum in actionibus, hoc non erit nisi secundum quod malum bono privative opponitur. Sed in privative oppositis non invenitur medium nisi per hoc quod subjectum non est susceptivum habitus: ut lapis, quia visionis susceptivus non est, neque videns neque caecus dicitur; et per hunc modum oportet accipere medium inter bonum et malum, ut si aliquid est quod alicujus bonitatis non est susceptivum, non opposita malitia sibi erit; unde relinquatur indifferens. Hoc autem contingit dupliciter.”

<sup>58</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “Aut per modum abstractionis, secundum quod universale aliquid significatur ut abstractum a differentiis contrariis dividendis ipsum; unde in sua communitate significatum, significatur ut indifferenter se habens ad utramlibet differentiarum: sicut animal neque significatur ut rationale neque ut irrationale; et tamen oportet quod omne particulare animal, rationale vel irrationale sit.”

<sup>59</sup> *In Sent.* 2, d. 40 q. 1 a. 5 co.: “Alio modo contingit hoc, secundum quod aliquod particulare signatum deficit a susceptibilitate alicujus perfectionis, sicut lapis a susceptibilitate visus.”

<sup>60</sup> *In Metaph.* 10, l. 8, §2075 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b3–5): “Postquam prosecutus est Philosophus quaestionem, quae mota fuerat de oppositione aequalis ad magnum et parvum, hic *prosequitur quaestionem motam de oppositione unius ad multa*. Et circa hoc duo facit. Primo *obiicit ad quaestionem*. Secundo determinat veritatem [...]. Circa primum tria facit. Primo *assignat rationem dubitationis*; dicens, quod sicut dubitabile est de oppositione aequalis ad magnum et parvum, similiter quidem potest dubitari de uno et multis, utrum opponantur adinvicem. Et ratio dubitationis est, quia si multa absque distinctione opponantur uni, sequuntur quaedam impossibilia, nisi distinguatur de multo, sicut ipse post distinguit.”

*many* should be opposed to *one* without distinction, some impossible (conclusions would) follow.

Thus, ARISTOTLE proves that, if *one* is opposed to *many*, then *one* should be *few* or a *few* (*paucum vel pauca* = ὀλίγον ἢ ὀλίγα) for two reasons:<sup>61</sup>

1. *Many* is opposed to a *few* (< τὰ... πολλὰ καὶ τοῖς ὀλίγοις ἀντίκειται).<sup>62</sup> Therefore, if *many* is simply opposed to *one* without distinction, since one (being) should be contrary (only) to one (being; ▶43.7, ¶2), it follows that *one* would be *few* or a *few*.

2. Two are many (< τὰ δύο πολλά).<sup>63</sup> This is proved because *double* is a multiple (▶37.3); and *many* is opposed to a *few*; therefore, *two* is opposed to some *few*. However, *two* can be many (in relation) to something *few* only (in relation) to *one*, for only *one* is less than *two*. It follows that *one* should be *few*.

Yet, as ARISTOTLE shows, it is impossible for *one* to be *few*.<sup>64</sup> For *one* and *few* are related to *plurality* as *long* and *short* (are related) to *longitude*. Indeed, one and the other are proper affections of one and of the other (i.e., as already noted, *few* and *many* are proper affections of multitude, while *great* and *small* are proper affections of magnitude; ▶2). And every *long* is some *longitude*. Therefore, every *few* is some *plurality*. Therefore, if *one* is *few*—which seems necessary to say if *two* are *many*—, it follows that *one* would be some *plurality*.

And thus, not only will *one* be *multiple* (*multum*, i.e., in singular), but (it will) also (be) *many* (*multa*, i.e., in plural), for every multiple is also many.<sup>65</sup>

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<sup>61</sup> In *Metaph.* 10, l. 8, §2076 (cf. ARISTOTLE, *Metaphysica* l.6, 1056b5): “*Probat* [Philosophus] *quod dixerat*. Probat enim, quod si unum opponitur multis, quod unum sit paucum vel pauca. Et hoc duabus rationibus.”

<sup>62</sup> In *Metaph.* 10, l. 8, §2076 (cf. ARISTOTLE, *Metaphysica* l.6, 1056b6): “quarum *prima* talis est. Multa opponuntur paucis. Si igitur multa opponuntur uni simpliciter sine distinctione; cum unum uni sit contrarium, sequitur quod unum sit paucum vel pauca.”

<sup>63</sup> In *Metaph.* 10, l. 8, §2077 (cf. ARISTOTLE, *Metaphysica* l.6, 1056b6–10): “*Secunda ratio* talis est. Duo sunt multa. Quod probatur ex hoc quod duplex est multiplex. Sed multa opponuntur paucis. Ergo duo opponuntur aliquibus paucis. Sed duo non possunt esse multa ad aliquid paucum, nisi ad unum. Nihil enim minus est duobus nisi unum. Sequitur igitur quod unum sit paucum.”

<sup>64</sup> In *Metaph.* 10, l. 8, §2078 (cf. ARISTOTLE, *Metaphysica* l.6, 1056b10–11): “*Ostendit* [Philosophus] *hoc esse impossibile, scilicet quod unum sit paucum*. Ita enim se habent unum et paucum ad pluralitatem, sicut productum et breve ad longitudinem. Utraque enim utriusque, proprie passionem sunt. Sed omne breve est longitudo quaedam. Ergo omne paucum est pluralitas quaedam. Si ergo unum est paucum, quod necesse videtur dicere si duo sunt multa, sequitur quod unum sit quaedam pluralitas.”

<sup>65</sup> In *Metaph.* 10, l. 8, §2079 (cf. ARISTOTLE, *Metaphysica* l.6, 1056b11–12): “Et ita unum erit non solum multum, sed etiam multa. Nam omne multum est etiam multa.” ARISTOTLE and St. Thomas deal with a possible exception that is taken from a case in which Greeks would consider one as many: if this should be different in easily divisible fluids, as are water, oil, air, and such, which ARISTOTLE calls *well terminable continua* (< ἐν συνεχεῖ εὐοπίστῳ). Indeed, **fluid** is *that which is well terminated by the terminus of another*. Thus, in such (fluids), too, some continuum is said to be multiple, as multiple water or multiple air, because they are proximate to a multitude on account of easiness of division. On the other hand, when

#### 44.11. Opposition of *Many* to *Few*

ARISTOTLE manifests how *many* should be opposed to a *few*, saying that (things) are said (to be) **many** (*multa, multum* = πολλά) in two modes:<sup>66</sup>

1. (As) **an exceeding plurality** (*significant pluralitatem excedentem < multitudo habens excedentiam* = πλήθος ἔχον ὑπεροχὴν)—and likewise, **few** (*paucum* = ὀλίγον) is said (to be) a *plurality having deficiency* (*pluralitas habens defectum* = πλήθος ἔχον ἔλλειψιν), that is, (a plurality that is) deficient from (i.e., in respect of) the exceeding plurality—either:<sup>67</sup>

(a) **Simply** (*simpliciter* = ἀπλῶς), as we say that some (things) are many because they exceed the plurality that is often, commonly found in things of its genus.<sup>68</sup> For example, if we were to say (that there is) *much rain* when it rains beyond the common course.

(b) **In respect of something** (*per respectum ad aliquid* = πρὸς τι).<sup>69</sup> For example, if we were to say (that) ten men (are) many in comparison to three.

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something of them is continuous, in this way, it is said to be multiple in singular, which is not said to be many in plural. In others, however, we say multiple only when they are divided in act. Thus, if (a piece of) wood should be continuous, we do not say that it is multiple but (that it is) great. And (if) division comes to be, not only do we say that it should be multiple, but also that it should be many. Hence, in others, it makes no difference to say multiple and many: rather, only in a well-terminated continuum. Hence, if one should be multiple, it follows that it would be many, which is impossible. Ibid. (cf. ARISTOTLE, *Metaphysica* I.6, 1056b12–14): “nisi forte hoc differat in humidis facile divisibilibus, ut sunt aqua, oleum, aer et huiusmodi, quae nominat [Philosophus] hic continua bene terminabilia. Nam humidum est, quod bene terminatur termino alieno. In talibus enim etiam aliquid continuum dicitur multum, sicut multa aqua vel multus aer, quia propter facilitatem divisionis sunt propinqua multitudini. Sed cum horum aliquid est continuum, ita dicitur esse multum singulariter, quod non dicitur esse multa pluraliter. Sed in aliis non dicimus multum, nisi quando sunt divisa actu. Non enim si lignum sit continuum, dicimus quod sit multum, sed magnum. Divisione autem actu adveniente, non solum dicimus quod sit multum, sed quod etiam sit multa. In aliis igitur non differt dicere multum et multa, sed solum in continuo bene terminabili. Si igitur unum sit multum, sequitur quod sit multa; quod est impossibile.” ARISTOTLE solves the question posed—namely, that it seems impossible that *multiple* should be *many* and that *many* should be opposed to a *few*—, showing that *multiple* is not opposed to *one* and to *few* in the same mode. He says that, perhaps, in some (things) *many* is said indifferently as *multiple*, while in some (other things)—namely, in well-terminated continua—*multiple* and *many* are taken as something that differs: for example, of continuous water, we say that there is multiple water and not that there are many waters, while in those that are divided in act, whatever they should be, *multiple* and *many* is said indifferently. Ibid., §2080 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b14–17): “Solvit propositam dubitationem. [...] Duo autem superius in obiciendo tetigerat, ex quibus impossibile hoc sequi videbatur: scilicet quod multum sit multa, et quod multa opponantur paucis. Primo ergo *manifestat primum*; dicens, quod forsitan in quibusdam multa dicuntur indifferenter sicut multum. Sed in quibusdam multum et multa accipiuntur ut aliquid differens; scilicet in continuo bene terminabili; sicut de una aqua continua dicimus quod est aqua multa, et non quod sunt aquae multae. Sed in his quae sunt divisa actu, quaecumque sint illa, in his indifferenter dicitur et multum et multa.” Cf. *ibid.*, §2075.

<sup>66</sup> *In Metaph.* 10, I. 8, §2081 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b17–28): “*Manifestat* [Philosophus] *secundum*, scilicet qualiter multa opponantur paucis; dicens, quod multa dicuntur dupliciter.”

<sup>67</sup> *In Metaph.* 10, I. 8, §2081 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b17–19): “Uno enim modo significant pluralitatem excedentem, vel simpliciter, vel per respectum ad aliquid. [...] Et similiter paucum dicitur «pluralitas habens defectum,» idest deficientis a pluralitate excedente.”

<sup>68</sup> *In Metaph.* 10, I. 8, §2081: “Simpliciter quidem, sicut dicimus aliqua esse multa, eo quod excedunt pluralitatem, quae solet communiter in rebus sui generis reperiri, ut si dicamus multam pluviam, quando ultra communem cursum pluit.”

<sup>69</sup> *In Metaph.* 10, I. 8, §2081: “Per respectum autem ad aliquid, ut si dicamus decem homines multos in comparatione ad tres.”

## 2. **Absolutely**, as number is said (to be) some multitude (< ὡς ἀριθμός).<sup>70</sup>

In this (second) mode, *many* is opposed only to *one* (< ἀντίκειται τῷ ἐνὶ μόνον), and (is) not (opposed) to *few*.<sup>71</sup> Thus, *many*, according to this signification, is as the plural of that which is said (to be) *one* in such a way that we should say *one* and *many* as we would say *one* and—plurally—*ones* (*unum et una* <*pluraliter*> = ἐν καὶ ἕνα), as we would (also) say *white* and *whites* (*album et alba* = λευκὸν καὶ λευκά); and as *measured* is said (in relation) to *measurable* (< ὥσπερ... τὰ μεμετρημένα πρὸς... τὸ μετρητόν), for many are measured by one (< ὥσπερ... τὰ μεμετρημένα πρὸς τὸ μέτρον; ►44.13; 44.16).

Also, according to this signification, *multiples* (*multiplicia* = πολλαπλάσια; ►37.3, ¶1; 5.2) is said from *many*, for it is manifest that something is said multiply (*multipliciter*) according to whatever number: for example, from *two*, (we say) *double*; (from) *three*, (we say) *triple*; and so on.<sup>72</sup> Thus, in this mode, any one number is many (< πολλὰ... ἕκαστος ὁ ἀριθμός) because it is referred to *one* and because whatever (quantity) is measurable by *one* (< ὅτι ἕνα καὶ ὅτι μετρητὸς ἐνὶ ἕκαστος); and this, insofar as *many* is opposed to *one*, and not insofar as it is opposed to *few* (< ὡς τὸ ἀντικείμενον τῷ ἐνὶ, οὐ τῷ ὀλίγῳ).

### 44.12. **Two Is the First Few**

Whence, also *two*, which is some number, is many (< οὕτω μὲν οὖν ἐστὶ πολλὰ καὶ τὰ δύο) insofar as it is opposed to *one*; but insofar as *many* signifies an exceeding plurality (44.11, ¶1), *two* are not *many*: rather, they are *few*.<sup>73</sup> Thus, there is nothing fewer than *two*, since *one* is not *few* (►44.10). Indeed, **fewness** is a *plurality that has a defect*; and the first plurality that has a defect is *twoness*; whence, *twoness* is the first (< πρῶτον) *fewness*.

Therefrom, ARISTOTLE excludes the error of ANAXAGORAS, who posited that the generation of things comes to be through extraction:<sup>74</sup> he posited that, from the beginning, all (things)

<sup>70</sup> *In Metaph.* 10, l. 8, §2082 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b19): “Alio modo dicitur multum absolute, sicut numerus dicitur quaedam multitudo.”

<sup>71</sup> *In Metaph.* 10, l. 8, §2082 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b19–22): “Et sic multum opponitur tantum uni, non autem pauco. Nam multa secundum hanc significationem sunt quasi plurale eius quod dicitur unum; ut ita dicamus unum et multa, ac si diceremus unum et una pluraliter, sicut dicimus album et alba, et sicut mensurata dicuntur ad mensurabile. Nam multa mensurantur per unum, ut infra dicitur.”

<sup>72</sup> *In Metaph.* 10, l. 8, §2082 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b22–25): “Et secundum hanc significationem, a multis dicuntur multiplicia. Manifestum est enim quod secundum quemlibet numerum dicitur aliquid multipliciter; sicut a binario, duplum, et ternario triplum, et sic de aliis. Unusquisque enim numerus est multa hoc modo, quia refertur ad unum, et quia quodlibet mensurabile est uno. Et hoc, secundum quod multa opponuntur uni, non autem secundum quod opponuntur pauco.”

<sup>73</sup> *In Metaph.* 10, l. 8, §2083 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b25–28): “Unde et ipsa duo quae sunt numerus quidam, sunt multa secundum quod multa opponuntur uni. Sed secundum quod multa significant pluralitatem excedentem, duo non sunt multa, sed sunt pauca. Nihil enim est paucius duobus, quia unum non est paucum, ut supra probatum est. Paucitas enim est pluralitas habens defectum. Prima vero pluralitas habens defectum est dualitas. Unde dualitas est prima paucitas.”

<sup>74</sup> *In Metaph.* 10, l. 8, §2075 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b28–30): “ex dictis excludit [Philosophus] quemdam errorem.” Ibid., §2084: “Excludit, secundum praedicta, quemdam errorem.”



exist(ed) simultaneously in some compound; but the Intellect began to segregate from that compound singular things—which is the generation of things. And since generation, according to him, is infinite, he therefore posited that things existing in that compound had infinity. Hence, he said that, before the distinction of things, all things would have been simultaneous—indeed, infinite in both plurality and smallness.

That ANAXAGORAS posited an infinite in smallness and in plurality is rightly said, since the infinite is found in continuous quantity by division—which infinity he indeed signified by *smallness*; and indiscrete quantities, the infinite is found by addition—which indeed he signified by *plurality* (► 25).<sup>75</sup>

Although ANAXAGORAS said this rightly, he wrongly desisted from what he said.<sup>76</sup> For, afterwards, it seemed to him that instead of saying *smallness* he should have said *fewness*. This reproof was, therefore, not right, since things are not infinite in fewness; for there is to be found a first few: namely, *two*—and not *one*, as some say (< τὸ ὀλίγον οὐ διὰ τὸ ἕν, ὡσπερ τινές φασι, ἀλλὰ διὰ τὰ δύο).

Indeed, where there is something first to be found, one does not proceed infinitely (*in infinitum*).<sup>77</sup> And if *one* should be *few*, we would have to proceed infinitely. Thus, it would follow that *one* should be *many*, since every *few* is *multiple* or *many* (► 44.10). And if *one* should be *many*, there would have to be something less than it, that would be *few*; and, again, this would have to be *many*; and we would proceed, thus, infinitely.

#### 44.13. How *One* and *Many* Are Opposed Relatively

ARISTOTLE shows how *one* should be opposed to *many* (in numbers, < ἀντίκειται... τὸ ἕν καὶ τὰ πολλὰ τὰ ἐν ἀριθμοῖς)<sup>78</sup> relatively (*relative, ut ad aliquid* = ὡς τὰ πρὸς τι) as *measure*

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Sciendum est enim, quod Anaxagoras posuit generationem rerum fieri per extractionem. Unde posuit a principio omnia existere simul in quodam mixto, sed intellectus incepit segregare ab illo mixto singulas res, et haec est rerum generatio. Et quia generatio, secundum eum, est in infinitum, ideo posuit quod res in illo mixto existentes infinitatem habeant. Dixit igitur quod ante distinctionem rerum omnes res essent simul, infinitae quidem et pluralitate et parvitate.”

<sup>75</sup> *In Metaph.* 10, l. 8, §2085 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b30): “Et quod quidem infinitum in parvitate et pluralitate posuit [Anaxagoras], recte dictum est; quia in quantitativibus continuis invenitur infinitum per divisionem; quam quidem infinitatem significavit per parvitatem. In quantitativibus autem discretis invenitur infinitum per additionem, quam quidem significavit per pluralitatem.”

<sup>76</sup> *In Metaph.* 10, l. 8, §2086 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b31–32): “Cum igitur hic recte dixisset [Anaxagoras], destitit ab hoc suo dicto non recte. Visum enim fuit ei postmodum quod loco eius quod dixit parvitatem, debuit dicere et paucitatem. Quae quidem correptio, ideo non recta fuit, quia res non sunt infinitae paucitate. Est enim invenire paucum primum, scilicet duo, non autem unum, ut quidam dicunt.”

<sup>77</sup> *In Metaph.* 10, l. 8, §2086: “Ubi enim est invenire aliquid primum, non proceditur in infinitum. Si autem unum esset paucum, oporteret in infinitum procedere. Sequeretur enim, quod unum esset multa, quia omne paucum est multum, vel multa, ut supra dictum est. Si autem unum esset multa, oporteret esse aliquid minus eo, quod esset paucum, et illud iterum oporteret esse multum, et sic in infinitum abiretur.”

<sup>78</sup> *In Metaph.* 10, l. 8, §2080 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b32–35): “ostendit [Philosophus] qualiter multum opponitur uni.” *In Metaph.* 10, l. 8, §2087: “Ostendit quomodo unum et multa opponantur.”

(is opposed) to *measurable* (*sicut mensura mensurabili* = ὡς μέτρον μετρητῶ; ► 37.10), and not in the mode of those that are relative according to themselves.

Indeed, as already noted (► 37.1; 37.10) some (things) are said to be **relative** (*ad aliquid*) in two modes:<sup>79</sup>

1. Some are **equally** referred to each other (*referuntur adinvicem ex aequo*).<sup>80</sup> ARISTOTLE says that these are relative as contraries (*ut contraria* = ὡς ἐναντία). And they are relative according to themselves (*ad aliquid secundum seipsa*) because each is essentially said (to be related) to the other (*utrumque eorum hoc ipsum quid est, ad alterum dicitur*). For example, *master* and *servant*, *father* and *son*, *great* and *small*.

2. Others are relative, but **not equally** (*sunt ad aliquid non ex aequo*): rather, one of them is said (to be in relation) *to something* not because it itself should be referred (to something else) but because something (else) is referred to it.<sup>81</sup> This happens, for example, in (scientific) knowledge and the (scientifically) knowable (*in scientia et scibili < ut scientia ad scibile* = ὡς ἐπιστήμη πρὸς ἐπιστητόν). Indeed, the (scientifically) knowable is said relatively not because it itself should be referred to (scientific) knowledge, but because (scientific) knowledge refers to it. And thus, it is evident that such (relatives) are not relative according to themselves, since the (scientifically) knowable is not essentially said (in relation) to the other; rather, another is said (to be related) to it.

#### 44.14. How One Is Opposed to Many as Measure to Measurable

ARISTOTLE shows how one is opposed to many as (measure) to measurable.<sup>82</sup> And since it belongs to the *ratio* of *measure* that it should be a minimum in some mode (► 28.2), hence, he says first that *one* is less than *many*; and, also, (less) than *two*, even if it should

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[...] Primo ostendit quod *unum opponitur multis relative*. [...] Circa primum tria facit. Primo ostendit quod *unum opponitur multis relative*; dicens quod unum opponitur multis, sicut mensura mensurabili; quae quidem opponuntur ut ad aliquid. — Non tamen ita quod sit de numero eorum quae sunt ad aliquid secundum seipsa.”

<sup>79</sup> *In Metaph.* 10, l. 8, §2087: “Supra enim in quinto dictum est, quod dupliciter dicuntur aliqua esse ad aliquid.”

<sup>80</sup> *In Metaph.* 10, l. 8, §2087 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b35–36): “Quaedam namque referuntur adinvicem ex aequo, sicut dominus et servus, pater et filius, magnum et parvum; et haec dicit [Philosophus] esse ad aliquid ut contraria; et sunt ad aliquid secundum seipsa; quia utrumque eorum hoc ipsum quid est, ad alterum dicitur.”

<sup>81</sup> *In Metaph.* 10, l. 8, §2088 (cf. ARISTOTLE, *Metaphysica* I.6, 1056b36–1057a1): “Alia vero sunt ad aliquid non ex aequo; sed unum eorum dicitur ad aliquid, non quod ipsum referatur, sed quia aliquid refertur ad ipsum, sicut in scientia et scibili contingit. Scibile enim dicitur relative, non quia ipsum refertur ad scientiam, sed quia scientia refertur ad ipsum. Et sic patet quod huiusmodi non sunt relativa secundum se, quia scibile non hoc ipsum quod est, ad alterum dicitur, sed magis aliud dicitur ad ipsum.”

<sup>82</sup> *In Metaph.* 10, l. 8, §2089 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a1–2): “Manifestat [Philosophus] qualiter unum opponitur multis ut mensurabili. Et quia de ratione mensurae est quod sit minimum aliquo modo, ideo primo dicitur, quod unum est minus multis, et etiam duobus, licet non sit paucum. Non enim sequitur, si aliquid sit minus, quod sit paucum; licet de ratione pauci sit quod sit minus, quia omnis paucitas pluralitas quaedam est.”

not be *few*. Thus, if something should be less, it does not follow that it is few, even though it belongs to the *ratio* of *few* that it should be less, since every fewness is some plurality.

On the other hand, it is to be known that absolute *plurality* or *multitude*, which is opposed to the *one* that is convertible with *being*, is as the genus of number (< τὸ... πλῆθος οἶον γένος ἐστὶ τοῦ ἀριθμοῦ), since **number** (*numerus* = ἀριθμός) is nothing other than a *plurality and multitude measurable by one* (*pluralitas et multitudo mensurabilis uno* = πλῆθος ἐνὶ μετρητόν).<sup>83</sup>

Hence, *one*, insofar as it is simply said (as) *indivisible being*, is convertible with *being*; but insofar as it receives the *ratio* of *measure*, it is thus determined to some genus of quantity, in which the *ratio* of *measure* is properly found (► 38.1).<sup>84</sup>

Likewise, *plurality* or *multitude*, insofar as it signifies *divided beings*, is not determined to some genus; but insofar as it signifies something measured, it is determined to the genus of quantity, (any) species of which is a number.<sup>85</sup> And hence, ARISTOTLE says that **number** is a *plurality measured by one*, and that *plurality* is as the genus of *number*.

However, ARISTOTLE does not say that (*plurality* or *multitude*) should be *simply* (*simpliciter*) a genus, for just as *being* is not a genus properly speaking, likewise, too, neither the *one* that is convertible with *being* nor the *plurality* that is opposed to it (can be said, simply speaking, to be a genus).<sup>86</sup>

Taking in this mode the *one* that is the principle of number—and that has the *ratio* of *measure*—, and the number that is a species of quantity—and that is a multitude measured by one—, *one* and *many* are not opposed as contraries, as has been said of the *one* that is convertible with *being* and the *plurality* opposed to it (► 44.4).<sup>87</sup> Rather,

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<sup>83</sup> *In Metaph.* 10, l. 8, §2090 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a2–4): “Sciendum vero est, quod pluralitas sive multitudo absoluta, quae opponitur uni quod convertitur cum ente, est quasi genus numeri; quia numerus nihil aliud est quam pluralitas et multitudo mensurabilis uno.” St. Thomas uses alternatively *plurality* and *multitude* because he is reading both the *Traslatio Anonyma*, which has *pluralitas*, and the version prepared by MOERBEKE, which renders πλῆθος as *multitudo*.

<sup>84</sup> *In Metaph.* 10, l. 8, §2090: “Sic igitur unum, secundum quod simpliciter dicitur ens indivisibile, convertitur cum ente. Secundum autem quod accipit rationem mensurae, sic determinatur ad aliquod genus quantitatis, in quo proprie invenitur ratio mensurae.”

<sup>85</sup> *In Metaph.* 10, l. 8, §2091 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a2–4): “Et similiter pluralitas vel multitudo, secundum quod significat entia divisa, non determinatur ad aliquod genus. Secundum autem quod significat aliquid mensuratum, determinatur ad genus quantitatis, cuius species est numerus. Et ideo dicit [Philosophus] quod numerus est pluralitas mensurata uno, et quod pluralitas est quasi genus numeri.”

<sup>86</sup> *In Metaph.* 10, l. 8, §2092: “Et non dicit [Philosophus] quod sit simpliciter genus; quia sicut ens genus non est, proprie loquendo, ita nec unum quod convertitur cum ente, nec pluralitas ei opposita. Sed est quasi genus, quia habet aliquid de ratione generis, in quantum est communis.”

<sup>87</sup> *In Metaph.* 10, l. 8, §2093 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a4–6): “Sic igitur accipiendum unum quod est principium numeri et habet rationem mensurae, et numerum qui est species quantitatis et est multitudo mensurata uno, opponuntur unum et multa, non ut contraria, ut supra dictum est de uno quod

they are opposed as some of those that are relative: namely, of which one is said relatively because the other is referred to it. Hence, in this mode *one* and *number* are opposed, insofar as *one* is the measure and *number* is the measurable.

And since the nature of those relatives is such that one can be without the other, but not conversely, hence, this (relation of dependence) is found in *one* and in *number*: that if there is a number, there must be a *one*; but (it is) not (the case) that wherever is a *one* there must be a number.<sup>88</sup> For if there is something indivisible, such as a point, there is a *one*, and not a number. On the other hand, in the other relatives of which one and the other is said (to be related) to something according to itself, neither of them is without the remainder: thus, there is no master without a servant; nor (is there) a servant without a master.

#### 44.15. Knowledge and Knowable Are Related as Measured and Measure

ARISTOTLE manifests the likeness of the relation of the (scientifically) knowable to (scientific) knowledge and of *one* to *many*.<sup>89</sup> He says that, although (scientific) knowledge is said, according to the truth of the thing, (in relation) to the (scientifically) knowable like number (is said in relation) to *one*, (this order of relation) is not likewise assigned by some (philosophers).

Thus, it seems to some—such as the Pythagoreans—that (scientific) knowledge should be the measure, and (that) the (scientifically) knowable (should be) the measured.<sup>90</sup> However, it appears (to be) the contrary, for it has been said that if there is a *one* that is the measure, it is not necessary for there to be a number that is measured—on the contrary. Thus, we see that if there is (scientific) knowledge, there must be a (scientifically) knowable; but if there is something (scientifically) knowable, it is not necessary for there to be (scientific) knowledge of it.

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convertitur cum ente, et de pluralitate sibi opposita; sed opponuntur sicut aliqua eorum quae sunt ad aliquid, quorum scilicet unum dicitur relative, quia alterum refertur ad ipsum. Sic igitur opponitur unum et numerus, in quantum unum est mensura et numerus est mensurabilis.”

<sup>88</sup> *In Metaph.* 10, l. 8, §2094 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a6–7): “Et quia talis est natura horum relativorum quod unum potest esse sine altero, sed non e converso, ideo hoc invenitur in uno et numero, quia si est numerus, oportet quod sit unum. Sed non oportet quod ubicumque est unum, quod sit numerus. Quia si est aliquid indivisibile ut punctus, ibi est unum, et non numerus. In aliis vero relativis quorum utrumque secundum se dicitur ad aliquid, neutrum est sine reliquo. Non enim est sine servo dominus, nec servus sine domino.”

<sup>89</sup> *In Metaph.* 10, l. 8, §2095 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a7–8): “Manifestat similitudinem relationis scibilis ad scientiam et unius ad multa; dicens, quod cum scientia similiter secundum rei veritatem dicatur ad scibile sicut numerus ad unum, non similiter assignatur a quibusdam.”

<sup>90</sup> *In Metaph.* 10, l. 8, §2095 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a8–11): “quia videtur quibusdam, sicut Pythagoricis, sicut supra dictum est, quod scientia sit mensura et scibile mensuratum. Sed contrarium apparet. Dictum est enim quod, si est unum quod est mensura, non est necesse numerum esse qui est mensuratum, sed e converso. Videmus enim quod si est scientia, oportet scibile esse. Non autem oportet, si est aliquid scibile, quod sit eius scientia.”

Whence, it is apparent, rather, that the (scientifically) knowable is as a measure, and (scientific) knowledge is as measured.<sup>91</sup> For (scientific) knowledge is measured by the (scientifically) knowable like a number (is measured) by one. Indeed, it is because the intellect apprehends a thing as it is, that true (scientific) knowledge of the thing is had.

#### 44.16. Opposition of *Plurality to One*

ARISTOTLE also shows that absolute *plurality* or *multitude* is not opposed to *few*.<sup>92</sup> As has been said, *plurality*, insofar as it is measured, is opposed to *one* as to a measure; but is not contrary to *few*. On the other hand, the **few** that signifies *an exceeded plurality*, is opposed to the **many** that signifies *an exceeding plurality*. Likewise, *plurality*, too, is not opposed to *one* in one mode, but in two:

1. As *divisible* is opposed to *indivisible* (< ὅτι διαιρετὸν τὸ... ἀδιαιρετόν), if we take *one* in common (*communiter*), which is convertible with *being*, and the *plurality* that corresponds to it.<sup>93</sup>
2. As (in relation) to something (< ὡς πρὸς τι), as (scientific) knowledge (is related) to the (scientifically) knowable, if we take the *plurality* that is a number, and the *one* that has the *ratio of measure* and is the principle of number.<sup>94</sup>

#### 44.17. Reduction of Contraries into Being and Non-Being

ARISTOTLE shows that contraries are reduced into *being* (*ens*) in two (modes):<sup>95</sup> **(1)** through the nature of privation; and **(2)** because contraries are principles. That they should be reduced to one, he shows through an example and through some reduction. Finally, he shows that they are reduced to *one* and to *being* insofar as they are genera (i.e., if we understand by *genus* a common container; ► 27.1, ¶2).

<sup>91</sup> *In Metaph.* 10, l. 8, §2095 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a11–12): “Unde apparet quod magis scibile est sicut mensura et scientia sicut mensuratum. Quodam enim modo mensuratur scibili scientia, sicut numerus uno. Ex hoc enim vera scientia rei habetur, quod intellectus apprehendit rem sicuti est.”

<sup>92</sup> *In Metaph.* 10, l. 8, §2087 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a12–14): “ostendit [Philosophus], quod multitudo absoluta non opponitur paucis.” Ibid., §2096: “Ostendit quod pluralitas vel multitudo absoluta non opponitur paucis, dicens: Dictum est quod pluralitas secundum quod est mensurata, opponitur uni ut mensurae, sed non est contraria paucis. Sed paucis, quod significat pluralitatem excessam, opponitur multum, quod significat pluralitatem excedentem. — Similiter etiam pluralitas non uno modo opponitur uni, sed dupliciter.”

<sup>93</sup> *In Metaph.* 10, l. 8, §2096 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a14–15): “Uno modo, sicut supra dictum est, opponitur ei ut divisibile indivisibili. Et hoc si accipiatur communiter unum quod convertitur cum ente, et pluralitas ei correspondens.”

<sup>94</sup> *In Metaph.* 10, l. 8, §2096 (cf. ARISTOTLE, *Metaphysica* I.6, 1057a15–17): “Alio modo opponitur pluralitas uni ut ad aliquid, sicut scientia ad scibile. Et hoc dico si accipiatur pluralitas quae est numerus, et unum quod habet rationem mensurae, et est principium numeri.”

<sup>95</sup> *In Metaph.* 4, l. 4, §583 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1005a1–2): “dupliciter ostendit [Philosophus] contraria reduci ad ens. Primo per naturam privationis. Secundo per hoc quod contraria sunt principia. Quod vero reducuntur ad unum, ostendit per exemplum et per quamdam reductionem. Finaliter autem ostendit quod reducuntur ad unum et ens in quantum sunt genera.”

Thus, as already noted (► 44.1), ARISTOTLE shows that all contraries are reduced into *one* and *multitude*.<sup>96</sup> For example, *rest* (*status sive quies* = στάσις) is reduced into *unity*, for that is said to rest which is related in one mode now and (in the same mode in a) prior (moment). On the other hand, *motion* pertains to multitude, because that which is moved is diversely related now and (at a) prior (moment), which (diversity) conveys a multitude. Likewise, *oddness* has something of unity because of non-division; *evenness*, on the other hand, pertains to the nature of multitude because of its division. Likewise, the *end* or *terminus* pertains to unity, which is the terminus of all resolution; the infinite, on the other hand, pertains to multitude, which increases indefinitely. And the same is true of the other contraries.

Indeed, it is necessary for all contraries to be reduced to *one*.<sup>97</sup> For, in all contraries, the privation of the (their) contraries is included. Hence, it is necessary for there to be a reduction into first privatives, among which principally is (the) *one* (that is convertible with being). And again, *multitude*, which is caused from *one*, is the cause of the diversity of difference and contrariety.

ARISTOTLE shows in another mode that contraries are reduced to *being*: for principles and those-that-proceed-from-principles (*principia et principiata*) pertain to one consideration.<sup>98</sup>

<sup>96</sup> *In Metaph.* 4, l. 4, §580 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b28–29): “Similiter etiam ostendit [Philosophus] quod [omnia contraria] reducuntur in unum et multitudinem, per quoddam exemplum. Status enim sive quies reducitur in unitatem. Illud enim quiescere dicitur, quod uno modo se habet nunc et prius [...]. Motus autem ad multitudinem pertinet; quia quod movetur, diversimode se habet nunc et prius; quod multitudinem importat.” Ibid., §582 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b33–1005a1): “Dicit [Philosophus], quod sicut praedicta contraria reducuntur ad ens, ita habent reduci ad unum et multitudinem. Quod apparet. Nam imparitas aliquid unitatis habet propter indivisionem: paritas autem ad naturam multitudinis pertinet propter suam divisionem. Sic autem finis sive terminus ad unitatem pertinet, quae est terminus omnis resolutionis: infinitum autem pertinet ad multitudinem, quae in infinitum augetur. Concordia etiam unitatis est manifeste (1). Discordia vero multitudinis. Calor autem ad unitatem pertinet, in quantum habet unire homogenea. Frigus autem ad multitudinem, in quantum habet ea separare. Nec solum ista contraria reducuntur sic in unum et multitudinem, sed etiam alia. — Sed ista «reductio» sive introductio ad unum et multitudinem accipiatur sive «sumatur,» idest supponatur nunc a nobis, quia longum esset per singula contraria hoc discutere.” In a footnote, the edition we are using says, “(1) *Al.* manifesta.”

<sup>97</sup> *In Metaph.* 4, l. 2, §562 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b36–1004a2): “Et hoc addit [*sc.*, *ad hoc principium, scilicet unum, reducuntur omnia contraria fere*], quia in quibusdam non est ita manifestum. Et tamen hoc esse necesse est; quia cum in omnibus contrariis alterum habeat privationem inclusam, oportet fieri reductionem ad privativa prima, inter quae praecipue est unum. Et iterum multitudo, quae ex uno causatur, causa est diversitatis differentiae et contrarietatis, ut infra dicitur. Et haec dicit esse considerata in ecloga, idest in electione contrariorum, idest in tractatu, quae est pars electa ad tractandum de contrariis, scilicet in decimo huius.”

<sup>98</sup> *In Metaph.* 4, l. 4, §581 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b29–33): “Ostendit [Philosophus] *alio modo*, quod contraria reducuntur ad ens: quia principia et principiata sunt unius considerationis. Principia autem entium, in quantum huiusmodi, confitentur philosophi esse contraria. Omnes enim dicunt entia et substantias entium ex contrariis componi, ut in primo Physicorum dictum est, et primo huius. Et quamvis in hoc convenient quod entium principia sint contraria, differunt tamen quantum ad contraria quae ponunt. Quidam enim ponunt par et impar, sicut Pythagorici. Et alii calorem et frigus, sicut Parmenides. Quidam «finem» sive terminum «et infinitum,» idest finitum et infinitum, sicut idem Pythagoras. Nam pari et impari, finitum et infinitum attribuebant, ut in primo habitum est. Alii concordiam et discordiam, sicut Empedocles. Patet ergo quod contraria reducuntur in considerationem entis.”

And philosophers acknowledge that the principles of beings as such (*inquantum huiusmodi*) are contraries, for all say that beings, and the substances of beings, are composed from contraries. And although they should agree in this, that the principles of beings should be contraries, they nonetheless differ in respect of the contraries that they posit. Thus, some posit the even and the odd, as the Pythagoreans. Others, heat and cold, as Parmenides. Some (others posit) the finite and the infinite—as (does) Pythagoras himself—, for they attributed the finite and the infinite to the even and the odd. Others (posit) concord and discord, as Empedocles. It is therefore evident that contraries are reduced into the consideration of *being*.

One and the other of (two) contraries, which must be in the same genus, is had from the *ratio* of *negation*, as is evident in the *even* and the *odd*, and in the *just* and the *unjust*.<sup>99</sup> Hence, if there should be a mean between affirmation and negation, in all of these contraries there would be some mean, since they manifestly follow upon affirmation and negation: for example, if in (the genus of) number there should be some number that is neither even nor odd. But this is evidently impossible from the definition of *even* and *odd*, for **even** is *that which can be divided into equals*, while **odd** is *that which cannot (be divided into equals)*. It follows, then, that between affirmation and negation there can be no mean.

Indeed, between two contraries, one is always correlative to the other, and coordinated with it as a privation.<sup>100</sup> And of (two) contraries, one is always imperfect in respect of the other; hence, it conveys (*importat*) some privation of a perfection of the other. But privation is some negation; and thus, it is a non-being. And hence, it is evident that all contraries are reduced into being and non-being.

Thus, all contraries are reduced to *one* and to *being*.<sup>101</sup> Everything—principles as much as those that proceed from principles (*quae sunt de aliis, idest principiata*)—lead into *one*

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<sup>99</sup> *In Metaph.* 4, l. 16, §728 (cf. ARISTOTLE, *Metaphysica* Γ.7, 1012a9–12): “dicit [Philosophus...] quod negatio in quibusdam generibus inest loco contrariae differentiae. Vel secundum aliam literam negatio implet contrarium, quia alterum contrariorum, quae necesse est esse in eodem genere, ex negatione rationem habet; sicut patet de pari et impari, iusto et iniusto. Si igitur inter affirmationem et negationem esset aliquod medium, in omnibus istis contrariis esset aliquod medium, cum affirmationem et negationem manifeste sequantur. Sicut in numero si esset aliquis numerus qui nec esset par nec impar. Hoc autem patet esse impossibile ex definitione paris et imparis. Nam par est quod potest dividi in aequalia. Impar vero quod non potest. Relinquitur ergo quod inter affirmationem et negationem non potest esse medium.”

<sup>100</sup> *In Metaph.* 4, l. 4, §579 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b27–28): “Inter duo contraria [...], semper unum quidem est alteri correlativum, et ei coordinatum est, ut privatio. [...] semper alterum contrariorum est imperfectum respectu alterius, et sic quamdam perfectionis privationem alterius importat. Privatio autem est quaedam negatio [...]; et sic est non ens. Et sic patet quod omnia contraria reducuntur in ens et non ens.”

<sup>101</sup> *In Metaph.* 4, l. 4, §583 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1005a1–2): “Deinde ostendit [Philosophus] consequenter quod omnia contraria reducuntur ad unum et ens. Constat enim quod omnia tam principia

and *being* as into a genus—not that (*one* and *being*) are truly genera: rather, they have some likeness to a genus by reason of their community (*ratione suae communitatis*; ► 27.1, ¶2). Therefore, if all contraries are principles or from principles, it is necessary that they be reduced to *one* and to *being*.

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quam quae sunt «de aliis,» idest principiata, inducunt in unum et ens tamquam in genera; non quod sint vere genera; sed ratione suae communitatis quamdam similitudinem generum habent. Si igitur contraria omnia sunt principia vel ex principiis, oportet quod ad unum et ens reducantur.”



## 45. First Principles

*Having determined that contraries are principles, we have now come full circle. All that remains is to examine what first principles are. This chapter is devoted to first principles universally speaking; the next chapter, to first principles according to causality.*

### 45.1. The Ratio of First Principles

Although every principle is *that which is first* (► 8.3; at least generically speaking; ► 8.7),<sup>1</sup> not every principle is a *first principle*.<sup>2</sup>

In creatures, something is known (to be a) first principle (*aliquod principium primum innotescit*)—(precisely) insofar as it is a first principle (*inquantum est principium primum*)—in two modes: **(1)** because *it has a relation to those that are from it* (*habet relationem ad ea quae ab ipso sunt*); and **(2)** because *it is not from another* (*non est ab alio*).<sup>3</sup>

Moreover, first (principles) are distinguished by themselves (*seipsis distinguuntur*).<sup>4</sup> And, since there is a negation in the *ratio* of *distinction* (► 40.7), for those are **distinct** (*distincta*) *of which one is not another* (*quorum unum non est aliud*), negative propositions in first (principles) are immediate (i.e., they have no mean; ► 8.9): for example, *no quantity is a substance*.

On the other hand, it would be superfluous (*superfluum* = περίεργος) for that which can come to be by fewer (principles) to come to be by more.<sup>5</sup> (This, of course, is what has come to be known as *Occam's razor*: *entia non sunt multiplicanda praeter necessitatem*.)

Therefore, there are three (*ratios*) that seemingly belong to the *ratio* of **first principles**:<sup>6</sup> **(1)** that *they not be from others* (*quod non sint ex aliis* < μήτε ἐξ ἄλλων); **(2)** that *they not*

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<sup>1</sup> The *ratio* of *order* requires a first principle in any genus, for *prior*—like *posterior*—is said by comparison to a principle; and there should not be an infinite regress. However, if both the principle and that which proceeds from it should not be in a genus, nothing would prevent such a principle from being neither prior nor posterior to that which proceeds from it, as already noted in our section on the simultaneous.

<sup>2</sup> *STh* I-II, q. 6 a. 1 ad 1: “non omne principium est principium primum.”

<sup>3</sup> *STh* I, q. 33 a. 4 co.: “In rebus autem creatis aliquod principium primum innotescit dupliciter, uno quidem modo, inquantum est principium primum per hoc quod habet relationem ad ea quae ab ipso sunt; alio modo, inquantum est primum principium per hoc quod non est ab alio.”

<sup>4</sup> *ScG* 1, 71 n. 5: “in ratione distinctionis est negatio: distincta enim sunt quorum unum non est aliud. Unde et prima, quae seipsis distinguuntur, mutuo sui negationem includunt: ratione cuius negativae propositiones in eis sunt immediatae, ut, nulla quantitas est substantia.”

<sup>5</sup> *In Physic.* 1, l. 11, n. 14: “quod potest fieri per pauciora, superfluum est si fiat per plura.” Here, St. Thomas is commenting on ARISTOTLE, *Physica* A.6, 189b21–22: “εἰ δ’ ἐξ ἀλλήλων δύνανται γεννᾶν δύο οὐσαι, περίεργος ἂν ἢ ἑτέρα τῶν ἐναντιώσεων εἴη.” Cf. *ScG* 2, 55 n. 13; 48, 12: “natura enim nihil facit frustra”; *In Polit.* 1, l. 1, n. 28–29; ARISTOTLE, *Politica* A.2, 1253a9: “οὐθὲν [...] μάτην ἢ φύσις ποιεῖ” (cf. 1256b20–22).

<sup>6</sup> *In Physic.* 1, l. 10, n. 3 (cf. ARISTOTLE, *Physica* A.5, 188a27–28): “Tria videntur de ratione principiorum esse: primum quod non sint ex aliis; secundum quod non sint ex alterutris; tertium quod omnia alia sint ex eis.”

be ones from the others (*quod non sint ex alterutris* < μήτε ἐξ ἀλλήλων εἶναι); and **(3)** that all others be from them (*quod omnia alia sint ex eis* < ἐκ τούτων πάντα).

## 45.2. Modes of Being First

**First** (*primum*) is said in two modes:<sup>7</sup>

1. **First simply** (*primum simpliciter*).<sup>8</sup> In this mode, there can only be one first principle.
2. **First in a genus or in some order** (*primum in genere vel in ordine aliquo*; ► 27.9; 8.5).<sup>9</sup> In this mode, there are multiple first principles according to the multiple genera of causes. Thus, the first material principle is first matter (*materia prima*); and the first formal principle is (the act of) being (*esse*).

Hence, *highest cause* can be taken in two (modes): either simply or in some genus.<sup>10</sup>

## 45.3. Posterior Principles

In the progression of things from a principle, there is found one first principle of things that is common to all, under which are found other, proper principles that are diverse in diverse (things).<sup>11</sup> The maximally universal principles are *being* (*ens*) and those that follow upon *being*, such as *one* and *many*, *potency* and *act*.<sup>12</sup>

Ultimately, descending into diverse genera, diverse first principles are found in diverse (things) even according to the same genus of cause (► 11.3).<sup>13</sup> In each genus, the highest

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<sup>7</sup> *In Sent.* 2, d. 1 q. 1 a. 1 co.: “primum dicitur dupliciter: scilicet primum simpliciter, et primum in genere vel in ordine aliquo.”

<sup>8</sup> *In Sent.* 2, d. 1 q. 1 a. 1 co.: “Sed primum simpliciter impossibile est esse nisi unum.” St. Thomas offers (in *ibid.*) three ways in which such a first principle can be shown to be only one: (1) from the order of the universe to its ordering principle (*ex ipso ordine universi, cujus partes inveniuntur ad invicem ordinatae esse, quasi partes animalis in toto, quae sibi invicem deserviunt*); (2) from the composite nature of things to the principle that gives them the act of being (*ex ipsa rerum natura [...] ita tamen quod ipsarum rerum naturae non sunt hoc ipsum esse quod habent*); and (3) from the need of an immaterial moving principle (*ex immaterialitate*).

<sup>9</sup> *In Sent.* 2, d. 1 q. 1 a. 1 co.: “Si secundo modo, sic secundum genera plura causarum sunt plura prima principia, ut materiale primum quod est materia prima, et primum formale, quod est esse, et sic de aliis.”

<sup>10</sup> *STh* II-II, q. 45 a. 1 co.: “Causa autem altissima dupliciter accipi potest, vel simpliciter, vel in aliquo genere.”

<sup>11</sup> *In Sent.* 2, d. 38 q. 1 a. 1 co.: “In progressu autem rerum a principio invenitur unum rerum principium primum, quod commune est omnium, sub quo inveniuntur alia principia propria, quae in diversis sunt diversa.”

<sup>12</sup> *In Metaph.*, pr.: “principia maxime universalialia [...] quidem sunt ens, et ea quae consequuntur ens, ut unum et multa, potentia et actus.”

<sup>13</sup> *In Sent.* 2, d. 1 q. 1 a. 1 co.: “ulterius descendendo ad diversa rerum genera, inveniuntur diversa prima principia in diversis etiam secundum idem genus causae.” St. Thomas offers some examples of multiple material first principles drawn from ancient science in *ibid.*: “sicut in liquabilibus prima materia est aqua, et in aridis terra; et in animalibus semen, vel menstruum.” Although such examples are now known to be incorrect, his statement about first principles is universally true. Thus, a gamete (a mature male or female cell capable of initiating formation of a new diploid individual by fusion with a gamete of the opposite sex) is a first material principle in the genus of diploids. And something analogous can be said of complex

(principles), the principles of others, are said to maximally be.<sup>14</sup> Hence, not only can there be a *first* principle (which is not from another), but also a *second* principle (which is indeed from a first principle, but other beings proceed from it).

As principles are related one to another, so too are the things of which they are principles.<sup>15</sup> Things whose principles are diverse, are themselves diverse too.<sup>16</sup> However, things are specified according to proper and proximate principles, not according to first (i.e., common, universal) principles.<sup>17</sup> Thus, the proper *ratio* of one thing is distinguished from the proper *ratio* of another.<sup>18</sup> And the otherness (*alietas*) of *ratios* is (had) from a diversity of respects, which is considered according to the diversity of things.<sup>19</sup>

#### 45.4. The Virtue of Prior vs. Posterior Principles

Second principles take their virtue from first principles (*secunda principia virtutem sortiuntur a primis*).<sup>20</sup> Whatever is from a principle is contained radically in its principle.<sup>21</sup> Whence, a principle is not weaker than that which is from it.<sup>22</sup> And that which is from a principle falls short of (*deficit*) its principle.<sup>23</sup>

Thus, an effect depends more on a first cause than on a second cause.<sup>24</sup> In virtue (of a first cause), it is possible for posterior (effects) to remain (if) prior (causes are) removed.

Distance (i.e., remoteness) from a principle brings about (*facit*) weakness in the effect.<sup>25</sup> Indeed, the effect is weaker than the cause; and the more something is withdrawn (*elongatur*) from a first agent, the less it receives of its virtue and likeness.<sup>26</sup>

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molecules that are constituted from simpler ones—and, ultimately (in the order of chemistry), constituted from chemical elements.

<sup>14</sup> *De sub. sep.*, c. 6, 15–17: “in unoquoque genere suprema quae sunt aliorum principia, esse maxime dicuntur.” *STh* I, q. 33 a. 4 co.: “in creaturis invenitur principium primum et principium secundum.”

<sup>15</sup> *In Metaph.* 1, l. 16, §256: “sicut habent se principia adinvicem, et principia.”

<sup>16</sup> *In Metaph.* 1, l. 16, §255: “quorum principia sunt diversa, ipsa etiam sunt diversa.”

<sup>17</sup> *De virtutibus*, q. 5 a. 1 ad 10: “Res autem specificantur secundum propria et proxima principia, non secundum principia prima.”

<sup>18</sup> *ScG* 1, 54 n. 7: “propria ratio unius distinguitur a propria ratione alterius.”

<sup>19</sup> *In Sent.* 1, d. 38 q. 1 a. 2 ad 4: “Alietas autem rationum est ex diversitate respectuum, qui attenduntur secundum diversitatem rerum.”

<sup>20</sup> *In Post. an.* 1, l. 41, 279–280: “secunda principia virtutem sortiuntur a primis.”

<sup>21</sup> *De veritate*, q. 22 a. 13 ad 13: “principiatum continetur in suo principio.” *In Sent.* 4, d. 44 q. 3 a. 3 qc. 1 co.: “in radice, per modum scilicet quo principia sunt in principiis suis.”

<sup>22</sup> *In Sent.* 1, d. 13 q. 1 a. 2 co.: “principium non est debilius principiato.”

<sup>23</sup> *De motu cordis*, 167–168: “principiatum deficit a principio.”

<sup>24</sup> *STh* III, q. 75 a. 5 ad 1: “sicut dicitur in libro De causis, effectus plus dependet a causa prima quam a causa secunda. Et ideo virtute [causae primae], fieri potest ut remaneant posteriora, sublatis prioribus.”

<sup>25</sup> *In Sent.* 3, d. 1 q. 1 a. 4 co.: “distantia a principio facit debilitatem in effectum.”

<sup>26</sup> *In De anima* 2, c. 30, 88–91: “effectus est debilius causa, et quanto magis aliquid elongatur a primo agente, tanto minus recipit de virtute et similitudine eius.”

That something should be difficult to be repelled comes from a weakness of virtue (► 31.7).<sup>27</sup> The more a virtue is weak, the fewer (beings) it can extend to. (Conversely, for example), the more the principle of action of something is perfect, the more it can extend its action into more (beings) and (into) more remote (beings).<sup>28</sup> Thus, if a fire is weak, it heats only proximate (bodies); but if it is strong, (it heats) also remote (bodies).

#### 45.5. Diversity of Principles

As ARISTOTLE says, something is said (to be) **plural** (*plurale*) because *it is divisible or divided* (► 40.2). Whence, that which is a cause of division must be posited (to be) a cause of plurality. However, the cause of division must be taken diversely in posterior, composite (principles, or beings that proceed from them) and in first, simple (principles).<sup>29</sup>

1. In posterior and composite (beings), the—as it were—formal cause of division—i.e., that by the *ratio* of which division comes to be—is the diversity of simple and prior (principles).<sup>30</sup>

This is evident in the division of (dimensional) quantity, for one part of a line is divided from another because it has a diverse **site** (*situs*), which is as *a formal difference of continuous quantity having position (quasi formalis differentia quantitatis continuae positionem habentis)*.<sup>31</sup>

It is also evident in the division of substances, for *man* is divided from *ass* because it has diverse constitutive differences.<sup>32</sup>

2. On the other hand, the diversity by which posterior, composite (things) are divided according to prior and simple (principles) presupposes the plurality of prior—or of first—simple (principles).<sup>33</sup>

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<sup>27</sup> *STh* I-II, q. 44 a. 1 co.: “Quod autem aliquid difficile possit repelli, provenit ex debilitate virtutis, ut supra dictum est. Virtus autem, quanto est debilior, tanto ad pauciora se potest extendere.”

<sup>28</sup> *ScG* 2, 6 n. 7: “Quanto alicuius actionis principium est perfectius, tanto actionem suam potest in plura extendere et magis remota: ignis enim, si sit debilis, solum propinqua calefacit; si autem sit fortis, etiam remota.”

<sup>29</sup> *In De Trin.*, q. 4 a. 1 co., 68–74: “sicut dicit Philosophus in X Metaphisice, plurale dicitur aliquid ex hoc quod est diuisibile uel diuisum; unde omne illud quod est causa diuisionis oportet ponere causam pluralitatis Causa autem diuisionis aliter est accipienda in posterioribus et compositis et in primis simplicibus.”

<sup>30</sup> *In De Trin.*, q. 4 a. 1 co., 75–77: “In posterioribus namque et compositis causa diuisionis quasi formalis, id est ratione cuius fit diuisio, <est> diuersitas simplicium et pri(m)orum.” All brackets in the source.

<sup>31</sup> *In De Trin.*, q. 4 a. 1 co., 78–81: “Quod patet in diuisione quantitatis: diuiditur enim una pars linee ab alia per hoc quod habet diuersum situm, qui est quasi formalis differentia quantitatis continuae positionem habentis.”

<sup>32</sup> *In De Trin.*, q. 4 a. 1 co., 81–84: “patet etiam in diuisione substantiarum: diuiditur enim homo ab asino per hoc quod habent diuersas differentias constitutiuas.”

<sup>33</sup> *In De Trin.*, q. 4 a. 1 co., 84–87: “Set diuersitas, qua diuiduntur posteriora composita secundum priora et simplicia praesupponit pluralitatem pri(m)orum simplicium.” Brackets in the source, indicating the two

Therefrom, *man* and *ass* have diverse differences because *rational* and *irrational* are not one but multiple differences.<sup>34</sup>

#### 45.6. Diversity of First Principles

It cannot be said that the cause of the plurality of prior principles always is the diversity of some prior, more simple (principles), for then we would have to proceed infinitely.<sup>35</sup> Hence, it is necessary to assign the cause of the plurality or division of the first, simple (principles) in another mode: such (principles) are divided according to themselves (*secundum se ipsa*).

However, it is impossible for being (*ens*) to be divided from being insofar as it is a being, for nothing is divided from being except non-being (*non ens*).<sup>36</sup> Therefrom, too, *this* being is divided from *that* being only because in *this* being is included the negation of *that* being; whence, negative propositions in first terms are immediate, as if the negation of one should be in the understanding of the other.

Moreover, a first effect brings about (*facit*) a plurality with its cause because it does not reach it (i.e., the first effect does not attain the perfection of its cause).<sup>37</sup>

Therefore, something is said (to be) **determined** in two modes: **(1)** by reason of **limitation** (*ratione limitationis*); or **(2)** by reason of **distinction** (*ratione distinctionis*; ► 40.7).<sup>38</sup>

Since one first (effect) can imitate something (i.e., some perfection of the first cause) in which another (first effect) falls short (*deficit*), and fall short in that which another imitates, multiple first effects can be found.<sup>39</sup> Thus, there can be found multiple first effects, in any of which there is a negation of both the cause and the effect of the other according to the

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possible readings reflected in our rendition: *prior* or *first*. Since *first* need not be *simply first*, these two readings amount to the same.

<sup>34</sup> *In De Trin.*, q. 4 a. 1 co., 87–89: “ex hoc enim homo et asinus habent diuersas differentias, quod rationale et irrationale non sunt una set plures differentiae.”

<sup>35</sup> *In De Trin.*, q. 4 a. 1 co., 89–95: “Nec potest semper dici quod illius pluralitatis sit aliqua diuersitas aliquorum pri(m)orum et simpliciorum causa, quia sic esset abire in infinitum. Et ideo pluralitatis uel diuisionis primorum et simplicium oportet alio modo causam assignare: sunt enim huiusmodi secundum se ipsa diuisa.” Evidently, the reading *primorum* (instead of *priorum*) is not possible here.

<sup>36</sup> *In De Trin.*, q. 4 a. 1 co., 96–102: “Non potest autem hoc esse, quod ens diuidatur ab ente in quantum est ens; nichil autem diuiditur ab ente nisi non ens, unde et ab hoc ente non diuiditur hoc ens <nisi> per hoc quod in hoc ente includitur negatio illius entis; unde in primis terminis propositiones negatiue sunt immediatae, quasi negatio unius sit in intellectu alterius.”

<sup>37</sup> *In De Trin.*, q. 4 a. 1 co., 103–104: “Primum etiam creatum in hoc facit pluralitatem cum sua causa, quod non attingit ad eam.” In the ensuing lines it will become clear that *primum creatum* = *primus effectus*.

<sup>38</sup> *Quodlibet* 7, q. 1 a. 1 ad 1: “aliquid dicitur determinatum dupliciter: primo ratione limitationis, alio modo ratione distinctionis.”

<sup>39</sup> *In De Trin.*, q. 4 a. 1 co., 111–117: “cum unum primum possit aliquid imitari in quo alterum ab eo deficit, et deficere in quo alterum imitatur; et sic possunt inueniri plures primi effectus, in quorum quolibet est negatio et cause et effectus alterius secundum idem, uel secundum remotiorem distantiam etiam in uno et eodem.”

same (perfection imitated) or according to a more remote distance even in one and the same (perfection imitated).

It is therefore evident that the first *ratio* or principle of *plurality* or *division* is (had) from negation and affirmation (► 40.7), such that such order of origin of plurality be understood thus: that **(1)** first is to be understood *being* and *non-being*, from which the first divided (beings) are constituted; and **(2)** by these, *many* (is to be understood).<sup>40</sup>

Whence, just as *one* is found immediately (*statim*) after *being* insofar as it is *undivided*, so the *plurality* (*pluralitas*) of the first simple (principles) is immediately found after the division of *being* and *non-being*.<sup>41</sup>

The *ratio* of *diversity* follows upon this plurality insofar as the virtue of its cause—to wit, the opposition of *being* and *non-being*—remains in it.<sup>42</sup> Thus, one—of many—is said to be diverse compared to another (i.e., compared to another one of the same multitude) because (*this* one) is not *that* (one).<sup>43</sup> And since a second cause produces an effect only by virtue of the first cause, hence, the plurality of first (principles) brings about division and plurality in second, composite (principles) only insofar as the virtue of the first opposition—i.e., between *being* and *non-being*, from which it has the *ratio* of *diversity*—remains in it: and this is how the diversity of first (principles) brings about the plurality of second (principles).<sup>44</sup>

Whence, whoever says that affirmation and negation are one, excludes all determination or distinction, so that it becomes impossible to define or determine anything in the mind.<sup>45</sup>

However, although division should precede the plurality of first—or prior—(principles), not so diversity, since division does not require both of the things co-divided to be a being, for

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<sup>40</sup> *In De Trin.*, q. 4 a. 1 co., 118–123: “Sic ergo patet quod prima pluralitatis uel diuisionis ratio siue principium est ex negatione et affirmatione, ut talis ordo originis pluralitatis intelligatur, quod primo sint intelligenda ens et non ens, ex quibus ipsa prima diuisa constituuntur, ac per hoc plura.”

<sup>41</sup> *In De Trin.*, q. 4 a. 1 co., 123–126: “unde sicut post ens in quantum est indiuisum statim inuenitur unum, ita post diuisionem entis et non entis statim inuenitur pluralitas pri(m)orum simplicium.” Brackets in the source. Evidently, the reading *primorum* (instead of *priorum*) is most suitable here.

<sup>42</sup> *In De Trin.*, q. 4 a. 1 co., 126–129: “Hanc autem pluralitatem consequitur ratio diuersitatis, secundum quod manet in ea sue cause uirtus, scilicet oppositionis entis et non entis.”

<sup>43</sup> *In De Trin.*, q. 4 a. 1 co., 129–131: “ideo enim unum plurius diuersum dicitur alteri comparatum, quia non est illud.”

<sup>44</sup> *In De Trin.*, q. 4 a. 1 co., 131–138: “et quia causa secunda non producit effectum nisi per uirtutem cause prime, ideo pluralitas primorum non facit diuisionem et pluralitatem in secundis compositis nisi in quantum manet in ea uis oppositionis prime, que est inter ens et non ens, ex qua habet rationem diuersitatis. Et sic diuersitas primorum facit pluralitatem secundorum.”

<sup>45</sup> *In Metaph.* 4, l. 9, §660 (cf. ARISTOTLE, *Metaphysica* Δ.4, 1008b30–1009a5): “Item prohibet [*sc.*, *quod affirmatio et negatio sint simul uera*] ne mente aliquid possimus definire vel determinare. Prima enim ratio distinctionis consideratur in affirmatione et negatione. Unde qui affirmationem et negationem unum esse dicit, omnem determinationem sive distinctionem excludit.”

division is by affirmation and negation.<sup>46</sup> Diversity, on the other hand, requires them both to be a being; whence, it presupposes plurality; whence, it is impossible for the plurality of first (principles) to be a cause of diversity—unless *diversity* should be taken for *division*.

#### 45.7. Unity and Diversity of the Ratios of Origin and Principle

The judgment that concerns *principle* is the same as (the judgement) that concerns *origin*, on which the *ratio* of *principle* is founded (►8.2).<sup>47</sup> However, *origin* can be considered in two (modes):

1. According to the common *ratio* of **origin**, which is (for) something to be from something (*aliquid ab aliquo esse*).<sup>48</sup>

In this (mode), there is a common *ratio* in respect of the origin of all originated things: not indeed according to a commonality of univocity, but of analogy.<sup>49</sup> And the same can be said of the name *principle*.

2. According to a determinate mode of origin.<sup>50</sup>

In this mode, there are diverse special *ratios* of *origin* and of *principle*; but this does not produce equivocation, for in this way, according to ARISTOTLE, even the *ratio* of *animal* is diverse (*alia*) according to each (species).<sup>51</sup>

#### 45.8. Modes in Which the First Principles of All Beings Are Common

Just as of any determinate genus there are some common principles that extend to all the principles of that genus (►27.4), so, too, all beings, insofar as they communicate in (i.e., have in common) *being* (*in ente communicant*), have some principles that are the principles of all beings.<sup>52</sup> These principles can be said (to be) **common** in two modes, as AVICENNA says:

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<sup>46</sup> *In De Trin.*, q. 4 a. 1 co., 142–149: “quamvis autem diuisio praecedat pluralitatem pri(m)orum, non tamen diuersitas, quia diuisio non requirit utrumque condisuorum esse ens, cum sit diuisio per affirmationem et negationem, set diuersitas requirit utrumque esse ens, unde praesupponit pluralitatem; unde nullo modo potest esse quod pluralitatis primorum causa sit diuersitas, nisi diuersitas pro diuisione sumatur.” Brackets in the source.

<sup>47</sup> *In Sent.* 1, d. 29 q. 1 a. 2 qc. 1 co.: “idem iudicium est de principio et de origine super quam fundatur ratio principii. Potest autem origo considerari dupliciter.”

<sup>48</sup> *In Sent.* 1, d. 29 q. 1 a. 2 qc. 1 co.: “aut secundum communem rationem originis, quae est aliquid ab aliquo esse.”

<sup>49</sup> *In Sent.* 1, d. 29 q. 1 a. 2 qc. 1 co.: “et sic una ratio est communis ad originem personarum et originem creaturarum, non quidem communitate univocationis, sed analogiae: et similiter etiam nomen principii.”

<sup>50</sup> *In Sent.* 1, d. 29 q. 1 a. 2 qc. 1 co.: “Potest etiam considerari secundum determinatum modum originis.”

<sup>51</sup> *In Sent.* 1, d. 29 q. 1 a. 2 qc. 1 co.: “et sic sunt diversae speciales rationes originis et principii; sed hoc non facit aequivocationem: quia sic etiam, secundum Philosophum, animalis ratio secundum unumquodque est alia.”

<sup>52</sup> *In De Trin.*, q. 5 a. 4 co., 108–115: “Sicut autem uniuscuiusque determinati generis sunt quedam communia principia que se extendunt ad omnia principia illius generis, ita etiam et omnia entia secundum

1. *By predication (per praedicationem; ►11.4).*<sup>53</sup> For example, when we say, “*form* is common to all forms” because (*form*) is predicated of any (form). ARISTOTLE appeals to this (mode when he says) that all beings have the same principles according to analogy.

2. *By causality (per causalitatem; discussed in the next chapter; ►46; 45.12; 11.5).*<sup>54</sup> For example, when we say (according to ancient opinion) that the sun is the principle of all generable things (i.e., in the genus of agent cause; or, in another way, when we say that elements are the principles of all compound bodies in the genus of material cause).

There are common principles of all beings not only according to the first mode, but also according to the second mode.<sup>55</sup>

#### 45.9. Unity of First Principles

The (first) *intrinsic* principles of all things—namely, matter, and form or privation—are not numerically one, but are universally one according to analogy or proportion (*secundum analogiam vel proportionem* = κατ’ ἀναλογίαν).<sup>56</sup> There is science of these (principles) not because they should be one in number in all (things), but because (any one of these principles) is (something) one in many according to *ratio* (i.e., it is universal; ►13.5). And the *ratio* that is (in relation) to an opposite is verified in the essential principles (i.e., matter and form), and not in separated principles, such as the agent and the end. Indeed, many

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quod in ente communicant, habent quedam principia que sunt principia omnium entium. Que quidem principia possunt dici communia dupliciter secundum Avicennam in sua Sufficientia.” See AVICENNA, *The Metaphysics of The Healing*, 1.2; especially, 11, 4–6: “ ويلزم هذا العلم أن ينقسم ضرورة إلى أجزاء. منها ما يبحث عن الأسباب القصوى، فإنها الأسباب لكل موجود معلول من جهة وجوده، ويبحث عن السبب الأول الذي يفيض عنه كل موجود معلول عن الأسباب القصوى، فإنها الأسباب لكل موجود معلول من جهة وجوده، ويبحث عن السبب الأول الذي يفيض عنه كل موجود معلول. بما هو موجود معلول.” Cf. AVICENNA, *Liber de philosophia prima*, 1.2, 14.68–71: “Sequitur ergo necessario ut haec scientia [sc., philosophia prima] dividatur in partes, quarum quaedam inquirunt causas ultimas, in quantum sunt causae omnis esse causati in quantum est esse; et aliae inquirunt causam primam ex qua fluit omne esse causatum in quantum est esse causatum.”

<sup>53</sup> *In De Trin.*, q. 5 a. 4 co., 115–117: “uno modo per predicationem, sicut hoc quod dico ‘forma est commune ad omnes formas’, quia de qualibet predicatur.” *Ibid.*, 121–124: “secundum primum modum, —quod appellat Philosophus in XI Metaphisice omnia entia habere eadem principia secundum analogiam—.”

<sup>54</sup> *In De Trin.*, q. 5 a. 4 co., 117–119: “alio modo per causalitatem, sicut dicimus solem unum numero esse principium ad omnia generabilia.”

<sup>55</sup> *In De Trin.*, q. 5 a. 4 co., 120–124: “Omnium autem entium sunt principia communia non solum secundum primum modum, [...] set etiam secundum modum secundum.”

<sup>56</sup> *In Metaph.* 3, l. 10, §465: “principia quae sunt intrinseca rebus, scilicet materia et forma, vel privatio, non sunt eadem numero omnium, sed analogia sive proportione. [...] Scientia autem est de his, non quia sint unum numero in omnibus, sed quia est unum in multis secundum rationem. Ratio autem quae est ad oppositum verificatur in principiis essentialibus, non autem in principiis separatis, cuiusmodi sunt agens et finis. Multa enim possunt produci ab uno agente vel movente et ordinari in unum finem.” *Ibid.* 11, l. 2, §2193 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b28–30): “Principia vero intrinseca, scilicet materia et forma, non sunt unum numero omnium, sed secundum analogiam.” That these are *first* principles is clearly stated in *ibid.* 12, l. 4, §2464 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b10–21): “Primo ostendit [Philosophus], quod eadem sunt principia omnium proportionaliter. Secundo, quod eadem sunt universaliter [...]. Circa primum duo facit. Primo ostendit quomodo proportionaliter sunt eadem. Secundo quomodo et simpliciter sint eadem principia omnium prima [...]. Primo ostendit, quod proportionaliter sunt eadem principia omnium quantum ad causas intrinsecas.” Privation is sometimes omitted because it is not a principle *per se* but *per accidens*, as we will presently see.



(i.e., diverse things) can be produced by one agent or mover (i.e., by an equivocal or analogical agent), and (diverse things) can be ordered to one (and the same) end.

Those (beings) that are of diverse genera as of most general (genera), have diverse principles according to thing (*secundum rem*), even if (their principles) are the same according to analogy.<sup>57</sup> But those things that are contained under one, most general genus, even though they should be in diverse subalternate genera, can have the same principles according to the community of that genus.

On the other hand, proximate intrinsic principles are diverse in diverse genera: for example, in the genus of color, white is (a principle) as species (i.e., form), black is (a principle) as privation, and surface (is a principle) as matter and subject (i.e., as the matter and subject in which color exists).<sup>58</sup>

#### 45.10. Contraries Are First Principles

As ARISTOTLE says, the three conditions of first principles (►45.1) befit contraries.<sup>59</sup> Therefore, first contraries are principles. And to understand what (it is that) ARISTOTLE calls *first contraries*, it is to be considered that there are some contraries that are caused from other contraries. However, we cannot proceed infinitely in this way (►45.6): rather, we must arrive at some contraries that are not caused from other contraries—and these he calls *first contraries*.

Thus, the aforesaid three conditions of principles befit first contraries:<sup>60</sup> **(1)** since they are first, it is manifest that they are not from others; **(2)** since they are contraries, it is manifest that they are not one from the other: although the cold should come to be from the hot

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<sup>57</sup> *De malo*, q. 8 a. 1 ad 13: “ea quae sunt diversorum generum quasi generalissimorum, sunt diversa principia secundum rem, licet sint eadem secundum analogiam, ut dicitur in X Metaph. Sed ea quae continentur sub uno genere generalissimo, licet sint in diversis generibus subalternis, possunt habere eadem principia secundum communitatem illius generis.”

<sup>58</sup> *In Metaph.* 12, l. 4, §2467: “aliorum sunt alia proxima principia. Non autem omnium sunt eadem nisi proportionaliter. Sicut si aliquis dicat quod sicut praedicta tria, scilicet calidum et frigidum et subiectum eorum, se habent in generatione corporum simplicium ut forma et privatio et materia, ita in quolibet alio genere illa tria sunt, quae se habent ut forma, privatio et materia; sed ista diversa sunt in diversis generibus. Sicut in genere colorum, album est sicut species, nigrum sicut privatio, et superficies sicut materia et subiectum. Et in genere distinctionis temporum, lumen est sicut species, tenebrae sicut privatio, aer sicut materia et subiectum. Ex quibus tribus principiis constituuntur dies et nox.”

<sup>59</sup> *In Physic.* 1, l. 10, n. 3 (cf. ARISTOTLE, *Physica* A.5, 188a28–30): “Sed haec tria conveniunt primis contrariis; ergo prima contraria sunt principia. — Ad intelligendum autem quid vocet [Philosophus] *prima contraria*, considerandum est quod quaedam contraria sunt quae ex aliis contrariis causantur, sicut dulce et amarum causantur ex humido et sicco et calido et frigido: sic autem non est procedere in infinitum, sed est devenire ad aliqua contraria quae non causantur ex aliis contrariis, et haec vocat prima contraria.”

<sup>60</sup> *In Physic.* 1, l. 10, n. 3 (cf. ARISTOTLE, *Physica* A.5, 188a30–31): “His igitur primis contrariis tres praedictae conditiones conveniunt principiorum. Ex eo enim quod prima sunt, manifestum est quod non sunt ex aliis; ex eo vero quod contraria sunt, manifestum est quod non sunt ex alterutris: quamvis enim frigidum fiat ex calido in quantum id quod prius est calidum postea fit frigidum, tamen ipsa frigiditas nunquam fit ex caliditate, ut postea dicitur. Tertium vero, qualiter omnia fiant ex contrariis, oportet diligentius investigare.”

insofar as that which is priorly hot thereafter comes to be cold, however, coldness itself never comes to be from hotness; **(3)** the third (condition)—how all (others) should come to be from contraries—must be diligently investigated (as shown in the ensuing sections).

#### 45.11. First Contrariety in One Genus

In one genus there is one first contrariety (i.e., since contrariety is the perfect difference; ►43.7).<sup>61</sup>

However, in the same genus there can be other contrarieties after the first, either:<sup>62</sup>

**1. By mode of subdivision**, as in the genus of *body* the first contrariety is *animate* and *inanimate*; and contrarieties are multiplied in the genus of *body*, since *animate body* is divided into *sensible* and *insensible*; and thereafter, *sensible* (is divided) into *rational* and *irrational*.<sup>63</sup>

**2. Accidentally**, as in the genus of *body* there is contrariety of black and white, and of other (accidents) insofar as they can happen to a body.<sup>64</sup>

#### 45.12. The Subject of Contrariety

**Subject of contrariety** can be taken in two modes:<sup>65</sup>

**1. The genus itself**, which is compared to contrary differences as potency to act.<sup>66</sup>

**2. The substance** that is the subject of the genus of which the contrarieties are.<sup>67</sup> For example, when we say that *colored body* is the subject of *white* and of *black*.

#### 45.13. Neither One nor Infinite Principles

Having inquired about the contrariety of principles,<sup>68</sup> ARISTOTLE inquires about their number—namely, whether they are two, three or many—, excluding, first, those (cases)

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<sup>61</sup> *In De anima* 2, c. 22, 85–87: “Ostensum est autem in IX Methaphisice quod in uno genere est una prima contrarietas.”

<sup>62</sup> *In De anima* 2, c. 22, 91–92: “Possunt tamen in uno genere esse plures contrarietates post primam.”

<sup>63</sup> *In De anima* 2, c. 22, 92–98: “uel per modum subdivisionis, sicut in genere corporum prima contrarietas est animati et inanimati et, quia animatum corpus diuiditur per sensibile et insensibile et ulterius sensibile per rationale et irrationale, multiplicantur contrarietates in genere corporis.”

<sup>64</sup> *In De anima* 2, c. 22, 98–101: “uel sont plures contrarietates unius generis per accidens, sicut in genere corporis est contrarietas albi et nigri et <alio> secundum omnia que corpori accidere possunt.”

<sup>65</sup> *In De anima* 2, c. 22, 108–109: “Potest enim accipi [subiectum].”

<sup>66</sup> *In De anima* 2, c. 22, 109–111: “uno modo subiectum contrarietatis ipsum genus quod comparatur ad differencias contrarias sicut potencia ad actum.”

<sup>67</sup> *In De anima* 2, c. 22, 111–115: “alio modo potest accipi subiectum contrarietatis substancia que est subiectum generis cuius sunt contrarietates, sicut si dicamus quod corpus coloratum est subiectum albi et nigri.”

<sup>68</sup> *In Physic.* 1, l. 11, n. 1 (cf. ARISTOTLE, *Physica* A.6, 189a11–12): “Postquam inquisivit Philosophus de contrarietate principiorum, hic incipit inquirere de numero eorum. Et circa hoc tria facit: primo movet

that do not fall under the question, (showing) that there should not be only one principle and that there should not be infinite (principles).

Thus, he says first that it is impossible for there to be only one principle, for it has been shown that principles are contraries; and contraries are not only one, since nothing is contrary to itself.<sup>69</sup> Therefore, principles are not only one.

Then, ARISTOTLE shows through four reasons that there are not infinite principles:<sup>70</sup>

1. The infinite as such is unknown.<sup>71</sup> Hence, if there are infinite principles, they must be unknown; but (if) principles (are) unknown, those that are from them (i.e., those that follow upon them) are unknown. Therefore, (if principles should be infinite) it follows that nothing in the world can be known.

2. Principles must be first contraries; and first contraries are of the first genus, which is substance (i.e., substance is the first subject of contraries; ►45.12; and it is also first in time, in cognition, and in definition; ►33.13).<sup>72</sup> Now, since substance is one genus, it has one first contrariety, for the first contrariety of whatever genus is (the contrariety) of the first differences whereby the genus is divided. Therefore, there are not infinite principles.

3. What can come to be through finite (principles) is to be posited to come to be through finite (principles) rather than through infinite (principles); and the *ratio* of all those that come to be according to nature is assigned through finite principles according to EMPEDOCLES, and through infinite principles according to ANAXAGORAS.<sup>73</sup> Therefore, principles are not to be posited to be infinite.

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quaestionem [...]. Dicit ergo primo quod post inquisitionem de contrarietate principiorum, consequens est inquirere de numero eorum, utrum scilicet sint duo aut tria aut plura.” Ibid., n. 2 (cf. ARISTOTLE, *Physica* A.6, 189a12–20): “excludit ea quae non cadunt sub quaestione: et primo quod non sit tantum unum principium; secundo quod non sint infinita.”

<sup>69</sup> *In Physic.* 1, l. 11, n. 2 (cf. ARISTOTLE, *Physica* A.6, 189a12): “Dicit ergo [Philosophus] primo quod impossibile est esse unum principium tantum. Ostensum est enim quod principia sunt contraria; sed contraria non sunt unum tantum, quia nihil est sibi ipsi contrarium; ergo principia non sunt unum tantum.”

<sup>70</sup> *In Physic.* 1, l. 11, n. 3 (cf. ARISTOTLE, *Physica* A.6, 189a13–20): “ostendit [Philosophus] quod non sunt infinita principia quatuor rationibus.”

<sup>71</sup> *In Physic.* 1, l. 11, n. 3 (cf. ARISTOTLE, *Physica* A.6, 189a12–13): “quarum prima talis est. Infinitum in quantum huiusmodi est ignotum; si igitur principia sunt infinita, oportet ea esse ignota: sed ignoratis principiis, ignorantur ea quae sunt ex eis; ergo sequitur quod nihil in mundo possit sciri.”

<sup>72</sup> *In Physic.* 1, l. 11, n. 4 (cf. ARISTOTLE, *Physica* A.6, 189a13–14): “Secundam rationem ponit [Philosophus...]: quae talis est. Principia oportet esse prima contraria, ut supra ostensum est; prima autem contraria sunt primi generis, quod est substantia; substantia autem, cum sit unum genus, habet unam primam contrarietatem: prima enim contrarietas cuiuslibet generis est primarum differentiarum, per quas dividitur genus; ergo non sunt infinita principia.”

<sup>73</sup> *In Physic.* 1, l. 11, n. 5 (cf. ARISTOTLE, *Physica* A.6, 189a14–17): “Tertiam rationem ponit [Philosophus...]: quae talis est. Quod potest fieri per finita, magis est ponendum per finita fieri quam per infinita; sed ratio omnium quae fiunt secundum naturam, assignatur secundum Empedoclem per principia finita, sicut per Anaxagoram per principia infinita; ergo non est ponendum principia esse infinita.”

4. Contraries are principles.<sup>74</sup> Hence, if principles are infinite, all contraries must be principles; but not all contraries are principles. Which is evident from two (reasons): **(a)** because principles must be the first contraries, and not all contraries are first, since some are prior; **(b)** because principles must not be one from another, and some contraries come to be (one contrary) from the other, as sweet and bitter, and white and black. Therefore, principles are not infinite.

And thus, ARISTOTLE concludes that principles are neither only one nor infinite.<sup>75</sup>

However, it is to be considered that ARISTOTLE proceeds here from more probable (reasons) according to disputation (*disputative*).<sup>76</sup> Whence, he assumes those (reasons) that seem (to be true) to most (thinkers), which cannot be false according to the whole, are true (perhaps only) according to a part. Thus, it is somehow true that contraries come to be from each other, as has been said (§4, b), if the subject is taken with the contraries: for that which is white comes thereafter to be black; yet, whiteness itself is not converted into blackness. Nonetheless, some ancient (philosophers) posited that, not even co-assuming a subject, first contraries come to be from one another; whence, EMPEDOCLES denied that elements come to be from each other. And hence, ARISTOTLE does not expressly (*signanter*) say that the hot comes to be from the cold, but (that) the sweet (comes to be) from the bitter; and the white from the black.

#### 45.14. Not Two Principles, but Three

ARISTOTLE shows that principles are not only two, but three.<sup>77</sup> He posits three reasons:

1. Since principles are contraries, they must be two—at least. Therefore, it remains to consider whether they are only two or more than two. And since it has been shown that

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<sup>74</sup> *In Physic.* 1, l. 11, n. 6 (cf. ARISTOTLE, *Physica* A.6, 189a17–20): “Quartam rationem ponit [Philosophus...]: quae talis est. Principia sunt contraria, si igitur principia sunt infinita, oportet omnia contraria esse principia. Sed non omnia contraria sunt principia. Quod patet ex duobus: primo quidem quia principia oportet esse prima contraria, non autem omnia contraria sunt prima, cum quaedam sint aliis priora; secundo quia principia non debent esse ex alterutris, ut supra dictum est, contraria autem quaedam fiunt ex alterutris, ut dulce et amarum, et album et nigrum. Non ergo principia sunt infinita.”

<sup>75</sup> *In Physic.* 1, l. 11, n. 6 (cf. ARISTOTLE, *Physica* A.6, 189a20): “Et sic ultimo concludit [Philosophus] quod principia non sunt unum tantum, neque infinita.”

<sup>76</sup> *In Physic.* 1, l. 11, n. 7: “Considerandum est autem quod Philosophus hic disputative procedit ex probabilibus. Unde assumit ea quae videntur pluribus, quae non possunt esse falsa secundum totum, sed sunt secundum partem vera. Verum est igitur quodammodo quod contraria fiunt ex invicem, ut supra dictum est, si sumatur subiectum cum contrariis; quia id quod est album, postea fit nigrum: sed tamen ipsa albedo non convertitur in nigredinem. Sed quidam antiquorum ponebant quod nec etiam coassumendo subiectum, prima contraria fiunt ex invicem: unde Empedocles negabat elementa fieri ex invicem. Et ideo Aristoteles hic signanter non dicit calidum fieri ex frigido, sed dulce ex amaro et album ex nigro.”

<sup>77</sup> *In Physic.* 1, l. 11, n. 8 (cf. ARISTOTLE, *Physica* A.6, 189a21–27): “prosequitur [Philosophus] illud quod erat in quaestione, scilicet in quo numero sint principia. [...] primo ostendit quod non sunt duo tantum principia, sed tria [...] primo ostendit per rationes non esse tantum duo principia, sed oportere addi tertium.” *Ibid.*, n. 9: “Circa primum: ponit tres rationes.”

contraries are principles, it seems that there are only two principles, since contrariety is between two extremities (► 43.7).<sup>78</sup>

However, others must come to be from principles; and if there should only be two contrary principles, it is not apparent in what mode all (things) should come to be from these two.<sup>79</sup> For it cannot be said that one of them produces (*facit*) something from the other. Thus, neither is density (*densitas*) naturally apt to convert lack of density (*raritas*) into something, nor is lack of density (naturally apt to convert) density (into something). And the same is (true) concerning any other contrariety, for concord does not move discord and brings about something from it; or conversely. Rather, some third (thing) transmutes one and the other of the (two) contraries: the subject of one and of the other. Thus, the hot does not make coldness itself to be hot: rather, (it makes) the subject of coldness (to be hot); or conversely.

Therefore, it seems that, in order for others to come to be from contraries, some third (thing) must be posited, which should be the subject of the contraries.<sup>80</sup> Whether that subject should be one or many is not important for the present (argument). Indeed, some (ancient philosophers) posited multiple material principles from which they prepare the nature of beings, for they used to say that only matter is the nature of things.

**2.** If something other than the contraries that are posited is not supposed, there arises a greater question (i.e., difficulty) than the above-posed, for the first principle cannot be some accident said of the subject.<sup>81</sup> Indeed, since the subject should be the principle of

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<sup>78</sup> *In Physic.* 1, l. 11, n. 9 (cf. ARISTOTLE, *Physica* A.6, 189a21–22): “Dicit ergo [Philosophus] primo quod cum ostensum sit quod principia sunt contraria, et ita non possit esse tantum unum principium, sed duo ad minus; nec iterum sint infinita principia; restat considerandum utrum sint duo tantum, vel plura duobus. Quantum enim ad hoc quod supra ostensum est, quod contraria sunt principia, videtur quod sint duo tantum principia; quia contrarietas est inter duo extrema.”

<sup>79</sup> *In Physic.* 1, l. 11, n. 9 (cf. ARISTOTLE, *Physica* A.6, 189a22–26): “Sed in hoc *deficiet aliquis*, id est dubitabit. Oportet enim quod ex principiis fiant alia, ut supra dictum est: si autem sint tantum duo contraria principia, non videtur quomodo ex illis duobus possint omnia fieri. Non enim potest dici quod unum eorum facit aliquid ex reliquo: non enim densitas nata est convertere ipsam raritatem in aliquid, neque raritas densitatem. Et similiter est de qualibet alia contrarietate: non enim concordia movet discordiam et facit aliquid ex ipsa, neque e converso. Sed utrumque contrariorum transmutat aliquid tertium, quod est subiectum utriusque. Calidum enim non facit esse calidam ipsam frigiditatem, sed subiectum frigiditatis: nec e converso.”

<sup>80</sup> *In Physic.* 1, l. 11, n. 9 (cf. ARISTOTLE, *Physica* A.6, 189a25–27): “Videtur ergo quod oporteat poni aliquid tertium, quod sit subiectum contrariorum, ad hoc quod ex contrariis alia possint fieri. Nec refert quantum ad praesens pertinet, utrum illud subiectum sit unum vel plura. Quidam enim posuerunt plura principia materialia, ex quibus praeparant naturam entium: non enim dicebant esse naturam rerum nisi materiam, ut infra in secundo dicitur.”

<sup>81</sup> *In Physic.* 1, l. 11, n. 10 (cf. ARISTOTLE, *Physica* A.6, 189a27–31): “Secundam rationem ponit [Philosophus...]: et dicit quod nisi contrariis quae ponuntur esse principia, supponatur aliquid aliud, surget maior dubitatio quam praemissa. Primum enim principium non potest esse accidens aliquid de subiecto dictum: cum enim subiectum sit principium accidentis quod de eo praedicatur, et sit eo prius naturaliter, sequeretur si primum principium esset accidens de subiecto praedicatum, quod principii esset principium, et quod primo esset aliquid prius.”

the accident that is predicated of it, and be naturally prior to it, it would follow—if the first principle should be an accident (that is) predicated of the subject—that there would be a principle of the principle; and that there would be something prior to the first.

Thus, if we should posit only contraries to be principles, the principle must be some accident said of the subject, since no substance of something is contrary to another (substance): rather, there is contrariety only between accidents.<sup>82</sup> Hence, it remains that contraries alone cannot be principles.

However, it is to be considered that, in this argument, *predicate* (< τοῦ κατηγορουμένου) is used for *accident*, since the predicate designates a form of the subject, and the ancients believed all forms to be accidents.<sup>83</sup> Here, ARISTOTLE proceeds disputatively, from probable propositions that were famous among the ancients.

3. Everything that is not a principle must be from principles.<sup>84</sup> Hence, if only contraries are principles, it follows—since substance is not contrary to substance—that substance should be from non-substances (i.e., not from the privation but from the absolute negation of substance). And in this way, what is not substance should be prior to substance, since what is from some things is posterior to them. Yet, this is impossible, for the first genus of being is substance, which is being by itself (►33.10). Hence, it is not possible that contraries alone should be principles. Rather, some third (thing) must be posited.

#### 45.15. Not More Than Three Principles

ARISTOTLE shows through two reasons that there are not more than three principles:<sup>85</sup>

1. It would be superfluous for that which can come to be by fewer (principles) to come to be by more (►45.1).<sup>86</sup> Yet, the whole generation of natural things can be completed

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<sup>82</sup> *In Physic.* 1, l. 11, n. 10 (cf. ARISTOTLE, *Physica* A.6, 189a31–32): “Sed si ponamus sola contraria esse principia, oportet principium esse aliquod accidens de subiecto dictum: quia nullius rei substantia est contraria alteri, sed contrarietas solum est inter accidentia. Relinquitur igitur quod non possunt sola contraria esse principia.”

<sup>83</sup> *In Physic.* 1, l. 11, n. 10 (cf. ARISTOTLE, *Physica* A.6, 189a32): “Considerandum autem quod in hac ratione utitur praedicato pro accidente, quia praedicatum designat formam subiecti, antiqui autem credebant omnes formas esse accidentia; hic autem procedit [Philosophus] disputative ex propositionibus probabilibus quae erant apud antiquos famosae.”

<sup>84</sup> *In Physic.* 1, l. 11, n. 11 (cf. ARISTOTLE, *Physica* A.6, 189a32–34): “Tertiam rationem ponit [Philosophus...]: quae talis est. Omne quod non est principium, oportet esse ex principiis: si igitur sola contraria sint principia, sequetur, cum substantia non sit contraria substantiae, quod substantia sit ex non substantiis; et sic quod non est substantia sit prius quam substantia, quia quod est ex aliquibus est posterius eis. Hoc autem est impossibile: nam primum genus entis est substantia, quae est ens per se. Non igitur potest esse quod sola contraria sint principia; sed oportet ponere aliquid aliud tertium.”

<sup>85</sup> *In Physic.* 1, l. 11, n. 8 (cf. ARISTOTLE, *Physica* A.6, 189b18–27): “ostendit [Philosophus] quod non sunt plura [principia tribus].” *Ibid.*, n. 14: “ostendit quod non sunt plura principia tribus, duabus rationibus.”

<sup>86</sup> *In Physic.* 1, l. 11, n. 14 (cf. ARISTOTLE, *Physica* A.6, 189b18–22): “quarum prima talis est. Quod potest fieri per pauciora, superfluum est si fiat per plura; sed tota generatio rerum naturalium potest compleri ponendo unum principium materiale et duo formalia, quia ad patiendum sufficit unum materiale

positing one material principle and two formal (principles), since one material principle suffices for affection. On the other hand, if there should be four contrary principles and two first contrarieties, each of the (two) contrarieties would need to have a diverse subject, since the first subject of one contrariety seems to be one. And thus, it seems superfluous that other contrarieties should be posited if things can come to be—one from the other—by the two contraries and the one subject posited. Hence, no more than three principles are to be posited.

2. If there are more principles than three, there must be multiple first contrarieties.<sup>87</sup> Yet, this is impossible, since the first contrariety seems to belong to the first genus, which is one: namely, substance. Whence, all contraries that are in the genus of substance do not differ in genus; rather, they are related according to prior and posterior, since in one genus there is only one contrariety—namely, the first, since all other contrarieties seem to be reduced to one first, for there are some first contrary differences by which a genus is divided. Therefore, it seems that there should not be more principles than three.

However, it is to be considered that one and the other (of these two reasons)—namely, both, that there should not be contrariety in substances and that there should be one first contrariety in substances—is said probably.<sup>88</sup> Indeed, if that which substance is should be taken, there is nothing contrary to it; but if formal differences should be taken in the genus of substance, contrariety is found in them (e.g., between *rational* and *irrational*).

#### 45.16. Are the Principles and Causes of All Beings the Same?

It is evident that if the principles of substances and of other genera should be the same, (as soon as) the principles of substance (are) assigned, the principles of all other genera have been assigned.<sup>89</sup> Hence, ARISTOTLE inquires whether they should be the same or diverse (for each genus, *alia et alia*).

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principium. Sed si essent quatuor principia contraria, et duae primae contrarietates, oporteret quod utraque contrarietas haberet aliud et aliud subiectum: quia unum subiectum videtur esse primo unius contrarietatis. Et sic, si duobus contrariis positis et uno subiecto, possunt res fieri ad invicem, superfluum videtur quod ponatur alia contrarietas. Non igitur ponenda sunt plura quam tria principia.”

<sup>87</sup> *In Physic.* 1, l. 11, n. 15 (cf. ARISTOTLE, *Physica* A.6, 189b22–27): “Secundam rationem ponit [Philosophus...]: quae talis est. Si plura sunt principia quam tria, oportet esse plures primas contrarietates. Sed hoc est impossibile, quia prima contrarietas videtur esse primi generis, quod est unum, scilicet substantia. Unde omnia contraria quae sunt in genere substantiae non differunt genere, sed se habent secundum prius et posterius; quia in uno genere est tantum una contrarietas, scilicet prima, eo quod omnes aliae contrarietates videntur reduci ad unam primam; sunt enim aliquae primae differentiae contrariae quibus dividitur genus. Ergo videtur quod non sint plura principia quam tria.”

<sup>88</sup> *In Physic.* 1, l. 11, n. 15: “Considerandum est autem quod utrumque probabiliter dictum est, scilicet et quod in substantiis non sit contrarietas, et quod in substantiis sit una contrarietas prima. Si enim accipiat ipsum quod est substantia, nihil est ei contrarium: si vero accipiantur formales differentiae in genere substantiae, contrarietas in eis invenitur.”

<sup>89</sup> *In Metaph.* 12, l. 4 §2455 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070a31–1071b2): “Postquam Philosophus determinavit de principiis substantiae sensibilis, nunc intendit inquirere *utrum sint eadem principia*

Thus, he says that, in some mode, both the principles and the causes of diverse (beings) are diverse (τὰ αἴτια καὶ αἱ ἀρχαὶ ἄλλα ἄλλων ἔστιν ὥς); and in some mode, (both the principles and the causes) of all (beings) are the same (ταύτὰ πάντων): (to wit), according to universality and according to proportion (*secundum universalitatem, et secundum proportionem* < ἂν καθόλου λέγη τις καὶ κατ' ἀναλογίαν).<sup>90</sup>

There is, however, the question whether the principles (and the elements, αἱ αὐταὶ ἀρχαὶ καὶ στοιχεῖα) of substances, of those (beings) that are said (in relation) to something (*ad aliquid*), and likewise, of the other categories, should be the same or diverse (for each of the genera, *alia et alia*).<sup>91</sup> He posits (the question) especially concerning the relative (*ad aliquid* = πρὸς τι) because those (beings) that are (in relation) to something seem to be more remote from substance than the other genera, for they are of a weaker (act of) being (*sunt debilioris esse*; ► 37.17).

Thus, ARISTOTLE posits two reasons to object against the proposed (solution to the) question, (which solutions contend) that the principles of substance and of the other genera are not the same:<sup>92</sup>

1. If the principles of substance and of the other genera should be the same, then either those principles would have to be apart from substance and the other genera (*praeter substantiam et alia genera* = παρὰ... τὴν οὐσίαν καὶ τᾶλλα τὰ κατηγορούμενα), or they would have to be in the genus of substance or in some other genus.<sup>93</sup>

Yet, it cannot be said that (the principles of all genera) should be outside (*extra*) of substance and of the other categories, since they would have to be prior both to substance and to the other categories.<sup>94</sup> Indeed, a principle is prior to those that are (i.e., proceed)

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*substantiarum et aliorum generum, aut alia et alia. Manifestum enim est, quod si sunt eadem, assignatis principiis substantiae, assignata sunt principia omnium aliorum generum.*"

<sup>90</sup> *In Metaph.* 12, l. 4 §2455 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070a31–33): "Dicit ergo [Philosophus] primo, quod quodammodo sunt alia aliorum et principia et causae, et quodammodo sunt eadem omnium, secundum universalitatem, et secundum proportionem."

<sup>91</sup> *In Metaph.* 12, l. 4, §2455 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070a33–35): "Philosophus [...] subiungit inquisitionem de veritate proposita." Ibid., §2456: "*Inquirendo discutit veritatem praemissam* [...]. Primo movet dubitationem. [...] Dicit ergo primo, quod dubitatio est, utrum substantiarum, et eorum quae sunt ad aliquid, et similiter aliorum praedicamentorum, sint eadem principia, aut alia et alia." Ibid., 2457: "Et ponit specialiter de ad aliquid, quia ea quae sunt ad aliquid, remotiora videntur esse a substantia quam alia genera, ex eo quod sunt debilioris esse."

<sup>92</sup> *In Metaph.* 12, l. 4, §2456 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070a35–b10): "obiicit [Philosophus] ad quaestionem." Ibid., §2458: "*Obiicit ad propositam quaestionem*; et ponit duas rationes ad ostendendum, quod non sunt eadem principia substantiae et aliorum generum."

<sup>93</sup> *In Metaph.* 12, l. 4, §2458 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070a35–b3): "Quarum prima talis est. Si eadem sint principia substantiae et aliorum generum, aut oportet quod illa principia eadem sint praeter substantiam et alia genera, aut oportet quod sint in genere substantiae, vel in aliquo alio genere."

<sup>94</sup> *In Metaph.* 12, l. 4, §2459 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b1–2): "Sed non potest dici, quod sint extra substantiam et alia praedicamenta; quia oportet quod essent priora tam substantia quam aliis"



from the principle. Therefore, since that which is prior should be found to be more common—as *animal* is prior to *man* (i.e., because the ratio of *man* depends on that of *animal*)—, it follows that, if something is prior to substance and to the other genera, something would be common to substance and to the other genera; (this), above all, according to the opinion of Platonists, who posited that universals are principles, and (that the Ideas of) One and Being (are) as the most common principles of all.

Nor can it be said that the most common principles of all genera should be in the genus of substance, in the genus of relation, or in some other genus.<sup>95</sup> Indeed, since principles are homogeneous with those that are from them (i.e., because measure and measured are in some mode in the same genus; ►28.6; 28.8; at least by reduction; ►29.10), it does not seem possible that substance should be the principle of those (beings) that are (in relation) to something—or conversely (e.g., it seems impossible that the relative should be the principle of substance).

Hence, (it seems that) the principles of substance and of the other genera are not the same.<sup>96</sup>

2. No element is the same with that which is composed from elements, since nothing is a cause or an element of itself.<sup>97</sup> For example, an element of the syllable *ba* is the letter *b* or (the letter) *a* (but the syllable itself, *ba*, is not an element).

Since this (argument) would seem to have force in the principles posited by PLATO,<sup>98</sup> which are (the Ideas of) One and Being (*unum et ens* < τὸ ὄν ἢ τὸ εἶν), for any one of the things that proceed from a principle (*unumquodque principiatorum*) is (something) one and (is)

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praedicamentis. Prius enim est principium his quae sunt a principio. Cum ergo id quod est prius, inveniatur esse communius, sicut animal est prius homine, sequitur, si aliquid est prius substantia et aliis generibus, quod aliquid sit commune substantiis et aliis generibus, et praecipue secundum opinionem Platoniorum, qui posuerunt universalis esse principia, et unum et ens quasi communissima esse principia omnium.”

<sup>95</sup> *In Metaph.* 12, l. 4, §2460 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b3–4): “Neque etiam potest dici, quod principia communissima omnium generum sint in genere substantiae, aut in genere ad aliquid, vel in aliquo alio genere. Cum enim principia sint homogenea his quae sunt ab eis, non videtur possibile quod substantia sit principium eorum quae sunt ad aliquid, aut e converso.”

<sup>96</sup> *In Metaph.* 12, l. 4, §2460: “Non igitur eadem sunt principia substantiae et aliorum generum.”

<sup>97</sup> *In Metaph.* 12, l. 4, §2461 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b4–7): “Secundam rationem ponit [Philosophus.] Quae talis est. Nullum elementum est idem cum eo quod ex elementis est compositum: quia nihil est causa aut elementum suiipsius; sicut huius syllabae BA, elementum est haec litera B aut A.”

<sup>98</sup> *In Metaph.* 12, l. 4, §2462 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b7–8): “Et quia videbatur hoc habere instantiam in principiis a Platone positis, quae sunt unum et ens, eo quod unumquodque principiatorum est unum et ens; ideo consequenter hoc excludit [Philosophus], dicens, quod neque etiam intellectualium elementorum, quae sunt unum et ens, possibile est aliquod esse idem cum his quae sunt ex elementis. Vocat autem ea intellectualia, quia universalis intellectu percipiuntur, et quia Plato ea ponebat separata a sensibilibus.”

a being, ARISTOTLE consequently excludes this. He says that not even of the intellectual elements (< τῶν νοητῶν στοιχειόν), which are One and Being, is it possible for something to be the same with those (beings) that are (composed) from elements. He calls them *intellectual* because universals are perceived by the intellect, and because PLATO posited them (to be) separated from sensible (things).

ARISTOTLE proves that such elements should be other than those (composites) of which the elements are.<sup>99</sup> For such elements—that is, *one* and *being*—are in each of the (things that are) composed from them; and none of the (things that are) composed from them is in others. Whence, it is evident that these elements differ from those (composites) that are composed from them. Hence, if it is true that elements are not the same with those that are (composed) from the elements, (and) if the elements of substances and of other genera should be the same, it follows that none of them should be in the genus of substance or in the other genera. But this is impossible, since it is necessary, for everything that is, to be in some genus. Hence, it is not possible that the principles of all (beings) should be the same.

#### 45.17. Modes in Which Principles Are or Are Not the Same for All Things

As ARISTOTLE says, to inquire whether the principles and elements of the (diverse) genera—of relatives, of qualities, and of the other genera—should be the same or diverse, is to inquire of (things that are) said in multiple modes, since the principles of diverse (things) are the same—and not diverse—only in some mode.<sup>100</sup>

Indeed, the principles of all (things) are in some mode the same:<sup>101</sup> either **(1)** according to proportion, as if we say that in whatever genus some (principles) are found that are related as matter, form, privation, and mover; or **(2)** because the causes of substances are the causes of all (things; ► 46), since (if) they are destroyed, the others are destroyed; or

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<sup>99</sup> *In Metaph.* 12, l. 4, §2463 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b8–10): “Et quod huiusmodi elementa sint alia ab eis quorum sunt elementa, probat, quia huiusmodi elementa, idest unum et ens, insunt singulis compositorum ex eis, nullum autem compositorum ex eis inest aliis. Unde patet, quod et ista elementa differunt ab his quae sunt composita ex eis. Si igitur verum est quod elementa non sunt idem cum his quae sunt ex elementis, si eadem sunt elementa substantiarum et aliorum generum, consequitur, quod nihil eorum sit in genere substantiae, neque in aliis generibus. Sed hoc est impossibile; quia necesse est omne quod est, esse in aliquo genere: non igitur possibile est, quod sint eadem principia omnium.”

<sup>100</sup> *In Metaph.* 12, l. 4, §2484 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a29–33): “*Recapitulat* [Philosophus] *ea quae dicta sunt* in hoc capitulo. Dicit ergo, quod quaerere utrum sint eadem principia et elementa generum et ad aliquid et qualitatum et aliorum generum, aut diversa, est quaerere de multipliciter dictis; quia diversorum non sunt eadem principia, sed diversa, nisi quodammodo.”

<sup>101</sup> *In Metaph.* 12, l. 4, §2485 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a33–36): “Omnium enim quodammodo sunt eadem principia, aut secundum proportionem; sicut si dicamus, quod in quolibet genere inveniuntur aliqua quae se habent ut materia et forma et privatio et movens; aut eo quod causae substantiarum sunt causae omnium, quia destructis eis, alia destruuntur. Aut quia principia «sunt endelechia,» idest actus et potentia. Istis autem tribus modis sunt eadem principia omnium.”

(3) because act and potency are principles (►45.22). In these three modes, the principles of all (things) are the same.

In another mode, however, the principles (of all things) are diverse: because *contraries*, which are the principles of things, and *matter* itself, are not said univocally, since they are not genera; nor are they said in multiple modes as (though they would be) equivocal.<sup>102</sup> And hence, we cannot say that they are the same simply, but according to analogy.

ARISTOTLE solves the posed question showing first that the principles of all (beings) are the same proportionately (►45.18); then, that they are the same universally (►45.23).<sup>103</sup>

### 45.18. The Intrinsic Causes of All Beings Are the Same Proportionately

To show that the principles of all (beings) are the same proportionately in respect of intrinsic causes, ARISTOTLE says first that, in some mode, it is true to say (that) the principles of all (beings are) the same; but in some (other) mode (it is) not (true).<sup>104</sup>

For example, we could posit that—perhaps—*hot* should be a principle of sensible bodies as a species and a form; (that) *cold* (should be a principle of sensible bodies) as a privation; and that the matter of sensible bodies should be that which is according to itself in potency of these two (i.e., in potency of being hot and of being cold), for matter taken according to itself is a principle susceptible of form and of privation.<sup>105</sup>

ARISTOTLE says *perhaps* (*forsan* = ἴσως) because hot is not the substantial form of sensible bodies; nor is cold a privation (of a substantial form): rather, they are both qualities.<sup>106</sup> However, he uses them as form and privation in the genus of substance to

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<sup>102</sup> *In Metaph.* 12, l. 4, §2486 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a36–b1): “Alio autem modo sunt diversa principia; quia contraria, quae sunt principia rerum, et ipsa materia, non univoce dicuntur, quia non sunt genera; nec etiam dicuntur multipliciter quasi aequivoca; et ideo non possumus dicere quod sunt eadem simpliciter, sed secundum analogiam.”

<sup>103</sup> *In Metaph.* 12, l. 4, §2456 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b10–1071a29): “determinat [Philosophus] veritatem.” Ibid., §2464: “Solvit propositam dubitationem. Et circa hoc duo facit. Primo ostendit, quod eadem sunt principia omnium proportionaliter. Secundo, quod eadem sunt universaliter [...]. Haec enim duo supra posuerat, dicens quod principia sunt eadem omnium universaliter et secundum proportionem.”

<sup>104</sup> *In Metaph.* 12, l. 4, §2464 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b10–11): “Primo ostendit [Philosophus], quod eadem sunt principia omnium proportionaliter. [...] Primo ostendit quomodo proportionaliter sunt eadem. [...] Primo ostendit, quod proportionaliter sunt eadem principia omnium quantum ad causas intrinsecas. [...] Dicit ergo primo, quod quodammodo est verum dicere omnium eadem principia, et quodammodo non.”

<sup>105</sup> *In Metaph.* 12, l. 4, §2465 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b11–13): “Et hoc ostendit [Philosophus] dicens: sicut si ponamus quod sensibilibium corporum sit principium, tamquam species et forma calidum, et tamquam privatio frigidum, et materia sensibilibium corporum sit id quod est secundum se in potentia ad haec duo. Nam materia secundum se sumpta est principium susceptivum formae et privationis.”

<sup>106</sup> *In Metaph.* 12, l. 4, §2465 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b11; 13–14): “Dicit autem [Philosophus], forsā, quia calidum non est forma substantialis corporum sensibilibium, neque frigidum est privatio, sed ambo sunt qualitates. Utitur tamen eis tamquam forma et privatione in genere substantiae

better manifest this (*ad maiorem manifestationem*; note the distinctions made above; ►45.11; 45.12). Whence, he adds that substances, too, are such principles: not as species in a genus, but as principles.

Thus, the principles and elements of simple bodies, and of (the compound bodies that are) composed from them, are (analogically and universally) the same.<sup>107</sup> However, the proximate principles of diverse (beings) are diverse (*aliorum sunt alia proxima principia*), since they are the same for all only proportionately (*proportionaliter < proportionabiliter = τῷ ἀνάλογον*).

Likewise, if someone should say that, in the generation of simple bodies (i.e., of the elements), just as the three aforesaid (principles)—namely, hot, cold, and their subject—are related as form, privation, and matter, so these three (principles), which are related as form, privation and matter (*forma, privatio et materia = τὸ εἶδος καὶ ἡ στέρησις καὶ ἡ ὕλη*), are (found) in whatever other genus.<sup>108</sup>

For example, in the genus of colors, white is like the species (►9.5), black (is) like privation (►42.9), and surface (is) like the matter and subject (►14.7; 14.1).<sup>109</sup> And in the genus of distinction of time (of the day), light is as the species, darkness is like the privation, and air is like the matter and subject—the three principles from which day and night are constituted.

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ad maiorem manifestationem. Unde subiungit, quod et huiusmodi principia sunt substantiae, non sicut species in genere, sed sicut principia.” As St. Thomas explains, ARISTOTLE provides another example taken from the speculations of ancient natural philosophers, according to which everything that is hot in the sublunar world comes from the element fire, while everything that is cold comes from the element water. Thus—he explains—again, (the same principles apply to) those that are (composed) from them, of which these are the principles: namely, fire and water, if we also understand that fire should be composed from hot as from (its) form and (from its) proper matter; and (that) water (should be composed) from cold as from the privation (of hot) and (from the same) matter. Or, also, if something *one* should come to be from hot and cold compounded, its principles are the aforesaid: namely, hot, cold, and their matter, since it is necessary for that which comes to be from hot and cold to be something diverse from them—namely, (diverse from) hot and cold—and (diverse) from the first bodies, the forms of which we imagine to be these. *In Metaph.* 12, l. 4, §2466 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b14–16): “Et iterum illa quae sunt ex his, quorum haec sunt principia, scilicet ignis et aqua: ac si intelligamus quod ignis componatur ex calido, sicut forma et propria materia, et aqua ex frigido, sicut ex privatione et materia. Aut etiam si aliquid unum fit ex calido et frigido commixtis, eorum sunt praedicta principia, scilicet calidum et frigidum et materia eorum; quia necesse est id quod fit ex calido et frigido, esse aliquid diversum ab illis, scilicet calido et frigido, et a primis corporibus, quorum imaginamur haec esse formas.”

<sup>107</sup> *In Metaph.* 12, l. 4, §2467 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b16–18): “Sic igitur horum, scilicet simplicium corporum, et compositorum ex eis, sunt eadem principia et elementa. Sed aliorum sunt alia proxima principia. Non autem omnium sunt eadem nisi proportionaliter.”

<sup>108</sup> *In Metaph.* 12, l. 4, §2467 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b18–20): “Sicut si aliquis dicat quod sicut praedicta tria, scilicet calidum et frigidum et subiectum eorum, se habent in generatione corporum simplicium ut forma et privatio et materia, ita in quolibet alio genere illa tria sunt, quae se habent ut forma, privatio et materia; sed ista diversa sunt in diversis generibus.”

<sup>109</sup> *In Metaph.* 12, l. 4, §2467 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b20–21): “Sicut in genere colorum, album est sicut species, nigrum sicut privatio, et superficies sicut materia et subiectum. Et in genere distinctionis temporum, lumen est sicut species, tenebrae sicut privatio, aer sicut materia et subiectum. Ex quibus tribus principiis constituuntur dies et nox.”

#### 45.19. The Four Parts of *Principle*

ARISTOTLE shows that the principles of all (beings) are proportionately the same (also) in respect of intrinsic and extrinsic causes simultaneously, reckoning four in all.<sup>110</sup>

Hence, he says that, since there are not only those causes that are intrinsic to the thing, but also those that are outside the thing, such as the moving (cause), it is manifest that *principle* and *element* differ (< δῆλον ὅτι ἕτερον ἀρχὴ καὶ στοιχεῖον).<sup>111</sup> For (that) which (is) outside as a mover is properly said (to be a) *principle*, since the principle of motion is from it; and (that) from which a thing is constituted is properly said (to be an) *element*.

However, both—namely, extrinsic as much as intrinsic causes—are said (to be) *causes*. And *principle* is in some mode divided into them—namely, (into) intrinsic and extrinsic causes, for there are some intrinsic principles (► 8.4; 8.11).<sup>112</sup> For example, the foundation is the principle of a house according to matter; and *animal* (is the principle) of *man* according to form. Yet, that which is the mover or the-cause-of-rest (*movens, aut sistens, idest quiescere faciens* < κινουῦν ἢ ἰστάν) is some principle, but is not an element: for **element** is *that from which something comes to be and is in it* (► 12.9).

Thus, it is manifest that, according to analogy (*secundum analogiam, idest proportionem* < κατ' ἀναλογίαν), the elements of everything are three: that is, matter, form, and privation.<sup>113</sup> Privations are said (to be) elements not by themselves but by accident—namely, because the matter in which (the privation) happens is an element, for a matter

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<sup>110</sup> *In Metaph.* 12, l. 4, §2464: “ostendit [Philosophus], quod proportionaliter sunt eadem principia omnium [...] quantum ad causas intrinsecas et extrinsecas simul.” Ibid., §2468: “Ostendit idem *in causis intrinsecis et extrinsecis*. [...] Primo enim ostendit quod computando tam causas intrinsecas quam extrinsecas, sunt quatuor proportionaliter omnium.” Cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b22–30: “ἐπεὶ δὲ οὐ μόνον τὰ ἐνυπάρχοντα αἴτια, ἀλλὰ καὶ τῶν ἐκτὸς οἷον τὸ κινουῦν, δῆλον ὅτι ἕτερον ἀρχὴ καὶ στοιχεῖον, αἴτια δ' ἄμφω· καὶ εἰς ταῦτα διαιρεῖται ἡ ἀρχή, τὸ δ' ὡς κινουῦν ἢ ἰστάν ἀρχή τις καὶ οὐσία. ὥστε στοιχεῖα μὲν κατ' ἀναλογίαν τρία, αἰτίαι δὲ καὶ ἀρχαὶ τέτταρες· ἄλλο δ' ἐν ἄλλω, καὶ τὸ πρῶτον αἴτιον ὡς κινουῦν ἄλλο ἄλλω. ὑγίεια, νόσος, σῶμα· τὸ κινουῦν ἰατρική· εἶδος, ἀταξία τοιαδί, πλίνθοι· τὸ κινουῦν οἰκοδομική· καὶ εἰς ταῦτα διαιρεῖται ἡ ἀρχή.”

<sup>111</sup> *In Metaph.* 12, l. 4, §2468 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b22–23): “Dicit ergo primo, quod quia non solum sunt causae ea quae dicta sunt intrinseca rei, sed etiam ea quae sunt extra rem, sicut movens, manifestum est quod principium et elementum differunt. Nam principium proprie dicitur quod est extra sicut movens. Nam ab eo est principium motus. Elementum autem proprie dicitur causa intrinseca ex qua constituitur res.”

<sup>112</sup> *In Metaph.* 12, l. 4, §2469 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b24–25): “Sed ambo dicuntur causae, scilicet tam principia extrinseca quam intrinseca. Et principium quodammodo dividitur in ea, scilicet intrinsecas causas et extrinsecas. Sunt enim quaedam principia intrinseca, ut in quinto ostensum est. Sicut fundamentum est principium domus secundum materiam, et animal hominis secundum formam. Sed id quod est movens, aut sistens, idest quiescere faciens, est principium quoddam, sed non est elementum; quia elementum est ex eo quo fit aliquid, et est in eo, ut habitum est in quinto.”

<sup>113</sup> *In Metaph.* 12, l. 4, §2470 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b25–26): “Sic igitur manifestum est quod secundum analogiam, idest proportionem, tria sunt elementa omnium; idest materia, forma et privatio. Dicuntur enim privationes esse elementum non per se, sed per accidens, quia scilicet materia cui accidit, est elementum. Materia enim sub una forma existens, habet in se privationem alterius formae. Sed causae et principia sunt quatuor, ut addamus tribus elementis causam moventem.”

that exists under a form has in itself the privation of another form. Yet, the causes and principles are four in such a way that we should add the moving cause to the three elements.

ARISTOTLE does not mention the final cause because the end is a principle only insofar as it is in the intention of the mover (►9.8).<sup>114</sup>

Hence, the causes and principles of all (beings) are four according to analogy: to wit, matter, form, privation, and the mover principle.<sup>115</sup> However, these are not the same in all (genera): rather, (the principles and causes are) diverse in diverse (genera, *alia in aliis* < *aliud... in alio* = ἄλλο... ἐν ἄλλῳ). For, just as it was said above that species, matter, and privation are diverse in diverse (beings), so, too, the first of the causes, which is as a mover, is diverse in diverse (beings).

ARISTOTLE manifests this through an example.<sup>116</sup> In health, health is as a form; illness, as a privation; the body, as matter; and the medicinal art, as the mover. In buildings, the species is the house as a form; such lack of order (*inordinatio talis* = ἀταξία τοιαυτή)—i.e., (the lack of order that is) opposed to the order that the house requires—is (as) privation; bricks (are) as matter; and the mover is the art of building (*ars aedificatoria* = οἰκοδομική).

#### 45.20. The Four Parts of *Principle* Reduced to Three

(From what has just been said), *principle* is divided into these four (i.e., *form*, *privation*, *matter*, and *mover*; < εἰς ταῦτα διαιρεῖται ἡ ἀρχή).<sup>117</sup> However, ARISTOTLE reduces the aforesaid four (parts of *principle*) into three, for, in artificial (beings) as much as in natural (beings), *mover* and *form* are reduced into *the same in species*.

Thus, he says that, in natural (beings), man is a mover insofar as it has a form. And, in those (artificial beings) that are produced by the mind or intellect (*a mente sive intellectu*

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<sup>114</sup> *In Metaph.* 12, l. 4, §2470: “Non facit autem [Philosophus] mentionem de causa finali, quia finis non est principium nisi secundum quod est in intentione moventis.”

<sup>115</sup> *In Metaph.* 12, l. 4, §2471 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b26–27): “Sic igitur causae et principia omnium secundum analogiam sunt quatuor; scilicet materia, et forma, et privatio, et principium movens. Non tamen haec sunt eadem in omnibus, sed alia in aliis. Sicut enim supra dictum est, quod species et materia et privatio sunt alia in aliis, ita etiam prima causarum, quae est quasi movens, est alia in aliis.”

<sup>116</sup> *In Metaph.* 12, l. 4, §2472 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b28–29): “Et hoc manifestat [Philosophus] per exemplum. Sicut in sanatis sanitas est sicut forma, infirmitas sicut privatio, corpus sicut materia; sicut movens autem ars medicinalis. In aedificativis autem est species domus sicut forma, «inordinatio talis,» idest opposita ordini quem requirit domus, est privatio, lateres autem sicut materia, movens autem est ars aedificatoria.”

<sup>117</sup> *In Metaph.* 12, l. 4, §2472 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b29–30): “Et sic in ista quatuor dividitur principium.” Ibid., §2468 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b30–34): “Ostendit [Philosophus...] quomodo reducuntur [quatuor causas].” Ibid., §2473: “Reducit praedicta quatuor ad tria, eo quod movens et forma reducuntur in idem specie tam in artificialibus quam in naturalibus.”

< ἀπὸ διανοίας), the mover is the species (τὸ εἶδος) conceived by the intellect—or even the contrary of the species (< τὸ ἐναντίον) by whose removal (man’s mind) introduces a species.<sup>118</sup>

Hence, it is manifest that, in some mode, the causes will be three—insofar (namely) as the mover and the form are the same in species—, while in some mode they will be four—to wit, insofar as they differ in number.<sup>119</sup>

Indeed, health is in some mode the medicinal art itself.<sup>120</sup> And the form of the house is in some mode the art itself of building—to wit, insofar as the art itself is some likeness and *ratio* of the form that is in matter. And in things that are generated, likewise, the likeness of the form of the (being) generated is found in the generator, for man begets man.

#### **45.21. The First Principles of All Beings Are Simply the Same Proportionately**

ARISTOTLE shows in what mode the first principles of all (beings) should be the same also simply, even if they should not be the same in all (beings) according to thing (*secundum rem*) but only according to proportion (*secundum proportionem*).<sup>121</sup> He does this in respect of three (things):

1. Among the four assigned causes, the first cause is the mover, since the **mover** is *that which causes a form or a privation to be in matter (quod facit esse formam vel privationem in materia)*.<sup>122</sup> And in the genus of movers, we must arrive at some *one* mover. Hence, that first mover, one and the same, is the first principle of all (beings).

2. Of beings, some are separable: namely substances; others are inseparable: namely, accidents, since affections, motions, and such accidents cannot be without a

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<sup>118</sup> *In Metaph.* 12, l. 4, §2473 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b30–32): “Dicit ergo [Philosophus] quod quia movens in naturalibus est homo, in quantum habet formam, et in his quae fiunt a mente sive intellectu movens est species concepta ab intellectu, aut etiam contrarium speciei per cuius remotionem species inducit.”

<sup>119</sup> *In Metaph.* 12, l. 4, §2473 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b32): “manifestum est, quod quodammodo tres erunt causae, in quantum movens et forma sunt idem specie, quodam vero modo erunt quatuor, in quantum scilicet differunt numero.”

<sup>120</sup> *In Metaph.* 12, l. 4, §2473 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b33–34): “Sanitas enim aliquo modo est ipsa ars medicinalis. Et forma domus quodammodo est ipsa ars aedificatoria, in quantum scilicet ipsa ars est similitudo quaedam et ratio formae quae est in materia. Et similiter in rebus quae generantur, in generante invenitur similitudo formae generati. Homo enim generat hominem.”

<sup>121</sup> *In Metaph.* 12, l. 4, §2464 (cf. ARISTOTLE, *Metaphysica* Λ.4–5, 1070b34–1071a3): “ostendit [Philosophus...] quomodo et simpliciter sint eadem principia omnium prima.” *Ibid.*, §2474: “Ostendit quod, licet prima principia non sint eadem in omnibus secundum rem, sed solum secundum proportionem, *prima tamen principia sunt simpliciter eadem omnium*. Et hoc ostendit quantum ad tria.”

<sup>122</sup> *In Metaph.* 12, l. 4, §2474 (cf. ARISTOTLE, *Metaphysica* Λ.4, 1070b34–35): “Primo quidem quantum ad hoc quod inter causas quatuor assignatas, movens est causa prima, quia movens est quod facit esse formam vel privationem in materia. In genere autem moventium, est devenire ad aliquod unum movens, ut ostensum est in libro octavo Physicorum. Id igitur primum movens unum et idem, est primum principium omnium.”

substance.<sup>123</sup> Whence, it is manifest that the first principles in the genus of substance are also the causes of all the other genera not only in respect of the first moving cause, but also in respect of intrinsic causes, for the matter and the form of a substance are causes of the accidents (e.g., matter is the cause of quantity; and form is the cause of figure).

3. In the genus of substance, we must arrive at some first (principles).<sup>124</sup> Thus, the first principles in the genus of substances are living, animate substances—that is, according to the opinion of ARISTOTLE, who posits celestial bodies (to be) animate. And thus, the first principles as matter and form in the genus of substance will be soul and body; or, also, body and intellect or desire, since the soul of a celestial body, if it should be animated, does not have (any) parts of the soul other than intellect and appetite, for the other parts are ordered to the conservation of generable and corruptible bodies; and desire, too, has the *ratio of moving cause*.

#### 45.22. The Principles of All Beings Are the Same Proportionately: Act and Potency

ARISTOTLE posits another mode according to which the principles of all (beings) are the same proportionately: act and potency are the principles of all (beings).<sup>125</sup>

In this, however, there is a difference in respect of two modes, for:<sup>126</sup>

1. **A diverse potency and a diverse act are principles in diverse things** (*alia potentia et alius actus sunt principia in diversis rebus* < ἄλλα τε ἄλλοις).<sup>127</sup>

ARISTOTLE shows this according to the first mode, saying that, in some (things), the same (thing) is sometimes in act and sometimes in potency, as is evident in all generable,

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<sup>123</sup> *In Metaph.* 12, l. 4, §2475 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1070b36–1071a2): “Ostendit [Philosophus] idem secundum aliud. Entium enim quaedam sunt separabilia, scilicet substantiae; alia sunt inseparabilia, scilicet accidentia, quia passiones et motus et huiusmodi accidentia non possunt esse sine substantiis. Unde manifestum est quod principia prima in genere substantiae sunt etiam causae omnium aliorum generum, non solum quantum ad primam causam moventem, sed etiam quantum ad causas intrinsecas. Nam materia et forma substantiae, sunt causae accidentium.”

<sup>124</sup> *In Metaph.* 12, l. 4, §2476 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a2–3): “Ostendit [Philosophus] ulterius, quod etiam in genere substantiae est devenire in aliqua prima. Nam prima principia in genere substantiarum sunt substantiae viventes animatae, secundum opinionem Aristotelis ponentis caelestia corpora animata. Et sic prima principia in genere substantiae ut materia et forma, erunt anima et corpus, vel etiam corpus et intellectus vel desiderium, nam anima corporis caelestis, si sit animatum, non habet alias partes animae nisi intellectum et appetitum. Aliae enim partes ordinantur ad conservationem corporum generabilium et corruptibilium. Intellectus etiam et desiderium habet rationem causae moventis.”

<sup>125</sup> *In Metaph.* 12, l. 4, §2477 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a3–5): “Ponit [Philosophus] alium modum, secundum quem sunt eadem principia omnium proportionaliter: et dicit, quod alio modo sunt eadem principia omnium proportionaliter, ita quod dicamus quod actus et potentia sunt principia omnium.”

<sup>126</sup> *In Metaph.* 12, l. 4, §2478 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a5–6): “Sed in hoc est differentia quantum ad duo.”

<sup>127</sup> *In Metaph.* 12, l. 4, §2478 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a5): “Uno quidem modo, quia alia potentia et alius actus sunt principia in diversis rebus.”



corruptible, mobile, and contingent (things).<sup>128</sup> For example, wine, flesh, and man, are sometimes in act and sometimes in potency.

And since he had said that this mode—whereby the principles of all (beings) are proportionately the same—is a mode other than the afore-assigned (►45.21), he consequently shows in what mode they should be reduced to the same.<sup>129</sup> Hence, he says that act and potency fall in the aforesaid causes, which are *form, privation, matter, and mover*.

Thus, **form** is an act, whether it should be separable from the composite—as Platonists posited—or, also, (if) it should be something composed from both—namely, matter and form.<sup>130</sup>

Likewise, **privation** is in some mode an act.<sup>131</sup> For example, darkness; or the sick (< σκότος ἢ κάμνον).

On the other hand, **matter** is *in potency*, since, according to itself, it can come to be under both—namely, under form and (under) privation.<sup>132</sup>

Hence, it is thus manifest that act and potency return into the same: as matter, form, and privation; and that act and potency in diverse (things) differ in one mode: because it is not the same in all (things), but diversely (in diverse things).<sup>133</sup>

## 2. Potency and act are found in some things diversely than in others (*aliter invenitur potentia et actus in quibusdam, et aliter in aliis* < καὶ ἄλλως).<sup>134</sup>

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<sup>128</sup> *In Metaph.* 12, l. 4, §2479 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a6–7): “Et hoc secundum primo manifestat [Philosophus]; dicens, quod in quibusdam idem quandoque est in actu et quandoque in potentia; ut patet in omnibus generabilibus et corruptibilibus et mobilibus et contingentibus: sicut vinum et caro et homo, quandoque sunt in actu, quandoque etiam in potentia.” St. Thomas adds that, on the other hand, some (things) are always in act: for example, sempiternal substances. *Ibid.*: “Quaedam vero semper sunt in actu, sicut substantiae sempiternae.”

<sup>129</sup> *In Metaph.* 12, l. 4, §2480 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a7–8): “Et quia dixerat [Philosophus] hunc modum, quo proportionaliter sunt principia eadem omnium, esse alium modum a praeassignato, consequenter ostendit quomodo reducantur in idem. Et hoc est quod dicit, quod haec, scilicet actus et potentia, cadunt in praedictas causas, quae sunt forma, privatio, et materia, et movens.”

<sup>130</sup> *In Metaph.* 12, l. 4, §2480 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a8–9): “quia forma est actus, sive sit separabilis a composito, ut Platonici posuerunt, sive etiam sit aliquid compositum ex ambobus, scilicet materia et forma.”

<sup>131</sup> *In Metaph.* 12, l. 4, §2480 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a9–10): “Et similiter privatio est quodammodo actus, ut tenebrae, aut laborans, idest infirmum.”

<sup>132</sup> *In Metaph.* 12, l. 4, §2480 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a10–11): “materia vero est in potentia, quia ipsa secundum se potest fieri sub ambobus, scilicet sub forma et privatione.”

<sup>133</sup> *In Metaph.* 12, l. 4, §2480: “Sic igitur manifestum est, quod actus et potentia in idem redeunt cum materia et forma et privatione; et quod actus et potentia in diversis uno modo differunt: quia non similiter est in omnibus, sed aliter et aliter.”

<sup>134</sup> *In Metaph.* 12, l. 4, §2478 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a5–6): “Alio modo, quia aliter invenitur potentia et actus in quibusdam, et aliter in aliis.”

Potency and act differ in diverse (things), whose matter—which is potency—is not the same, and whose species—which is act—is not the same, but diverse (< ὧν μὴ ἔστιν ἡ αὐτὴ ὕλη, ὧν οὐκ ἔστι τὸ αὐτὸ εἶδος ἀλλ’ ἕτερον).<sup>135</sup>

For example, elements are a cause of man as matter; and as form, the proper species: to wit, the soul.<sup>136</sup> The moving cause is something extrinsic, as the father is a proximate moving cause; and the sun, a remote cause.

However, such extrinsic causes are neither matter nor form nor privation; nor (are they) something in conformity with them or of the same species, such that it could be said that they are reduced to these causes as act and potency.<sup>137</sup> Rather, they are in another genus of cause, since they are movers—and these are reduced into act.

(Likewise, things) other than man have another proper matter, another proper form, and some (other) proper agent.<sup>138</sup>

#### 45.23. The Principles of All Beings Are the Same Universally

Having shown that the principles of all (things) are the same proportionately, ARISTOTLE shows how (the principles of all things) are the same universally.<sup>139</sup> He therefore says that it is necessary to see in what mode some principles are said universally and some (are) not (said) universally.

Thus, the first principles (that are) maximally signified universally are **act** and **potency**, for they divide *being* as such (*dividunt ens in quantum huiusmodi*).<sup>140</sup>

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<sup>135</sup> *In Metaph.* 12, l. 4, §2481 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a6–13): “Et quia dixerat [Philosophus] quod non solum aliter est potentia et actus in diversis, sed etiam sunt alia in aliis, hoc consequenter exponit, dicens, quod alio modo potentia et actus differunt in diversis, quorum non est eadem materia, quae est potentia, et quorum non est eadem species, quae est actus, sed diversa.”

<sup>136</sup> *In Metaph.* 12, l. 4, §2481 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a13–15): “Sicut hominis causa ut materia, elementa, scilicet ignis etc., et causa ut forma, «species propria,» scilicet anima; et causa movens est aliquod extrinsecum; sicut pater est causa movens propinqua, et causa remota sol.” St. Thomas and ARISTOTLE speak of the ecliptic as a more remote cause, following ancient science (in our days, we would perhaps speak of gravity or of cosmic rays). *Ibid.* (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a15–16): “et obliquus circulus, idest zodiacus in quo movetur sol, et alii planetae, qui suo motu causant generationem in istis inferioribus.”

<sup>137</sup> *In Metaph.* 12, l. 4, §2481 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a16–17): “Huiusmodi autem causae extrinsecae neque sunt materiae neque formae neque privatio, neque aliquid conforme eis, aut eiusdem speciei, ut possit dici quod reducuntur ad has causas sicut actus et potentia; sed sunt in alio genere causae, quia sunt moventia, et ipsa etiam reducuntur in actum.”

<sup>138</sup> *In Metaph.* 12, l. 4, §2481: “Alia vero ab homine habent materiam aliam propriam, et aliam formam propriam, et aliquod agens proprium.”

<sup>139</sup> *In Metaph.* 12, l. 4, §2464 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a17–18): “ostendit [Philosophus...], quod eadem sunt [principia omnium] universaliter.” *Ibid.*, §2482: “Quia iam ostensum est, quod sunt eadem principia omnium proportionaliter, vult ostendere *quomodo sunt omnium eadem universaliter*. Utrumque enim supra dictum fuit. Dicit ergo, quod oportet videre quomodo principia aliqua dicuntur universaliter, et aliqua non universaliter.”

<sup>140</sup> *In Metaph.* 12, l. 4, §2482 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a18–19): “Et prima principia maxime universaliter significata sunt actus et potentia; nam haec dividunt ens in quantum huiusmodi.”

However, these are said (to be) *universal principles* because they are universally signified and understood—not in such a way that universals themselves should be subsistent principles, as the Platonists posited, since there cannot be some principle of singular (things) unless (it, too, is) singular.<sup>141</sup> Indeed, a universal principle is (a principle) of an effect universally taken.

For example, man (universally taken is a principle) of man.<sup>142</sup> However, since there is not some Man that subsists universally (i.e., some Idea of man that exists in itself), there will not be some universal principle of the universal man. Rather, only *this* particular (will be the principle) of *that* particular: for example, Peleus is the father of Achilles; your (principle is) your father; and *this* letter *b* (is the principle) of *this* syllable *ba*, while *b* universally taken is the principle of *ba* universally taken. Hence, in this mode, the principles of all (things) are the same universally signified.

ARISTOTLE brings in another mode according to which the principles of substances are universally (the principles) of all (beings): insofar as accidents are caused from substances.<sup>143</sup> And just as *act* and *potency* are universally the principles of all (things), since they follow upon common *being*, so, (too), according as the community of those-that-are-from-principles (*principiatorum*) descends, the community of principles must descend.

Thus, the causes and elements of those (things) that are not in the same genus—for example, (the causes) of colors, of sounds, of substances, and of quantities—are other; except that (the causes and elements) of all (things) should proportionally be the same, as has been said (► 45.21).<sup>144</sup>

On the other hand, the principles of those (things) that are in the same species—but (are) diverse according to number—are diverse not in species but in number. For example, your

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<sup>141</sup> *In Metaph.* 12, I. 4, §2482 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a19–21): “Haec autem dicuntur principia universalia, quia universaliter significantur et intelliguntur; non ita quod ipsa universalia subsistentia principia sint, ut Platonici posuerunt, quia singularium non potest esse aliquod principium nisi singulare; universale enim principium est effectus universaliter accepti.”

<sup>142</sup> *In Metaph.* 12, I. 4, §2482 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a21–24): “ut homo hominis. Sed, cum non sit aliquis homo universaliter subsistens, non erit aliquod principium universale hominis universalis, sed solum hoc particulare huius particularis, sicut si Peleus Achillis est pater, tui vero, pater tuus. Et haec litera B huius syllabae BA, sed B universaliter acceptum, est principium eius quod est BA, universaliter accepti. Sic igitur principia universaliter significata sunt eadem omnium.”

<sup>143</sup> *In Metaph.* 12, I. 4, §2483 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a24–25): “Deinde inducit alium modum, secundum quem principia substantiarum sunt universaliter omnium, in quantum accidentia ex substantiis causantur. Sicut autem actus et potentia sunt universaliter principia omnium, quia consequuntur ens commune, ita oportet quod secundum quod descendit communitas principiatorum, descendat communitas principiorum.”

<sup>144</sup> *In Metaph.* 12, I. 4, §2483 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a25–27): “Eorum enim quae non sunt in eodem genere, puta colorum, sonorum, substantiarum et quantitatis, sunt aliae causae et elementa, ut dictum est, praeterquam quod proportionaliter sint eadem omnium.”

matter, form, and mover (cause) are other than mine; but according to universal *ratio* they are the same (< τῷ καθόλου... λόγῳ ταύτά). Indeed, soul and body are the form and the matter of man; but of *this* man, (the form and the matter are) *this* soul and *this* body.<sup>145</sup>

#### 45.24. Same in Number, in Species, in Genus, and According to Analogy

The form and the matter of those (things) that are the same in number are (also) the same in number: for example (the form and the matter) of Tullius and of Cicero (are the same in number; i.e., because Tullius is the same individual as Cicero).<sup>146</sup>

On the other hand, the matter and the form of those (things) that are the same in species (but) diverse in number is not the same in number but (the same) in species: for example, (the form and the matter) of Sortes and of Plato (is the same in species).<sup>147</sup>

Likewise, the principles of those (things) that are the same in genus are (also) the same in genus: for example, the soul and body of an ass and of a horse differ in species, but are the same in genus (i.e., they are the same at least in the genus of *animal*).<sup>148</sup>

Likewise, the principles of those (things) that agree only according to analogy are (also) the same only according to analogy, proportion. Indeed, matter, form, and privation, or potency and act, are the principles of substance and of the other genera.<sup>149</sup>

However, the matter of substance and (the matter) of quantity—and likewise the form and the privation (of substance and of quantity)—differ in genus, but agree only according to proportion in this (way): as the matter of substance is related to substance in the *ratio* of *matter*, so is the matter of quantity (i.e., substance-matter itself) related to quantity.<sup>150</sup>

And just as substance is the cause of the other (genera), so are the principles of substance the principles of all the others.<sup>151</sup>

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<sup>145</sup> *In Metaph.* 12, l. 4, §2483 (cf. ARISTOTLE, *Metaphysica* Λ.5, 1071a27–29): “Eorum autem, quae sunt in eadem specie, sed diversa secundum numerum, sunt diversa principia, non specie, sed numero. Sicut aliud est materia tua, et forma et movens, et aliud mea. Sed secundum universalem rationem sunt eadem. Nam anima et corpus sunt materia et forma hominis. Huius autem hominis, haec anima et hoc corpus.”

<sup>146</sup> *De prin. nat.* §6, 63–65: “Eorum igitur quae sunt idem numero, forma et materia sunt idem numero, ut Tullii et Cicerorus.”

<sup>147</sup> *De prin. nat.* §6, 65–67: “eorum autem quae sunt idem in specie, diversa numero, etiam materia et forma non est eadem numero sed specie, sicut Sortis et Platonis.”

<sup>148</sup> *De prin. nat.* §6, 67–70: “Et similiter eorum quae sunt idem genere, et principia sunt idem genere, ut anima et corpus asini et equi differunt specie, sed sunt idem genere.”

<sup>149</sup> *De prin. nat.* §6, 70–75: “Et similiter eorum quae conveniunt secundum analogiam tantum, principia sunt eadem secundum analogiam tantum siue proportionem. Materia enim et forma et privatio, siue potentia et actus, sunt principia substantie et aliorum generum.”

<sup>150</sup> *De prin. nat.* §6, 75–81: “tamen materia substantie et quantitatis, et similiter forma et privatio, differunt genere, sed conveniunt solum secundum proportionem in hoc quod, sicut se habet materia substantie ad substantiam in ratione materie, ita se habet materia quantitatis ad quantitatem.”

<sup>151</sup> *De prin. nat.* §6, 81–83: “Sicut tamen substantia est causa ceterorum, ita principia substantie sunt principia omnium aliorum.”

## 46. First Principles According to Causality

*We continue here our discussion of first principles, but in the order of causality.*

### 46.1. Order of Causes

Always, that which is by itself is the cause of that which is by another.<sup>1</sup> In any genus of cause, the first cause is more a cause than a second cause, for the second cause is a cause only through the first cause.<sup>2</sup> The virtue of a second cause is participated from the virtue of the first cause, which is not participated from another.<sup>3</sup>

As PROCLUS says, a cause is in (its) effect, and conversely (i.e., an effect is in its cause), insofar as the cause acts in (its) effect and the effect receives the action of the cause by its (own) mode (*per modum suum*).<sup>4</sup> Whence, a cause must be in its effect according to the mode of the effect; and the effect is in the cause according to the mode of the cause. Thus, prior (causes) are in posterior (causes) according to the mode of the posterior (causes), and conversely (i.e., posterior causes are in prior causes according to the mode of prior causes).

### 46.2. The First Cause in the Order of Necessity

An **absolute necessity** is a necessity that depends on prior causes.<sup>5</sup> However, in causes, it is impossible to proceed infinitely.<sup>6</sup> Therefore, there must be one first necessary (cause) from which others have (their) necessity. Hence, this first necessary (cause), which is also maximally properly necessary because it is necessary in all modes, must be simple, for those (things) that are composite are mutable, and hence can be in multiple modes; and

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<sup>1</sup> *In Post. an.* 1, l. 7, 96–97: “semper quod est per se est causa eius quod est per aliud.”

<sup>2</sup> *ScG* 3, 17 n. 4: “In quolibet genere causarum causa prima est magis causa quam causa secunda: nam causa secunda non est causa nisi per causam primam.”

<sup>3</sup> *In De causis*, l. 9: “virtus causae secundae participatur a virtute causae primae quae non est participata ab alio.”

<sup>4</sup> *In De causis*, l. 12: “Et dicit [Proclus] quod hoc modo causa est in effectu et e converso, secundum quod causa agit in effectum et effectus recipit actionem causae; causa autem agit in effectum per modum ipsius causae, effectus autem recipit actionem causae per modum suum; unde oportet quod causa sit in effectu per modum effectus et effectus sit in causa per modum causae. Sic igitur ea quae sunt in sensu sensibiliter, sunt in anima intellectiva per modum ei convenientem, et ea quae sunt in anima per modum animale, sunt in intellectu per modum proprium, et quae sunt in intelligentia intelligibiliter, sunt in causa prima essentialiter, secundum modum suum; et e converso priora sunt in posterioribus secundum modum posteriorum.”

<sup>5</sup> *In Physic.* 2, l. 15, n. 2: “necessitas quae dependet ex causis prioribus, est necessitas absoluta.”

<sup>6</sup> *In Metaph.* 5, l. 6, §840 (cf. ARISTOTLE, *Metaphysica* Δ.5, 1015b9–14): “quia, cum oporteat esse unum primum necessarium, a quo alia necessitatem habent, quia in causis non est procedere in infinitum, ut in secundo ostensum est, oportet hoc primum necessarium, quod etiam maxime proprie est necessarium, quia est omnibus modis necessarium, quod ipsum sit simplex. Ea enim, quae sunt composita, sunt mutabilia, et ita pluribus modis se possunt habere: quae autem pluribus modis habere se possunt, possunt se habere aliter et aliter; quod est contra rationem necessarii. Nam necessarium est, quod est impossibile aliter se habere. Unde oportet, quod primum necessarium non aliter et aliter se habeat, et per consequens nec pluribus modis. Et ita oportet ipsum esse simplex.”

those that can be in multiple modes can be in one mode or in another, which is against the *ratio* of *necessary*, for **necessary** is *that which is impossible to be otherwise* (►9.9). Whence, it is necessary for a first necessary (cause) not be in one mode and another; nor, consequently, in multiple modes. Therefore, it must be simple.

### 46.3. Reduction to First Principles Common by Causality

There are two genera of principles:<sup>7</sup>

1. Some (principles) are in themselves some **complete natures** and are nonetheless principles of others.<sup>8</sup> For example, celestial bodies are some principles of inferior bodies (i.e., according to ancient science); and simple bodies, of compound bodies.

Since that which is the principle of being of all (things) must maximally be a being (*oportet esse maxime ens*), as ARISTOTLE says (►8.3; 11.3; 27.4), such principles must therefore be most complete (*completissima*).<sup>9</sup> Therefore, they must be maximally in act, such that they have nothing or a minimum of potency, for act is prior to—and better (or more powerful, *potior*) than—potency. Therefrom, they must be without matter, which is in potency, and without **motion**, which is *the act of that which exists in potency* (*actus exsistentis in potentia*).

2. There are some principles that are **not complete natures** in themselves, but are only principles of natural (beings).<sup>10</sup> For example, the unit (is the principle) of number; the point (is the principle) of the line; and matter and form (are principles) of physical bodies.

Some existing things (that are) the same in number are the principles of all things.<sup>11</sup> For the principles of accidents are reduced into the principles of substances; and the principles

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<sup>7</sup> *In De Trin.*, q. 5 a. 4 co., 87–88: “principiorum duo sunt genera.”

<sup>8</sup> *In De Trin.*, q. 5 a. 4 co., 88–92: “Quedam enim sunt que et sunt in se ipsis quedam nature complete, et sunt nichilominus principia aliorum, sicut corpora celestia sunt quedam principia inferiorum corporum et corpora simplicia corporum mixtorum.”

<sup>9</sup> *In De Trin.*, q. 5 a. 4 co., 131–140: “Et quia id, quod est principium essendi omnibus oportet esse maxime ens, ut dicitur in II Metaphisice, ideo huiusmodi principia oportet esse completissima; et propter hoc oportet ea esse maxime actu, ut nichil uel minimum habeant de potentia, quia actus est prior et potior potentia, ut dicitur in IX Metaphisice. Et propter hoc oportet ea esse absque materia, que est in potentia, et absque motu, qui est actus exsistentis in potentia.” Cf. *De sub. sep.*, c. 9, 145–153: “si quis ordinem rerum consideret, semper inveniet id quod est maximum causam esse eorum quae sunt post ipsum, sicut ignis qui est calidissimus causa est caliditatis in ceteris elementatis corporibus. Primum autem principium quod Deum dicimus est maxime ens; non enim est in infinitum procedere in rerum ordine, sed ad aliquid summum devenire quod melius est esse unum quam plura.”

<sup>10</sup> *In De Trin.*, q. 5 a. 4 co., 102–105: “Quedam autem sunt principia que non sunt nature complete in se ipsis, sed solum sunt principia naturarum, sicut unitas numeri, et punctus lineae, et forma et materia corporis phisici.”

<sup>11</sup> *In De Trin.*, q. 5 a. 4 co., 125–131: “ut sint quedam res eedem numero existentes omnium rerum principia, prout scilicet principia accidentium reducuntur in principia substantie, et principia substantiarum corruptibilium reducuntur in substantias incorruptibiles; et sic quodam gradu et ordine in quedam principia omnia entia reducuntur.”

of corruptible substances are reduced into the principles of incorruptible substances. And so, in some degree and order, all beings are reduced into some principles.

Since substance should be prior to accidents, the principles of accidents are reduced to the principles of substance as (the posterior is reduced) to the prior.<sup>12</sup> However, although the principles of substances should also be—in some mode—the principles of accidents, accidents have (their) proper principles, for the principles of all genera are not the same in every mode (►45.17).

#### 46.4. The Formality of Being

A principle is naturally prior to that of which it is a principle.<sup>13</sup> And (the act of) being (*esse*) has something (that is) as a principle in some things (i.e., in things composed from matter and form), for form is said to be a principle of being (*principium essendi*). And likewise, the agent, which causes some (things) to be in act (is a principle of being; ►9.7).

Thus, every (act of) being (*esse*) is according to some form.<sup>14</sup> And *being* (*ens*) conveys (*importat*) a relation only of formal cause—either inherent (i.e., intrinsic) or exemplar (i.e., extrinsic)—whose causality extends only to those things that are in act.<sup>15</sup> Hence, the efficient causality of the exemplar extends only to those that participate in act (in) the form of their exemplary cause.<sup>16</sup>

#### 46.5. Being and the Division of Causes

There are necessarily four (genera of) causes because **cause** is *that upon which the being of another follows* (*ad quam sequitur esse alterius*), and the (act of) being of that which has a cause can be considered in two modes:<sup>17</sup>

1. **Absolutely**, in which mode the cause of being (*causa essendi*) is the **form** by which something is in act (►46.4).<sup>18</sup>

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<sup>12</sup> *STh* I, q. 3 a. 6 ad 2: “cum substantia sit prior accidentibus, principia accidentium reducuntur in principia substantiae sicut in priora.” *In Metaph.* 1, l. 17, §267: “licet principia substantiarum etiam quodammodo sint principia accidentium, tamen accidentia propria principia habent. Nec sunt omnibus modis omnium generum eadem principia.”

<sup>13</sup> *ScG* 1, 26 n. 4: “Principium naturaliter prius est eo cuius est principium. Esse autem in quibusdam rebus habet aliquid quasi principium: forma enim dicitur esse principium essendi; et similiter agens, quod facit aliqua esse actu.”

<sup>14</sup> *In De anima* 2, c. 5, 104–105: “omne esse est secundum aliquam formam.”

<sup>15</sup> *STh* I, q. 5 a. 2 ad 2: “Ens autem non importat habitudinem causae nisi formalis tantum, vel inhaerentis vel exemplaris, cuius causalitas non se extendit nisi ad ea quae sunt in actu.”

<sup>16</sup> *In Sent.* 1, d. 8 q. 1 a. 3 ad 2: “causalitas enim efficiens exemplaris extenditur tantum ad ea quae participant formam actu suae causae exemplaris.”

<sup>17</sup> *In Physic.* 2, l. 10, n. 15: “Necesse est autem quatuor esse causas. Quia cum causa sit ad quam sequitur esse alterius, esse eius quod habet causam, potest considerari dupliciter.” *ScG* 3, 10 n. 5: “Omnis causa vel est materia, vel forma, vel agens, vel finis.”

<sup>18</sup> *In Physic.* 2, l. 10, n. 15: “absolute, et sic causa essendi est forma per quam aliquid est in actu.”

2. Insofar as a being in act comes to be from a being in potency (*de potentia ente fit actu ens*).<sup>19</sup>

Since everything that is in potency is reduced to act by that which is a being in act, there necessarily are two other causes: **matter** (i.e., that which is in potency), and the **agent** that reduces matter from potency into act.<sup>20</sup> Moreover, the action of the agent tends to some determinate thing, just as it proceeds from some determinate principle, for every agent does what befits it (*omne agens agit quod est sibi conveniens*); and that to which the action of the agent tends is said (to be the) **final cause**.

Hence, there are necessarily four causes: form is the cause of being in absolute (*causa essendi absolute*), while the other three are causes of being insofar as something receives being (*secundum quod aliquid accipit esse*).<sup>21</sup> Whence, the three other causes are not considered in immobile things, but only the formal cause (e.g., mathematical things are considered through abstraction from motion; whence, demonstration in mathematics is through the formal cause alone).

#### 46.6. Order among Being, Form, and Matter

Since matter is in potency to all acts in some order, that which is simply first among acts should be understood (to be) in matter first.<sup>22</sup> And first among all acts is (the act of) being (*esse*). Therefore, it is impossible to understand matter to be hot or quantified before (it is understood) to be in act. And (matter) has (its) being in act through a substantial form, which causes (something) to be simply (*facit esse simpliciter*). Whence, it is impossible for any accidental dispositions to pre-exist in matter before a substantial form.

However, *that which is* (*quod est*) differs from *matter*, since *that which is* conveys (*dicit*) the suppositum itself that has the (act of) being (*ipsum suppositum habens esse*).<sup>23</sup> Thus,

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<sup>19</sup> *In Physic.* 2, l. 10, n. 15: “alio modo secundum quod de potentia ente fit actu ens.”

<sup>20</sup> *In Physic.* 2, l. 10, n. 15: “Et quia omne quod est in potentia, reducitur ad actum per id quod est actu ens; ex hoc necesse est esse duas alias causas, scilicet materiam, et agentem qui reducit materiam de potentia in actum. Actio autem agentis ad aliquid determinatum tendit, sicut ab aliquo determinato principio procedit: nam omne agens agit quod est sibi conveniens; id autem ad quod tendit actio agentis, dicitur causa finalis.”

<sup>21</sup> *In Physic.* 2, l. 10, n. 15: “Sic igitur necesse est esse causas quatuor. Sed quia forma est causa essendi absolute, aliae vero tres sunt causae essendi secundum quod aliquid accipit esse; inde est quod in immobilibus non considerantur aliae tres causae, sed solum causa formalis.”

<sup>22</sup> *STh* I, q. 76 a. 6 co.: “cum materia sit in potentia ad omnes actus ordine quodam, oportet quod id quod est primum simpliciter in actibus, primo in materia intelligatur. Primum autem inter omnes actus est esse. Impossibile est ergo intelligere materiam prius esse calidam vel quantam, quam esse in actu. Esse autem in actu habet per formam substantialem, quae facit esse simpliciter, ut iam dictum est. Unde impossibile est quod quaecumque dispositiones accidentales praeexistant in materia ante formam substantialem.”

<sup>23</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “Differt autem quod est a materia; quia quod est, dicit ipsum suppositum habens esse; materia autem non habet esse, sed compositum ex materia et forma; unde materia non est quod est, sed compositum. Unde in omnibus illis in quibus est compositio ex materia et forma, est etiam compositio ex quo est et quod est.”



it is not matter what has the (act of) being, but the composite from matter and form. Whence, *that which is*, is not matter, but the composite; and in all those (things) in which there is composition from matter and form, there is also composition from *that whereby it is* (*ex quo est*) and *that which is* (*quod est*).

However, in composites from matter and form, **that whereby (something) is** (*quo est*) can be said in three (modes):<sup>24</sup>

1. **The form itself of the part**, which gives the (act of) being to matter.<sup>25</sup>
2. **The act itself of being** (*ipse actus essendi*): to wit, being (*esse*), just like that whereby (something) is run (*quo curritur*) is the act of running (*actus currendi*).<sup>26</sup>
3. **The nature** itself that remains (i.e., results) from the conjunction of form with matter, such as humanity: above all, according to those who posit that the form that is the whole, which is said (to be the) *quiddity*, is not the form of the part—among them, AVICENNA.<sup>27</sup>

In any one (being), it is necessary that the participated (act of) being itself be compared to the participating nature as act to potency.<sup>28</sup> Hence, in the nature of corporeal things, matter does not by itself participate (in the act of) being itself, but through a form, for the form that befalls matter causes it to be in act. Whence, in composed things, a twofold act is to be considered; and a twofold potency. Indeed, first, matter is as potency in respect of form, and form is its act; and, again, the nature constituted from matter and form is in potency in respect of the (act of) being itself insofar as it is susceptible of it.

However, since it belongs to the *ratio* of **quiddity** or **essence** *not to be that which should be compositive or composite*, there could consequently be found and be understood some simple quiddity that does not follow upon the composition of form and matter.<sup>29</sup> And if we

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<sup>24</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “In compositis autem ex materia et forma quo est potest dici tripliciter.”

<sup>25</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “Potest enim dici quo est ipsa forma partis, quae dat esse materiae.”

<sup>26</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “Potest etiam dici quo est ipse actus essendi, scilicet esse, sicut quo curritur, est actus currendi.”

<sup>27</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “Potest etiam dici quo est ipsa natura quae relinquitur ex conjunctione formae cum materia, ut humanitas; praecipue secundum ponentes quod forma, quae est totum, quae dicitur quidditas, non est forma partis, de quibus est Avicenna.”

<sup>28</sup> *De spirit. creat.*, a. 1 co.: “necesse est quod esse participatum in unoquoque comparetur ad naturam participantem ipsum, sicut actus ad potentiam. In natura igitur rerum corporearum materia non per se participat ipsum esse, sed per formam; forma enim adveniens materiae facit ipsam esse actu, sicut anima corpori. Unde in rebus compositis est considerare duplicem actum, et duplicem potentiam. Nam primo quidem materia est ut potentia respectu formae, et forma est actus eius; et iterum natura constituta ex materia et forma, est ut potentia respectu ipsius esse, in quantum est susceptiva eius.”

<sup>29</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “Cum autem de ratione quidditatis, vel essentiae, non sit quod sit composita vel compositum; consequens poterit inveniri et intelligi aliqua quidditas simplex, non consequens compositionem formae et materiae. Si autem inveniamus aliquam quidditatem quae non sit composita ex materia et forma, illa quidditas aut est esse suum, aut non.” As St. Thomas explains, if that quiddity

should find some quiddity that would not be composed from matter and form, either that quiddity is its (act of) being, or the quiddity itself will be *that which is*, while the (act of) being itself would be *that whereby it is*.

Thus, (should) the foundation of matter (be) removed, if some form of a determinate nature should remain subsisting by itself, not in matter, (such a nature) will still be compared to its (act of) being as potency to act: not (compared) as a potency separable from act, but (as a potency) that should always be accompanied by its act.<sup>30</sup>

#### 46.7. The First Matter

Some matter has composition with form.<sup>31</sup> For example, bronze is matter with respect to the statue; but bronze itself is composed from matter and form, and therefore bronze is not said (to be the) *first matter* (*materia prima*, i.e., prime matter) because it has matter.

The *matter itself that is understood without any form or privation but (nonetheless) subjected to form and privation*, is said (to be the) **first matter** (*materia prima*) on account of there being no other matter before it; and it is also called *yle* (i.e., [πρώτη] ὕλη).<sup>32</sup>

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should be its (act of) being, in this way, it will be the essence of God Himself, which is His (act of) being, and will be altogether simple. Ibid: “Si illa quidditas sit esse suum, sic erit essentia ipsius Dei, quae est suum esse, et erit omnino simplex.” On the other hand, if it should not be the (act of) being itself, it must have an (act of) being acquired from another, as is every created quiddity. And since this quiddity is posited not to subsist in matter, (an act of) being in another would not be acquired for it, as (being in another is acquired for) composite quiddities; rather, the (act of) being in itself would be acquired for it; and thus, the quiddity itself will be *that which is*, and the (act of) being itself would be *that whereby it is*. And since everything that does not have something from itself (*a se*) is possible in respect of that, such a quiddity, since it should have (its act of) being from another, will be possible in respect of that (act of) being, and in respect of that from which it has (its act of) being, in which no potency (be)falls. And thus, in such a quiddity, there is found potency and act, insofar as the quiddity itself is possible; and its being is its act. And in this mode, St. Thomas understands the composition of potency and act—and of *that whereby it is* and *that which is*—in an angel; and likewise, in a soul. Whence, an angel or a soul can be said (to be a) simple quiddity or nature insofar as their quiddity is not composed from diverse (principles); however, composition befalls these two: namely, (the composition) of quiddity and (act of) being. Ibid.: “Si vero non sit ipsum esse, oportet quod habeat esse acquisitum ab alio, sicut est omnis quidditas creata. Et quia haec quidditas posita est non subsistere in materia, non acquireretur sibi esse in altero, sicut quidditatibus compositis, immo acquireretur sibi esse in se; et ita ipsa quidditas erit hoc quod est, et ipsum esse suum erit quo est. Et quia omne quod non habet aliquid a se, est possibile respectu illius; huiusmodi quidditas cum habeat esse ab alio, erit possibilis respectu illius esse, et respectu ejus a quo esse habet, in quo nulla cadit potentia; et ita in tali quidditate inveniatur potentia et actus, secundum quod ipsa quidditas est possibilis, et esse suum est actus ejus. Et hoc modo intelligo in Angelis compositionem potentiae et actus, et de quo est et quod est, et similiter in anima. Unde Angelus vel anima potest dici quidditas vel natura vel forma simplex, inquantum eorum quidditas non componitur ex diversis; tamen advenit sibi compositio horum duorum, scilicet quidditatis et esse.”

<sup>30</sup> *De spirit. creat.*, a. 1 co.: “Remoto igitur fundamento materiae, si remaneat aliqua forma determinatae naturae per se subsistens, non in materia, adhuc comparabitur ad suum esse ut potentia ad actum: non dico autem ut potentiam separabilem ab actu, sed quam semper suus actus comitetur.”

<sup>31</sup> *De prin. nat.* §2, 70–74: “Sed sciendum quod quedam materia habet compositionem forme, sicut es cum sit materia respectu ydoli, ipsum tamen es est compositum ex materia et forma, et ideo es non dicitur materia prima quia habet materiam.”

<sup>32</sup> *De prin. nat.* §2, 74–78: “Ipsa autem materia que intelligitur sine qualibet forma et priuatione, sed subiecta forme et priuationi, dicitur materia prima, propter hoc quod ante ipsam non est alia materia: et hoc etiam dicitur yle.”

Thus, that is named *first matter* (*materia prima*) in common (*communiter*) which is in the genus of substance (i.e., because there is no genus before substance) as some potency understood without (*praeter*) any species or form—and also without privation—, which is nonetheless susceptible (of receiving) both forms and privations.<sup>33</sup>

Although matter does not have in its nature some form or privation—just like in the *ratio* of bronze there is neither *formed* (i.e., shaped) nor *formless* (i.e., shapeless)—, however, it is never denuded of form and privation.<sup>34</sup> Indeed, sometimes it is under one form, and sometimes under another; but it can never be by itself (*per se*). Since it should not have some form in its *ratio*, it does not have (an act of) being (*esse*) in act, for being in act is only (had) from a form; rather, it is only in potency. Hence, whatever is in act cannot be said (to be the) *first matter*.

If the essence of matter could be defined, it would have as a difference its order itself to form; and (it would have) as a genus its substance itself.<sup>35</sup> However, since every definition and every cognition is through a form, the first matter by itself cannot be known or defined: rather, (it is known) by comparison (►41.11): for example, if it should be said that first matter is *that which is related to all forms and privations as bronze is related to the statue and the formless*.<sup>36</sup> And this is said (to be the) *first (matter)* simply.

Something can also be said (to be a) *first matter* in respect to some genus.<sup>37</sup> For example, water is the matter of liquids (*materia liquabilium*; i.e., according to ancient science). (In this way, not only is bronze a cause of a statue, and silver a cause of a saucer, but bronze and silver are) also their genera (*et horum genera* = καὶ τὰ τούτων γένη) because, of whichever matter some species is, that matter is its genus.<sup>38</sup> For example, if the matter of

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<sup>33</sup> *De spirit. creat.*, a. 1 co.: “id communiter materia prima nominatur quod est in genere substantiae, ut potentia quaedam intellecta praeter omnem speciem et formam, et etiam praeter privationem; quae tamen est susceptiva et formarum et privationum, ut patet per August. XII Confess. et I super Genes. ad litteram, et per Philosophum in VII Metaph.”

<sup>34</sup> *De prin. nat.* §2, 109–119: “Et sciendum quod, licet materia non habeat in sua natura aliquam formam uel priuationem, sicut in ratione eris neque est figuratum neque infiguratum, tamen numquam denudatur a forma et priuatione: quandoque enim est sub una forma, quandoque sub alia. Sed per se numquam potest esse, quia, cum in ratione sua non habeat aliquam formam, non habet esse in actu, cum esse in actu non sit nisi a forma, sed est solum in potentia; et ideo quicquid est actu non potest dici materia prima.”

<sup>35</sup> *Quodlibet* 10, q. 4 a. 1 ad 3: “Materia autem, si eius essentia definiretur, haberet pro differentia ipsum suum ordinem ad formam, et pro genere ipsam suam substantiam.”

<sup>36</sup> *De prin. nat.* §2, 78–85: “Et quia omnis diffinitio et omnis cognitio est per formam, ideo materia prima per se non potest cognosci uel diffiniri, sed per comparisonem, ut dicatur quod illud est materia prima quod hoc modo se habet ad omnes formas et priuationes sicut es ad ydolum et infiguratum: et hec dicitur simpliciter prima.”

<sup>37</sup> *De prin. nat.* §2, 85–87: “Potest etiam aliquid dici materia prima respectu alicuius generis, sicut aqua est materia liquabilium.”

<sup>38</sup> *In Metaph.* 5, l. 2, §763 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a26): “Et horum genera, quia cuiuscumque materia est species aliqua, materia est eius genus, sicut si materia statuae est aes, eius

a statue is *bronze*, its matter and genus will be *metal*; the matter and genus of *metal* will be *compound (mixtum)*; and the matter and genus of *compound* will be *body (corpus)*.

However, (such a matter) is not the first matter simply, because it is composed from matter and form; and hence, it has a prior matter.<sup>39</sup>

#### 46.8. The First Matter Is One in Number

The first matter is said (to be) *one in number* in all (natural bodies).<sup>40</sup> However, **one in number** (*unum numero*) is said in two modes:

1. That which **has one form determined in number**.<sup>41</sup> For example, *Sortes* (i.e., any individual; ► 45.24). In this mode, the first matter (i.e., prime matter) is not said (to be) *one in number*, for there is no form in it.

2. That which is **without the dispositions that cause to differ according to number**.<sup>42</sup> In this mode, first matter is said (to be) *one in number*, since it is understood without any of the dispositions from which there is a difference in number.

#### 46.9. The First Form

Just like that which is the genus of a matter is also matter, so too the genera of forms or of species are the forms of things.<sup>43</sup>

For example,<sup>44</sup> the form of the *octave* consonant is the (numerical) proportion of *two-to-one* (*proportio duorum ad unum*, i.e., 2 : 1), or *double*, which is a multiplicity (► 5.2; 37.3),

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materia erit metallum, et mixtum, et corpus, et sic de aliis." *In Physic.* 2, l. 5, n. 3 (cf. ARISTOTLE, *Physica* B.3, 194b25–26): "et etiam genera horum dicuntur causae earundem rerum, sicut metallum vel liquabile vel huiusmodi." Again, a *mixtum*, which we have been translating as *compound*, is a composite body constituted from elements. Thus, for example, what we understand today by *molecule* is a compound constituted from chemical elements; and what we understand today by *chemical element* is a compound constituted from elementary physical particles.

<sup>39</sup> *De prin. nat.* §2, 87–89: "non tamen est prima simpliciter quia est composita ex materia et forma, unde habet materiam priorem."

<sup>40</sup> *De prin. nat.* §2, 98–100: "Sciendum est etiam quod materia prima dicitur una numero in omnibus. Sed unum numero dicitur duobus modis."

<sup>41</sup> *De prin. nat.* §2, 100–103: "quod habet unam formam determinatam in numero, sicut *Sortes*: et hoc modo materia prima non dicitur unum numero, cum in se non habeat aliquam formam."

<sup>42</sup> *De prin. nat.* §2, 104–108: "Dicitur etiam aliquid unum numero quia est sine dispositionibus que faciunt differre secundum numerum: et hoc modo dicitur materia prima unum numero, quia intelligitur sine omnibus dispositionibus a quibus est differentia in numero."

<sup>43</sup> *In Metaph.* 5, l. 2, §764 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a27–28): "Et sicut id quod est genus materiae, est etiam materia, ita etiam genera formarum sunt formae rerum." *In Physic.* 2, l. 5, n. 4 (cf. ARISTOTLE, *Physica* B.3, 194b26–27): "Et sicut dictum est circa materiam quod etiam genera materiae dicuntur causa, ita et genera speciei dicuntur causa."

<sup>44</sup> *In Metaph.* 5, l. 2, §764 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a28–29): "sicut forma consonantiae diapason, est proportio duorum ad unum. Quando enim duo soni se habent adinvicem in dupla proportione, tunc est inter eos consonantia diapason, unde dualitas est forma eius. Nam proportio dupla ex dualitate rationem habet. Et, quia numerus est genus dualitatis, ideo ut universaliter loquamur, etiam numerus est forma diapason, ut scilicet dicamus quod diapason est secundum proportionem numeri ad

for numeral proportions (*proportiones numerales*) applied to sounds, as to matter, constitute musical consonances. Hence, when(ever) two sounds are related to each other in double proportion, then is there between them a consonance of octave. Whence, their form is *two* (*dualitas*), for a proportion has the *ratio* of *double* from (the number) *two*. And since *number* is the genus of *two*, speaking universally, also *number* is the form of *octave*, insofar as we say that *octave* is according to a proportion of number to number.

However, since a substantial form is that which produces (*facit*) *this* something and gives a substantial (act of) being to the thing, only the first form should be substantial, for it alone would give a substantial (act of) being to the thing, and would make it *this* something.<sup>45</sup> All other (forms) after the first would be accidentally befalling (*this* substantial thing) and would not give (an act of) being (to it) simply but (an act of) being *such*. And thus, in their loss or acquisition there would be no generation or corruption, but only alteration.

Moreover, (substantial) forms differ according to the perfect and the imperfect.<sup>46</sup> For there is some form that gives (the act of) *being a body* only; some (other substantial form) is more perfect, which also gives (the act of) *being and living* in whatever mode of living; some (other substantial form is even more perfect), which—with these—gives also sense.

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numerus." *In Physic.* 2, l. 5, n. 4 (cf. ARISTOTLE, *Physica* B.3, 194b27–29): "Et ponit exemplum in quadam consonantia musicae quae vocatur diapason, cuius forma est proportio dupla, quae est duorum ad unum. Nam proportiones numerales applicatae ad sonos sicut ad materiam, consonantias musicales constituunt: et cum duo vel duplum sit forma consonantiae quae est diapason, et genus duorum, quod est numerus, est causa. Sicut enim dicimus quod forma *diapason* est proportio duorum ad unum, quae est proportio dupla, ita possumus dicere quod forma diapason, est proportio duorum ad unum, quae est multiplicitas."

<sup>45</sup> *Quodlibet* 11, q. 5 co.: "cum forma substantialis sit quae facit hoc aliquid, et dat esse substantiale rei, tunc sola prima forma esset substantialis, cum ipsa sola daret esse substantiale rei, et faceret hoc aliquid; omnes autem post primam essent accidentaliter advenientes, nec darent esse rei simpliciter, sed esse tale: et sic in amissione vel acquisitione ipsarum non esset generatio et corruptio, sed tantum alteratio." This argumentation is against the position of Solomon ben Judah ibn Gabirol, aka AVICEBRON, *Fons vitae*, trans. Johannes Hispanus and Dominicus Gundissalinus, vol. Bd. 1, Heft 2-4, ed. Clemens Baeumker, Beiträge zur Geschichte der Philosophie des Mittelalters (Münster in Westfalen: Aschendorff, 1895), 4.3, 215.26-216.6: "Non putavi quod tu opponeres de dubitatione huiusmodi propter praemissas probationes de assignatione diversitatis in substantiis simplicibus, tamquam si certum tibi non fuisset quod forma naturae est aliud a forma animae uegetabilis, et quod forma animae uegetabilis alia est a forma animae sensibilis, et quod forma animae sensibilis alia est a forma animae rationalis, et quod forma animae rationalis alia est a forma intelligentiae." Cf. *In De anima* 2, c. 1, 258–270: "Per quod tollitur positio Auicebron in libro Fontis uite, qui posuit quod secundum ordinem generum et specierum est ordo plurimum formarum substancialium in una et eadem re, ut puta quod in hoc indiuiduo hominis est una forma per quam est substancia et alia per quam est corpus et tertia per quam est animatum corpus et sic de aliis. Oportet enim secundum premissa dicere quod una et eadem forma substancialis sit per quam hoc indiuiduum est hoc aliquid siue substancia et per quam est corpus et animatum corpus et sic de aliis: forma enim perfectior dat materie et hoc quod dat forma minus perfecta et adhuc amplius."

<sup>46</sup> *Quodlibet* 11, q. 5 co.: "Simile etiam esset in potentiis animae; nam sola prima, scilicet uegetabilis, esset forma substantialis, et faceret hoc aliquid; aliae vero essent accidentales: quod omnino est falsum. Et ideo dicendum est, quod huiusmodi formae differunt secundum perfectum et imperfectum. Est enim aliqua forma quae non dat nisi esse corpus tantum; aliqua est magis perfecta, quae etiam dat esse et vivere quocumque modo vivendi; aliqua, quae cum his dat etiam sensum. Unde patet quod semper ultima est perfectior primis, et habet se ad priores sicut perfectissima ad imperfectissimas; et ideo quidquid continetur in ipsis, totum est virtute in ultima."

Whence, it is evident that the last (substantial form) is always more perfect than the first and is related to the prior as the most perfect to the most imperfect; and hence, whatever is contained in them, the whole is virtually in the last.

Thus, a diversity is found in forms according to some order of perfection and imperfection, for that (form) which is closer to matter is more imperfect, and (is) as in potency in respect to the form that comes over.<sup>47</sup> And diverse degrees of perfection are considered in matter: for example, to be, to live, and to understand.<sup>48</sup> However, always the second, which comes over the first, is more perfect. Therefore, the form that gives to matter only the first degree of perfection is most imperfect, while the form that gives the first and the second, and the third, and so on, is most perfect; and yet, it is immediate to matter (i.e., just like the first).

#### 46.10. Corporeity

Corporeity can be taken in two (modes):<sup>49</sup>

1. Insofar as it is **the substantial form of a body**, according to which it is placed in the genus of *substance*.<sup>50</sup> In this mode, the corporeity of any body is nothing other than its substantial form, according to which it is placed in a genus and a species, (and) to which the corporeal thing owes having three dimensions.

Indeed, there are not diverse substantial forms in one and the same (individual substance) whereby it would be placed in a highest genus—for example, *substance*—by one (substantial form), in a proximate genus—for example, in the genus of *body* or of *animal*—by another, and in a species—for example, (in the species) of *man* or of *horse*—by another.<sup>51</sup> For if the first form would make (the individual) to be a substance, subsequent

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<sup>47</sup> *De sub. sep.*, c. 8, 48–52: “Invenitur igitur in formis diversitas secundum quemdam ordinem perfectionis et imperfectionis, nam quae materiae est propinquior, imperfectior est, et quasi in potentia respectu supervenientis formae.”

<sup>48</sup> *STh* I, q. 76 a. 4 ad 3: “in materia considerantur diversi gradus perfectionis, sicut esse, vivere sentire et intelligere. Semper autem secundum superveniens priori, perfectius est. Forma ergo quae dat solum primum gradum perfectionis materiae, est imperfectissima, sed forma quae dat primum et secundum, et tertium, et sic deinceps, est perfectissima; et tamen materiae immediata.”

<sup>49</sup> *ScG* 4, 81 n. 7: “Corporeitas autem dupliciter accipi potest.” *Quodlibet* 12, q. 7 a. 1 co.: “Si dicatur corporeitas forma corporis, corporeitas dicitur dupliciter: quandoque tres dimensiones: et hoc non est forma substantialis, sed accidens; aliquando dicitur quaedam forma, ex qua provenit trina dimensio: et haec non est alia forma specifica.”

<sup>50</sup> *ScG* 4, 81 n. 7: “Corporeitas autem dupliciter accipi potest. Uno modo, secundum quod est forma substantialis corporis, prout in genere substantiae collocatur. Et sic corporeitas cuiuscumque corporis nihil est aliud quam forma substantialis eius, secundum quam in genere et specie collocatur, ex qua debetur rei corporali quod habeat tres dimensiones.”

<sup>51</sup> *ScG* 4, 81 n. 7: “Non enim sunt diversae formae substantiales in uno et eodem, per quarum unam collocetur in genere supremo, puta substantiae; et per aliam in genere proximo, puta in genere corporis vel animalis; et per aliam in specie puta hominis aut equi. Quia si prima forma faceret esse substantiam, sequentes formae iam advenirent ei quod est hoc aliquid in actu et subsistens in natura: et sic posteriores formae non facerent hoc aliquid, sed essent in subiecto quod est hoc aliquid sicut formae accidentales. Oportet igitur, quod corporeitas, prout est forma substantialis in homine, non sit aliud quam anima

forms would befall that which already is *this* something in act and subsisting in nature; and thus, posterior forms would not make *this* something: rather, like accidental forms, they would be in a subject that is *this* something. Thus, corporeity, insofar as it is a substantial form in man, must not be other than the rational soul, which in its matter requires having three dimensions, for it is the act of some body.

Hence, if (*corporeity*) should be taken from *body* insofar as it is in the genus of *substance*, thus (taken) *corporeity* names the essence of a natural thing.<sup>52</sup> It does not follow, however, that every quiddity should be a corporeity—unless it would be said that it befits quiddity, insofar as it is quiddity, to be corporeity (i.e., as materialists do).

**2.** Insofar as it is **an accidental form**, according to which to is said (to be a) *body* that is in the genus of quantity.<sup>53</sup> In this mode, corporeity is nothing but the three dimensions that constitute the *ratio* of *body*.

Hence, if *corporeity* (*corporeitas*) should be taken from *body* (*a corpore*) insofar as it is in the genus of quantity, corporeity thus (taken) is not the quiddity of a natural thing, but its accident—namely, a threefold dimension.<sup>54</sup>

Quantitative dimensions are accidents that follow upon (substantial) corporeity (§1), which befits the whole of matter.<sup>55</sup> Whence, matter—already understood under corporeity and dimensions—can be understood as distinct in diverse parts, such that it would receive diverse forms according to ulterior degrees of perfection. Thus, although the same form

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rationalis, quae in sua materia hoc requirit, quod habeat tres dimensiones: est enim actus corporis alicuius." *Comp. th.* 1, c. 154, 92–108: "si per corporeitatem intelligatur forma substantialis per quam aliquid in genere substantie corporee ordinatur, cum non sit unius nisi una forma substantialis, talis corporeitas non est aliud quam anima; nam hoc animal per hanc animam non solum est animal, sed animatum corpus et corpus et etiam hoc aliquid in genere substantie existens: alioquin anima adueniret corpori existenti in actu, et sic esset forma accidentalis. Subiectum enim substantialis forme non est actu hoc aliquid, sed potentia tantum: unde cum accipit formam substantialem non dicitur tantum generari hoc aut illud, sicut dicitur in formis accidentalibus, sed dicitur simpliciter generari, quasi simpliciter esse accipiens; et sic corporeitas accepta eadem numero manet, rationali anima incorruptibili existente."

<sup>52</sup> *De veritate*, q. 10 a. 4 ad 3: "Si vero sumatur [corporeitas] a corpore prout est in genere substantiae, sic corporeitas nominat rei naturalis essentiam. Nec tamen sequetur quod omnis quidditas sit corporeitas, nisi diceretur, quod quidditati, in quantum est quidditas, conveniret esse corporeitatem."

<sup>53</sup> *ScG* 4, 81 n. 7: "Alio modo accipitur corporeitas prout est forma accidentalis, secundum quam dicitur corpus quod est in genere quantitatis. Et sic corporeitas nihil aliud est quam tres dimensiones, quae corporis rationem constituunt."

<sup>54</sup> *De veritate*, q. 10 a. 4 ad 3: "si corporeitas sumatur a corpore prout est in genere quantitatis, sic corporeitas non est rei naturalis quidditas, sed eius accidens, scilicet trina dimensio." *Comp. th.* 1, c. 154, 108–113: "Si uero corporeitatis nomine forma quedam intelligatur a qua denominatur corpus quod ponitur in genere quantitatis, sic est quedam forma accidentalis, cum nichil aliud significet quam trinam dimensionem."

<sup>55</sup> *STh* 1, q. 76 a. 6 ad 2: "dimensiones quantitativae sunt accidentia consequentia corporeitatem, quae toti materiae convenit. Unde materia iam intellecta sub corporeitate et dimensionibus, potest intelligi ut distincta in diversas partes, ut sic accipiat diversas formas secundum ultiores perfectionis gradus. Quamvis enim eadem forma sit secundum essentiam quae diversos perfectionis gradus materiae attribuit, ut dictum est; tamen secundum considerationem rationis differt."

should be, according to essence, that which attributes to matter diverse degrees of perfection, however, it differs according to the consideration of reason (or of *ratio, rationis*).

#### 46.11. Corporeity: The First Form Received in the First Matter

A form is caused to be (*efficitur*) intelligible only through being separated from matter and from those that depend upon matter.<sup>56</sup> However, this is not insofar as corporeal matter is perfect in corporeity, since the form itself of corporeity should be intelligible through separation from matter. Whence, those substances that are intelligible by nature seem not to be material; otherwise, the species of things in them would not be according to an intelligible being (*secundum esse intelligibile*). Whence, AVICENNA says that something is said to be intellective because it is immune from matter. Therefore, the first matter, insofar as it is considered denuded of every form, does not have some diversity; nor is it caused to be diverse by some accidents before the advent of a substantial form, since accidental being does not precede substantial (being). And one perfection is owed to one perfectible. Therefore, the first substantial form must perfect the whole matter. And **the first form** that is received in matter is **corporeity**, from which (matter) is never denuded, as AVERROES says. Therefore, the form of corporeity is in the whole matter; and thus, matter will only be in bodies.

Thus, incorporeity is incompatible with (*repugnat*) matter.<sup>57</sup> Indeed, since one perfection should be owed to one perfectible, and there should be no diversity in first matter, every form must clothe it whole (i.e., must clothe the whole of first matter) before there could be—or be understood—any diversity in it. Yet, no diversity whatsoever can be understood before corporeity, since diversity presupposes parts, which can only be if the divisibility that follows upon quantity—which cannot be without corporeity—is pre-understood. Whence, the whole matter must be clothed (by) the form of corporeity; and thus, if something is incorporeal, it must be immaterial.

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<sup>56</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “nulla forma efficitur intelligibilis, nisi per hoc quod separatur a materia et ab appendentiis materiae. Hoc autem non est in quantum est materia corporalis perfecta corporeitate, cum ipsa forma corporeitatis sit intelligibilis per separationem a materia. Unde illae substantiae quae sunt intelligibiles per naturam, non videntur esse materiales: alias species rerum in ipsis non essent secundum esse intelligibile. Unde Avicenna dicit, quod aliquid dicitur esse intellectivum, quia est immune a materia. Et propterea materia prima, prout consideratur nuda ab omni forma, non habet aliquam diversitatem, nec efficitur diversa per aliqua accidentia ante adventum formae substantialis, cum esse accidentale non praecedat substantiale. Uni autem perfectibili debetur una perfectio. Ergo oportet quod prima forma substantialis perficiat totam materiam. Sed prima forma quae recipitur in materia, est corporeitas, a qua nunquam denudatur, ut dicit Comment. Ergo forma corporeitatis est in tota materia, et ita materia non erit nisi in corporibus.”

<sup>57</sup> *In Sent.* 2, d. 3 q. 1 a. 1 co.: “incorporeitas repugnat materiae: cum enim uni perfectibili debeatur una perfectio, et in materia prima non sit ulla diversitas, oportet quod omnis forma antequam possit in ea esse ulla diversitas, nec intelligi, investiat eam totam. Sed ante corporeitatem non potest intelligi aliqua diversitas, quia diversitas praesupponit partes, quae non possunt esse nisi praeintelligatur divisibilitas quae consequitur quantitatem, quae sine corporeitate non est. Unde oportet quod tota materia sit vestita forma corporeitatis; et ideo si aliquid est incorporeum, oportet esse immateriale.”



Matter does not have division from the quiddity of substance, but from corporeity, upon which follow the dimensions of quantity in act; and after it (i.e., after corporeity), through the division of matter, according to which diverse sites are disposed, are acquired in it (i.e., in matter) diverse forms (► 35.15; 35.19).<sup>58</sup>

Corporeity is univocally found in all bodies according to logical intention on account of one *ratio* of corporeity.<sup>59</sup> Yet, considered physically, according to being (*secundum esse*), it cannot be of one *ratio* in a corruptible and (in) an incorruptible thing, since they are not

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<sup>58</sup> *In Sent.* 1, d. 8 q. 5 a. 2 co.: “ex quidditate substantiae materia non habet divisionem, sed ex corporeitate, quam consequuntur dimensiones quantitatis in actu; et postea per divisionem materiae, secundum quod disponitur diversis sitibus, acquiruntur in ipsa diversae formae.”

<sup>59</sup> *In Sent.* 2, d. 12 q. 1 a. 1 ad 1: “corporeitas secundum intentionem logicam univoce in omnibus corporibus invenitur; sed secundum esse considerata, non potest esse unius rationis in re corruptibili et incorruptibili: quia non similiter se habent in potentia essendi, cum unum sit possibile ad esse et ad non esse, et alterum non: et per modum istum dicit Philosophus in 10 Metaph., quod de corruptibili et incorruptibili nihil commune dicitur, nisi communitate nominis; et per hoc Commentator ibidem hanc rationem solvit.” Cf. *S7h* I, q. 66 a. 2 ad 2: “si genus consideretur physice, corruptibilia et incorruptibilia non sunt in eodem genere, propter diversum modum potentiae in eis, ut dicitur X Metaphys. Secundum autem logicam considerationem, est unum genus omnium corporum, propter unam rationem corporeitatis.” As St. Thomas explains, notwithstanding this difference of natural corruptibility and incorruptibility, AVICEBRON posited (that there is) one matter of all bodies, considering (only) the unity of the corporeal form. Yet, if the form of corporeity should be one form by itself, over which other forms would come, whereby bodies would be distinguished, that form would immutably inhere in matter; and every body would be incorruptible in respect of it. Corruption would happen, rather, through the removal of subsequent forms, which would not be corruption simply, but (corruption) according to something, since some being in act would lay under the privation. However, (if it is) supposed that no form that is in a corruptible body should remain as the substrate of generation and corruption, it follows of necessity that there the matter of corruptible and incorruptible bodies should not be the same. Indeed, matter, according to what it is, is in potency to a form. Therefore, matter, considered in itself, must be in potency to a form of all those (composites) of which there is a common matter; and it comes to be in act by one form only in respect to that form. Therefore, it remains in potency in respect to all other forms. This is not excluded if one of those forms should be more perfect, virtually containing in itself the others, since potency, in respect of itself, is indifferently had to the perfect and the imperfect; whence, just as when it is under an imperfect form it is in potency to a perfect form, so, (too), conversely. Therefore, matter, insofar as it is under the form of an incorruptible body, will still be in potency to the form of a corruptible body. And since it should not have it in act, it will simultaneously be under a form and under a privation, since privation is the lack of a form in that which is in potency to a form. However, this disposition belongs to a corruptible body. Therefore, it is impossible that the matter of a corruptible and of an incorruptible body should be one (and the same). See *ibid.*, co.: “Sed non obstante hac differentia corruptibilitatis et incorruptibilitatis naturalis, Avicebron posuit unam materiam omnium corporum, attendens ad unitatem formae corporalis. Sed si forma corporeitatis esset una forma per se, cui supervenirent aliae formae, quibus corpora distinguuntur, haberet necessitatem quod dicitur. Quia illa forma immutabiliter materiae inhaereret, et quantum ad illam esset omne corpus incorruptibile, sed corruptio accideret per remotionem sequentium formarum, quae non esset corruptio simpliciter, sed secundum quid, quia privationi substerneretur aliquod ens actu. Sicut etiam accidebat antiquis naturalibus, qui ponebant subiectum corporum aliquod ens actu, puta ignem aut aerem aut aliquid huiusmodi. Supposito autem quod nulla forma quae sit in corpore corruptibili remaneat ut substrata generationi et corruptioni, sequitur de necessitate quod non sit eadem materia corporum corruptibilium et incorruptibilium. Materia enim, secundum id quod est, est in potentia ad formam. Oportet ergo quod materia, secundum se considerata, sit in potentia ad formam omnium illorum quorum est materia communis. Per unam autem formam non fit in actu nisi quantum ad illam formam. Remanet ergo in potentia quantum ad omnes alias formas. Nec hoc excluditur, si una illarum formarum sit perfectior et continens in se virtute alias. Quia potentia, quantum est de se, indifferenter se habet ad perfectum et imperfectum, unde sicut quando est sub forma imperfecta, est in potentia ad formam perfectam, ita e converso. Sic ergo materia, secundum quod est sub forma incorruptibilis corporis, erit adhuc in potentia ad formam corruptibilis corporis. Et cum non habeat eam in actu, erit simul sub forma et privatione, quia carentia formae in eo quod est in potentia ad formam, est privatio. Haec autem dispositio est corruptibilis corporis. Impossibile ergo est quod corporis corruptibilis et incorruptibilis per naturam, sit una materia.”

similarly had in the potency of being; for one (of them, i.e., the corruptible) should be possible (in relation) to being and to non-being, while the other (should) not. It is through this mode that ARISTOTLE says that nothing is said in common of the corruptible and the incorruptible, except by community of name (►41.17).

That which is understood in matter before form, remains in matter after corruption, for (if) the posterior (is) removed, the prior can still remain.<sup>60</sup> In order for diverse forms to be received in diverse parts, it is necessary to understand, in the matter of things subject to generation and corruption (*in materia generabilium et corruptibilium*), non-terminated dimensions (►35.15; 35.16), according to which the division of matter is considered. Whence, also after the separation of a substantial form from matter, those dimensions still remain the same. And thus, matter existing under those dimensions, whatever form it takes, has greater identity (in relation) to that which was generated from it than some other part of matter existing under whatever form.

#### 46.12. The Relation between Matter and Form

The nature of relation is such that it should have a cause in the other genera of things, since it has the minimum of the nature of being, as AVERROES says (►37).<sup>61</sup> Whence, although a relation by itself should not terminate a motion, for there is no motion in (the genus of) relation, as ARISTOTLE proves, however, because motion is by itself terminated at some being (*ad aliquod ens*), some relation follows of necessity. For example, because the motion of alteration is terminated at whiteness, a relation of likeness follows (in respect) to all white (things). Likewise, too, because the motion of generation is terminated at a form, a relation follows, according to which matter is said to be under a form.

#### 46.13. The First Extrinsic Principles of All Things

If by *passive potency* should be understood *the relation or order of matter to form* (►46.12), then matter is not its potency, since the essence of matter is not a relation.

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<sup>60</sup> *In Sent.* 4, d. 44 q. 1 a. 1 qc. 1 ad 3: “illud quod intelligitur in materia ante formam, remanet in materia post corruptionem: quia remoto posteriori, remanere adhuc potest prius. Oportet autem, ut Commentator dicit in 1 Physic. et in Lib. De substantia orbis, in materia generabilium et corruptibilium ante formam substantialem intelligere dimensiones non terminatas, secundum quas attendatur divisio materiae, ut diversas formas in diversis partibus recipere possit; unde et post separationem formae substantialis a materia adhuc dimensiones illae manent eadem; et sic materia sub illis dimensionibus existens, quamcumque formam accipiat, habet maiorem identitatem ad illud quod ex ea generatum fuerat, quam aliqua pars alia materiae sub quacumque forma existens.”

<sup>61</sup> *In Sent.* 3, d. 2 q. 2 a. 2 qc. 3 co.: “Est enim natura relationis ut in aliis rerum generibus causam habeat, quia minimum habet de natura entis, ut Commentator 12 Metaph. dicit. Unde quamvis relatio per se non terminet motum, quia in ad aliquid non est motus, ut probatur in 5 Physic. tamen ex hoc quod motus per se terminatur ad aliquod ens, de necessitate consequitur relatio aliqua; sicut ex hoc quod motus alterationis terminatur ad albedinem, consequitur relatio similitudinis ad omnia alba: similiter etiam ex hoc quod motus generationis terminatur ad formam, consequitur haec relatio secundum quam materia sub forma esse dicitur.”

However, if *potency* should be understood insofar as it is a principle in the genus of substance, insofar as potency and act are principles in any genus, in this way, matter is itself its own potency. And the first matter, which is the first recipient, is related to passive potency as the first agent is related to active potency. Hence, matter is its own passive potency just as the first agent is its (own) active potency. All means have one and the other potency (i.e., passive and active) participatively. Yet, the potency of matter is not (ordered) to some operation but to reception alone.<sup>62</sup>

Thus, a material principle, which is found by us (to be) imperfect, cannot be simply first.<sup>63</sup> Rather, it is preceded by something perfect. For example, although seed should be a principle of an animal begotten from seed, however, it has before itself an animal or a plant whence it proceeds (*deciditur*). Thus, before that which is in potency, there must be something in act, since a being in potency is reduced into act only by a being in act.

Hence, the agent is nobler than the patient, and the active principle (is more noble than) matter.<sup>64</sup> Just as matter as such (*inquantum huiusmodi*) is in potency, so the agent as such is in act. Whence, the first active principle must maximally be in act and—consequently—maximally be perfect (► 23.4).

The more some cause is higher, the more it is common and efficacious; and the more it is efficacious, the more profoundly does it penetrate (*ingreditur*) in the effect and reduces it into act from a more remote potency.<sup>65</sup> According to ARISTOTLE, the first active or motive principles of all things are the same, but in some order.<sup>66</sup> The first are simply incorruptible

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<sup>62</sup> *In Sent.* 1, d. 3 q. 4 a. 2 ad 4: “Ad quartum [sc., *materia prima est sua potentia. Sed sicut in materia est potentia passiva, ita in forma potentia activa. Ergo etiam forma essentialis est sua potentia activa*] dicendum, quod si per potentiam passivam intelligatur relatio vel ordo materiae ad formam, tunc materia non est sua potentia, quia essentia materiae non est relatio. Si autem intelligatur potentia, secundum quod est principium in genere substantiae, secundum quod potentia et actus sunt principia in quolibet genere, ut dicitur, in 12 Metaph., sic dico, quod materia est ipsa sua potentia. Et hoc modo se habet materia prima, quae est primum recipiens, ad potentiam passivam, sicut se habet Deus, qui est primum agens, ad potentiam activam. Et ideo materia est sua potentia passiva, sicut et Deus sua potentia activa. Omnia autem media habent utramque potentiam participative, et potentia materiae non est ad aliquam operationem, sed ad recipiendum tantum.”

<sup>63</sup> *STh* I, q. 4 a. 1 ad 2: “principium materiale, quod apud nos imperfectum invenitur, non potest esse simpliciter primum, sed praeceditur ab alio perfecto. Nam semen, licet sit principium animalis generati ex semine, tamen habet ante se animal vel plantam unde deciditur. Oportet enim ante id quod est in potentia, esse aliquid actu, cum ens in potentia non reducat in actum, nisi per aliquod ens in actu.”

<sup>64</sup> *In De anima* 3, c. 4, 64–86: “agens est honorabilius paciente et principium actuum materia.” Cf. ARISTOTLE, *De anima* Γ.5, 430a17–18: “ἀεὶ γὰρ τιμιώτερον τὸ ποιοῦν τοῦ πάσχοντος καὶ ἡ ἀρχὴ τῆς ὕλης.” *STh* I, q. 4 a. 1 co.: “Sicut enim materia, inquantum huiusmodi, est in potentia; ita agens, inquantum huiusmodi, est in actu. Unde primum principium activum oportet maxime esse in actu, et per consequens maxime esse perfectum.”

<sup>65</sup> *De potentia*, q. 3 a. 7 co.: “Quanto enim aliqua causa est altior, tanto est communior et efficacior, et quanto est efficacior, tanto profundius ingreditur in effectum, et de remotiori potentia ipsum reducit in actum.”

<sup>66</sup> *In Metaph.* 3, l. 11, §487: “Philosophus ostendit prima quidem principia activa vel motiva esse eadem omnium sed quodam ordine. Nam prima quidem sunt principia simpliciter incorruptibilia et immobilia.

and immobile principles. The second—namely, celestial bodies (i.e., according to ancient science)—are incorruptible and mobile, which by their motion cause generation and corruption in things.

Hence, the first *extrinsic* principles of all things—namely, efficient and final causes—are numerically one and the same (*eadem numero* = ἀριθμῶ αἱ αὐταί, ἀριθμῶ ἓν), because that which is the first principle of all things is an agent and an end.<sup>67</sup>

On the other hand, the intrinsic principles of corruptible and incorruptible things are not the same in number, but according to analogy (► 45.18).<sup>68</sup> And the intrinsic principles of corruptible things, which are matter and form, are not corruptible by themselves, but only by accident.

#### 46.14. Division of the Efficient Cause

The efficient cause can be divided in two modes:<sup>69</sup>

1. **From the part of the effect:** into **disposing**, which causes a disposition to the last form; and **perfecting**, which introduces the last perfection.<sup>70</sup>

2. **From the part of the cause itself:** into **principal agent**, and **instrumental (agent)**.<sup>71</sup>

The principal agent is a first mover; the instrumental agent is a moved mover.

The principal agent and the instrumental (agent) are as one cause, since one acts through the other.<sup>72</sup> However, the *ratio* of the principal agent and of the instrumental (agent) is not

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Sunt autem secunda incorruptibilia et mobilia, scilicet caelestia corpora, quae per sui motum causant generationem et corruptionem in rebus.”

<sup>67</sup> *In Metaph.* 3, l. 10, §465: “Principia autem separata [...] sunt unum numero unaquaeque secundum seipsam.” *Ibid.* 11, l. 2, §2193 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b28–30): “loquendo de principiis extrinsecis, unum numero sunt; cum id quod est primum principium omnium, sit agens et finis.” *In Metaph.* 12, l. 4 §2455: “quodammodo sunt alia aliorum et principia et causae, et quodammodo sunt eadem omnium, secundum universalitatem, et secundum proportionem.” Cf. ARISTOTLE, *Metaphysica* Λ.4, 1070a31–33: “τὰ δ’ αἴτια καὶ αἱ ἀρχαὶ ἄλλα ἄλλων ἔστιν ὥς, ἔστι δ’ ὥς, ἂν καθόλου λέγη τις καὶ κατ’ ἀναλογίαν, ταῦτὰ πάντων.”

<sup>68</sup> *In Metaph.* 3, l. 11, §487: “Principia autem intrinseca non sunt eadem numero corruptibilium et incorruptibilium, sed secundum analogiam. Nec tamen principia intrinseca corruptibilium, quae sunt materia et forma, sunt corruptibilia per se, sed solum per accidens. Sic enim corrumpitur materia et forma corruptibilium, ut habetur in primo Physicorum.”

<sup>69</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 1 co.: “causa efficiens dupliciter potest dividi.”

<sup>70</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 1 co.: “Uno modo ex parte effectus; scilicet in disponentem, quae causat dispositionem ad formam ultimam; et perficientem, quae inducit ultimam perfectionem.”

<sup>71</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 1 co.: “Alio modo ex parte ipsius causae in agens principale, et instrumentale. Agens enim principale est primum movens, agens autem instrumentale est movens motum.” *De malo*, q. 4 a. 1 ad 15: “duplex est causa. Una principalis [...]. Alia est causa instrumentalis [...].” *In Sent.* 4, d. 5 q. 2 a. 2 qc. 2 co.: “duplex est agens; unum principale, et aliud instrumentale.”

<sup>72</sup> *STh* I-II, q. 14 a. 3 ad 4: “agens principale et instrumentale sunt quasi una causa, cum unum agat per alterum.” *STh* II-II, q. 165 a. 2 ad 1: “Non autem est eadem ratio principalis agentis et instrumenti. Nam principale agens oportet esse potius, quod non requiritur in agente instrumentali.”

the same, for the principal agent must be more effective (*potius*), which is not required in the instrumental agent.

#### 46.15. The Principal Agent

The principal agent acts (*agit*) by (its) proper form.<sup>73</sup>

The principal agent, since it should produce its like (*cum agat sibi simile*), must have a form that it brings into (*inducit*) the univocal agent by its action, or some more noble (form) (that it brings) into a non-univocal agent (► 46.19).<sup>74</sup>

The principal agent, insofar as it is a cause, is more noble than the effect.<sup>75</sup>

#### 46.16. The Instrumental Agent

Every agent that does not act (*non agit*) according to (its) proper form, but only insofar as it is moved by another, is an agent only instrumentally.<sup>76</sup> For example, an axe acts insofar as it is moved by the artificer.

Thus, an instrument performs (*agit*) an instrumental action insofar as it is moved by the principal agent, by which motion it somehow (*aliqua l i t e r*) participates (in) the virtue of the principal agent; (but) not in such a way that the virtue should be in the instrument according to a perfect being, since motion is an imperfect act.<sup>77</sup>

The instrumental agent need not be more noble than the effect: for example, a saw is not more noble than a house.<sup>78</sup> Thus, something is more noble in a principal cause than in the effect, but not (so) in an instrumental cause.

That which acts in virtue of another produces an effect not merely like itself, but more (like) that in virtue of which it acts.<sup>79</sup> Hence, the effect is not assimilated to the instrument but to

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<sup>73</sup> *De malo*, q. 4 a. 1 ad 15: "Una principalis quae agit per propriam formam."

<sup>74</sup> *In Sent.* 4, d. 5 q. 2 a. 2 qc. 2 co.: "Agens autem principale, cum agat sibi simile, oportet quod habeat formam, quam inducit per suam actionem in agentibus univocis, vel aliquam nobiliores in agentibus non univocis."

<sup>75</sup> *De malo*, q. 4 a. 1 ad 15: "haec est nobilior quam effectus in quantum est causa."

<sup>76</sup> *De virtutibus*, q. 2 a. 1 co.: "Omne enim agens quod non agit secundum formam propriam, sed solum secundum quod est motum ab altero, est agens instrumentaliter tantum; sicut securis agit prout est mota ab artifice." *De malo*, q. 4 a. 1 ad 15: "Alia est causa instrumentalis quae non agit per formam propriam, sed in quantum est mota ab alio."

<sup>77</sup> *De veritate*, q. 26 a. 1 ad 8: "instrumentum agit actionem instrumentalem, in quantum est motum ab agente principali, per quem motum participat aliqua l i t e r virtutem agentis principalis, non ita quod virtus illa sit in instrumento secundum esse perfectum, quia motus est actus imperfectus."

<sup>78</sup> *De malo*, q. 4 a. 1 ad 15: "hanc non oportet nobiliores esse effectum, sicut serra non est nobilior quam domus." *Ibid.*, q. 4 a. 3 ad 5: "nobilius est aliquid in causa principali quam in effectum, non autem in causa instrumentali."

<sup>79</sup> *In De gen.* 1, l. 13 n. 4: "Instrumentum enim non agit in virtute propriae formae, sed in quantum movetur a principali agente, quod per suam formam agit. Unde effectus assimilatur in forma, non quidem instrumento, sed principali agenti; sicut domus quae fit in materia, assimilatur domui quae est in mente

the principal agent. Indeed, since an instrument does not act (*non agit*) by virtue of (its) proper form, but insofar as it is moved by a principal agent, which acts by its form, the effect is assimilated in (i.e., made like) the form: not indeed in (the likeness of) the instrument, but (in the likeness of) the principal agent.

For example, since, the form of an art comes to be in the artifact from the action of an instrument, a house that comes to be in matter is assimilated in (i.e., comes to be like) the house that is in the mind of the builder, and not (in the likeness of) the axe; likewise, a bed is not assimilated to the axe but to the art that is in the mind of the artificer. (And in the natural order), a begotten man is assimilated in (the likeness of) the species of the begetting father, and not (in the likeness of) the seed.

Therefore, the agent by itself (*per se*) and the instrumental agent differ in this: that the instrumental agent does not introduce into the effect its likeness, but the likeness of the principal agent, while the principal agent introduces its likeness.<sup>80</sup> Hence, something is constituted (as) a principal agent which has some form that it can transfer (*transfundere*) into another, while it is constituted (as) an instrumental agent through being applied by the principal agent in order to induce some effect. And just like the participation of the form that is to be induced in an effect does not produce an instrument, so nor does the subtraction of such a form take away the use of the instrument.<sup>81</sup> Indeed, the instrumental agent need not have the form that it introduces as disposing it, but only by the mode of intention (i.e., inclination; ►9.8; 46.18), as is evident concerning the form of the bench in the saw.<sup>82</sup>

Thus, we find that there is an order of the effects according to the order of the causes, which necessarily is on account of the likeness of effects and causes. A second cause

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aedificantis, non autem securi aut asciae; et homo generatus assimilatur in specie patri generanti, non autem semini.” *STh* III, q. 62 a. 1 co.: “Causa vero instrumentalis non agit per virtutem suae formae, sed solum per motum quo movetur a principali agente. Unde effectus non assimilatur instrumento, sed principali agenti, sicut lectus non assimilatur securi, sed arti quae est in mente artificis.” *ScG* 3, 69 n. 23: “Quod autem agit in virtute alterius, producit effectum similem non sibi tantum, sed magis ei in cuius virtute agit: sicut ex actione instrumenti fit in artificiato similitudo formae artis. Ex quo sequitur quod ex actione formarum accidentalium producuntur formae substantiales, inquantum agunt instrumentaliter in virtute substantialium formarum.”

<sup>80</sup> *In Sent.* 4, d. 19 q. 1 a. 2 qc. 1 co.: “agens per se et agens instrumentale in hoc differunt, quod agens instrumentale non inducit in effectu similitudinem suam, sed similitudinem principalis agentis. Principale autem agens inducit similitudinem suam; et ideo ex hoc aliquid constituitur principale agens, quod habet aliquam formam, quam in alterum transfundere potest; non autem ex hoc constituitur agens instrumentale, sed ex hoc quod est applicatum a principali agente ad effectum aliquem inducendum.”

<sup>81</sup> *In Sent.* 4, d. 19 q. 1 a. 2 qc. 2 co.: “sicut participatio formae quae est inducenda in effectu, non facit instrumentum; ita nec subtractio talis formae tollit usum instrumenti.”

<sup>82</sup> *In Sent.* 4, d. 5 q. 2 a. 2 qc. 2 co.: “agens instrumentale non oportet quod habeat formam quam inducit ut disponentem ipsum, sed solum per modum intentionis, sicut de forma scamni in serra patet, ut in 1 dist. quaest. 1, art. 4, quaestiunc. 1 et 2, dictum est.”

cannot (attain) the effect of a first cause by its proper virtue, even though it should be an instrument of the first cause in respect of that effect. Indeed, an instrument is in some mode a cause of the effect of the principal cause not by (its) proper form or virtue, but insofar as it participates (in) some of the virtue of the principal cause through its motion. For example, an ax is not a cause of a thing made by art (*causa rei artificiatae*) by (its) proper form or virtue, but by virtue of the artificer, by which (virtue) it is moved; and (the ax) participates (in) it (i.e., in the virtue of the artificer) in some mode.<sup>83</sup>

However, the form of the effect that is in the principal agent does not come to be one in number in the effect.<sup>84</sup> Yet, it is not in vain on account of this, since it is not ordered in such a way that it itself should flow into the effect, but in such a way that from it—or through it—the like should come to be in the effect: for the efficient cause is not reduced into the same (thing) in number with the generated form, but into the same in species (►45.20).

A twofold action befits the instrument: one, which it has from its proper nature; another, which it has insofar as it is moved by the first agent.<sup>85</sup> Nevertheless, the action of an instrument sometimes pertains to a last perfection, which sometimes the principal agent introduces; but sometimes (it does) not. However, it always reaches at something beyond (*ultra*) that which befits it according to its nature, whether that should be a last form or a disposition; otherwise, it would not act as an instrument. And since every instrument—by performing (*agendo*) the natural action that befits it insofar as it is something—attains an effect that befits it insofar as it is an instrument—as an axe, dividing by its sharpness instrumentally attains the form of a bench—, hence, also a material element, exerting the natural action according to which it is a sign of an inferior effect, attains the interior effect instrumentally.

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<sup>83</sup> *De potentia*, q. 3 a. 7 co.: “invenimus, secundum ordinem causarum, esse ordinem effectuum, quod necesse est propter similitudinem effectus et causae. Nec causa secunda potest in effectum causae primae per virtutem propriam, quamvis sit instrumentum causae primae respectu illius effectus. Instrumentum enim est causa quodammodo effectus principalis causae, non per formam vel virtutem propriam, sed in quantum participat aliquid de virtute principalis causae per motum eius, sicut dolabra non est causa rei artificiatae per formam vel virtutem propriam, sed per virtutem artificis a quo movetur et eam quoquomodo participat.”

<sup>84</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 4 ad 3: “forma effectus quae est in agente principali vel instrumentali, non fit eadem numero in effectum. Nec propter hoc frustra est: quia non ad hoc ordinatur ut ipsamet in effectum fluat, sed ut ab ea vel per eam similis fiat in effectum. Causa enim efficiens non reducitur in idem numero cum forma generati, sed in idem specie, ut patet in 2 Phys.”

<sup>85</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 1 co.: “Instrumento autem competit duplex actio: una quam habet ex propria natura, alia quam habet prout est motum a primo agente [...]. Sed sciendum, quod actio instrumenti quandoque pertingit ad ultimam perfectionem, quam principale agens inducit aliquando autem non; semper tamen pertingit ad aliquid ultra id quod competit sibi secundum suam naturam, sive illud sit ultima forma, sive dispositio, alias non ageret ut instrumentum [...]. Et quia omne instrumentum agendo actionem naturalem, quae competit sibi in quantum est res quaedam, pertingit ad effectum qui competit sibi in quantum est instrumentum, sicut dolabrum dividendo suo acumine pertingit instrumentaliter ad formam scanni: ideo etiam materiale elementum exercendo actionem naturalem, secundum quam est signum interioris effectus, pertingit ad interiorum effectum instrumentaliter.”

Every instrumental agent attains (*exequitur*) the action of the principal agent through some action (that is) proper and connatural to it.<sup>86</sup> For example, a saw operates to perfect a bench by cutting. The effect that responds to the proper action of the instrument is prior in the way of generation than the effect that responds to the principal agent; wherefrom, the last end responds to the first agent (►46.24). Thus, the cutting up of wood is prior to the form of the bench.

#### 46.17. The Virtue of Acting in Principal and in Instrumental Agents

An instrumental agent disposes (matter, in order) to introduce a perfection from the principal agent only insofar as it acts from the virtue of the principal agent.<sup>87</sup> And the same virtue (*vis*) of the principal agent is instrumentally found in all the instruments that are ordered to the effect, just as they are something one in an order.<sup>88</sup>

Thus, it may happen that something participates (in) the proper action of something else not by (its) proper virtue but instrumentally, insofar as it acts in virtue of another.<sup>89</sup> A second, instrumental cause participates (in) the action of a superior cause only insofar as it operates to (produce) the effect of the principal agent through something (that is) dispositive (and) proper to it. Hence, if nothing would act according to that which is proper to it, it would be used in vain in order to act; nor would there be determinate instruments for determinate actions. For example, we see that an axe, in cutting up wood—which it has from the property of its form—, produces the form of a bench, which is the proper effect of a principal agent.

The virtue of acting (*virtus agendi*) is proportionate to the agent.<sup>90</sup> Whence, the virtue of acting must be posited in a principal agent in a mode other than in an instrumental agent.

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<sup>86</sup> ScG 2, 21 n. 7: “Omne agens instrumentale exequitur actionem principalis agentis per aliquam actionem propriam et connaturalem sibi: sicut [...] serra operatur ad perfectionem scamni secando. [...] Effectus autem respondens actioni propriae instrumenti est prior in via generationis quam effectus respondens principali agenti, ex quo provenit quod primo agenti finis ultimus respondet: prius enim est sectio ligni quam forma scamni.”

<sup>87</sup> ScG 3, 149 n. 2: “Agens instrumentale non disponit ad perfectionem inducendam a principali agente nisi secundum quod agit ex virtute principalis agentis.”

<sup>88</sup> *STh* III, q. 62 a. 4 ad 4: “eadem vis principalis agentis instrumentaliter invenitur in omnibus instrumentis ordinatis ad effectum, prout sunt quodam ordine unum.”

<sup>89</sup> *STh* I, q. 45 a. 5 co.: “Contingit autem quod aliquid participet actionem propriam alicuius alterius, non virtute propria, sed instrumentaliter, in quantum agit in virtute alterius. [...] causa secunda instrumentalis non participat actionem causae superioris, nisi in quantum per aliquid sibi proprium dispositive operatur ad effectum principalis agentis. Si igitur nihil ibi ageret secundum illud quod est sibi proprium, frustra adhiberetur ad agendum, nec oporteret esse determinata instrumenta determinatarum actionum. Sic enim videmus quod securis, scindendo lignum, quod habet ex proprietate suae formae, producit scamni formam, quae est effectus proprius principalis agentis.”

<sup>90</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 2 co.: “virtus agendi proportionatur agenti. Unde alio modo oportet ponere virtutem agendi in agente principali; alio modo in agente instrumentali. Agens enim principale agit secundum exigentiam suae formae; et ideo virtus activa in ipso est aliqua forma vel qualitas habens completum esse in natura.”



Indeed, the principal agent acts according to the exigency of its form; and hence, the active virtue in it is some form or quality that has a complete being (*completum esse*) in nature.

On the other hand, the instrument acts as moved by another.<sup>91</sup> Hence, (what) befits it (is) a virtue proportionate to the motion; and motion is not a complete being: rather, it is a way into being (*via in ens*), as a mean between pure potency and pure act.

Hence, the virtue of the instrument as such (*inquantum hujusmodi*), insofar as it acts (in relation) to an effect beyond (*ultra*) that which befits it according to its nature, is not a complete being (*ens completum*) that has a fixed being in nature (*habens esse fixum in natura*), but some incomplete being.<sup>92</sup> For example, the virtue of affecting sight (*virtus immutandi visum*) is in the air (i.e., in the mean through which light reaches the eye) insofar as it is an instrument moved from and exterior visible.

The virtue of acting (*virtus agendi*) is instrumentally given in the instrument in two modes: as **inchoatively** (*inchoative*), when it is instituted in the species of instrument; or **completely** (*complete*), when it is moved in act by the principal agent: for example, when a carpenter uses a saw.<sup>93</sup>

#### 46.18. The Instrumental Mode of Intention

Since an instrumental agent does not have the virtue of acting (in order) to (produce) some complete being except by the mode of intention, the form introduced, too, is contained in it by the mode of intention, as the species of colors in the air, from which air is not said to be colored.<sup>94</sup> This is so because:

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<sup>91</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 2 co.: “Instrumentum agit ut motum ab alio; et ideo competit sibi virtus proportionata motui: motus autem non est ens completum sed est via in ens quasi medium quid inter potentiam puram et actum purum, ut dicitur in 3 Physic.”

<sup>92</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 2 co.: “Et ideo virtus instrumenti inquantum hujusmodi, secundum quod agit ad effectum ultra id quod competit sibi secundum suam naturam, non est ens completum habens esse fixum in natura, sed quoddam ens incompletum, sicut est virtus immutandi visum in aere, inquantum est instrumentum motum ab exteriori visibili.”

<sup>93</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 2 ad 2: “instrumento datur virtus agendi instrumentaliter dupliciter. Uno modo quasi inchoative, quando instituitur in specie instrumenti [...]. Alio modo datur complete, quando actu movetur a principali agente, sicut quando carpentarius utitur serra.”

<sup>94</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 4 co.: “quia agens instrumentale non habet virtutem agendi ad aliquod ens completum, sed per modum intentionis, ut dictum est, et forma introducta continetur in eo per modum intentionis, sicut sunt species colorum in aere, a quibus aer non denominatur coloratus [...]. Primo, quia in instrumento non est forma effectus secundum completam rationem speciei, sicut est in effectu jam completo, et in causa univoca. Secundo, quia est in eo per modum intentionis, et non secundum completum esse in natura, sicut forma effectus est in causa principali non univoca secundum esse perfectum in natura, quamvis non secundum completam rationem illius speciei sive formae quam inducit in effectu, ut calor est in sole. Tertio, quia non est in eo per modum intentionis quiescentis, sicut sunt intentiones rerum in anima, sed per modum intentionis fluentis duplici fluxu: quorum unus est de potentia in actum, sicut etiam in mobili est forma, quae est terminus motus, dum movetur ut fluens de potentia in actum; et inter haec cadit medium motus, cujus virtute instrumentum agit: alius de agente in patiens, inter quae cadit medium instrumentum, prout unum est movens, et alterum motum.”

1. The form of the effect is not in the instrument according to the complete *ratio* of the species, as it is in the effect already completed, and in the univocal agent.
2. The form of the effect is in the instrument by the mode of intention, and not according to the complete (act of) being in nature, as the form of the effect is in the non-univocal principal cause according to the perfect (act of) being in nature, although not according to the complete *ratio* of the species or form that it introduces in the effect, as heat is in the sun.
3. The form of the effect is not in the instrument by the mode of a resting intention, as are the (intellectual) intentions of things in the soul, but by the mode of a flowing intention in a twofold flow: (a) from potency to act, just as also a form—which is the terminus of motion—is in the mobile, as long as it is moved, as flowing from potency into act; and between these falls a mean motion, in virtue of which the instrument acts; (b) (a flow) from the agent into the patient, between which there falls a mean instrument, insofar as one is the mover and the other (is) the moved.

#### 46.19. Univocal, Equivocal, and Analogical Agent Causes

Since every agent produces its like (*omne agens agit sibi simile*; ►9.6; 9.7; 10.1), the effect of the agent must somehow be in the agent.<sup>95</sup> However, in some (of them) it is the same according to species; and these are said (to be) *univocal agents*, as heat is in heating fire. In some, however, it is the same according to proportion or analogy, as when the sun heats, for there is in the sun something that makes it a heater, just as heat makes fire hot; and according to this, heat is said equivocally to be in the sun. Whence, it is evident that that which is in the effect as a form that gives (the act of) being is in the agent as such (*inquantum hujusmodi*) as an active virtue (*ut virtus activa*). Hence, just as the agent is related to (its) active virtue, so is it related to containing the form of the effect.

Thus, we find three modes of the agent cause:<sup>96</sup>

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<sup>95</sup> *In Sent.* 4, d. 1 q. 1 a. 4 qc. 4 co.: “quia omne agens agit sibi simile, ideo effectus agentis oportet quod aliquo modo sit in agente. In quibusdam enim est idem secundum speciem; et ista dicuntur agentia univoca, sicut calor est in igne calefaciente. In quibusdam vero est idem secundum proportionem sive analogiam, sicut cum sol calefacit. Est enim in sole aliquid quod ita facit eum calefacientem sicut calor facit ignem calidum; et secundum hoc calor dicitur esse in sole aequivoce, ut dicitur in libro De substantia orbis. Ex quo patet quod illud quod est in effectu ut forma dans esse, est in agente, inquantum hujusmodi, ut virtus activa; et ideo sicut se habet agens ad virtutem activam, ita se habet ad continendam formam effectus.”

<sup>96</sup> *In Sent.* 1, d. 8 q. 1 a. 2 co.: “Invenimus enim tres modos causae agentis. Scilicet causam aequivoce agentem, et hoc est quando effectus non convenit cum causa nec nomine nec ratione: sicut sol facit calorem qui non est calidus. Item causam univoce agentem, quando effectus convenit in nomine et ratione cum causa, sicut homo generat hominem et calor facit calorem. Neutro istorum modorum Deus agit. (Non univoce) quia nihil univoce convenit cum ipso. Non aequivoce, cum effectus et causa aliquo modo conveniant in nomine et ratione secundum prius et posterius; sicut Deus sua sapientia facit nos sapientes, ita tamen quod sapientia nostra semper deficit a ratione sapientiae suae, sicut accidens a

1. The **equivocal** agent cause, which occurs when the effect agrees with the cause neither in name nor in *ratio*. For example, the sun (according to ancient science) produces a heat that is not hot.
2. The **univocal** agent cause, when the effect agrees in name and in *ratio* with the cause. For example, man begets man; and heat produces (*facit*) heat.
3. The **analogical** agent cause, which produces an effect in its likeness—but imperfect, such that the *ratio* of the effect always falls short of the *ratio* of the cause; yet, the effect and the cause agree in some mode in name and in *ratio* according to prior and posterior.

The likeness of the effect in a univocal cause is found uniformly, while in an equivocal (cause) it is found more excellently.<sup>97</sup> For example, heat is found more excellently in the sun than in fire.

#### 46.20. The First, Common Cause of a Genus

Contraries are not altogether diverse.<sup>98</sup> Rather, they agree according to something and differ according to something (else): they agree in genus and differ according to specific differences. Hence, just as there are proper contrary causes of contraries, according to which they differ by specific differences, so, (too), of them, there must be one common cause of the whole genus in which they agree. And a common cause is prior and higher than proper causes, for the more a cause is higher, the greater its virtue and the more it extends to many (► 11.3). It remains, therefore, that contraries are not the first active principle of things, and that there is one first active cause of all.

Whatever is caused according to some nature cannot be the first, but a second and instrumental cause of that nature.<sup>99</sup> Thus, Socrates, since he has a cause of his humanity,

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ratione entis, secundum quod est in substantia. Unde est tertius modus causae agentis analogice. Unde patet quod divinum esse producit esse creaturae in similitudine sui imperfecta: et ideo esse divinum dicitur esse omnium rerum, a quo omne esse creatum effective et exemplariter manat.”

<sup>97</sup> *STh* I, q. 6 a. 2 co.: “Similitudo autem effectus in causa quidem univoca invenitur uniformiter, in causa autem aequivoca invenitur excellentius, sicut calor excellentiori modo est in sole quam in igne.”

<sup>98</sup> *De sub. sep.*, c. 17, 79–93: “Non enim contraria omnino diversa sunt, sed secundum aliquid quidem conveniunt, secundum aliquid autem differunt. Conveniunt enim in genere, differunt autem secundum specificas differentias. Sicut igitur contrariorum sunt contrariae causae propriae, secundum quod specificis differentiis differunt, ita eorum oportet esse unam causam communem totius generis in quo conveniunt. Causa autem communis prior est et superior propriis causis, quanto enim est aliqua causa superior, tanto virtus eius maior et ad plura se extendens. Relinquitur igitur contraria non esse prima rerum activa principia, sed omnium esse unam primam causam activam.”

<sup>99</sup> *ScG* 2, 21 n. 5: “Quicquid est causatum secundum aliquam naturam, non potest esse prima causa illius naturae, sed secunda et instrumentalis. Socrates enim, quia habet suae humanitatis causam, non potest esse prima humanitatis causa: quia, cum humanitas sua sit ab aliquo causata, sequeretur quod esset sui ipsius causa, cum sit id quod est per humanitatem. Et ideo oportet quod generans univocum sit quasi agens instrumentale respectu eius quod est causa primaria totius speciei. Et inde est quod oportet omnes causas inferiores agentes reduci in causas superiores sicut instrumentales in primarias.”

cannot be the first cause of humanity. Indeed, since his humanity should be caused by something, it would follow that he would be a cause of himself, since he is what he is by (his) humanity. Hence, a univocal generator must be as an instrumental agent in respect to that which is the primary cause of the whole species. Wherefrom, all inferior agent causes must be reduced into superior causes as instrumental (causes are reduced) into primary (causes).

Therefore, nothing that is in some genus is the universal cause of those that are in that genus, for nothing is the cause of itself, as the cause of men is not some man: rather, the sun, which is outside the human genus, is a universal cause of human generation.<sup>100</sup>

#### **46.21. Reduction of the Univocal to the Analogical Agent**

Every multitude presupposes some unity, and every equivocation (presupposes some) univocity.<sup>101</sup> However, not every equivocal generation presupposes a univocal generation. Conversely, rather, (every univocal generation presupposes an equivocal generation) following a natural *ratio*, for equivocal causes are by themselves causes of a species; whence, they have causality into the whole species. Univocal causes, on the other hand, are not causes by themselves of the species. Rather, (they are causes by themselves) in *this* or *that* (individual of the species); whence, no univocal cause has causality in respect of the whole species—otherwise something would be a cause of itself, which cannot be.

Thus, although—in predications—equivocal (predications) must be reduced to univocal (predications), in actions, on the other hand, the non-univocal agent necessarily precedes the univocal agent.<sup>102</sup> Indeed, a non-univocal agent is the universal cause of the whole

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<sup>100</sup> ScG 4, 7 n. 16: “Nihil quod est in aliquo genere, est universalis causa eorum quae sunt in genere illo, sicut universalis causa hominum non est aliquis homo, nihil enim est sui ipsius causa: sed sol, qui est extra genus humanum, est universalis causa generationis humanae, et ulterius Deus.”

<sup>101</sup> *De veritate*, q. 10 a. 13 ad 3: “omnis multitudo praesupponit aliquam unitatem, et aequivocatio omnis univocationem; non tamen omnis aequivoca generatio praesupponit generationem univocam; sed magis est e converso, sequendo rationem naturalem. Causae enim aequivocae sunt per se causae speciei: unde in totam speciem causalitatem habent; causae vero univocae non sunt causae speciei per se, sed in hoc vel illo: unde nulla causa univoca habet causalitatem respectu totius speciei, alias aliquid esset causa sui ipsius, quod esse non potest.” *In De Trin.*, q. 1 a. 4 ad 4, 129–140: “quamvis omne equiuocum reducat ad uniuocum, non tamen oportet quod generatio equiuoca reducat ad generationem uniuocam, set ad generans quod est in se uniuocum: in rebus enim naturalibus uidemus quod generationes equiuoce sunt priores generationibus uniuocis, eo quod cause equiuoce habent influentiam supra totam speciem, non autem cause uniuoce, set solum supra unum indiuiduum; unde sunt quasi instrumenta causarum equiuocarum.”

<sup>102</sup> *STh* I, q. 13 a. 5 ad 1: “licet in praedicationibus oporteat aequivoca ad univoca reduci, tamen in actionibus agens non univocum ex necessitate praecedit agens univocum. Agens enim non univocum est causa universalis totius speciei, ut sol est causa generationis omnium hominum. Agens vero univocum non est causa agens universalis totius speciei (alioquin esset causa sui ipsius, cum sub specie contineatur), sed est causa particularis respectu huius indiuidui, quod in participatione speciei constituit.” *De potentia*, q. 7 a. 7 ad 7: “agens aequivocum oportet esse prius quam agens univocum, quia agens univocum non habet causalitatem super totam speciem, alias esset causa sui ipsius, sed solum super aliquid indiuiduum speciei.”

species, while a univocal agent is not the universal agent cause of the whole species—otherwise, it would be a cause of itself, since it would be contained under the species. Rather, (a univocal cause) is a particular cause in respect of *this* individual, which it constitutes in the participation of the species.

Hence, the universal cause of a whole species is not a univocal agent; and the universal is prior to the particular.<sup>103</sup> This universal agent, even if it should not be univocal, is not altogether equivocal, nonetheless, because—in this mode—it would not produce its like. However, it can be said (to be an) *analogical agent*, just like, in predications, all univocal (predications) are reduced to one first, non-univocal but analogical (principle), which is *being*.

#### 46.22. Modes of Procession

The mode in which something proceeds from something (else) is twofold:<sup>104</sup>

**1. In the likeness of a species (*in similitudinem speciei*).**<sup>105</sup> For example, a man (i.e., a human being) is generated from a man.

In this mode of procession, however many times it should be repeated, the same species always remains.<sup>106</sup> For example, if a man should be generated from a man through a generative virtue, a man would be generated also from this; and so on. (Of course, this does not preclude a mutation due to, for example, an error in DNA replication, which is an accidental cause.)

**2. In unlikeness in species (*dissimile in specie*).**<sup>107</sup> This process is always into an lower species, as is evident in all agents (that act) equivocally (► 46.19, ¶1; ¶3).

(Un)like the first mode, in this mode, however many times it should be repeated, (the procession) produces (*facit*) another species. For example, if a line—not a point—should proceed from a point through motion, since a moved point produces a line. (Repeating the

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<sup>103</sup> *STh* I, q. 13 a. 5 ad 1: “Causa igitur universalis totius speciei non est agens univocum. Causa autem universalis est prior particulari. Hoc autem agens universale, licet non sit univocum, non tamen est omnino aequivocum, quia sic non faceret sibi simile; sed potest dici agens analogicum, sicut in praedicationibus omnia univoca reducuntur ad unum primum, non univocum, sed analogicum, quod est ens.” *De potentia*, q. 7 a. 7 ad 7: “agens autem aequivocum habet causalitatem super totam speciem; unde oportet primum agens esse aequivocum.”

<sup>104</sup> *In Sent.* 4, d. 41 q. 1 a. 1 qc. 5 co.: “duplex est modus quo aliquid ex alio procedit.”

<sup>105</sup> *In Sent.* 4, d. 41 q. 1 a. 1 qc. 5 co.: “Unus secundum quem procedit in similitudinem speciei, sicut ex homine generatur homo.”

<sup>106</sup> *In Sent.* 4, d. 41 q. 1 a. 1 qc. 5 co.: “Primus autem modus processionis quotiescumque iteretur, semper remanet eadem species; sicut si ex homine generetur homo per actum generativae virtutis, ex hoc quoque generabitur homo, et sic deinceps.”

<sup>107</sup> *In Sent.* 4, d. 41 q. 1 a. 1 qc. 5 co.: “alius secundum quem procedit dissimile in specie; et hic processus semper est in inferiorem speciem, ut patet in omnibus agentibus aequivoco.”

procession), a line does not proceed from a line linearly moved, but a surface. And from a (moved) surface (proceeds) a body. Ultimately, something cannot (come to) be through such a mode of process (i.e., it cannot be infinitely repeated).<sup>108</sup>

Thus, ARISTOTLE uses the mode of speaking that geometers use, imagining that a moved point produces a line; a moved line produces a surface; and a moved surface (produces) a body.<sup>109</sup> However, there is no transit from a body to another magnitude, for such a passage (*exitus*) or process (*processus*) to another genus of magnitude is according to the defect of that from which is transited. Whence, too, natural motion is an imperfect act.

#### 46.23. The Order of the End

In the progression of things from a principle, there is found one first principle of things that is common to all, under which are found other, proper principles that are diverse in diverse (things; ►45.3).<sup>110</sup> Likewise, also in referring a thing towards an end, a last end is found that is common to all, which is the ultimate end; but diverse proper ends are found according to the diversity of beings. Thus, good(ness) is found in things according to a twofold order:

1. According to the order of one thing towards another thing, which is similar to the order that the parts of an army have to each other.
2. An order of things towards its ultimate end, which is similar to the order of an army to the good of the leader.

And since things are referred towards the ultimate common end by means of a proper end, a diverse relation of things towards the ultimate end is effected (*efficitur*) according to the diversity of proper ends.

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<sup>108</sup> *In Sent.* 4, d. 41 q. 1 a. 1 qc. 5 co.: “Secundus autem modus, sicut in primo facit aliam speciem, ita quotiescumque iteratur, aliam speciem facit; ut si ex puncto per motum procedit linea, non punctus, quia punctus motus lineam facit; ex linea linealiter mota non procedit linea, sed superficies; et ex superficie corpus; et ulterius per talem modum processus aliquis esse non potest.”

<sup>109</sup> *In De caelo* 1, l. 2, n. 9 (cf. ARISTOTLE, *De caelo* A.1, 268a30–b3): “non fit transitus a corpore in aliud genus magnitudinis, sicut fit transitus ex longitudine in superficiem, et ex superficie in corpus. Et utitur modo loquendi quo utuntur geometrae, imaginantes quod punctus motus facit lineam, linea vero mota facit superficiem, superficies autem corpus. A corpore autem non fit transitus ad aliam magnitudinem: quia talis exitus, sive processus, ad aliud genus magnitudinis, est secundum defectum eius a quo transitur (unde etiam motus naturalis est actus imperfecti).”

<sup>110</sup> *In Sent.* 2, d. 38 q. 1 a. 1 co.: “In progressu autem rerum a principio invenitur unum rerum principium primum, quod commune est omnium, sub quo inveniuntur alia principia propria, quae in diversis sunt diversa: ita etiam in referendo res ad finem invenitur ultimus finis omnibus communis, qui est ultimus finis; sed inveniuntur diversi fines proprii secundum diversitatem entium. Bonum enim invenitur in rebus secundum duplicem ordinem, ut in 12 *Metaphys.* dicitur, scilicet secundum ordinem unius rei ad rem aliam, qui ordo similis est ordini quem partes exercitus ad invicem habent: et alius est ordo rerum ad finem ultimum, qui scilicet est similis ordini exercitus ad bonum ducis: et quia res referuntur in finem ultimum communem, mediante fine proprio; ideo secundum diversitatem finis proprii efficitur diversa relatio rerum ad finem ultimum.”

#### 46.24. First Efficient and Ultimate Final Causes Related

The principal and the secondary are (also) found in the genera of final and of efficient cause.<sup>111</sup> Thus, the principal end is the last end, while the secondary end is the good that is at the end, just like a principal agent cause is a first agent (►46.15), while a secondary efficient cause is a secondary, instrumental agent (►46.16).

Things that proceed from a principle are referred into an end in the same order, since the agent of any one thing orders its effect towards some end.<sup>112</sup> Hence, the order of ends follows upon the order of agents, such that an ultimate end responds to a first agent; and, proportionately, according to an order, other ends (respond) to other agents.<sup>113</sup>

For example, if we consider the ruler of a city, the leader of its army, and one single soldier, it is evident that the ruler of the city is prior in the order of agents, at whose command the leader of the army proceeds to war; and under him is the soldier, who fights with his hands following to the orders of the leader of the army.<sup>114</sup> Yet, the end of the soldier is to oppose the enemy, which is further ordered to the victory of the army, which is the end of the leader; and this is further ordered to the good state of the city or kingdom, which is the end of the ruler or king.

Thus, in ordered agents, the ends of secondary agents are ordered to the end of the first agent as an army (is ordered) to the good of the leader.<sup>115</sup> Hence, the action of the first agent is both prior and posterior. It is prior in moving, since the actions of all secondary agents are founded over the action of the first agent, which, since it is one—supporting all in common (*communiter omnes firmans*)—, its effect is specified in *this* and in *that* according to the exigency of *this*. For example, by one command of the leader who orders

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<sup>111</sup> *STh* II-II, q. 17 a. 4 co.: “In genere autem utriusque causae [sc., finalis et efficientis] invenitur principale et secundarium. Principalis enim finis est finis ultimus; secundarius autem finis est bonum quod est ad finem. Similiter principalis causa agens est primum agens; secundaria vero causa efficiens est agens secundarium instrumentale.”

<sup>112</sup> *In Sent.* 2, d. 38 q. 1 a. 1 co.: “eodem ordine res referuntur in finem quo procedunt a principio, eo quod agens unusquisque ordinat effectum suum in finem aliquem; et ideo secundum ordinem agentium est ordo finium.”

<sup>113</sup> *De potentia*, q. 7 a. 2 ad 10: “secundum ordinem agentium est ordo finium, ita quod primo agenti respondet finis ultimus, et proportionaliter per ordinem alii fines aliis agentibus.”

<sup>114</sup> *De potentia*, q. 7 a. 2 ad 10: “Si enim considerentur rector civitatis et dux exercitus et unus singularis miles, constat quod rector civitatis est prior in ordine agentium, ad cuius imperium dux exercitus ad bellum procedit; et sub eo est miles, qui secundum ordinationem ducis exercitus manibus pugnat. Finis autem militis est prosternere hostem; quod ulterius ordinatur ad victoriam exercitus, quod est finis ducis; et hoc ulterius ordinatur ad bonum statum civitatis vel regni, quod est finis rectoris et regis.”

<sup>115</sup> *In Sent.* 3, d. 23 q. 3 a. 1 qc. 1 co.: “in agentibus ordinatis fines agentium secundorum ordinantur ad finem agentis primi [...], sicut exercitus ad bonum ducis; et ideo actio primi agentis est et prior et posterior. Prior in movendo: quia actiones omnium secundorum agentium fundantur super actionem primi agentis, quae cum sit una, communiter omnes firmans, specificatur ejus effectus in hoc et in illo secundum exigentiam illius; sicut uno praecepto ducis praecipientis bellum unus accipit gladium, alius parat equum, et sic de aliis. Est autem posterior in utendo aliorum actibus ad finem proprium; et sic omnes actiones aliorum agentium modificantur per actionem primi agentis.”

war, one takes a sword, another prepares the horse, and so on. (The action of the first agent is) posterior in using other acts to the proper end. And in this way, all the actions of other agents are modified by the action of the first agent.

#### 46.25. The Last End of a Genus as a First Principle

In any genus, there is one first principle; and the last end has the *ratio* of *first principle*.<sup>116</sup> Even though there should be one last end of all things, as (there should be) one first (active) principle, however, a proper end is owed to each one thing, as also a proper first principle.

Thus, just as those that are of one genus communicate in (i.e., have in common) one principle proper of that genus, so do they communicate in one end that is indeed common to all those (things) that are in that genus, but not to all things.<sup>117</sup> There can be a due relation of something to a last end only by means of the end that is owed to its genus. And the proper end of any one thing, by which it is ordered into the last end, is its proper operation.

#### 46.26. Intrinsic vs. Extrinsic End

The good, insofar as it is the end of something, is twofold (► 8.8; 30.10):<sup>118</sup>

1. The end (that is) **extrinsic** to that which is (related) to an end.<sup>119</sup>

For example, if we say that the end of that which is moved to a place is the place.

2. The end **within** (*intra*).<sup>120</sup>

For example, the form of the end of generation and of alteration—and the form already obtained—is some intrinsic good of that which has the form. Likewise, the form of some whole that is one by some ordination of the parts is its order; whence, it remains that it is its good.

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<sup>116</sup> *STh* I-II, q. 1 a. 5 co.: “in quolibet genere est unum primum principium, ultimus autem finis habet rationem primi principii.” *In Sent.* 2, d. 38 q. 1 a. 2 co.: “quamvis omnium rerum sit unus finis ultimus, sicut unum principium primum; tamen unicuique rei debetur finis proprius, sicut et principium proprium.”

<sup>117</sup> *In Sent.* 2, d. 38 q. 1 a. 2 co.: “ita ut sicut ea quae sunt unius generis, communicant in uno principio proprio illius generis, ita communicent in uno fine: qui quidem est communis omnibus quae sunt in illo genere, non tamen omnibus rebus: nec potest esse debita relatio alicujus rei ad finem ultimum, nisi mediante fine qui suo generi debetur. Finis autem proprius uniuscujusque rei, per quem in finem ultimum ordinatur, est sua propria operatio.”

<sup>118</sup> *In Metaph.* 12, l. 12, §2627: “Bonum enim, secundum quod est finis alicuius, est duplex.”

<sup>119</sup> *In Metaph.* 12, l. 12, §2627: “Est enim finis extrinsecus ab eo quod est ad finem, sicut si dicimus locum esse finem eius quod movetur ad locum.”

<sup>120</sup> *In Metaph.* 12, l. 12, §2627: “Est etiam finis intra, sicut forma finis generationis et alterationis, et forma iam adepti, est quoddam bonum intrinsecum eius, cuius est forma. Forma autem alicuius totius, quod est unum per ordinationem quamdam partium, est ordo ipsius: unde relinquitur quod sit bonum eius.”



#### 46.27. End of Operation vs. End of Intention

Many (effects) cannot proceed from one principle immediately and properly.<sup>121</sup> This seems to be on account of the determination of cause to effect, wherefrom it seems due and necessary that, if such is the cause, such effect should proceed.

Now, the causes are four; of which two—namely, matter and the efficient—precede the (thing) caused according to internal being (*secundum esse internum*), while the end, even if (it does not precede the thing caused) according to being, however, (it does precede it) according to intention (*secundum intentionem*).<sup>122</sup>

On the other hand, the form (precedes the thing caused according to being) in neither mode insofar as it is a form.<sup>123</sup> Indeed, since the (thing) caused should have being (*esse*) by it, its being is simultaneous with the being of the caused (thing).

However, insofar as (the form) itself, too, is an end, it precedes (the thing caused) in the intention of the agent.<sup>124</sup> And although the form should be the end of the operation, at which the operation of the agent is terminated, yet, not every end is a form, for there is some end of intention beyond (*praeter*) the end of operation.

This is evident in a house, for its form is the end that terminates the operation of the builder; however, his intention is not terminated there, but at an ulterior end, which is the habitation (of the house).<sup>125</sup>

Hence, such a caused due-of-being (*debitum essendi*) cannot be from the form insofar as it is a form, since—in this mode—the caused (thing) is concomitant.<sup>126</sup> Rather, (it must be) from the virtue of the efficient cause, from the matter, or from the end—whether it should be the end of the intention or the end of the operation.

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<sup>121</sup> *De potentia*, q. 3 a. 16 co.: “quod multa non posse procedere ab uno principio immediate et proprie, videtur esse ex determinatione causae ad effectum, ex qua videtur debitum et necessarium ut si est talis causa, talis effectus proveniat.”

<sup>122</sup> *De potentia*, q. 3 a. 16 co.: “Causae autem sunt quatuor, quarum duae, scilicet materia et efficiens, praecedunt causatum, secundum esse internum; finis vero etsi non secundum esse, tamen secundum intentionem.”

<sup>123</sup> *De potentia*, q. 3 a. 16 co.: “forma vero neutro modo, secundum quod est forma; quia cum per eam causatum esse habeat, esse eius simul est cum esse causati.”

<sup>124</sup> *De potentia*, q. 3 a. 16 co.: “sed in quantum etiam ipsa est finis, praecedit in intentione agentis. Et quamvis forma sit finis operationis, ad quem operatio agentis terminatur, non tamen omnis finis est forma. Est enim aliquis finis intentionis praeter finem operationis.”

<sup>125</sup> *De potentia*, q. 3 a. 16 co.: “ut patet in domo. Nam forma eius est finis terminans operationem aedificatoris; non tamen ibi terminatur intentio eius, sed ad ulteriorem finem, quae est habitatio; ut sic dicatur, quod finis operationis est forma domus, intentionis vero habitatio.”

<sup>126</sup> *De potentia*, q. 3 a. 16 co.: “Debitum igitur essendi tale causatum non potest esse ex forma in quantum est forma, quia sic concomitatur causatum; sed vel ex virtute causae efficientis, vel ex materia vel ex fine, sive sit finis intentionis, sive finis operationis.”

#### 46.28. The Last End

Not only the last (*ultimum*) for the sake of which the efficient cause acts is said to be an end in respect of preceding (things).<sup>127</sup> As ARISTOTLE says, all those that are means (*intermedia* = μεταξύ) between a first agent mover and a last end are all in some mode ends. In the same mode, mean agents are said to be causes whence motion begins (*causa unde principium motus*) with respect to subsequent agents.

For example, between medication, which is the first agent in this order, and health, which is the last end, there are these means: reduction (*attenuatio* = ἰσχνασία, thinness), which is the most proximate cause of health in those with excessive accumulation; and so is purgation (*purgatio* = κάθαρσις), by means of which reduction is attained; and laxative medication (*pharmacia, idest medicina laxativa* = τὰ φάρμακα), by means of which (*ex qua*) purgation is caused; and also the instruments (*organa idest instrumenta* = τὰ ὄργανα) by which medication is prepared and administered.<sup>128</sup> Thus, the physician makes a body thin (in order) to induce health, and in this way, health is the end of thinness; thinness is brought about through purgation; purgation, through medication; and (the physician) prepares the medication through some instruments.

All such (means) are for the sake of an end (*propter finem*), and yet all are in some mode ends, since one is the end of another.<sup>129</sup> Thus, reduction is the end of purgation; purgation (is the end of) medication; medication (is the end of) the instruments; and the instruments are ends in the production or research of instruments.

However, these means differ from one another in that some are instruments (*organa* = ὄργανα), such as the instruments by which medication is prepared and administered, and the administered medicine itself, which is used as an instrument by nature; while some

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<sup>127</sup> *In Metaph.* 5, l. 2, §771 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a35–36): “Non solum autem ultimum, propter quod efficiens operatur, dicitur finis respectu praecedentium; sed etiam omnia intermedia quae sunt inter primum agens et ultimum finem, dicuntur finis respectu praecedentium; et eodem modo dicuntur causa unde principium motus respectu sequentium.” *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 194b35–36): “Et ulterius addit [Philosophus] quod omnia quae sunt intermedia inter primum movens et ultimum finem, omnia sunt quodammodo fines.”

<sup>128</sup> *In Metaph.* 5, l. 2, §771 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013a36–b2): “sicut inter medicinam, quae est primum agens in hoc ordine, et sanitatem quae est ultimus finis, sunt ista media: scilicet attenuatio, quae est propinquissima sanitati in his, qui superabundant in humoribus, et purgatio, per quam acquiritur attenuatio, et pharmacia, idest medicina laxativa, et ex qua purgatio causatur, et organa idest instrumenta quibus medicina vel pharmacia praeparatur et ministratur.” *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 194b36–195a1): “sicut medicus ad sanitatem inducendam extenuat corpus, et sic sanitas est finis maciei; maciem autem operatur per purgationem; purgationem autem per potionem; potionem autem praeparat per aliqua instrumenta.”

<sup>129</sup> *In Metaph.* 5, l. 2, §771 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013ab2): “Huiusmodi etiam omnia sunt propter finem; et tamen unum eorum est finis alterius. Nam attenuatio est finis purgationis, et purgatio pharmaciae.” *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 195a1–2): “Unde omnia haec sunt quodammodo finis: nam macies est finis purgationis, et purgatio potionis, et potio organorum, et organa sunt fines in operatione vel inquisitione organorum.”

operations or actions (*opera* = ἔργα), such as purgation and reduction.<sup>130</sup> Thus, all those that are means between the first mover and the last end, are—in some mode—ends.

ARISTOTLE says this lest someone should believe that only that which is last would be a cause as that for the sake of which, since the name *end* seems to be (i.e., to signify) some last (end).<sup>131</sup> Hence, not every end is the last (end) simply, but in respect of something.

That which is a first cause in the order of final causes must be more a final cause—of whatever (effect)—than a proximate final cause.<sup>132</sup> Since *anything* (*res quaelibet*) attains (*pertingit*) its proper end through its proper action, it is necessary for proper ends, too, to be diversified in things, even if it should be the common last end of all (things).<sup>133</sup>

Since *being* is said absolutely, while *good* should add over (*being*) a relation of final cause, the essence itself of a thing, absolutely considered, suffices for something to be said (to be a) *being*, but not for it to be said (to be) some something *good*.<sup>134</sup> Thus, just as in the other genera of causes the relation (*habitus*) of a second cause depends on the relation of a first, but the relation of the first cause does not depend on something else (►46.1; 47.1, ¶1), so, too, it is (the case) in final causes that second ends participate (in) the relation of final cause (that is had) from the order to the last end, while the last end has this relation by itself.

#### 46.29. The Order of Nature

As ARISTOTLE says, in any order, *prior* and *posterior* are said by comparison to the principle of that order (►8.6).<sup>135</sup> For example, in (the order of) place, (*prior* and *posterior*

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<sup>130</sup> *In Metaph.* 5, l. 2, §771 (cf. ARISTOTLE, *Metaphysica* Δ.2, 1013ab2–3): “Haec autem intermedia posita differunt adinvicem in hoc, quaedam eorum sunt organa, sicut instrumenta quibus medicina praeparatur et ministratur, et ipsa medicina ministrata qua natura utitur ut instrumento; quaedam vero sunt opera, id est operationes, sive actiones, ut purgatio et attenuatio.” *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 195a2–3): “Et sic patet quod ista intermedia differunt ad invicem, in quantum quaedam sunt organa et quaedam opera, operata scilicet per organa.”

<sup>131</sup> *In Physic.* 2, l. 5, n. 6 (cf. ARISTOTLE, *Physica* B.3, 194b35–195a3 = *Metaphysica* Δ.2, 1013a35–b3): “Et hoc inducit ne aliquis credat quod solum id quod est ultimum sit causa sicut *cuius gratia*, propter hoc quod hoc nomen finis ultimum quoddam esse videtur. Est igitur omnis finis ultimum non simpliciter, sed respectu alicuius.”

<sup>132</sup> *ScG* 3, 17 n. 4: “In quolibet genere causarum causa prima est magis causa quam causa secunda: nam causa secunda non est causa nisi per causam primam. Illud igitur quod est causa prima in ordine causarum finalium, oportet quod sit magis causa finalis cuiuslibet quam causa finalis proxima.”

<sup>133</sup> *ScG* 3, 97 n. 5: “Quia vero per propriam actionem res quaelibet ad proprium finem pertingit, necesse est et proprios fines diversificari in rebus: quamvis sit finis ultimus omnibus communis.”

<sup>134</sup> *De veritate*, q. 21 a. 1 ad 1: “sicut enim in aliis generibus causarum habitudo secundae causae dependet ex habitudine causae primae; primae vero causae habitudo non dependet ex aliquo alio; ita etiam est in causis finalibus, quod secundi fines participant habitudinem causae finalis ex ordine ad ultimum finem, ipse autem ultimus finis habet hanc habitudinem per seipsum.”

<sup>135</sup> *Quodlibet* 5, q. 10 a. 1 co.: “necesse est [...] considerare: primo quid sit esse prius ordine naturae [...]. De primo ergo sciendum est, quod secundum Philosophum in V Met. prius et posterius dicuntur in quolibet ordine per comparisonem ad principium illius ordinis; sicut in loco per comparisonem ad principium loci, in disciplinis per comparisonem ad principium disciplinae.”

are said) by comparison to the principle of place; in disciplines, (*prior* and *posterior* are said) by comparison to the principle of the discipline.

Therefore, something is said to be prior in the order of nature by comparison to the principles of nature, which are the four causes (► 9.2, ¶1).<sup>136</sup> Whence, according to each genus of cause, that is prior in the order of nature which is more proximate to the cause. And although the causes should be four, three of them—namely, the efficient, the formal, and the final—concur in the same (i.e., they are the same in species; ► 45.20).

Whence it remains that the **order of nature** is twofold:<sup>137</sup>

1. According to the *ratio* of **material cause** (► 9.3), insofar as the imperfect is prior to the perfect, and potency (is prior) to act.<sup>138</sup>
2. According to the *ratio* of the other three causes (i.e., **formal**, ► 9.4; **efficient**, ► 9.7; and **final**, ► 9.8), insofar as the perfect is prior to the imperfect, and act (is prior) to potency.<sup>139</sup>

Whence, too, ARISTOTLE says (► 47.1, ¶3) that some (things) are prior in power (*potestate*, i.e., in potency), and others in perfection (i.e., in act).<sup>140</sup>

And since form is more nature than matter (► 12.6), that is more fittingly said to be **prior in (the order of) nature which is prior in substance and in species** (► 47.1, ¶2), rather than in potency, which in one and the same (thing) is prior in generation and in time.<sup>141</sup>

Whence, ARISTOTLE says that, in those (things) that can be in act and in potency (< τὰ δὲ μετὰ δυνάμεως), those that are in act are prior in (the order of) nature (< ἃ τῆ μὲν φύσει πρότερα), and (they are) posterior (in the order of time, τῷ χρόνῳ δὲ ὕστερα).<sup>142</sup>

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<sup>136</sup> *Quodlibet* 5, q. 10 a. 1 co.: “Sic ergo et in ordine naturae dicitur aliquid esse prius per comparationem ad naturae principia: quae quidem sunt quatuor causae. Unde secundum unumquodque genus causae, prius in ordine naturae est quod propinquius est causae. Quamvis autem causae sint quatuor, tres tamen earum, scilicet efficiens, formalis et finalis, concurrunt in idem.”

<sup>137</sup> *Quodlibet* 5, q. 10 a. 1 co.: “unde relinquitur quod ordo naturae sit duplex.”

<sup>138</sup> *Quodlibet* 5, q. 10 a. 1 co.: “Unus quidem secundum rationem causae materialis, secundum quod imperfectum est prius perfecto, et potentia actu.”

<sup>139</sup> *Quodlibet* 5, q. 10 a. 1 co.: “Alius autem ordo naturae est secundum rationem aliarum trium causarum, secundum quam perfectum est prius imperfecto et actus potentia.”

<sup>140</sup> *Quodlibet* 5, q. 10 a. 1 co.: “Unde et Philosophus dicit, V Metaph., quod alia sunt potestate priora, alia perfectione.”

<sup>141</sup> *Quodlibet* 5, q. 10 a. 1 co.: “Et quia forma est magis natura quam materia ut probatur in III Phys., convenientius dicitur esse prius natura actus, qui est prior substantia et specie, ut dicitur in III Metaph., quam potentia, quae in uno et eodem est prior generatione et tempore.”

<sup>142</sup> *Quodlibet* 5, q. 10 a. 1 co. (cf. ARISTOTLE, *De interpretatione* 13, 23a24–25): “Unde Philosophus dicit in II Perihermeneias, quod in his quae contingit esse actu et potestate, ea quae sunt actu, sunt natura priora et posteriora.”

However, that is said to be **prior simply in** (the order of) **nature** *which is prior according to the final cause*.<sup>143</sup>

Thus, the act of being (*esse*), which is the proper effect and end in the operation of the first agent, must take place in the ultimate end.<sup>144</sup> Even though the end is first in intention, it is, however, last in operation, and is the effect of other causes.

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<sup>143</sup> *De veritate*, q. 28 a. 7 ad 13: “secundum illud dicitur aliquid esse simpliciter natura prius, quod est prius secundum ordinem causae finalis.”

<sup>144</sup> *De potentia*, q. 7 a. 2 ad 10: “Esse ergo quod est proprius effectus et finis in operatione primi agentis oportet quod teneat locum ultimi finis. Finis autem licet sit primum in intentione, est tamen postremum in operatione, et est effectus aliarum causarum.”



## 47. The Order of Being

With the preceding chapter, we have completed our synthesis of St. Thomas's doctrine on principles in common, which is what we first set out to do. However, this is not sufficient for our purpose, since we are also seeking the principles that are proper to mathematics, which should be reduced to the principles of science. Therefore, to determine the nature and principles of mathematics, we still need to briefly examine some orders in particular. We begin with the order of being, whose principles are contained in all other orders.

### 47.1. Modes of Priority in Being, According to the Natural Order

ARISTOTLE posits three modes in which something is said (to be) **prior** (and **posterior**, < λέγεται πρότερα καὶ ὕστερα) according to nature and substance (secundum naturam et substantiam = κατὰ φύσιν καὶ οὐσίαν), that is, in being, according to the natural order (in essendo, idest secundum naturam; secundum naturalem ordinem in essendo):<sup>1</sup>

1. **By reason of dependence or community** (►47.2), insofar as (those) are said (to be) **prior** which can be without others, while the latter cannot be without the former (quae possunt esse sine aliis et illa non possunt esse sine eis = ὅσα ἐνδέχεται εἶναι ἄνευ ἄλλων, ἐκεῖνα δὲ ἄνευ ἐκείνων μὴ).<sup>2</sup>

2. **According to the order of substance to accident** (►47.6; 33.10).<sup>3</sup> Indeed, *being* is said in multiple (modes) and not univocally. Hence, all the significations of *being* must be reduced to one first, according to which (that) is said (to be a) **being** which is the subject of other beings (and) exists by itself (quod est subiectum aliorum entium per se existens). Wherefrom, the first subject is said to be prior; whence, substance is prior to accident (< πρῶτον μὲν τὸ ὑποκείμενον πρότερον, διὸ ἡ οὐσία πρότερον).

3. **According to the division of being into act and potency** (►47.7), for something is said to be prior in one mode according to potency, and in another mode according to act.<sup>4</sup>

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<sup>1</sup> In *Metaph.* 5, l. 13, §937 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a1–3): “ostendit [Philosophus...] quomodo dicitur aliquid altero prius in essendo, idest secundum naturam.” Ibid., §950: “Ponit modos, quibus dicitur aliquid prius secundum ordinem in essendo: et circa hoc duo facit. Primo ponit tres modos, quibus dicitur aliquid esse prius in essendo. [...] Dicit ergo primo, quod quaedam dicuntur esse priora, secundum naturam et substantiam, idest secundum naturalem ordinem in essendo. Et hoc tripliciter.”

<sup>2</sup> In *Metaph.* 5, l. 13, §950 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a3–4): “Primo ratione communitatis aut dependentiae: secundum quod priora dicuntur, quae possunt esse sine aliis et illa non possunt esse sine eis.”

<sup>3</sup> In *Metaph.* 5, l. 13, §951 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a4–6): “Secundus modus attenditur secundum ordinem substantiae ad accidens. Quia enim ens multipliciter dicitur, et non univoce, oportet, quod omnes significationes entis reducantur ad unam primam, secundum quam dicitur ens, quod est subiectum aliorum entium per se existens. Et propter hoc primum subiectum dicitur esse prius: unde substantia prius est accidente.”

<sup>4</sup> In *Metaph.* 5, l. 13, §952 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a6–8): “Tertius modus attenditur secundum divisionem entis in actum et potentiam. Nam uno modo dicitur aliquid esse prius secundum potentiam et alio modo secundum actum.”

## 47.2. The Order of Dependence or Community

(According to this order of priority, that being) is **prior** from which the consequence of being is not convertible (a quo non convertitur essendi consequentia = τὸ μὴ ἀντιστρέφον κατὰ τὴν τοῦ εἶναι ἀκολουθήσιν), as ARISTOTLE says in the *Categories*.<sup>5</sup>

(In the *Categories*, ARISTOTLE gives the following example of this mode of being prior: *one* is prior to *two*, for if there are two, it follows that there is one; but if there is one, it is not necessary for there to be two, since the consequence of being is not convertible from *one* to the rest. He concludes, “It is agreed, then, that when the sequence of <two things> [ἡ τοῦ εἶναι ἀκολουθήσιν, *the sequence of being*] cannot be reversed [μὴ ἀντιστρέφει, lit., *is not converted*], then that one on which the other depends is <called> ‘prior’ to that other.”)<sup>6</sup>

That which is prior does not depend on the posterior: rather, conversely.<sup>7</sup> Consequently, if the posterior is posited, the prior is posited too.<sup>8</sup>

It follows, also, that if the prior is removed, the posterior is removed—but not conversely.<sup>9</sup> Whence, if the posterior is removed, the prior can yet remain.<sup>10</sup> And if the prior is removed, the posterior can only be restituted if the prior is restituted.<sup>11</sup> However, if the prior is

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<sup>5</sup> *In Metaph.* 5, l. 13, §950: “Et hoc est prius a quo non convertitur essendi consequentia, ut dicitur in [P]raedicamentis.” Cf. *In Metaph.* 3, l. 15, §520: “prius est a quo non convertitur consequentia essendi.”

<sup>6</sup> ARISTOTLE, *Categoriae* 12, 14a29–35: “δεύτερον δὲ τὸ μὴ ἀντιστρέφον κατὰ τὴν τοῦ εἶναι ἀκολουθήσιν, οἷον τὸ ἐν τῶν δύο πρότερον· δεῦν μὲν γὰρ ὄντων ἀκολουθεῖ εὐθύς τὸ ἐν εἶναι, ἐνὸς δὲ ὄντος οὐκ ἀναγκαῖον δύο εἶναι, ὥστε οὐκ ἀντιστρέφει ἀπὸ τοῦ ἐνὸς ἢ ἀκολουθήσιν τοῦ εἶναι τὸ λοιπόν. πρότερον δὲ δοκεῖ τὸ τοιοῦτον εἶναι ἀφ’ οὗ μὴ ἀντιστρέφει ἢ τοῦ εἶναι ἀκολουθήσιν.” This is the **(2)** second of four modes in which *prior* is said according to *ibid.*, 14a26–b23. The three remaining modes are: **(1)** firstly and primarily (πρῶτον... καὶ κυριώτατα), according to time (κατὰ χρόνον); **(3)** according to some order (κατὰ τινα τάξιν), as in science there is a prior and a posterior according to demonstration: e.g., in geometry, elements are prior to diagrammatic propositions (τὰ... στοιχεῖα πρότερα τῶν διαγραμμαμάτων); **(4)** a natural order of excellence or dignity (τὸ βέλτιον καὶ τὸ τιμιώτερον πρότερον εἶναι τῇ φύσει δοκεῖ), perhaps the most foreign mode to the purpose (ἔστι μὲν δὴ σχεδὸν ἀλλοτριώτατος τῶν τρόπων οὗτος). All the modes of the prior, together with the simultaneous, and the four genera of opposites, belong to what is traditionally called *postpraedicamenta*, since they are discussed by ARISTOTLE after the ten categories, though only according to their logical intentions, for it belongs to the metaphysician to treat of them according to being.

<sup>7</sup> *De spirit. creat.*, a. 1 co.: “Illud autem quod est prius, non dependet a posteriori, sed e converso.”

<sup>8</sup> *In De caelo* 2, l. 2, n. 3: “posito posteriori, ponitur prius.” *In De caelo* 2, l. 4, n. 8: “Posito autem posteriori, ponitur prius.”

<sup>9</sup> *In Sent.* 4, d. 14 q. 1 a. 3 qc. 2 co.: “remoto priori, removetur posterius, non autem e converso.” *De veritate*, q. 2 a. 8 co.: “Remoto autem priori removetur posterius, sed non e converso.” *Quodlibet* 12, q. 9 a. 2 co.: “Remota ergo priori removetur posterior.” *In Physic.* 4, l. 11, n. 5: “Remoto ergo motu naturali, removetur omnis motus; cum remoto priori, removeatur posterius.” *Super Rom.* 4, l. 2: “Remoto autem priori, removetur posterius.”

<sup>10</sup> *In Sent.* 4, d. 44 q. 1 a. 1 qc. 1 ad 3: “remoto posteriori, remanere adhuc potest prius.” *In Sent.* 4, d. 12 q. 1 a. 2 qc. 4 co.: “remoto posteriori oportet remanere prius.” *In Sent.* 4, d. 25 q. 2 a. 1 qc. 2 co.: “remoto autem posteriori non tollitur prius.” *In Sent.* 4, d. 17 q. 2 a. 4 qc. 1 ad 5: “Nec est inconveniens, si remoto posteriori, maneat prius.” *STh* II-II, q. 12 a. 1 co.: “Remoto autem posteriori remanet prius, sed non convertitur.” *In De anima* 3, c. 2, 101–102: “remoto autem posteriori, remanet prius.” *In Metaph.* 4, l. 14, §706: “Remoto enim posteriori, non removetur prius.”

<sup>11</sup> *In Sent.* 4, d. 16 q. 2 a. 1 qc. 3 co.: “remoto priori removetur posterius, nec posterius restituitur nisi priori restituto.”



removed, only the posterior—that properly follows upon it—is removed.<sup>12</sup> Hence, if something can follow upon multiple (principles), it is not necessary that the posterior be removed if one of the prior (principles) is removed. For example, if hardening can come to be from both cold and hot—for bricks are hardened by fire, and frozen water is hardened by cold—it is not necessary that hardening be removed if heat is removed.

Hence, the prior is always preserved in the posterior.<sup>13</sup> And the virtue (*virtus*) of the prior is always in the posterior, but not conversely (*non convertitur*).<sup>14</sup>

Consequently, too, the variation of posterior (beings) does not induce the variability of prior (beings).<sup>15</sup> But if prior (beings) are varied, it is necessary for posterior (beings) to be varied.<sup>16</sup>

In whatever order, that which is by itself (*per se*) is prior to that which is by another (*per aliud*) and is its principle (and, again, that which is said by itself is the cause of that which is said by participation; ►26.11).<sup>17</sup> Whenever things are related to each other in such a way that one is the cause of the other, the one that has the *ratio* of cause can have (the act of) being (*esse*) without the other; but not conversely.<sup>18</sup>

It is impossible for the same (being) to be prior and posterior in the same mode.<sup>19</sup> (Whence, what is simultaneous is not according to prior and posterior; ►8.7.)<sup>20</sup>

### 47.3. Community of Thing vs. Community of *Ratio*

**Community** is twofold: to wit, **(1) of thing**; and **(2) of *ratio***.<sup>21</sup>

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<sup>12</sup> *STh* I-II, q. 15 a. 2 ad 2: “remoto priori, removetur posterius quod proprie ex eo tantum sequitur. Si autem aliquid ex pluribus sequi possit, non propter hoc posterius removetur, uno priorum remoto, sicut si induratio possit fieri et a calido et frigido (nam lateres indurantur ab igne, et aqua congelata induratur ex frigore), non oportet quod, remoto calore, removeatur induratio.”

<sup>13</sup> *STh* I, q. 60 a. 1 co.: “semper prius salvatur in posteriori.” *In De div. nom.*, c. 7, l. 1: “semper in posterioribus priora salvantur.”

<sup>14</sup> *In Sent.* 2, d. 35 q. 1 a. 4 ad 3: “virtus prioris est in posteriori, sed non convertitur.” *In Sent.* 1, d. 3 q. 4 a. 1 ad 5: “virtus prioris semper est in posteriori.”

<sup>15</sup> *ScG* 1, 67 n. 8: “Non enim posteriorum variatio prioribus variabilitatem inducit.” *In Sent.* 4, d. 30 q. 1 a. 3 co.: “priora non variantur ex posterioribus, sed e converso.”

<sup>16</sup> *De veritate*, q. 24 a. 3 co.: “variatis enim prioribus necesse est posteriora variari.”

<sup>17</sup> *ScG* 3, 46 n. 5: “In quolibet ordine, quod est per se est prius eo quod est per aliud, et principium eius.”

<sup>18</sup> *De ente*, c. 4, 42–45: “Quecumque enim ita se habent ad inuicem quod unum est causa esse alterius, illud quod habet rationem cause potest habere esse sine altero, sed non conuertitur.”

<sup>19</sup> *In Post. an.* 2, l. 18, n. 6: “non autem contingit idem esse prius et posterius eodem modo.”

<sup>20</sup> This can be inferred from multiple places. For example, *In De gen.* 1, l. 5 n. 5: “Quaedam enim sunt, de quorum ratione est esse in potentia: unde in talibus non potest poni esse simul in actu quod est simul in potentia, quia auferretur ratio et natura illius rei. Quod quidem primo manifestum est in successivis. In prima enim parte diei simul possibile est esse horas diei: non tamen potest poni quod omnes horae illius diei sint simul actu; auferretur enim natura temporis, de cuius ratione est quod sit numerus motus secundum prius et posterius; si enim esset simul quaelibet pars eius, iam non esset secundum prius et posterius.”

<sup>21</sup> *In Sent.* 1, d. 25 q. 1 a. 3 co.: “est duplex communitas: scilicet rei et rationis.”

However, *common*, of itself (*quantum est de se*), does not determine the community of thing or of *ratio*, as (does) *universal* (which is *that which is naturally apt to be predicated of many*; ► 19.9).<sup>22</sup> Hence, an essence can be said (to be) *common* but not *universal*.

For example, Socrates and Plato are two men (according to thing) even if *being a man* should be common to them according to *ratio*.<sup>23</sup> However, a difference is sought not only in those in which there is something common according to thing, but (also in those) in which there is something common according to *ratio* (► 41.28).

The form signified by the name *man*—that is, (the form of) humanity—is really (*realiter*, i.e., according to thing) divided into diverse supposita.<sup>24</sup> However, the unity or community of human nature is not according to thing (*secundum rem*), but only according to consideration (*secundum considerationem*); whence, the term *man* supposes for (*supponit pro*) a common nature only on account of the requirement of something added: for example, when we say that *man* is a species (i.e., in contrast, if we say that Peter is a man we do not mean that he is a species, but that he has a human nature).

Indeed, the names of genera and of species, such as *animal* or *man*, are imposed to signify the common natures themselves, and not the intentions of common natures that are signified by the names *genus* or *species*.<sup>25</sup> On the other hand, a vague individual, such as *some man*, signifies a common nature with a determinate mode of existing that befits singulars: to wit, that it be subsistent by itself, distinct from others. And in the name of a designated singular, a distinguishing determinate (principle) is signified: for example, *these flesh and bones* (are signified) in the name *Socrates*.

(In a community of *ratio*), the prior is posited in the definition of the posterior, but not conversely.<sup>26</sup> However, sometimes prior (principles) from which a definition should be

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<sup>22</sup> *In Sent.* 1, d. 19 q. 4 a. 2 ad 2: “commune, quantum est de se, non determinat rei communitatem, vel rationis, sicut universale; et ideo essentia potest dici communis, non autem universalis.”

<sup>23</sup> *De potentia*, q. 8 a. 3 ad 11: “sicut Socrates et Plato sunt duo homines licet esse hominem sit eis commune secundum rationem. Differentia autem quaeritur non solum in illis in quibus est aliquid commune secundum rem, sed in quibus est aliquid commune secundum rationem.”

<sup>24</sup> *STh* I, q. 39 a. 4 ad 3: “Quia enim forma significata per hoc nomen homo, idest humanitas, realiter dividitur in diversis suppositis, per se supponit pro persona; etiamsi nihil addatur quod determinet ipsum ad personam, quae est suppositum distinctum. Unitas autem sive communitas humanae naturae non est secundum rem, sed solum secundum considerationem, unde iste terminus homo non supponit pro natura communi, nisi propter exigentiam alicuius additi, ut cum dicitur, homo est species.”

<sup>25</sup> *STh* I, q. 30 a. 4 co.: “Nomina enim generum vel specierum, ut homo vel animal, sunt imposita ad significandum ipsas naturas communes; non autem intentiones naturarum communium, quae significantur his nominibus genus vel species. Sed individuum vagum, ut aliquis homo, significat naturam communem cum determinato modo existendi qui competit singularibus, ut scilicet sit per se subsistens distinctum ab aliis. Sed in nomine singularis designati, significatur determinatum distinguens, sicut in nomine Socratis haec caro et hoc os.”

<sup>26</sup> *In Sent.* 1, d. 28 q. 2 a. 1 ad 4: “ponitur [...] prius in definitione posterioris, et non e converso.”

given are not named. Hence, in the definition of some (things), there may be posited some simply posterior (things) that are prior in respect of us. For example, ARISTOTLE posits *such* in the definition of *quality* when he says that **quality** (*qualitas* = ποιότητα) is *that according to which we say (that some things are) such* (*secundum quam quales dicimur* < καθ' ἣν ποιοί τινες λέγονται).<sup>27</sup>

(A community of *ratio* need not be univocal: for example), *principle* is common according to a community of analogy, and not (according to a community) of univocal predication.<sup>28</sup>

#### 47.4. Order between the Common and the Proper

The common is prior to the proper if one and the other should be of one genus.<sup>29</sup> On the other hand, in those (things) that are of diverse genera, nothing prevents the proper from being prior to the common. Whence, nothing prevents the principle and origin of that which is common, to be prior to it, since (such a principle) is not had by addition to the common.

#### 47.5. Platonist Use of the Order of Being Refuted

As ARISTOTLE says, PLATO used the first mode of division of *prior* and *posterior* (i.e., according to dependence; ►47.1, ¶1; 47.2) against others (< ἢ διαιρέσει ἐχρήσατο Πλάτων).<sup>30</sup> For he would that, on account of this (dependence), universals should be prior in being than singulars; surfaces (should be prior in being) than bodies; lines (should be prior in being) than surfaces; and number (should be prior in being) than all others.

When something one is predicated of many (but) not according to prior and posterior, PLATO posited that one (to exist) separated, as (he posited the Idea of) *Man* (to exist) apart from all men.<sup>31</sup> But when something is predicated of many according to prior and posterior, he would not posit it (to exist) separated.

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<sup>27</sup> *In Sent.* 4, d. 27 q. 1 a. 1 qc. 3 ad 1 (cf. ARISTOTLE, *Categoriae* 8, 8b25): “priora aliquando, ex quibus debet dari definitio, non sunt nominata; et ideo in definitione aliquorum ponuntur aliqua posteriora simpliciter, quae sunt priora quo ad nos, sicut in definitione qualitatis ponitur quale a Philosopho, cum dicit: qualitas est secundum quam quales dicimur.”

<sup>28</sup> *In Sent.* 1, d. 29 q. 1 a. 2 qc. 1 ad 1: “principium est commune communitate analogiae, et non univocationis.”

<sup>29</sup> *STh* III, q. 7 a. 13 ad 3: “commune est prius proprio si utrumque sit unius generis, sed in his quae sunt diversorum generum, nihil prohibet proprium prius esse communi. Gratia autem unionis non est in genere gratiae habitualis, sed est super omne genus, sicut et ipsa divina persona. Unde hoc proprium nihil prohibet esse prius communi, quia non se habet per additionem ad commune, sed potius est principium et origo eius quod commune est.”

<sup>30</sup> *In Metaph.* 5, l. 13, §950 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a4): “Et «hac divisione,» idest isto modo prioris et posterioris contra alios diviso usus est Plato. Voluit enim quod propter hoc universalia essent priora in essendo quam singularia, et superficies quam corpora, et lineae quam superficies, et numerus quam omnia alia.”

<sup>31</sup> *In Metaph.* 3, l. 8, §437 (cf. ARISTOTLE, *Metaphysica* B.3, 999a6–7): “Secundam rationem ponit [Philosophus], quae procedit ex quadam positione Platonis; qui quando aliquid unum de pluribus praedicatur, non secundum prius et posterius, posuit illud unum separatum, sicut hominem praeter omnes homines. Quando vero aliquid praedicatur de pluribus secundum prius et posterius, non ponebat illud separatum.”

Hence, ARISTOTLE says, when one of those—of which something common is predicated—is prior to another, it is not possible, in these, for something to be separated apart from (*praeter*) these many (individual subjects) of which it is predicated.<sup>32</sup>

For example, if numbers are related according to an order, such that *two* is the first species of numbers, no Idea of *Number* is found apart from all the species of numbers (for which Platonists did posit subsistent Ideas; ►27.3, ¶2).<sup>33</sup> And for the same reason, no separated (Idea of) *Figure* is found apart from all the species of figures (►36.5; 36.11).

The reason of this can be, then, that something common is posited separated such that it should be some first (thing in) which all others participate.<sup>34</sup> Hence, if one (thing) should be the first of many, (in) which all others participate, it is not necessary to posit something separated (in) which all participate (►26.12, ¶1 vs. ¶2). Yet, all genera seem (to be) such, for all the species of genera are found to differ according to more perfect and less perfect (►41.19; 41.14, ¶1; 41.15; 42.19); and consequently, according to prior and posterior according to (the order of) nature (►46.29).<sup>35</sup>

Therefore, if **(a)** of those (things) of which one is prior to another, something common is not to be taken (as) separated; (and) if **(b)** a genus should be found apart from the species; then, Platonists will have a different doctrine and rule—and the aforesaid rule would not be preserved in them (i.e., they will inconsistently apply the rule of dependence).<sup>36</sup> Thus, it is manifest that, among individuals, one is not (found to be) prior and another posterior according to nature, but only in (the order of) time; and, according to the school of PLATO, a species is something thus separated. Hence, since (species) are common principles insofar as they are separated, it follows that a species is a principle more than a genus.

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<sup>32</sup> *In Metaph.* 3, l. 8, §437 (cf. ARISTOTLE, *Metaphysica* B.3, 999a6–13): “Et hoc est quod dicit [Philosophus] quod «in quibus prius et posterius est,» scilicet quando unum eorum de quibus aliquod commune praedicatur est altero prius, non est possibile in his aliquid esse separatum, praeter haec multa de quibus praedicatur.”

<sup>33</sup> *In Metaph.* 3, l. 8, §437 (cf. ARISTOTLE, *Metaphysica* B.3, 999a7–10): “Sicut si numeri se habent secundum ordinem, ita quod dualitas est prima species numerorum, non invenitur idea numeri praeter omnes species numerorum. Eadem ratione non invenitur figura separata, praeter omnes species figurarum.” See also *In De anima* 2, c. 5, 232–247 (cf. ARISTOTLE, *De anima* B.3, 414b19–32).

<sup>34</sup> *In Metaph.* 3, l. 8, §438: “Et huius ratio esse potest, quia ideo aliquod commune ponitur separatum, ut sit quoddam primum quod omnia alia participant. Si igitur unum de multis sit primum, quod omnia alia participant, non oportet ponere aliquod separatum, quod omnia participant.”

<sup>35</sup> *In Metaph.* 3, l. 8, §438: “Sed talia videntur omnia genera; quia omnes species generum inveniuntur differre secundum perfectius et minus perfectum. Et, per consequens, secundum prius et posterius secundum naturam.”

<sup>36</sup> *In Metaph.* 3, l. 8, §438 (cf. ARISTOTLE, *Metaphysica* B.3, 999a10–13): “Si igitur eorum quorum unum est prius altero, non est accipere aliquod commune separatum, si genus praeter species inveniatur, erunt «schola aliorum,» id est erit eorum alia doctrina et regula, et non salvabitur in eis praedicta regula. Sed manifestum est quod inter individua unius speciei, non est unum primum et aliud posterius secundum naturam, sed solum tempore. Et ita species secundum scholam Platonis est aliquid separatum. Cum igitur communia sint principia inquantum sunt separata, sequitur quod sit magis principium species quam genus.”

Likewise, AVERROES shows that the principles of things are matter and form, in the likeness of which are related genus and species: for the genus is taken from matter, while the difference (is taken) from the form.<sup>37</sup> Whence, since form is more a principle than matter, according to this, species too will be principles more than genera.

ARISTOTLE objects to the contrary (of the preceding conclusion, that species are principles more than genera) through the following reason.<sup>38</sup> A principle—and cause—is other than the things of which it is a principle and cause (< τὴν... ἀρχὴν δεῖ καὶ τὴν αἰτίαν εἶναι παρὰ τὰ πράγματα ὧν ἀρχή), and it is possible (for a principle and cause) to be separated from them (< καὶ δύνασθαι εἶναι χωριζομένην αὐτῶν); he speaks here of extrinsic principles and causes (i.e., efficient, exemplar, and final), which are *causes of the whole thing*. Yet, something other than (*praeter*) singulars is posited to be (i.e., to exist) only because it is common and is universally predicated of all. Therefore, the more something is universal, the more is it separated—and the more it must be posited (to be) a principle. Now, genera are maximally universal. Therefore, genera are maximally principles. And according to this, (Platonists) posited genera or species (to be) principles insofar as they were posited (to be) separated.

What is objected against (ARISTOTLE)—i.e., that genera are principles of knowing species and their definitions—is resolved in the same mode as (the question) of separation: for a genus is taken separately without a species by reason (i.e., through total abstraction).<sup>39</sup> And in the same mode, it would be a principle in being if it had a separated being (*esset principium in essendo, si haberet esse separatum*).

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<sup>37</sup> *In Metaph.* 3, l. 8, §442: “Unde et Commentator in octavo ostendit quod principia rerum sunt materia et forma, ad quorum similitudinem se habent genus et species. Nam genus sumitur a materia, differentia vero a forma, ut in eodem libro manifestabitur. Unde, cum forma sit magis principium quam materia, secundum hoc etiam erunt species magis principia quam genera.”

<sup>38</sup> *In Metaph.* 3, l. 8, §441 (cf. ARISTOTLE, *Metaphysica* B.3, 999a16–23): “Obiicit [Philosophus] in contrarium tali ratione. Principium et causa est praeter res quarum est principium et causa, et possibile est ab eis esse separatum. Et hoc ideo quia nihil est causa sui ipsius. Et loquitur hic de principiis et causis extrinsecis, quae sunt causae totius rei. Sed aliquid esse praeter singularia non ponitur, nisi quia est commune et universaliter de omnibus praedicatum: ergo quanto aliquid est magis universale, tanto magis est separatum, et magis debet poni principium. Sed genera prima sunt maxime universalia: ergo genera prima sunt maxime principia.” In this context, the question of course is whether genera are principles more than individuals—or vice-versa. *In Metaph.* 3, l. 8, §431 (cf. ARISTOTLE, *Metaphysica* B.3, 998b14–17): “si ponamus quod genera sint maxime principia, quae oportet existimare magis esse principia? Utrum prima de numero «generum,» scilicet communissima, aut etiam infima, quae proxima praedicantur de individuis, scilicet species specialissimas. Hoc enim habet dubitationem, sicut ex sequentibus patet.” And the argument just quoted (*ibid.*, §441) favors genera. *In Metaph.* 3, l. 8, §442: “Harum autem quaestionum solutio innuitur ex hac ultima ratione. Secundum hoc enim genera vel species universalia principia ponebantur, in quantum ponebantur separata. Quod autem non sint separata et per se subsistentia ostendetur in septimo huius.” The question is resolved at *In Metaph.* 7, l. 14, §§1592–1605 (cf. ARISTOTLE, *Metaphysica* Z.14, 1039a24–b19), which we have not included.

<sup>39</sup> *In Metaph.* 3, l. 8, §442: “Quod vero contra obiicitur ex hoc quod genera sunt principia cognoscendi speciem et definitiones ipsius, eodem modo solvitur sicut et de separatione. Quia enim separatim accipitur a ratione genus sine speciebus, est principium in cognoscendo. Et eodem modo esset principium in essendo, si haberet esse separatum.”

## 47.6. The Order of Substance to Accident

In any genus, that which is maximally and most truly said (to be), is the cause of those that are after (it) in that genus (► 27.4); and a subject (► 15.2, ¶1) is naturally prior to that which is in the subject (► 47.1, ¶2).<sup>40</sup> Hence, substance, which is first in the genus of being (*primum in genere entis*; ► 27.1, ¶2; 33.10), most truly and maximally having an essence (► 33.21; 16.1), must be the cause of accidents, which participate (in) the *ratio* of being secondarily and as according to something (*secundario et quasi secundum quid*; ► 18.1).

However, this happens diversely, for, since the parts of substance are **matter** and **form** (► 15.8), hence, some accidents principally follow upon form, and some (others principally follow upon) matter (see also the order in which accidents inhere in substance; ► 35.6).<sup>41</sup> Moreover, there is found a form that does not depend upon matter, such as the intellectual soul, while matter has (an act of) being (*esse*) only through form (► 46.6). Whence:

**1. In accidents that follow upon form**, there is some (accident) that does not have a communication with matter: for example, *to understand*, which is not through a corporeal organ.<sup>42</sup> On the other hand, there are some (other accidents), from those that follow upon form, that have communication with matter: for example, *to sense*.

**2. In those accidents that follow upon matter**, there is some diversity.<sup>43</sup> For some accidents follow upon matter according to the order that it has to a special form: for example, male and female in animals, whose diversity is reduced to matter; hence, (if) the form of animal (is) removed, the said accidents do not remain, except equivocally. On the other hand, some (accidents) follow upon matter according to the order that it has to a

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<sup>40</sup> *De ente*, c. 6, 50–58 (cf. ARISTOTLE, *Metaphysica* α.1, 993b24–27): “quia illud quod dicitur maxime et uerissime in quolibet genere est causa eorum que sunt post in illo genere, sicut ignis qui est in fine caliditatis est causa caloris in rebus calidis, ut in II Methaphisice dicitur: ideo substantia que est primum in genere entis, uerissime et maxime essentiam habens, oportet quod sit causa accidentium que secundario et quasi secundum quid rationem entis participant.” *In Physic.* 8, l. 2, n. 2 (cf. ARISTOTLE, *Physica* Θ.1, 251a15–16): “subiectum naturaliter prius est eo quod est in subiecto.”

<sup>41</sup> *De ente*, c. 6, 58–65: “Quod tamen diuersimode contingit. Quia enim partes substantie sunt materia et forma, ideo quedam accidentia principaliter consequuntur formam et quedam materiam. Forma autem inuenitur aliqua cuius esse non dependet ad materiam, ut anima intellectualis; materia uero non habet esse nisi per formam. Vnde [...]”

<sup>42</sup> *De ente*, c. 6, 65–71 (cf. ARISTOTLE, *De anima* Γ.4, 429a18–b5): “in accidentibus que consequuntur formam est aliquid quod non habet communicationem cum materia, sicut est intelligere, quod non est per organum corporale, sicut probat Philosophus in III De anima; aliqua uero ex consequentibus formam sunt que habent communicationem cum materia, sicut sentire.”

<sup>43</sup> *De ente*, c. 6, 73–86: “In hiis tamen accidentibus que materiam consequuntur inuenitur quedam diuersitas. Quedam enim accidentia consequuntur materiam secundum ordinem quem habet ad formam specialem, sicut masculinum et femininum in animalibus, quorum diuersitas ad materiam reducitur, ut dicitur in X Methaphisice; unde remota forma animalis dicta accidentia non remanent nisi equiuoce. Quedam uero consequuntur materiam secundum ordinem quem habet ad formam generalem; et ideo remota forma speciali adhuc in ea remanent, sicut nigredo cutis est in ethiope ex mixtione elementorum et non ex ratione anime, et ideo post mortem in eo manet.” Cf. *In Metaph.* 10, l. 11, §2134 (cf. ARISTOTLE, *Metaphysica* I.9, 1058b21–24).

general form; hence, (if) the special form (is) removed, they remain in it (i.e., they remain specifically the same in a new subject, merely by reason of sensible matter): for example, blackness of skin is (had) in an Ethiopian from the compounding of elements and not by reason of the soul; and hence, they remain in it (i.e., in the new subject) after death.

Yet, no accident follows upon matter without the communication of a form.<sup>44</sup>

#### 47.7. Priority of Act and of Potency: Formally vs. Materially

Since every cause—insofar as it is a cause—is naturally prior to the (thing) caused (► 10.4; 46.29), it is to be considered that, as ARISTOTLE says, *prior* (► 8.6) is said in two modes, by whose diversity something—both the cause and the (thing) caused—can be said to be prior and posterior in respect to the same.<sup>45</sup>

Indeed, there are two intrinsic principles (and causes) of a thing: namely, matter and form.<sup>46</sup> And according to their difference, something is said (to be) *prior* in two modes (► 46.29):

1. According to a priority that responds to a **formal principle**, something is prior to another in perfection (*perfectione*), as act (is prior) to potency, and the perfect (is prior) to the imperfect.<sup>47</sup>
2. According to a priority that responds to a **material principle**, something is prior in the way of generation and of time (*in via generationis et temporis*).<sup>48</sup> And thus, potency is prior to act in the same (thing); and the imperfect (is prior) to the perfect.

According to potency, for example, half of a thing is prior to the thing itself (< ἡ ἡμίσεια τῆς ὅλης); any part (is prior) to the whole (< τὸ μέρος τοῦ ὅλου); and matter (is prior) than form (< ἡ ὕλη τῆς οὐσίας).<sup>49</sup> All of these are compared to those in respect of which they are said (to be) *prior* as potency (is compared) to act.

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<sup>44</sup> *De ente*, c. 6, 71–72: “Sed nullum accidens consequitur materiam sine communicatione forme.”

<sup>45</sup> *De prin. nat.* §4, 44–49: “quia omnis causa in quantum est causa naturaliter prior est causato, sciendum quod prius dicitur duobus modis, ut dicit Aristoteles in XVI De animalibus: per quorum diuersitatem potest aliquid dici prius et posterius respectu eiusdem et causa et causatum.” Cf. ARISTOTLE, *De generatione animalium* B.6, 742a19–22: “τὸ δὲ πρότερον ἤδη πολλαχῶς ἐστίν· τό τε γὰρ οὐ ἔνεκα καὶ τὸ τοῦτου ἔνεκα διαφέρει, καὶ τὸ μὲν τῆ γενέσει πρότερον αὐτῶν ἐστὶ τὸ δὲ τῆ οὐσία.”

<sup>46</sup> *De virtutibus*, q. 4 a. 3 co.: “Sunt autem duo principia intrinseca rei: materia, et forma; et secundum horum differentiam aliquid dicitur dupliciter prius.”

<sup>47</sup> *De virtutibus*, q. 4 a. 3 co.: “Uno quidem modo est aliquid prius altero perfectione, sicut actus potentia, et perfectum imperfecto: quae quidem prioritas respondet principio formali.”

<sup>48</sup> *De virtutibus*, q. 4 a. 3 co.: “Alio vero modo est aliquid prius in via generationis et temporis; et sic potentia est prior actu in eodem, et imperfectum perfectio; [...] hoc autem respondet materiali principio.”

<sup>49</sup> *In Metaph.* 5, l. 13, §952 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a8–9): “secundum potentiam quidem dimidium rei est prius re ipsa, et quaelibet pars toto, et materia «quam substantia,» idest quam forma. Haec enim omnia sic comparantur ad ea, respectu quorum sic dicuntur priora, ut potentia ad actum.”

According to act, however, the aforesaid (i.e., half a thing, part, and matter) are said to be posterior (< κατ' ἐντελέχειαν δ' ὕστερον).<sup>50</sup> For (if) the whole (is) resolved into (its) parts, the parts begin to be in act.

Since the operation of nature proceeds from the imperfect to the perfect, and from the incomplete to the complete, the imperfect is prior to the perfect according to generation and time; but the perfect is prior in complement. For example, it can be said that an adult is before a child in substance and complement; but the child is before the adult in generation and time.<sup>51</sup>

Thus, something is said (to be) prior to another in generation (< τῆ γενέσει) and time (► 47.8); and, again, (something is said to be prior to another) in substance (< τῆ οὐσίᾳ) and in complement (i.e., in perfection or completeness; ► 47.10).<sup>52</sup>

#### 47.8. How Act Is Prior to Potency in Time—and How Not

ARISTOTLE shows how act is prior to potency in time—and how not.<sup>53</sup>

In passive potencies, act is prior to potency in such a way that, (among those that are) the same **in species** (*specie* = εἶδει), *the agent or being in act is prior than the being in potency*, while (among those that are) the same **in number** (*numero* = ἀριθμῶ), *(the being) in potency is prior in time than (the being) in act*.<sup>54</sup>

This is manifested as follows:<sup>55</sup>

If we take *this* man, who is already a man in act, he was, priorly according to time, a matter that was a man in potency.<sup>56</sup> Likewise, the seed that is grain in potency was prior in time

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<sup>50</sup> *In Metaph.* 5, l. 13, §952 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a9–11): “secundum actum vero dicuntur praedicta esse posteriora. Nam praedicta non efficiuntur in actu nisi per dissolutionem. Resoluto enim toto in partes, incipiunt partes esse in actu.”

<sup>51</sup> *De prin. nat.* §4, 51–58: “Cum ergo nature operatio procedat ab imperfecto ad perfectum et ab incompleto ad completum, imperfectum est prius perfecto secundum generationem et tempus, sed perfectum est prius in complemento: sicut potest dici quod uir est ante puerum in substantia et complemento, sed puer est ante uirum generatione et tempore.”

<sup>52</sup> *De prin. nat.* §4, 49–51 (cf. ARISTOTLE, *De generatione animalium* B.6, 742a19–22): “Dicitur enim aliquid prius altero generatione et tempore, et iterum in substantia et complemento.”

<sup>53</sup> *In Metaph.* 9, l. 7, §1846 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b17–32): “ostendit [Philosophus] quomodo [actus] est prior [potentia] tempore, et quomodo non.” *Ibid.*, §1847: “Ostendit quomodo sit actus potentia prior tempore, et quomodo non: et circa hoc duo facit. Primo manifestat hoc in potentiis passivis. Secundo in potentiis activis quibusdam.”

<sup>54</sup> *In Metaph.* 9, l. 7, §1847 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b17–19): “Dicit ergo [Philosophus] primo, quod actus est prior tempore potentia; ita tamen quod idem specie, est prius agens, vel ens actu quam ens in potentia; sed idem numero est prius tempore in potentia quam in actu.”

<sup>55</sup> *In Metaph.* 9, l. 7, §1848: “Quod sic manifestatur.”

<sup>56</sup> *In Metaph.* 9, l. 7, §1848 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b19–23): “Si enim accipiamus hunc hominem qui est iam actu homo, fuit prius secundum tempus materia, quae erat potentia homo. Et similiter prius tempore fuit semen quod potentia est frumentum, quam frumentum actu, «et visivum,» id est habens potentiam videndi, quam videns in actu.”



than the grain (that is) in act; and that which has a potency to see (was prior in time) than the seer in act.

On the other hand, some existents in act were prior according to time in these existents in potency: to wit, the agents by which they have been reduced into act.<sup>57</sup> Indeed, that which is a being in potency must always (come to) be in act by an agent that is in act.

Whence, a man in potency comes to be a man in act by a generating man that is in act.<sup>58</sup> Likewise, the musical in potency has a regard to the musical in act, learning from the teacher who is musical in act.

Thus, there always is something prior to that which is in potency, which moves; and the mover is in act.<sup>59</sup> Whence, it remains that, although (among those beings that are) the same in number, (the being) in potency should be prior than (the being) in act, however, some being in act (that is) the same in species is also prior in time than the being in potency.

Indeed, everything that comes to be, comes to be from something as from matter; and by something as by an agent.<sup>60</sup> And the agent is the same in species with that which comes to be (► 45.20). This is evident in univocal generations. In equivocal generations, on the other hand, there must be some likeness of the generator to the generated (► 46.19).

#### **47.9. Act Is Prior to Potency in *Ratio***

Although act should be posterior to potency in (the order of) being (*in esse*),<sup>61</sup> it is, however, prior in intention and according to *ratio*, just as the end (is prior) in the agent; and although the object should be extrinsic, it is nonetheless the principle or end of action

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<sup>57</sup> *In Metaph.* 9, l. 7, §1848 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b23–25): “Sed tamen quaedam existentia in actu fuerunt priora secundum tempus in his existentibus in potentia, scilicet agentia, a quibus reducta sunt in actum. Semper enim oportet quod id quod est in potentia ens, sit actu ens ab agente, quod est actu ens.”

<sup>58</sup> *In Metaph.* 9, l. 7, §1848 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b25–26): “Unde homo in potentia fit homo in actu ab homine generante, qui est in actu. Et similiter musicum in potentia respicit musicum in actu, discendo a doctore qui est musicus actu.”

<sup>59</sup> *In Metaph.* 9, l. 7, §1848 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b26–27): “Et ita semper eo quod est in potentia, est aliquid prius quod movet, et movens est in actu. Unde relinquitur, quod licet idem numero prius tempore sit in potentia quam in actu, tamen aliquod ens in actu secundum idem specie, est etiam prius tempore, quam ens in potentia.”

<sup>60</sup> *In Metaph.* 9, l. 7, §1849 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b27–29): “Et quia posset aliquis dubitare de quibusdam quae dixerat, ideo subiungit ea esse manifesta superius. Dictum est enim in superioribus de substantia, scilicet in septimo libro, quod omne quod fit, fit ex aliquo, sicut ex materia, et ab aliquo, sicut ab agente. Et hoc etiam agens est specie idem cum eo quod fit. Quod manifestum est in generationibus univocis. Sed in generationibus aequivocis oportet esse aliquam similitudinem generantis ad genitum, ut ibidem ostensum est.”

<sup>61</sup> *STh* I, q. 77 a. 3 ad 1: “actus, licet sit posterior potentia in esse, est tamen prior in intentione et secundum rationem, sicut finis agente. Obiectum autem, licet sit extrinsecum, est tamen principium vel finis actionis. Principio autem et fini proportionantur ea quae sunt intrinseca rei.”

(► 14.9; indeed, act is the end of potency; ► 47.11); and the principle and the end are proportionate to those (causes) that are intrinsic to the thing (i.e., matter and form; ► 10.5).

Insofar as genus is compared to species as potency to act (and as matter to form), species are prior to genus according to nature; but absolutely considered, genus is naturally prior to species insofar as the genus is included in (the *ratio* of) the species.<sup>62</sup>

Hence, ARISTOTLE proves that act is prior to potency in *ratio* as follows.<sup>63</sup> That by which another must be defined is prior to it in *ratio*: for example, *animal* is prior to *man*, and *subject* (is prior) to *accident*. Now, *potency* can only be defined by *act*, for the first *ratio* of *possible* consists in that it befits the same (thing) to act or to be in act: for example, (that person) is said (to be a) *builder* who can build; (that person is said to be a) *theorist* who can theorize; (that thing) is said (to be) *visible* which can be seen; and so on. Therefore, it is necessary for the *ratio* of *act* to precede the *ratio* of *potency*, and (it is necessary for) the knowledge (*notitia*) of act (to precede) the knowledge of potency.

Since a proper act requires a proper potency, the potency of any one thing is such as we find its perfection (to be).<sup>64</sup>

This is why ARISTOTLE manifested *potency* by defining (it) through *act*, while he could not define act by something else, and instead manifested it inductively only (► 32.1; 32.2).<sup>65</sup>

#### 47.10. Act Is Prior to Potency According to Substance

ARISTOTLE shows that act is prior to potency according to substance because sometimes (substances) are in potency (and) sometimes in act.<sup>66</sup> Since to be prior according to

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<sup>62</sup> *Quodlibet* 5, q. 10 a. 1 co.: “in consiliis necesse est ut includantur praecepta [...]. Erit ergo una comparatio consiliorum ad praecepta absolute considerata. Et sic hoc modo praecepta erunt ordine naturae priora consiliis, sicut genus est naturaliter prius specie; consilia autem e converso priora naturaliter praeceptis, sicut species sunt priores secundum naturam quam genera, ut patet per Philosophum, I Phys. Comparatur enim genus ad speciem sicut potentia ad actum.”

<sup>63</sup> *In Metaph.* 9, l. 7, §1846 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1049b12–17): “ostendit [Philosophus] propositum. Et primo, quod *actus est prior potentia ratione*. [...] Primum sic probatur. Id per quod oportet alterum definiri, est prius eo ratione; sicut animal prius homine, et subiectum accidente. Sed potentia non potest definiri nisi per actum. Nam prima ratio possibilis in hoc consistit, quod convenit ipsum agere vel esse in actu; sicut aedificator dicitur qui potest aedificare, et speculator qui potest speculari, et visibile dicitur aliquid quod potest videri, et sic est in aliis. Ergo est necessarium, quod ratio actus praecedat rationem potentiae, et notitia actus notitiam potentiae.”

<sup>64</sup> *De spirit. creat.*, a. 1 co.: “Talis autem est uniuscuiusque rei potentia, qualis reperitur perfectio eius; nam proprius actus propriam potentiam requirit.”

<sup>65</sup> *In Metaph.* 9, l. 7, §1846: “Et propter hoc superius Aristoteles manifestavit potentiam definiendo per actum; actum autem non potuit per aliquod aliud definire, sed solum inductive manifestavit.”

<sup>66</sup> *In Metaph.* 9, l. 8, §1856 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a4–9): “Postquam Philosophus ostendit quod actus est prior potentia, ratione, et tempore quodammodo, hic ostendit, *quod sit prior secundum substantiam*: quod erat superius tertio propositum. [...] *ostendit propositum rationibus* sumptis ex his, quae quandoque sunt in potentia quandoque in actu. [...] Et quia esse prius secundum substantiam est esse prius perfectione, perfectio autem attribuitur duabus causis, scilicet formae et fini; ideo duabus rationibus in parte prima utitur ad propositum ostendendum. Quarum prima sumitur *ex parte formae*.

substance is to be prior in perfection, and perfection is attributed to two causes—namely, to the form and to the end—, hence he uses two reasons to show this:

**1. From the part of the form.**<sup>67</sup> Not only is act prior to potency both in *ratio* and in time, but in substance (οὐσίᾳ) too—that is, in perfection, for, by the name *substance*, ARISTOTLE is wont to signify the form whereby something is perfect. This is first apparent for the following reason. Those that are posterior in generation are prior according to substance and species—that is, in perfection—, since generation always proceeds from the imperfect to the perfect: for example, the adult is posterior in generation than the child, for the adult comes to be from the child; and man is posterior in generation than seed, since the adult and the man already have a perfect species, while child and seed (do) not yet (have a perfect species; e.g., the child cannot reproduce). Therefore, since in (those that are) the same according to number, act should be posterior to potency in (the order of) generation and time (►47.8), it follows that act should be prior to potency in substance and *ratio*.

**2. From the part of the end.**<sup>68</sup> Everything that comes to be, proceeding towards an end, proceeds (*vadit* = βαδίζει) towards some principle. Indeed, the end for the sake of which something comes to be is some principle (insofar as it is in the agent; ►9.8), for it is prior in the intention of the agent, since generation comes to be by its cause (< ἀρχὴ γὰρ τὸ οὐ ἔνεκα, τοῦ τέλους δὲ ἔνεκα ἢ γένεσις). And act is the end of potency. Therefore, act is prior to potency (►47.11), and some principle of it.

#### 47.11. Act is the End of Potency

**1.** ARISTOTLE shows that act is the end of potency, first, **in natural active potencies.**<sup>69</sup> Thus, he says that animals do not see in order to have a seeing potency: rather, they have

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Secunda ex parte finis." Ibid., I. 7, §1846: "ostendit [Philosophus] quod [actus] est prior [potentia] secundum substantiam."

<sup>67</sup> In *Metaph.* 9, I. 8, §1856 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a4–7): "Dicit ergo [Philosophus] primo, quod non solum actus est prior potentia et ratione et tempore sed substantia, idest perfectione. Nomine enim substantiae consuevit forma significari per quam aliquid est perfectum. Et hoc quidem primum apparet tali ratione: quia ea quae sunt posteriora in generatione, sunt «priora secundum substantiam et speciem,» idest perfectione, quia generatio semper procedit ab imperfecto ad perfectum, sicut vir est posterior generatione quam puer, nam ex puero fit vir, et homo posterius generatione quam sperma. Et hoc ideo quia vir et homo iam habent speciem perfectam, puer autem et sperma nondum. Cum igitur in eodem secundum numerum actus generatione et tempore sit posterior potentia, ut ex superioribus patet, sequitur quod actus sit prior potentia substantia et ratione."

<sup>68</sup> In *Metaph.* 9, I. 8, §1857 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a7–10): "Ostendit [Philosophus] idem ratione sumpta a parte finis: et circa hoc tria facit. Primo proponit rationem. [...] Dicit ergo primo, quod omne quod fit vadens ad finem, vadit ad quoddam principium. Nam finis cuius causa fit aliquid, est quoddam principium. Est enim prius in intentione agentis, quia eius causa fit generatio. Sed actus est finis potentiae: ergo actus est prior potentia, et principium quoddam eius."

<sup>69</sup> In *Metaph.* 9, I. 8, §1858 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a10–11): "Ostendit [Philosophus] quod supra posuerat, scilicet quod actus sit finis potentiae. Quod quidem primo manifestat in potentiis activis naturalibus; dicens, quod animalia non vident ut habeant potentiam visivam; sed magis habent potentiam visivam ut videant. Et sic manifestum est quod potentia est propter actum, et non e converso." Ibid., §1857: "manifestat [Philosophus] quoddam in ratione suppositum."

an active potency in order to see. In this way, it is manifest that potency is for the sake of act, and not conversely.

2. He then shows the same **in rational potencies**, saying that men have the potency of building in order to build; and they have theoretical science in order to theorize.<sup>70</sup> Thus, they do not theorize in order to have theoretical (science)—except those who are learning, who meditate those (things) that belong to theoretical science in order to acquire it; and these do not theorize perfectly, but in some mode and imperfectly, since to theorize is not on account of some lack (of science), but (on account of) using an already acquired science. Of those who are learning, there is theorizing (only) because they need to acquire science.

3. ARISTOTLE shows the same **in passive potencies**.<sup>71</sup> He says that matter is in potency until it comes (to have) a (new) form or species; but it is in act first, when it has a species. And this is so in all other (things) that are moved for the sake of an end. Whence, just as those who are teaching reckon to have reached (their) end when they demonstrate that their disciple, whom they have instructed, performs those operations that belong to (their) art, so, too, nature reaches (its) end when the act is attained. And thus, it is manifest that the act is the end in natural motion.

4. Since there could be questions concerning what ARISTOTLE says—namely, that work is an end (< *opus enim finis* = τὸ γὰρ ἔργον τέλος, and that work is an act, *actus autem opus* = ἡ δὲ ἐνέργεια τὸ ἔργον)—, someone could believe that this is true in all things.<sup>72</sup> However, he removes this (difficulty) saying that the last end of some active potencies is only the use of the potency, and not something operated by the action of the potency. For

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<sup>70</sup> *In Metaph.* 9, l. 8, §1859 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a11–14): “Manifestat [Philosophus] idem *in potentiis rationalibus*; dicens, quod ad hoc homines potentiam habent aedificandi ut aedificent; ad hoc habent «theoricam,» scilicet scientiam speculativam, ut speculentur. Non autem speculantur ut habeant theoricam, nisi addiscentes, qui meditantur ea quae sunt scientiae speculativae, ut acquirant eam. Et hi non perfecte speculantur, sed quodammodo et imperfecte, ut supra dictum est; quia speculari non est propter aliquam indigentiam, sed scientia iam habita uti. Discentium autem speculatio est, quia indigent acquirere scientiam.”

<sup>71</sup> *In Metaph.* 9, l. 8, §1860 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a15–19): “Manifestat [Philosophus] idem *in potentiis passivis*; dicens, quod materia est in potentia donec veniat ad formam vel speciem; sed tunc primo est in actu, quando habet speciem. Et ita est in omnibus aliis, quae moventur propter finem. Unde, sicut docentes putant ad finem pertingere, quando demonstrant discipulum, quem instruxerunt, operantem ea quae sunt artis; ita et natura pertingit ad finem, quando consequitur actum. Et sic manifestum est quod actus est finis in motu naturali.”

<sup>72</sup> *In Metaph.* 9, l. 8, §1857 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a23–27): “determinat [Philosophus] quoddam quod posset facere dubium circa praedicta.” Ibid., §1862: “*Manifestat quoddam quod poterat esse dubium* circa praedicta. Quia enim dixerat, quod opus est finis, posset aliquis credere, quod hoc esset verum in omnibus. Sed ipse hoc removet, dicens, quod quarumdam activarum potentiarum ultimus finis est solus usus potentiae, et non aliquid operatum per actionem potentiae; sicut ultimus finis potentiae visivae est visio, et praeter eam non fit a potentia visiva aliquod opus operatum. In quibusdam vero potentiis activis fit aliquod opus praeter actionem, ut ab arte aedificativa fit domus praeter ipsam aedificationem.”

example, the last end of the seeing power is seeing; and beyond it, no operated work comes to be from the seeing potency. In some (actions), however, something comes to be (done) by the active potencies beyond the action: for example, a house comes to be through the building art, beyond the (act of) building itself.

However, this difference does not cause the act of the potency to be an end in some of these potencies less and in some (others) more, since the action itself is in the thing caused, just as (the act of) building (is found) in that which is built.<sup>73</sup> And (the act of) building comes to be and has being simultaneously with the house. Whence, if the house or the (thing) built should be an end, it is not excluded that an act should be the end of a potency.

However, the difference between the aforesaid potencies is to be considered such that, when beyond the act itself of the potency—which is an act—there should be something operated, the action of such potencies is in (the thing) produced; and (it is) the act of the thing produced, as (the act of) building (is) in the (thing) built, the (act of) weaving is in the (thing) woven, and—universally—motion (is) in the (thing) moved (< ὅλως ἡ κίνησις ἐν τῷ κινουμένῳ).<sup>74</sup> This is so because, when something operated is constituted by the action of a potency, that action perfects the thing operated, and not the operator; whence, it is in the (thing) operated as its action and perfection, but not in the operator.

On the other hand, when there is not some work operated beyond the action of the potency, then the action exists in the agent and as its perfection; and it does not pass over into some external (thing) perfecting (it).<sup>75</sup> For example, (the act of) seeing is in the seer as its perfection; (the act of) theorizing (is) in the theorizer; and life is in the soul—if by *life* we should understand the operations of life. Whence, it is manifest that also happiness consists in such an operation that is in the operator, and not the one that passes on into

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<sup>73</sup> *In Metaph.* 9, l. 8, §1863 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a27–29): “Tamen haec differentia non facit quod in aliquibus harum potentiarum minus sit actus finis potentiae, et in aliquibus magis; quia ipsa actio est in facto, ut aedificatio in eo quod aedificatur. Et aedificatio simul fit et habet esse cum domo. Unde, si domus aut aedificatum sit finis, non excluditur quin actus sit finis potentiae.”

<sup>74</sup> *In Metaph.* 9, l. 8, §1864 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a30–34): “Talis autem differentia inter praedictas potentias est consideranda, quod quando praeter actum ipsum potentiae, qui est actio, sit aliquod operatum, actio talium potentiarum est in facto, et actus facti, ut aedificatio in aedificato, et contextio in contexto, et universaliter motus in moto. Et hoc ideo, quia quando per actionem potentiae constituitur aliquod operatum, illa actio perficit operatum, et non operantem. Unde est in operato sicut actio et perfectio eius, non autem in operante.”

<sup>75</sup> *In Metaph.* 9, l. 8, §1865 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050a34–b2): “Sed, quando non est aliquod opus operatum praeter actionem potentiae, tunc actio existit in agente et ut perfectio eius, et non transit in aliquid exterius perficiendum; sicut visio est in vidente ut perfectio eius, et speculatio in speculante, et vita in anima, ut per vitam intelligamus opera vitae. Unde manifestum est, quod etiam felicitas in tali operatione consistit, quae est in operante, non quae transit in rem exteriolem, cum felicitas sit bonum felicis, et perfectio eius. Est enim aliqua vita felicis, scilicet vita perfecta eius. Unde sicut vita est in vivente, ita felicitas in felice. Et sic patet quod felicitas non consistit nec in aedificando, nec in aliqua huiusmodi actione, quae in exterius transeat, sed in intelligendo et volendo.”

an external thing, since happiness should be the good of the happy (person) and his perfection; for there is some happy life: namely, his perfect life. Whence, just as life is in the living, so is happiness in the happy. And thus, it is evident that happiness consists neither in building nor in some such action that would pass on into an external (thing), but in understanding and willing (i.e., the specifically human intransient operations).

5. ARISTOTLE returns to conclude the principal purpose, saying that it is manifest, from the aforesaid, that substance, form, and species is some act.<sup>76</sup> Wherefrom, it is manifest that act is prior to potency according to substance and form. And it is prior in time (►47.8, i.e., according to species), since a first act is always required, according to which the generator, mover or producer is in act before another act by which the generated or produced is in act after it was in potency. For that which comes out from potency into act requires a preceding act in the agent, by which it is reduced into act.

#### 47.12. Act Is Prior to Potency Simply, Universally, and Naturally

To seek that which is prior in one and the same (thing) differs from (seeking) that which is prior **simply**.<sup>77</sup> Indeed, if one should inquire which is prior simply, the perfect must be prior to the imperfect, just like act (is prior) to potency. For something is reduced from imperfect into perfect, or from potency into act, only by something that is perfect in act.

Thus, although in generable things the imperfect should be prior to the perfect, and potency prior to act, considering—in something (numerically one and the) same—that which is imperfect prior to (being) perfect, and in potency (prior to being) in act, however, **simply** speaking, act and perfect must be prior, since that which reduces potency to act is in act; and that which perfects the imperfect is perfect.<sup>78</sup>

Thus, matter is prior to form in generation and time, for that to which (something) befalls is prior to that which befalls. Yet, form is prior to matter in perfection, since matter has a

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<sup>76</sup> *In Metaph.* 9, l. 8, §1866 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050b2–6): “Redit [Philosophus] ad concludendum principale propositum; dicens, quod manifestum est ex praedictis, quod substantia et forma et species est actus quidam. Et ex hoc manifestum est, quod actus est prior quam potentia secundum substantiam et formam. Et est prior tempore, ut supra dictum est, quia semper prius exigitur actus secundum quem generans aut movens aut faciens est actu, ante alterum actum quo generatum vel factum est in actu, postquam fuit in potentia; quousque veniatur ad primum movens, quod est in actu tantum. Id enim, quod exit de potentia in actum, requirit actum praecedentem in agente, a quo reducitur in actum.”

<sup>77</sup> *In Metaph.* 1, l. 12, §188: “Est autem attendendum quod differt quaerere illud quod est prius in uno et eodem, et illud quod est prius simpliciter. Si enim quaeratur quid est prius simpliciter, oportet perfectum esse prius imperfecto, sicut et actum potentia. Nihil enim reducitur de imperfecto ad perfectum, vel de potentia in actum, nisi per aliquod perfectum ens actu.”

<sup>78</sup> *De prin. nat.* §4, 59–66: “licet in rebus generabilibus imperfectum sit prius perfecto et potentia prior actu, considerando in aliquo eodem quod prius est imperfectum quam perfectum et in potentia quam in actu, simpliciter tamen loquendo oportet actum et perfectum prius esse, quia quod reducit potentiam ad actum actu est, et quod perficit imperfectum perfectum est.”

complete (act of) being only through form. Likewise, the efficient (cause) is prior to the end in generation and in time, since motion towards an end comes to be from an efficient (cause); yet, the end is prior to the efficient (cause) insofar as it is efficient in substance and complement, since the action of the efficient (cause) is completed only by the end. Hence, these two causes—namely, matter and efficient—are prior by the way of generation; but form and end are prior by the way of perfection.<sup>79</sup>

Thus, **simply and universally** (*simpliciter et universaliter*), the perfect is prior also in time, for the imperfect (thing) is only moved by some perfect thing that preexists.<sup>80</sup>

Act is **prior** to potency **in** (the order of) **nature** because it is the end (*finis*) and complement (*complementum*) of potency.<sup>81</sup> Even in the order of generation and time, **universally** speaking, act is prior to potency, for that which is in potency is reduced to act (*reducitur in actum*) by some being in act. However, in one and the same (thing), potency is prior to act, for the thing is first in potency and thereafter it comes to be in act.

Since act is **naturally prior** to potency, the *ratio of principle* befits it (i.e., befits act) priorly (*per prius*).<sup>82</sup> That which is in potency and not in act is the indefinite (< τὸ δυνάμει ὄν καὶ μὴ ἔντελεχεία τὸ ἀόριστόν ἐστιν), for potency is ended only by act.<sup>83</sup>

Since act should be **naturally prior** to potency, and form (prior) than matter, potency depends in its (act of) being on act, and matter (depends) on form.<sup>84</sup> However, form does not depend (►47.2) in its (act of) being on matter—nor (does) act (depend on potency)—

<sup>79</sup> *De prin. nat.* §4, 66–78: “Materia quidem est prior forma generatione et tempore, prius enim est cui aduenit quam quod aduenit; forma uero est prior materia perfectione, quia materia non habet esse completum nisi per formam. Similiter efficiens prior est fine generatione et tempore, cum ab efficiente fiat motus ad finem; sed finis est prior efficiente in quantum est efficiens in substantia et complemento, cum actio efficientis non compleatur nisi per finem. Igitur iste due cause, scilicet materia et efficiens, sunt prius per uiam generationis, sed forma et finis sunt prius per uiam perfectionis.”

<sup>80</sup> *De virtutibus*, q. 4 a. 3 co.: “Simpliciter autem et universaliter etiam tempore perfectum est prius, quia imperfectum non movetur nisi ab aliquo praeexistenti perfecto.”

<sup>81</sup> *In De anima* 2, c. 1, 303–311: “actus autem, ut habetur in IX Methaphisice, natura est prior potencia est erum finis et complementum potencie; set ordine generationis et temporis, uniuersaliter loquendo, actus etiam est prior potencia (nam id quod est in potencia reducitur in actum per aliquid ens actu), set in uno et eodem, potencia est prior actu; nam aliquid est primo in potenda et postea actu fit.”

<sup>82</sup> *Comp. th.* 1, c. 69, 13–14: “Actus naturaliter prior est potencia, unde et per prius competit sibi ratio principii.”

<sup>83</sup> *In Metaph.* 4, l. 8, §638 (cf. ARISTOTLE, *Metaphysica* Γ.4, 1007b26–29): “Quod autem est in potencia et non «endelechia,» idest in actu, est indefinitum. Potencia enim non finitur nisi per actum.”

<sup>84</sup> *De sub. sep.*, c. 7, 91–97: “cum actus naturaliter sit prior potencia et forma quam materia, potencia quidem dependet in suo esse ab actu et materia a forma, forma autem in suo esse non dependet a materia secundum propriam rationem, vel actus <a potencia>; non enim priora naturaliter a posterioribus dependent.” *ScG* 2, 89 n. 18: “materia tempore est prior forma; materiam dico secundum quod est in potencia ad formam, non secundum quod actu est per formam perfecta, sic enim est simul cum forma.” *De spirit. creat.*, a. 1 co.: “Licet enim in uno et eodem, quod quandoque est in actu quandoque in potencia, prius tempore sit potencia quam actus; actus tamen naturaliter est prior potencia. Illud autem quod est prius, non dependet a posteriori, sed e converso.”

according to (its) proper *ratio*; for the naturally prior does not depend on the posterior. And matter is prior to form in time insofar as it is in potency (in relation) to form, and not insofar as it is in act, perfected by a form, for then it is simultaneous with the form.

#### **47.13. The First Principle of the Universe**

(From what has just been said), if we speak of the first (principle) of the universe, it must be most perfect; but in respect of one particular (being) that proceeds from potency into perfect act, potency is prior to act in time, albeit posterior in nature.<sup>85</sup> Thus, it is evident that the first (principle) of all (beings in the universe) must be most simple, since composite (beings) depend upon simple (principles), and not conversely.

Therefore, it was necessary for the ancient natural (philosophers) to attribute one and the other—namely, *highest simplicity* and *greatest perfection*—to the first principle of the universe.<sup>86</sup> These two, however, cannot be attributed to some corporeal principle, for among generable and corruptible bodies, the simplest are imperfect; hence, they thought that positing diverse principles (would be) as (positing) contrary reasons.

However, they fore-chose the reason of simplicity because they considered things following only the mode according to which something passes from potency into act: in which order, that which is a principle cannot be more perfect.<sup>87</sup> However, this mode of dissolution of contrariety can only be had by positing the first of the beings (to be) an incorporeal principle, as ARISTOTLE proves.

#### **47.14. Being: The Most Perfect Act**

The (act of) being (*esse*) is the most perfect (act).<sup>88</sup> This is evident because act is always more perfect than potency, and any designated form is only understood (to be) in act because (an act of) being is posited. For example, humanity or fireness (*igneitas*) can be

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<sup>85</sup> *In Metaph.* 1, l. 12, §188: “Et ideo, si loquamur de primo universi, oportet ipsum esse perfectissimum. Sed respectu unius particularis, quod procedit de potentia in actum perfectum, potentia est prius tempore actu, licet posterius natura. Constat etiam quod primum omnium oportet esse simplicissimum, eo quod composita dependent a simplicibus et non e converso.”

<sup>86</sup> *In Metaph.* 1, l. 12, §188: “Necessarium ergo erat antiquis naturalibus quod utrumque attribuerent primo principio totius universi, scilicet cum summa simplicitate maximam perfectionem. Haec autem duo non possunt simul attribui alicui principio corporali. Nam in corporibus generabilibus et corruptibilibus sunt simplicissima imperfecta; ideo cogebantur quasi rationibus contrariis diversa principia ponere.”

<sup>87</sup> *In Metaph.* 1, l. 12, §188: “Praeligebant autem rationem simplicitatis, quia non considerabant res nisi secundum modum, secundum quem aliquid exit de potentia in actum; in cuius ordine non oportet id quod est principium esse perfectius. Huiusmodi autem contrarietatis dissolutio haberi non potest, nisi ponendo primum entium principium incorporeum: quia hoc erit simplicissimum, ut de eo inferius Aristoteles probabit.”

<sup>88</sup> *De potentia*, q. 7 a. 2 ad 9: “hoc quod dico esse est inter omnia perfectissimum: quod ex hoc patet quia actus est semper perfectior potentia. Quaelibet autem forma signata non intelligitur in actu nisi per hoc quod esse ponitur. Nam humanitas vel igneitas potest considerari ut in potentia materiae existens, vel ut in virtute agentis, aut etiam ut in intellectu: sed hoc quod habet esse, efficitur actu existens.”



considered as in potency of an existing matter; or as in the virtue of the agent; or, also, as in understanding. On the other hand, what has (an act of) being is caused to be an existent in act (*efficitur actu existens*).

Whence, it is evident that (the act of) being is the actuality of all acts; and on account of this, it is the perfection of all perfections.<sup>89</sup>

Nor are we to understand that something should be added to (the act of) being that would be more formal than it, determining it as act (determines) potency.<sup>90</sup>

(Note that the act of being is said to be the first formal principle even if, strictly speaking, it is not itself a form; ►45.1. As St. Thomas explains in various places, there is nothing against using the names *form* and *matter* for any which two principles that are related to each other as act and potency—such as the act of being and essence—, although this is not properly said according to the common use of the names.)<sup>91</sup>

Indeed, the (act of) being, which is of such a mode, is diverse according to essence from that to which it is added, determining (it).<sup>92</sup> And nothing can be added to (the act of) being that would be extraneous to it, since only non-being—which can be neither form nor matter—would be extraneous to it.

Whence, (the act of) being is not thus determined by something as potency (is determined) by act, but rather **as act (is determined) by potency**.<sup>93</sup> For even in the definition of forms, proper matters are posited in the place of differences: for example, when it is said that the **soul is the act of an organic physical body**. And through this mode, *this* (act of) being is distinguished from *that* (act of) being insofar as it is of such or such a nature.

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<sup>89</sup> *De potentia*, q. 7 a. 2 ad 9: “Unde patet quod hoc quod dico esse est actualitas omnium actuum, et propter hoc est perfectio omnium perfectionum.”

<sup>90</sup> *De potentia*, q. 7 a. 2 ad 9: “Nec intelligendum est, quod ei quod dico esse, aliquid addatur quod sit eo formalius, ipsum determinans, sicut actus potentiam.”

<sup>91</sup> See, for example, *De spirit. creat.*, a. 1 co.: “Si tamen quaecumque duo se habent ad invicem ut potentia et actus, nominentur materia et forma, nihil obstat dicere, ut non fiat vis in verbis, quod in substantiis spiritualibus est materia et forma. Oportet enim in substantia spirituali creata esse duo, quorum unum comparatur ad alterum ut potentia ad actum. [...] Et hoc modo natura spiritualis substantiae, quae non est composita ex materia et forma, est ut potentia respectu sui esse; et sic in substantia spirituali est compositio potentiae et actus, et per consequens formae et materiae; si tamen omnis potentia nominetur materia et omnis actus nominetur forma. Sed tamen hoc non est proprie dictum secundum communem usum nominum.”

<sup>92</sup> *De potentia*, q. 7 a. 2 ad 9: “esse enim quod huiusmodi est, est aliud secundum essentiam ab eo cui additur determinandum. Nihil autem potest addi ad esse quod sit extraneum ab ipso, cum ab eo nihil sit extraneum nisi non-ens, quod non potest esse nec forma nec materia.”

<sup>93</sup> *De potentia*, q. 7 a. 2 ad 9: “Unde non sic determinatur esse per aliud sicut potentia per actum, sed magis sicut actus per potentiam. Nam et in definitione formarum ponuntur propriae materiae loco differentiae, sicut cum dicitur quod anima est actus corporis physici organici. Et per hunc modum, hoc esse ab illo esse distinguitur, in quantum est talis vel talis naturae.”

Therefrom, (pseudo-)DIONYSIUS says that, although living (beings) should be more noble than existing (beings), however, (the act of) being is more noble than (the act of) living, for living (beings) not only have life, but, simultaneously with life, they have (the act of) being too.<sup>94</sup>

Thus, the (act of) being itself (*ipsum esse*) is the most perfect of all (acts), for it is compared to all as act.<sup>95</sup> Indeed, each thing has actuality only insofar as it is. Whence, (the act) itself (of) being is the actuality of all things—and even of forms themselves. Whence, it is not compared to others as the recipient to what is received, but rather as that which is received to the recipient. Thus, when I say that a man, a horse, or whatever other (thing) *is*, (the act of) being itself is considered as formal and received, and not as that to which (the act of) being (i.e., *to be*) befits.

#### 47.15. Immediacy of the Act of Being

Among all (acts), (the act of) being (*esse*) is what most immediately and most intimately (*immediatius et intimius*) befits things (*convenit rebus*).<sup>96</sup> Whence, since matter has (its act of) being through form, it is necessary for the form that gives (the act of) being to matter to be understood to befall matter (*advenire materiae*) before all (other acts), and to be in it more immediately than the others.

It is proper of a substantial form to give to matter (an act of) being simply, for the same (form) is that whereby a thing is *this itself that is* (*hoc ipsum quod est*).<sup>97</sup> And (matter) does not have (its act of) being simply through accidental forms, but (an act of) being according to something (*secundum quid*): for example, to be great, colored, or something such.

Therefore, if the form is (such) that it does not give to matter (its act of) being simply but befalls a matter already existent in act by some form, it will not be a substantial form.<sup>98</sup>

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<sup>94</sup> *De potentia*, q. 7 a. 2 ad 9: “Et per hoc dicit Dionysius, quod licet viventia sint nobiliora quam existentia, tamen esse est nobilior quam vivere: viventia enim non tantum habent vitam, sed cum vita simul habent et esse.”

<sup>95</sup> *STh* I, q. 4 a. 1 ad 3: “ipsum esse est perfectissimum omnium, comparatur enim ad omnia ut actus. Nihil enim habet actualitatem, nisi in quantum est, unde ipsum esse est actualitas omnium rerum, et etiam ipsarum formarum. Unde non comparatur ad alia sicut recipiens ad receptum, sed magis sicut receptum ad recipiens. Cum enim dico esse hominis, vel equi, vel cuiuscumque alterius, ipsum esse consideratur ut formale et receptum, non autem ut illud cui competit esse.”

<sup>96</sup> *Q. d. de anima*, a. 9 co.: “inter omnia, esse est illud quod immediatius et intimius convenit rebus, ut dicitur in Lib. de causis; unde oportet, cum materia habeat esse actu per formam, quod forma dans esse materiae, ante omnia intelligatur advenire materiae, et immediatius ceteris sibi inesse.”

<sup>97</sup> *Q. d. de anima*, a. 9 co.: “Est autem hoc proprium formae substantialis quod det materiae esse simpliciter; ipsa enim est per quam res est hoc ipsum quod est. Non autem per formas accidentales habet esse simpliciter, sed esse secundum quid: puta esse magnum, vel coloratum, vel aliquid tale.”

<sup>98</sup> *Q. d. de anima*, a. 9 co.: “Si qua ergo forma est quae non det materiae esse simpliciter, sed adveniat materiae iam existenti in actu per aliquam formam, non erit forma substantialis. Ex quo patet quod inter formam substantialem et materiam non potest cadere aliqua forma substantialis media.”

Therefrom, it is evident that no mean substantial form whatever can fall between a substantial form and (the first) matter.

#### **47.16. The Act of Being Is Participated but Does Not Participate**

Leaving aside the last mode of participating (i.e., according to which an effect participates in its cause; ►26.2, ¶4), it is impossible for (the act of) being itself (*ipsum esse*) to participate (in) something according to the other modes:<sup>99</sup>

1. It cannot participate (in) something in the mode by which matter—or a subject—participates (in) a form or (in) an accident (►26.2, ¶3), since (the act of) being itself is signified as something abstract.<sup>100</sup>

2. Likewise, nor can it participate (in) something in the mode by which the particular participates (in) the universal (i.e., as a species participates in a genus, ►26.2, ¶1; or an individual in a species, ¶2), for in this mode, too, those (things) that are said abstractly (*in abstracto*) can participate (in) something, as whiteness (is said to participate in) color.<sup>101</sup>

Rather, the (act of) being itself is the most common (principle and act).<sup>102</sup> Whence, (the act of being) is indeed participated by others, but it does not participate (in) something else.

On the other hand, *that which is (id quod est)*, or *being (ens)*, even though it is most common, is nevertheless said concretely (*concretive*).<sup>103</sup> Hence, it participates (in the act of) being itself: not in the mode by which the more common is participated by the less common; rather, it participates (in the act of) being itself in the mode by which the concrete participates (in) the abstract.

#### **47.17. The First and Pure Act of Being**

Any one (being) that is (sometimes found to be) in potency and (sometimes) in act, comes to be in act because it participates (in) a higher act.<sup>104</sup> And something maximally comes

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<sup>99</sup> *In De ebdo.*, l. 2, 85–87: “Pretermisso autem hoc tercio modo participandi, impossibile est quod secundum duos primos modos ipsum esse participet aliquid.”

<sup>100</sup> *In De ebdo.*, l. 2, 87–91: “Non enim potest participare aliquid per modum quo materia uel subiectum participat formam uel accidens quia ut dictum est ipsum esse significatur ut quiddam abstractum.”

<sup>101</sup> *In De ebdo.*, l. 2, 91–95: “Similiter autem nec potest aliquid participare per modum quo particulare participat uniuersale; sic enim etiam ea que in abstracto dicuntur participare aliquid possunt sicut albedo colorem.”

<sup>102</sup> *In De ebdo.*, l. 2, 95–97: “set ipsum esse est communissimum, unde ipsum quidem participatur in aliis, non autem participat aliquid aliud.”

<sup>103</sup> *In De ebdo.*, l. 2, 97–102: “Set id quod est siue ens, quamuis sit communissimum, tamen concretie dicitur, et ideo participat ipsum esse, non per modum quo magis commune participatur a minus communi, set participat ipsum esse per modum quo concretum participat abstractum.”

<sup>104</sup> *Quodlibet* 12, q. 5 a. 1 co.: “unumquodque quod est in potentia et in actu, fit actu per hoc quod participat actum superiorem. Per hoc autem aliquid maxime fit actu quod participat per similitudinem

to be in act because it participates in the likeness of the first and pure act. The first act is (an act of) being subsistent by itself. Whence, any one (thing) receives completion because it participates in (the act of) being. Whence, (the act of) being is the complement (i.e., the perfection) of every form, since it is completed because it has (an act of) being, and it has (an act of) being when it is in act; and thus, a form is (i.e., exists) only through (an act of) being (*per esse*). Thus, the substantial (act of) being of a thing is not an accident, but the actuality of whatever existing form, whether without matter or with matter.

Hence, everything that is in act must either be a subsistent form, as separated substances, or have a form in another, which is related to the form as matter, (which matter is related) as potency to act.<sup>105</sup> And it is necessary for every simple, subsisting substance to either be its (own act of) being or to participate (in the act of being). However, there can only be one simple substance that is a subsistent (act of) being itself, just as there could only be one whiteness if it should be subsistent. Therefore, every substance that is after the first, simple substance participates (in the act of) being.

Every participant is composed from participant and participated; and the participant is in potency (in relation) to the participated.<sup>106</sup> Therefore, there is potency of being (*potentia essendi*) in every substance after the first, simple substance—however simple (such a secondary substance should be).

Therefore, everything that is not its (own act of) being participates (in the act of) being from the first cause, which is its (own act of) being.<sup>107</sup>

#### **47.18. The Cause of the Act of Being**

That which is found first in any being whatever is maximally common to all (beings).<sup>108</sup> For whatever should be added over (it) would contract that which they find, since that which

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primum et purum actum. Primus autem actus est esse subsistens per se; unde completionem unumquodque recipit per hoc quod participat esse; unde esse est complementum omnis formae, quia per hoc completur quod habet esse, et habet esse cum est actu: et sic nulla forma est nisi per esse. Et sic dico quod esse substantiale rei non est accidens, sed actualitas cuiuslibet formae existentis, sive sine materia sive cum materia.”

<sup>105</sup> *In Physic.* 8, l. 21, n. 13: “Oportet autem omne quod est actu, vel esse formam subsistentem, sicut substantiae separatae; vel habere formam in alio, quod quidem se habet ad formam sicut materia, et sicut potentia ad actum. Necesse est enim quod omnis substantia simplex subsistens, vel ipsa sit suum esse, vel participet esse. [...] Substantia autem simplex quae est ipsum esse subsistens, non potest esse nisi una, sicut nec albedo, si esset subsistens, posset esse nisi una. Omnis ergo substantia quae est post primam substantiam simplicem, participat esse.”

<sup>106</sup> *In Physic.* 8, l. 21, n. 13: “Omne autem participans componitur ex participante et participato, et participans est in potentia ad participatum. In omni ergo substantia quantumcumque simplici, post primam substantiam simplicem, est potentia essendi.”

<sup>107</sup> *In Physic.* 8, l. 21, n. 14: “Omne enim quod non est suum esse, participat esse a causa prima, quae est suum esse.”

<sup>108</sup> *De sub. sep.*, c. 10, 104–122: “id quod primum invenitur in unoquoque ente maxime commune est omnibus; quaecumque enim superadduntur contrahunt id quod prius inveniunt, nam quod posterius in re

is posteriorly understood (to be) in a thing is compared to the prior as act (is compared) to potency; and act is determined by potency. Hence, that which subsists in any (being) whatever, must be the effect of the highest virtue; and the more something is posterior, the more it is reduced to the virtue of a lower cause. Hence, that which subsists first in any (being) whatever—as matter in bodies, and in immaterial substances that which is proportional (to matter)—must be the proper effect of the first virtue of a universal agent. Hence, (if) some effect of a higher agent (is) not presupposed, it is impossible that some (beings) should be produced in being (*in esse*) from the second causes of some (beings).

Just as form can only be a principle of being (if) some other prior principle (is) supposed, so (can it only be a principle) of operating (if some other prior principle is supposed).<sup>109</sup> Thus, it is impossible for a second cause to be—from its own virtue—the principle of the (act of) being as such, for the order of effects is according to the order of causes; and the first effect is the (act of) being itself, which is presupposed in all other effects, while it itself does not presuppose some other effect.<sup>110</sup>

Hence, to give (an act of) being as such must be an effect only of the first cause according to (its) proper virtue.<sup>111</sup> Whatever other cause gives (an act of) being, has this insofar as the virtue and operation of the first cause is in it, and not by (its) proper virtue, just like an instrument, too, causes (*efficit*) an instrumental action by the virtue of the mover, and not by virtue of (its) proper nature (► 46.16).

The act of something, even if it should be of it as of an instrument, must come out of its potency.<sup>112</sup> However, since the potency of every creature should be finite, it is impossible for some creature to operate (in order) to create, even as an instrument, since creation

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intelligitur comparatur ad prius ut actus ad potentiam: per actum autem potentia determinatur. Sic igitur oportet ut id quod primum subsistit in unoquoque sit effectus supremae virtutis, quanto autem aliquid est posterius tanto reducatur ad inferioris causae virtutem; oportet igitur quod id quod primum subsistit in unoquoque, sicut in corporibus materia et in immaterialibus substantiis quod proportionale est, sit proprius effectus primae virtutis universalis agentis. Impossibile est igitur quod ab aliquibus causis secundis aliqua producantur in esse non praesupposito aliquo effectu superioris agentis.”

<sup>109</sup> *De potentia*, q. 5 a. 1 ad 18: “sicut forma non potest esse principium essendi, nisi aliquo priori principio praesupposito, ita nec operandi, cum Deus in qualibet re operetur, ut in alia quaestione, ostensum est; nec etiam cognoscendi, cum omnis cognitio a lumine increato derivetur.”

<sup>110</sup> *De potentia*, q. 3 a. 4 co.: “Impossibile est autem quod causa secunda ex propria virtute sit principium esse in quantum huiusmodi; hoc enim est proprium causae primae; nam ordo effectuum est secundum ordinem causarum. Primus autem effectus est ipsum esse, quod omnibus aliis effectibus praesupponitur et ipsum non praesupponit aliquem alium effectum.”

<sup>111</sup> *De potentia*, q. 3 a. 4 co.: “et ideo oportet quod dare esse in quantum huiusmodi sit effectus primae causae solius secundum propriam virtutem; et quaecumque alia causa dat esse, hoc habet in quantum est in ea virtus et operatio primae causae, et non per propriam virtutem; sicut et instrumentum efficit actionem instrumentalem non per virtutem propriae naturae, sed per virtutem moventis.”

<sup>112</sup> *De potentia*, q. 3 a. 4 co.: “actio alicuius, etiamsi sit eius ut instrumenti, oportet ut ab eius potentia egrediatur. Cum autem omnis creaturae potentia sit finita, impossibile est quod aliqua creatura ad creationem operetur, etiam quasi instrumentum. Nam creatio infinitam virtutem requirit in potentia a qua egreditur: quod ex quinque rationibus apparet.”

requires an infinite virtue in the potency from which it comes. This is apparent from five reasons:

1. A potency that produces is proportionate to the distance that there is between that which is produced and the opposite from which it is produced.<sup>113</sup> For example, the more intense a cold is, and thus the more distant from heat, the greater the virtue of heat that must operate in order for the cold to become hot. However, non-being simply (*non esse simpliciter*) is infinitely distant from being; which is evident thus: non-being (*non esse*) is more distant from any determinate being (*a quolibet ente determinato*) than any (other) being (*quam quodlibet ens*), however much it is found to be distant from the other being. Hence, it is only possible for an infinite potency to produce something from altogether non-being (*ex omnino non ente*).

2. What is produced is acted upon in the mode in which the producer acts.<sup>114</sup> And the agent acts insofar as it is in act. Whence, only that acts by itself in whole, which is whole in act, which is proper only of the infinite act, which is the first act. Whence, too, to produce a thing according to its whole substance is proper only of an infinite virtue.

3. Since an accident must be in a subject; and the subject of an action should be the recipient of the action; only that whose action is not an accident, but (is) its own substance itself—which is proper only of God—does not require some receiving matter (in order) to produce (something).<sup>115</sup> Hence, it belongs only to Him to create.

4. Since every second cause has its acting from the first agent, the mode and the order must be imposed to all second agents from the first agent.<sup>116</sup> And since the mode of action depends on the matter that receives the action of the agent, it will be proper of the first

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<sup>113</sup> *De potentia*, q. 3 a. 4 co.: “Prima est ex hoc quod potentia facientis proportionatur distantiae quae est inter id quod fit et oppositum ex quo fit. Quanto enim frigus est vehementius, et sic a calore magis distans, tanto maiori virtute caloris opus est ut ex frigido fiat calidum. Non esse autem simpliciter, in infinitum ab esse distat, quod ex hoc patet, quia a quolibet ente determinato plus distat non esse quam quodlibet ens, quantumcumque ab alio ente distans invenitur; et ideo ex omnino non ente aliquid facere non potest esse nisi potentiae infinitae.”

<sup>114</sup> *De potentia*, q. 3 a. 4 co.: “Secunda ratio est, quia hoc modo factum agitur quo faciens agit. Agens autem agit secundum quod actu est; unde id solum se toto agit quod totum actu est, quod non est nisi actus infiniti qui est actus primus; unde et rem agere secundum totam eius substantiam solius infinitae virtutis est.”

<sup>115</sup> *De potentia*, q. 3 a. 4 co.: “Tertia ratio est, quia cum accidens oporteat esse in subiecto, subiectum autem actionis sit recipiens actionem; illud solum faciendo aliquid recipientem materiam non requirit, cuius actio non est accidens, sed ipsa substantia sua, quod solius Dei est; et ideo solius eius est creare.”

<sup>116</sup> *De potentia*, q. 3 a. 4 co.: “Quarta ratio est, quia cum omnes secundae causae agentes a primo agente habeant hoc ipsum quod agant, ut in Lib. de causis probatur; oportet quod a primo agente, omnibus secundis agentibus modus et ordo imponatur; ei autem non imponitur modus vel ordo ab aliquo. Cum autem modus actionis ex materia dependeat quae recipit actionem agentis, solius primi agentis erit absque materia praesupposita ab alio agente agere, et aliis omnibus secundis agentibus materiam ministrare.”

agent alone to act without a matter presupposed from another agent, and to supply the matter to all other second agents.

5. According to the elongation of potency from act, there is a proportion of potencies to reduce something from potency into act.<sup>117</sup> Thus, the more a potency is distant from act, the more potency is needed. Therefore, if there should be some finite potency that would operate from no presupposed potency, it would have to have some proportion to that active potency which educes something from potency into act; and thus, there is some proportion of no potency to some potency, which is impossible, for there is no proportion of non-being to being. It remains, therefore, that no potency of a creature can create something: neither by (its) proper virtue nor as the instrument of another.

#### 47.19. Reduction of All Modes of Priority to One Mode

ARISTOTLE concludes that all the modes of *prior* and *posterior* (e.g., according to place, time, motion, cognition, etc.) are reduced to the (three) modes of being prior according to the natural order in being (► 47.1, ¶1, ¶2, ¶3): and above all to the first (► 47.1, ¶1; 47.2), insofar as (that) is said (to be) **prior which can be without the others, and not conversely** (*quod potest esse sine aliis, et non e converso*).<sup>118</sup>

Thus, some (beings) can be without others according to generation.<sup>119</sup> According to this mode, whole is prior to part, since, when a whole is already generated, the parts are not in act but in potency.

On the other hand, some (being) can be without other (beings) according to corruption.<sup>120</sup> For example, a part (can be) without the whole when the whole is already corrupted and dissolved into the parts.

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<sup>117</sup> *De potentia*, q. 3 a. 4 co.: “Quinta ratio est ducens ad impossibile. Nam secundum elongationem potentiae ab actu, est proportio potentiarum de potentia in actum aliquid reducentium: quanto enim plus distat potentia ab actu, tanto maiori potentia indiget. Si ergo sit aliqua potentia finita quae de nulla potentia praesupposita aliquid operetur, oportet eius esse aliquam proportionem ad illam potentiam activam quae educit aliquid de potentia in actum; et sic est aliqua proportio nullius potentiae ad aliquam potentiam, quod est impossibile. Non entis enim ad ens nulla est proportio, ut habetur IV Physic. Relinquitur ergo quod nulla potentia creaturae potest aliquid creare neque propria virtute, neque sicut alterius instrumentum.”

<sup>118</sup> *In Metaph.* 5, l. 13, §950 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a11–12): “tres modos, quibus dicitur aliquid esse prius in essendo [...] reducit [Philosophus...] ad unum.” Ibid., §953: “Concludit, quod omnes modi prioris et posterioris possunt reduci ad hos ultimos modos, et praecipue ad primum, prout prius dicitur quod potest esse sine aliis, et non e converso.” *De sub. sep.*, c. 7, 96–97: “non enim priora naturaliter a posterioribus dependent.” *STh* III, q. 64 a. 10 co.: “prius non dependet a posteriori.” *De spirit. creat.*, a. 1 co.: “Illud autem quod est prius, non dependet a posteriori.”

<sup>119</sup> *In Metaph.* 5, l. 13, §953 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a12–13): “Quaedam enim possunt esse sine aliis secundum generationem, per quem modum totum est prius partibus: quia, quando iam totum generatum est, partes non sunt in actu, sed in potentia.”

<sup>120</sup> *In Metaph.* 5, l. 13, §953 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a13–14): “Quaedam vero contingit esse sine aliis secundum corruptionem, sicut pars sine toto, quando est iam totum corruptum et dissolutum in partes.”

Likewise, the other modes of prior and posterior, too, can be reduced to this mode.<sup>121</sup> For it is evident that prior (principles) do not depend on posterior (principles or beings) as, conversely, (posterior principles or beings depend on prior principles). Whence, all prior (principles) can in some mode be without posterior (principles or beings), and not conversely.

(Note, again, that all things that are related according to dependence are in some mode related as **measure** and **measurable**, for everything is measured by that on which it depends; ► 37.10.)

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<sup>121</sup> *In Metaph.* 5, l. 13, §953 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a14): “Et similiter etiam alii modi prioris et posterioris ad hunc modum reduci possunt. Constat enim, quod priora non dependent a posterioribus, sicut e converso. Unde omnia priora aliquo modo possunt esse sine posterioribus, et non e converso.”



## 48. The Order of Motion or Coming-To-Be

We briefly examine here the order of motion or coming-to-be, which depends on the order of quantity. The order of cognition, discussed in the next chapter, depends on this order.

Due to the scope of the present work, we omit many questions that properly belong to this order, but which do not contribute to our understanding of the principles of mathematics.

### 48.1. Mutation

As ARISTOTLE says, the name **mutation** (*mutatio* = μεταβολή) denotes that *something is after another* (*aliquid esse post aliud* < μετ' ἄλλο... τι), and that *one is prior and the other posterior* (*et aliud esse prius et aliud posterius* < καὶ τὸ μὲν πρότερον... τὸ δ' ὕστερον).<sup>1</sup>

Having supposed this, it is necessary for everything that is mutated to be mutated in (one of) four modes, for either:<sup>2</sup>

1. One and the other terminus is affirmed.<sup>3</sup> And in this mode, something is said to be mutated **from a subject into a subject** (*ex subiecto in subiectum* = ἐξ ὑποκειμένου εἰς ὑποκείμενον).
2. The terminus *from which* (*a quo*) is affirmed and the terminus *towards which* (*ad quem*) is negated.<sup>4</sup> And thus, something is said to be moved **from a subject into a non-subject** (*ex subiecto in non subiectum* = ἐξ ὑποκειμένου εἰς μὴ ὑποκείμενον).
3. Conversely, the terminus *from which* is negated and the terminus *towards which* is affirmed.<sup>5</sup> And thus, something is said to be moved **from a non-subject into a subject** (*ex non subiecto in subiectum* = οὐκ ἐξ ὑποκειμένου εἰς ὑποκείμενον).
4. One and the other terminus is negated.<sup>6</sup> And thus, something is said to be mutated **from a non-subject into a non-subject** (*ex non subiecto in non subiectum* = οὐκ ἐξ ὑποκειμένου εἰς μὴ ὑποκείμενον).

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<sup>1</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 224b35–225a2): “Dicit ergo [Philosophus] primo quod cum omnis mutatio sit a quodam in quiddam, ut manifestatur ex ipso mutationis nomine, quod denotat aliquid esse post aliud, et aliud esse prius et aliud posterius; [...]”

<sup>2</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a3): “necesse est his suppositis, quod omne quod mutatur, quatuor modis mutetur.”

<sup>3</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a3–4): “Aut enim uterque terminus est affirmatus; et sic dicitur aliquid mutari ex subiecto in subiectum.”

<sup>4</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a4–5): “Aut terminus a quo est affirmatus, et terminus ad quem est negatus; et sic dicitur aliquid moveri ex subiecto in non subiectum.”

<sup>5</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a5): “Aut e converso terminus a quo est negatus, et terminus ad quem est affirmatus; et sic dicitur aliquid moveri ex non subiecto in subiectum.”

<sup>6</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a5–6): “Aut uterque terminus est negatus; et sic dicitur aliquid mutari ex non subiecto in non subiectum.”

Note, however, that *subject* is not taken here in the mode in which it bears a form (► 15.7).<sup>7</sup> Rather, everything that is signified affirmatively is here said (to be a) *subject* (< λέγω δὲ ὑποκείμενον τὸ καταφάσει δηλούμενον).

## 48.2. The Species of Mutation: Generation, Corruption, Motion

From the aforesaid division of *mutation*, ARISTOTLE concludes that there are necessarily three species of mutation:<sup>8</sup>

1. **Generation** (*generatio* = γένεσις), which is from negated into affirmed, as when something is mutated from non-being into being.<sup>9</sup> For example, from non-white into white; or from non-man into man.

2. **Corruption** (*corruptio* = φθορά), which is from affirmed into negated, as when something is mutated from being into non-being.<sup>10</sup> For example, from white into non-white; or from man into non-man.

3. **Motion** (*motus* = κίνησις; ► 48.12), which is from one affirmed into another affirmed: for example, from white into black.<sup>11</sup> It is to be considered that sometimes ARISTOTLE takes the name *motion* insofar as it is common to all species of mutation.<sup>12</sup> Here, the name *motion* is taken—more strictly—as some species of mutation.

## 48.3. No Fourth Species of Mutation

As ARISTOTLE says, there cannot be some species of mutation, from a non-subject into a non-subject, since every mutation is between opposites, and two negations are not opposites.<sup>13</sup> Nor can it be said that they should be contraries or that they should be contradictories.

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<sup>7</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a6–7): “Non enim accipitur hic *subiectum* eo modo quo sustinet formam; sed omne illud quod affirmative significatur, dicitur hic *subiectum*.”

<sup>8</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a7–8): “concludit [Philosophus] ex praemissis divisionem mutationis. Et dicit quod necessario ex praemissis sequitur, quod tres sint mutationis species.” *In Physic.* 1, l. 13, n. 7: “tres sunt species mutationis, scilicet generatio et corruptio et motus. Quorum haec est differentia.”

<sup>9</sup> *In Physic.* 1, l. 13, n. 7: “generatio autem est de negato in affirmatum, sicut de non albo in album, vel de non homine in hominem.” *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a9–10): “e converso ex non subiecto in subiectum, sicut cum aliquid mutatur de non esse in esse.”

<sup>10</sup> *In Physic.* 1, l. 13, n. 7: “corruptio autem est de affirmato in negatum, sicut de albo in non album, vel de homine in non hominem.” *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a9): “alia autem est ex subiecto in non subiectum, sicut cum aliquid mutatur de esse in non esse.”

<sup>11</sup> *In Physic.* 1, l. 13, n. 7: “motus est de uno affirmato in aliud affirmatum, sicut de albo in nigrum.” *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a8): “una est ex subiecto in subiectum, sicut cum aliquid mutatur de albo in nigrum.”

<sup>12</sup> *In Physic.* 5, l. 2, n. 1: “considerandum est quod Aristoteles supra in tertio ubi motum definivit, accepit nomen *motus* secundum quod est commune omnibus speciebus mutationis. Et hoc modo accipit hic nomen *mutationis*: *motum* autem accipit magis stricte, pro quadam mutationis specie.”

<sup>13</sup> *In Physic.* 5, l. 2, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225a10–12): “excludit [Philosophus] quandam obiectionem. Posset enim aliquis obiicere, quod cum praemiserit quatuor modis aliquid mutari, debuisset

A sign of this, too, is that any negations can simultaneously be true of something one and the same: for example, a stone is neither healthy nor sick.<sup>14</sup> Whence, since mutation by itself is only (found) in contraries and in contradiction, it follows that there should not be mutation by itself from a negation into a negation: in this mode, something is mutated only by accident. Thus, when something comes to be black from white, it also comes to be non-white from non-black by accident. In this mode, something is said to be mutated from a non-subject into a non-subject. And what is in some genus by accident cannot be a species of that genus. Hence, there cannot be some species of mutation from a non-subject into a non-subject.

#### 48.4. The Four Transmutations

As ARISTOTLE says, there are four transmutations (*transmutationes sunt quatuor* = αἱ μεταβολαὶ τέτταρες):<sup>15</sup>

1. **Simple** (*simplex* = ἀπλῆ) **generation** (*generatio* = γένεσις) and **corruption** (*corruptio* = φθορά), **according to substance** (*secundum substantiam* < κατὰ τὸ τί, κατὰ τόδε).<sup>16</sup>

2. **Increase** (*augmentum* = αὔξησις) and **decrease** (*diminutio* = φθίσις), **according to quantity** (*secundum quantitatem* = κατὰ τὸ πόσον).<sup>17</sup>

3. **Alteration** (*alteratio* = ἀλλοίωσις), **according to the affection** (*secundum passionem* = κατὰ τὸ πάθος) that is the third species **of quality** (< κατὰ τὸ ποῖον; ► 36.1, ¶3).<sup>18</sup>

4. **Locomotion** (*latio* = φορά), that is, mutation of place (*loci mutatio*), **according to where** (*secundum ubi* = κατὰ τὸ... ποῦ, κατὰ τόπον).<sup>19</sup>

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concludere quatuor esse species mutationis, et non tres tantum. Sed hanc obiectionem excludit dicens, quod non potest esse aliqua mutationis species de non subiecto in non subiectum; quia omnis mutatio est inter opposita; duae autem negationes non sunt oppositae. Neque enim dici potest quod sint contraria, neque quod sint contradictoria."

<sup>14</sup> *In Physic.* 5, l. 2, n. 2: "Et huius etiam signum est, quia quascumque negationes contingit simul esse veras de aliquo uno et eodem, sicut lapis nec est sanus nec aeger. Unde cum mutatio per se sit solum in contrariis et in contradictione, ut supra dictum est, sequitur quod ex negatione in negationem non sit mutatio per se, sed solum sic mutatur aliquid per accidens. Cum enim aliquid fit de albo nigrum, fit etiam per accidens de non nigro non album. Et per hunc modum dixit aliquid mutari ex non subiecto in non subiectum. Quod autem est per accidens in aliquo genere, non potest esse species illius generis. Et ideo ex non subiecto in non subiectum non potest esse aliqua mutationis species."

<sup>15</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b9–14): "Ostendit [Philosophus] cuiusmodi ens sit materia; et dicit, quod transmutationes sunt quatuor."

<sup>16</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b9–11): "generatio quidem et corruptio simplex secundum substantiam."

<sup>17</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b10–12): "et augmentum et diminutio secundum quantitatem."

<sup>18</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b10; 12): "alteratio secundum passionem, quae est tertia species qualitatis."

<sup>19</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b10; 12–13): "«latio,» idest loci mutatio, secundum ubi."

#### 48.5. Contrariety and the Subject of Transmutation

It is manifest that all four transmutations will be according to the contrarieties that are according each of those genera: for example, alteration, into a contrariety of quality; increase, into a contrariety of quantity; and so on.<sup>20</sup>

Thus, since, in whichever transmutation, there should be some third (principle) other than the contrary, which is said (to be the) *matter*, it is necessary for that which is transmuted—the subject of transmutation—to be, of itself (*quantum est de se*), in potency (in relation) to one and to the other contrary.<sup>21</sup> Otherwise, it would not be susceptible of one or of the other; nor could it be transmuted from one into the other.

Therefore, just like a body that is transmuted from whiteness into blackness, insofar as it is a body (i.e., not insofar as it is white or non-black), is in potency (in relation) to one and to the other, so, (too), (first) matter—which is the subject of generation and corruption in the generation of a substance—is, of itself (*quantum est de se*), in potency to form and to privation, having—of itself (*quantum est de se*)—neither form nor privation in act.<sup>22</sup>

#### 48.6. The Generation of One Is the Corruption of Another

Something is always generated from (some) corrupted (things).<sup>23</sup> This is what ARISTOTLE supposes when he says that *the generation of one is the corruption of another* (*generatio unius est corruptio alterius* < ἔστιν ἡ θατέρου γένεσις ἀεὶ ἐπὶ τῶν οὐσιῶν ἄλλου φθορὰ; and conversely, *the corruption of one is the generation of another*, καὶ ἡ ἄλλου φθορὰ ἄλλου γένεσις).

He solves this question saying that, since corruption tends into non-being and generation is from non-being, generation must be from corrupted (things).<sup>24</sup> It is therefore evident

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<sup>20</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b13–14): “Et manifestum est, quod omnes istae transmutationes erunt secundum contrarietates, quae sunt secundum unumquodque horum generum: ut puta, alteratio in contrarietatem qualitatis; augmentum in contrarietatem quantitatis, et sic de aliis.”

<sup>21</sup> *In Metaph.* 12, l. 2, §2431 (cf. ARISTOTLE, *Metaphysica* Λ.2, 1069b14–15): “Et ita, cum in qualibet transmutatione sit quoddam tertium praeter contrarium, quod dicitur materia, necesse est, quod id quod transmutatur, sive subiectum transmutationis, quantum est de se, sit in potentia ad utrumque contrarium. Aliter enim non esset susceptivum utriusque, nec posset de uno in aliud transmutari.”

<sup>22</sup> *In Metaph.* 12, l. 2, §2431: “Sicut igitur corpus, quod transmutatur de albedine in nigredinem, in quantum est corpus, est in potentia ad utrumque, ita materia in generatione substantiae, quae est subiectum generationis et corruptionis, quantum est de se, est in potentia ad formam et privationem, nec formam nec privationem, quantum est de se, actu habens.”

<sup>23</sup> *In De gen.* 1, l. 9 n. 4 (cf. ARISTOTLE, *De generatione* A.3, 319a20–22): “semper generatur aliquid ex corruptis: quod supponit [Philosophus] in hoc quod dixit, quod generatio unius est corruptio alterius.”

<sup>24</sup> *In De gen.* 1, l. 9 n. 4 (cf. ARISTOTLE, *De generatione* A.3, 319a23–25): “Et solvit hanc quaestionem, dicens: quia corruptio tendit in non ens, et generatio est ex non ente, ideo oportet quod generatio sit ex corruptis. [...] Patet ergo quod, secundum hunc modum, id quod est terminus corruptionis, est principium generationis. Sive ergo sit aliquod subiectum ex quo est generatio, sive non, semper oportet quod generatio eius sit ex non ente, quod est terminus corruptionis: hoc enim est de ratione generationis, quod sit ex non ente; quod autem illud non ens adiungatur alteri existenti, accidit generationi.”

that, according to this mode, that which is the terminus of corruption is the principle of generation. Hence, whether there should be some subject from which there is generation or not, its generation must always be from non-being, which is the terminus of corruption. Indeed, it belongs to the *ratio* of generation that it should be from non-being—and it is accidental to generation (*accidit generationi*) that this non-being should be joined to an existent other.

Therefrom, it is evident that, simultaneously, something is generated from non-being and (something else) is corrupted into non-being—regardless of how *non-being* should be said (i.e., according to simple negation or according to privation; ► 42.2).<sup>25</sup> Fittingly, therefore, the succession of generation and corruption does not fail (*non deficit*), for generation is some corruption of non-being; and corruption is some generation of non-being. Thus, one of them is always conjoined to the other, since that in which one begins, (in that, too) the other is terminated.

#### 48.7. Things That Are Not Generated

Forms do not properly have being (*non proprie habent esse*): rather, they are that whereby some (things) have being (*quibus aliqua habent esse*).<sup>26</sup> Whence, if (the act of) coming to be (*fieri*) is a way into being (*via in esse*), only those (things) come by themselves to be which have (their act of) being through forms. And forms begin to be in that mode in which they are in those-that-have-come-to-be (*eo modo quo sunt in illis factis*), which have (their act of) being through the forms.

Thus, as ARISTOTLE says, there are some (things) that are not by themselves generated or corrupted, such as points and—universally—all species and forms, whether they should be substantial or accidental.<sup>27</sup> For example, white, speaking by itself, does not come to

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<sup>25</sup> *In De gen.* 1, l. 9 n. 4 (cf. ARISTOTLE, *De generatione* A.3, 319a25–29): “Quare patet quod simul aliquid generatur ex non ente, et corrumpitur in non ens, qualitercumque dicatur non ens. Sic igitur idem est in quod terminatur corruptio, et ex quo est generatio: et propter hoc generatio est ex corruptis. Convenienter ergo non deficit successio generationis et corruptionis, ut supra dictum est: quia generatio est quaedam corruptio non entis, et corruptio est quaedam generatio non entis; et ita unum eorum semper adiungitur alteri, cum in id ex quo unum incipit, aliud terminetur.”

<sup>26</sup> *In Metaph.* 7, l. 7, §1419: “formae non proprie habent esse, sed magis sunt quibus aliqua habent esse. Unde si fieri est via in esse, illa tantum per se fiunt, quae per formas habent esse. Formae autem incipiunt esse, eo modo quo sunt in illis factis, quae per formas esse habent.”

<sup>27</sup> *In Metaph.* 8, l. 4, §1746 (cf. ARISTOTLE, *Metaphysica* H.5, 1044b21–29): “Dicit ergo [Philosophus] primo, quod quaedam quandoque sunt et quandoque non sunt «sine generatione et corruptione,» idest sine hoc quod ipsa per se generentur et corrumpantur; sicut puncta, et universaliter omnes species et formae, sive sint substantiales sive accidentales. Non enim album per se loquendo fit, sed lignum album: omne enim quod fit, fit ex aliquo, scilicet materia, et fit aliquid, ad quod terminatur generatio, quod est forma: et sic omne quod fit, est compositum ex materia et forma. Unde ea quae sunt formae tantum, per se fieri non possunt. Cum ergo dicitur quod contraria fiunt ex invicem, diversimode intelligendum est in compositis et simplicibus. Aliter enim fit albus homo ex nigro homine, et aliter nigrum ex albo: quia albus homo significat aliquid compositum, et ideo per se potest fieri: sed album significat formam tantum, unde non fit nisi per accidens ex nigro.”

be; rather, (what comes to be is, for example,) a white (piece of) wood. Indeed, everything that comes to be, comes to be from another—namely, (from) matter—and comes to be something, at which the generation is terminated, which is a form (i.e., the form terminates matter; ► 10.7, ¶1). And thus, everything that comes to be is a composite from matter and form. Whence, those that are only forms cannot—by themselves—come to be. Therefore, when contraries are said to come to be from each other, (this) is diversely to be understood in composite (things) and in simple (things). Thus, a white man comes to be from a black man—or a black (man) from a white (man)—in another mode, for *white man* signifies something composite, and hence, it can—by itself—come to be. On the other hand, *white* signifies only a form; whence, it comes to be from black only by accident (and not by itself).

#### 48.8. Forms Are Not Generated

ARISTOTLE proves as follows that a form does not come to be.<sup>28</sup> Thus, to produce (*facere* = ποιεῖν) something is to produce *this* from some subject—which is universally true in every generation. For example, to produce *this* round (piece of) bronze is not to produce roundness or to produce the form of the sphere. Rather, it is to produce a species in something: to wit, in matter—which is to produce the composite.

This is evident as follows.<sup>29</sup> If an agent produces something, it must produce (it) from some other thing as from matter. For example, an agent is said to produce a bronze sphere; and this is so because it produces *this*, which is a bronze sphere, from *this*, which is bronze. Therefore, if it should also produce the form, it will be plain that it would produce it likewise: to wit, from some matter. And thus, just like the bronze sphere will be composed from matter and form, so, too, the form of the bronze sphere will be composed from matter and form; and the same question concerning the form of the form returns; and so on, infinitely. In this way, generations will proceed infinitely, since every generated (thing) has matter and form. Therefore, it is plain that the species of the generated thing does not

<sup>28</sup> In *Metaph.* 7, l. 7, §1420 (cf. ARISTOTLE, *Metaphysica* Z.8, 1033a31–34): “Et quod forma non fiat, sic probat [Philosophus]. Facere enim hoc aliquid, est facere hoc ex aliquo subiecto, quod est «totaliter,» idest universaliter verum in omni generatione. Facere enim hoc quod est aes rotundum, non est facere hoc ipsum «quod est rotundum,» scilicet rotunditatem; aut hoc ipsum quod est facere «sphaeram,» scilicet formam sphaerae; sed est facere «aliquid alterum,» scilicet speciem, non qualitercumque, «sed in alio,» scilicet in materia: quod est facere compositum.”

<sup>29</sup> In *Metaph.* 7, l. 7, §1420 (cf. ARISTOTLE, *Metaphysica* Z.8, 1033a34–b8): “Quod sic patet. Si enim agens facit aliquid, oportet quod faciat ex aliquo alio sicut ex materia. Hoc «enim superius subiiciebatur,» scilicet quod omnis generatio ex materia fit, propter probationem superius inductam. Sicut agens dicitur facere sphaeram aeream. Et hoc ideo, quia facit hoc quod est sphaera aerea, ex hoc quod est aes. Si igitur etiam ipsam formam faciat, palam erit quod faciet eam similiter, scilicet ex aliqua materia. Et ita sicut sphaera aerea erit composita ex materia et forma, sic et forma sphaerae aereae erit composita ex materia et forma: et redibit eadem quaestio de forma formae, et sic in infinitum: et ita generationes procedent in infinitum, quia omne generatum habet materiam et formam. Palam igitur est quod non fit species rei generatae, nec aliquid aliud quodcumque fit, quod oporteat vocare formam in rebus sensibilibus, sicut ordo et compositio et figura quae in aliquibus tenet locum formae, maxime in artificialibus.”

come to be; nor does something else whatsoever come to be that would have to be called *form* in sensible things: for example, the order, composition, and figure that in some things—and, above all, in artifacts—has the place of a form.

Thus, since generation belongs to that which comes to be, it is plain that there is no generation of the form, but of the composite; nor does the essence (*quod quid erat esse* = τὸ τί ἦν εἶναι) of the thing come to be—except by accident.<sup>30</sup> Rather, the form and the essence is *that which comes to be in another* (*quod fit in alio* = ὃ ἐν ἄλλῳ γίγνεται): to wit, in matter, not by itself. And it comes to be either by art or by nature; or by power (*potestate* = δυνάμειος): that is, by whatever agent through violence.

Although ARISTOTLE says that the essence does not come to be, even if it should be the same as the thing produced, (it is to be noted), however, (that) the essence is that which pertains by itself to the species.<sup>31</sup> Whence, individual conditions—which belong to the species by accident—are excluded from it. Therefore, species and other universals are generated only by accident (when) the singulars (are) generated.

Also, it is to be known that, although it is literally said that the form comes to be *in matter*, (this) is not properly said, for the form does not properly come to be; rather, (it is) the composite (that comes to be).<sup>32</sup> Thus, just as the form is said to be in matter, even if the form should not be (that which exists), but the composite through the form, so, too, the proper mode of speaking is for us to say that *the composite is generated from matter in such a form*. Indeed, forms do not properly come to be: instead, they are educed from the potency of matter insofar as matter, which is in potency (in relation) to form, comes to be in act under a form—which is to produce a composite.

#### 48.9. Points, Lines, Surfaces Are Not Generated

As ARISTOTLE says, it is unreasonable to posit (points), lines, and surfaces to be the substances of things (as Platonists do). Indeed, every substance that priorly was not and

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<sup>30</sup> *In Metaph.* 7, l. 7, §1421 (cf. ARISTOTLE, *Metaphysica* Z.8, 1033b5–8): “Et quia generatio est eius quod fit, palam est quod nec generatio est formae, sed compositi. Nec iterum quod quid erat esse rei generatae generatur, nisi per accidens. Sed forma et quod quid erat esse, est quod fit in alio, idest in materia, non per se. Et dico quod fit, vel ab arte, vel a natura, vel potestate, idest a quocumque agente per violentiam.”

<sup>31</sup> *In Metaph.* 7, l. 7, §1422 (cf. ARISTOTLE, *Metaphysica* Z.8, 1033b7): “Dicit autem [Philosophus] quod quid erat esse non fieri, quamvis sit idem rei factae. Supra enim ostensum est unamquamque rem esse idem cum suo quod quid erat esse. Sed tamen quod quid erat esse est quod per se pertinet ad speciem. Unde ab eo excluduntur conditiones individuales, quae per accidens sunt speciei. Species autem et alia universalia non generantur nisi per accidens, singularibus generatis.”

<sup>32</sup> *In Metaph.* 7, l. 7, §1423 (cf. ARISTOTLE, *Metaphysica* Z.8, 1033b7): “Sciendum tamen quod licet in litera dicatur, quod forma fit in materia, non tamen proprie dicitur. Forma enim proprie non fit, sed compositum. Sicut enim dicitur forma esse in materia, licet forma non sit, sed compositum per formam: ita etiam proprius modus loquendi est, ut dicamus compositum generari ex materia in talem formam. Formae enim proprie non fiunt, sed educuntur de potentia materiae, in quantum materia quae est in potentia ad formam fit actu sub forma, quod est facere compositum.”

thereafter is—or that priorly was and thereafter is not—seems to suffer this with generation and corruption.<sup>33</sup> This is manifest in those (things) that are caused through motion. Now, sometimes points, lines, and surfaces, indeed exist, while sometimes (they do) not; and yet, they are neither generated nor are they corrupted; therefore, nor are they substances.

ARISTOTLE proves both suppositions (thus):<sup>34</sup>

1. First, (he proves) that sometimes (the surfaces of bodies) should be (i.e., should exist) and sometimes they should not be.<sup>35</sup> For it happens **(a)** that bodies (which were) priorly divided are joined into one; or **(b)** (that bodies which were) priorly joined are divided. Now, when **(a)** bodies that were first divided are joined, there comes to be one surface of two bodies, since the parts of a continuous body are joined into one common terminus, which is one surface. On the other hand, when **(b)** a body is divided into two, two surfaces are effected, since it cannot be said that when **(a)** the two bodies are composed, their two surfaces should remain: instead, one and the other are corrupted (*corrumpuntur* < ἔφθαρται), that is, they cease to be. Likewise, when **(b)** bodies are divided, two priorly non-existent surfaces begin to be anew. For it cannot be said that a surface, which is indivisible according to depth (► 34.14, ¶2), should be divided into two surfaces according to depth; or that a line, which is indivisible according to latitude (► 34.14, ¶1), should be divided according to latitude; or a point, which is altogether indivisible (► 4), should be divided in whatever mode. And thus, it is evident that **(b)** two (extremities) cannot come to be from one in the way of division; **(a)** nor can there come to be one from two of the aforesaid (extremities) in the way of composition. Whence, it remains that points, lines, and surfaces sometimes begin to be and sometimes cease to be.

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<sup>33</sup> *In Metaph.* 3, l. 13, §510 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a28–34): “Dicit ergo [Philosophus] primo, quod cum dictis inconvenientibus etiam irrationabilia accidunt ex parte generationis et corruptionis, ponentibus lineas et superficies esse substantias rerum. Omnis enim substantia, quae prius non fuit et postea est, aut prius fuit et postea non est, videtur hoc pati cum generatione et corruptione. Et hoc manifeste apparet in omnibus his quae per motum causantur. Puncta autem et lineae et superficies quandoque quidem sunt, quandoque vero non sunt, et tamen non generantur nec corrumpuntur; ergo nec sunt substantiae.”

<sup>34</sup> *In Metaph.* 3, l. 13, §511 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a34–b11): “Probat autem [Philosophus] utrumque suppositorum.”

<sup>35</sup> *In Metaph.* 3, l. 13, §511 (cf. ARISTOTLE, *Metaphysica* B.5, 1002a34–b4): “Primo quidem, quod quandoque sint et quandoque non sint. Contingit enim corpora prius divisa copulari in unum aut prius copulata dividi. Quando autem corpora primum divisa copulantur, fit una superficies duorum corporum, quia partes corporis continui copulantur ad unum communem terminum, qui est superficies una. Quando vero corpus unum dividitur in duo, efficiuntur duae superficies. Quia non potest dici quod quando corpora duo componuntur, quod duae superficies eorum maneant, sed utraeque «corrumpuntur,» idest desinunt esse. Similiter quando corpora dividuntur, incipiunt esse de novo duae superficies prius non existentes. Non enim potest dici quod superficies quae est indivisibilis secundum profunditatem, dividatur in superficies duas secundum profunditatem: aut linea, quae est indivisibilis secundum latitudinem, dividatur secundum latitudinem: aut punctum, quod omnino est indivisibile, quocumque modo dividatur. Et sic patet quod ex uno non possent fieri duo in via divisionis: nec ex duobus praedictorum potest fieri unum in via compositionis. Unde relinquitur quod puncta et linea et superficies quandoque esse incipiant, et quandoque esse deficiant.”



2. Consequently, he proves that (the extremities of magnitudes) should neither be generated nor corrupted.<sup>36</sup> For everything that is generated, is generated from something; and everything that is corrupted, is corrupted into something as into matter. Yet, on account of their simplicity, it is impossible to posit (*dare*) some matter from which these (extremities of magnitudes) would be generated and into which they would be corrupted. Therefore, they are neither generated nor are they corrupted.

#### 48.10. The Existence of Motion Is to Be Supposed by the Natural Philosopher

As ARISTOTLE says, not all (bodies) are always at rest.<sup>37</sup> About this, he posits three means to make it apparent that it does not pertain to the natural (philosopher) to dispute against the position (that denies the existence of motion):

1. That some (thinkers) should say that all (things) are at rest, and that (such thinkers) should seek some sophistic reason to (prove) this, proceeds from some weakness of intellect (< ἀρρωστία τίς ἐστὶν διανοίας).<sup>38</sup>

Indeed, it proceeds from this: that the intellect (by itself, alone) is not sufficient to resolve sophistic arguments (*rationes*) that are incompatible with (*repugnant*) those (things) that are manifest according to sense.<sup>39</sup> And we should not trouble ourselves about disputing against whatever positions or problems concerning which someone—lacking in sense or penalty—is in doubt. Whence, it is not necessary to doubt against this position on account of the foolishness of someone who says it (*propter stultitiam dicentis*).

2. This question does not concern some particular being, but universally the whole (of) being.<sup>40</sup> Nor does it pertain to the natural philosopher alone. Rather, it pertains in some

<sup>36</sup> In *Metaph.* 3, l. 13, §512 (cf. ARISTOTLE, *Metaphysica* B.5, 1002b4–5): “Consequenter probat secundum quod supponebatur, scilicet quod ista non generantur nec corrumpuntur. Omne enim quod generatur, ex aliquo generatur: et omne quod corrumpitur, in aliquid corrumpitur sicut in materiam. Sed non est dare aliquam materiam, ex qua ista generentur et in qua corrumpantur, propter eorum simplicitatem; ergo non generantur nec corrumpuntur.”

<sup>37</sup> In *Physic.* 8, l. 5, n. 3 (cf. ARISTOTLE, *Physica* Θ.3, 253a32–b6): “ponit [Philosophus] quod non omnia quiescunt semper [...]. Circa primum tria ponit. [...] Sic ergo per tria media apparet quod ad naturalem non pertinet contra hanc positionem disputare.”

<sup>38</sup> In *Physic.* 8, l. 5, n. 3 (cf. ARISTOTLE, *Physica* Θ.3, 253a32–34): “Quorum primum est, quod ex quadam intellectus infirmitate procedit, quod aliqui dicant omnia quiescere, et quod inquirant ad hoc aliquam sophisticam rationem, dimisso sensu.”

<sup>39</sup> In *Physic.* 8, l. 5, n. 3 (cf. ARISTOTLE, *Topica* A.10, 104a3–37): “procedit enim ex hoc quod intellectus non est sufficiens ad dissolvendum sophisticas rationes, quae repugnant iis quae sunt manifesta secundum sensum. Dictum est autem in I *Topicorum*, quod non est curandum disputare contra quascumque positiones vel problemata, de quibus aliquis dubitat indigens sensu vel poena: unde contra istam positionem non oportet dubitare, propter stultitiam dicentis.”

<sup>40</sup> In *Physic.* 8, l. 5, n. 3 (cf. ARISTOTLE, *Physica* Θ.3, 253a34–b2): “Secundum quod dicit [Philosophus] est, quod ista dubitatio non est de aliquo particulari ente, sed universaliter de toto ente. Neque etiam pertinet solum ad naturalem philosophum, sed quodammodo pertinet ad omnes scientias demonstrativas, et ad omnes opiniones, idest ad omnes artes quae utuntur quibusdam opinionibus, sicut rhetorica et dialectica.”

mode to all demonstrative sciences and to all opinions—that is, (it also pertains) to all the arts that use some opinions, such as rhetoric and dialectic.

Indeed, all arts and sciences use motion:<sup>41</sup>

- (a) The practical (sciences and arts use motion) as directing some motions.
- (b) Natural philosophy (uses motion) theorizing (on) the nature of motion and the mobile.
- (c) Mathematicians, too, use an imaginary motion, saying that a moved point produces a line (*punctus motus facit lineam*; ► 46.22, ¶2).
- (d) And the metaphysician considers first principles (i.e., through the motion of reason).

Thus, it is evident that the destruction of motion is incompatible (*repugnat*) with all the sciences.<sup>42</sup> And an error that pertains to all beings and to all sciences is not to be reproved by the natural (philosopher), but by the metaphysician. Therefore, it does not pertain to the natural (scientist) to dispute against this error.

3. In the doctrines of mathematicians, unreasonable and unfitting doubt concerning principles do not pertain to the mathematician, such that he should remove them.<sup>43</sup> And it is likewise in the other sciences: it does not pertain to the physicist either to destroy such a position, which is incompatible with (*repugnat*) his principles. Indeed, in any science, the definition of the subject is supposed as a principle. Whence, in the science that is about nature, it is supposed as a principle that nature should be a principle of motion.

#### 48.11. Requirements for Motion

It is evident that two contraries and one subject are required in motion (► 48.2, ¶3).<sup>44</sup> In generation (¶1) and corruption (¶2), on the other hand, (what) is required (is) the presence of one of the contraries and its absence, which is a privation.

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<sup>41</sup> *In Physic.* 8, l. 5, n. 3: “quia omnes artes et scientiae utuntur motu; practicae quidem, quasi dirigentes aliquos motus, naturalis autem philosophia, speculando naturam motus et mobilia. Mathematici etiam utuntur motu imaginato, dicentes quod punctus motus facit lineam. Metaphysicus autem considerat de primis principiis.” St. Thomas often uses the analogy of the moved point; e.g., *In Sent.* 4, d. 40 q. 1 a. 2 co.: “punctus motus lineam facit.” Sometimes it is supposed, even if it remains unstated.

<sup>42</sup> *In Physic.* 8, l. 5, n. 3: “Sic igitur patet, quod destruere motum repugnat omnibus scientiis. Error autem qui pertinet ad omnia entia et ad omnes scientias, non est reprobatus a naturali, sed a metaphysico. Non ergo pertinet ad naturalem contra istum errorem disputare.”

<sup>43</sup> *In Physic.* 8, l. 5, n. 3 (cf. ARISTOTLE, *Physica* Θ.3, 253b2–6): “Tertium quod dicit est, quod irrationabiles et importunae dubitationes de principiis in doctrinis mathematicis, non pertinent ad mathematicum, ut eas removeat; et similiter est in aliis scientiis. Et similiter nec ad physicum pertinet destruere huiusmodi positionem, quae repugnat suis principiis. In qualibet enim scientia supponitur pro principio definitio subiecti: unde et in scientia quae est de natura, supponitur quasi principium, quod natura sit principium motus.”

<sup>44</sup> *In Physic.* 1, l. 13, n. 7: “Sic igitur patet quod in motu requiruntur duo contraria et unum subiectum. Sed in generatione et corruptione requiritur praesentia unius contrarii et absentia eius, quae est privatio.”

Nonetheless, generation and corruption are preserved in motion, for (when something) is moved from white into black, the white is corrupted and the black comes to be.<sup>45</sup> Therefore, every natural mutation requires a subject, a form, and a privation.

However, the *ratio* of *motion* is not preserved in every generation and corruption, as is evident in the generation and corruption of substances (e.g., from non-man to man, and from man to non-man).<sup>46</sup> Whence, subject, form, and privation are preserved in every mutation—but not a subject and two contraries.

#### 48.12. Motion

ARISTOTLE defines motion, saying that, since *being*, according to any one genus of being, should be divided by potency and act (< διηρημένου δὲ καθ' ἕκαστον γένος τοῦ μὲν δυνάμει τοῦ δ' ἐντελεχείᾳ), **motion** (*motus* = κίνησις) is said to be *the act of that which is in potency insofar as (it is) such (actus eius, quod est in potentia in quantum huiusmodi < τὴν τοῦ δυνάμει ἢ τοιοῦτόν ἐστιν ἐνέργειαν λέγω)*.<sup>47</sup>

From this definition, ARISTOTLE explains: (1) what is posited from the part of the subject of motion (►48.13); (2) what is posited as the genus of motion (►48.14).<sup>48</sup>

#### 48.13. The Subject in the Definition of Motion

ARISTOTLE shows that motion is in the mobile, for every act is in that of which it is the act; and motion is the act of the mobile caused by the mover; whence, it remains that it should be in the mobile.<sup>49</sup> That it should be the act of the mobile is evident from what has been said. (And to explain what is posited in the definition of *motion* from the part of the subject of motion), ARISTOTLE does two (things):<sup>50</sup>

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<sup>45</sup> *In Physic.* 1, l. 13, n. 7: “Generatio autem et corruptio salvantur in motu: nam quod movetur de albo in nigrum, corrumpitur album et fit nigrum. Sic igitur in omni mutatione naturali requiritur subiectum et forma et privatio.”

<sup>46</sup> *In Physic.* 1, l. 13, n. 7: “Non autem ratio motus salvatur in omni generatione et corruptione, sicut patet in generatione et corruptione substantiarum. Unde subiectum et forma et privatio salvantur in omni mutatione; non autem subiectum et duo contraria.”

<sup>47</sup> *In Metaph.* 11, l. 9, §2294 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b14–16): “*Definit* [Philosophus] *motum*. Et primo *ponit definitionem ipsam*, dicens, quod cum ens secundum unumquodque genus entis dividatur per potentiam et actum, motus dicitur esse actus eius, quod est in potentia in quantum huiusmodi.”

<sup>48</sup> *In Metaph.* 11, l. 9, §2295 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b16–1066a7): “*Exponit* [Philosophus] *positam definitionem*. Et circa hoc duo facit. Primo *exponit id quod ponitur in definitione ex parte subiecti motus*. Secundo id quod ponitur in definitione quasi genus motus.”

<sup>49</sup> *In Metaph.* 11, l. 9 §2308 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a26–28): “*Ostendit* [Philosophus] *in quo sit motus*; et primo ostendit quod *in mobili*: quia omnis actus est in eo cuius est actus. Sed motus est actus mobilis a movente causatus. Unde relinquitur quod sit in mobili. Et quod sit actus mobilis, ex superioribus patet.”

<sup>50</sup> *In Metaph.* 11, l. 9, §2295 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b16–33): “Circum primum duo facit. Primo *exponit* [Philosophus] *hanc particulam eius, quod est in potentia*. Secundo hanc, in quantum huiusmodi.”

1. He explains the particle *of that which is in potency*, saying first that it is manifest that it is true that motion is what has just been said.<sup>51</sup>

Thus, it is manifest that *buildable* (*aedificabile* = οἰκοδομητόν) signifies something that exists in potency.<sup>52</sup> And this potency is signified to be reduced into act by saying *being built* (*aedificari* = οἰκοδομεῖται). And this act is called *building* (*aedificatio* = οἰκοδόμησις). Likewise, (this is the case) in all other motions, as in ambulation, alteration, and other such (motions).

Thus, something is said to be moved when it comes to be in act in this mode and is in potency in this mode—and neither priorly nor posteriorly.<sup>53</sup> Therefore, since it is thus, it follows that motion is of something that exists in potency on account of being reduced into act. And it should be reduced into act insofar as it is mobile, for something is said (to be) **mobile** (*mobile* = κινήτόν) because it is *in potency of being moved* (*in potentia ad moveri*). And thus, such a potency is reduced into act when it is moved in act. That which is in act—insofar as it is in act—cannot be reduced into act by motion, for this is in act before it begins to be moved. Nor is it reduced into act by motion insofar as it is in potency at the terminus of motion. Moreover, while it is moved, it still remains in potency (in relation) to the terminus of motion. On the other hand, only by motion is something reduced from potency into act—from that potency that is signified when something is said to be **mobile**: i.e., *what can be moved* (*potens moveri*).

2. (He explains the particle) *insofar as (it is) such* (*inquantum huiusmodi, vel inquantum tale* = ἢ [τοιοῦτον]).<sup>54</sup>

In order to explain it, he says that bronze is in potency (in relation) to the statue. However, it is not the same in *ratio* (*idem ratione*): rather, the *ratio* of bronze insofar as (it is) bronze

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<sup>51</sup> *In Metaph.* 11, l. 9, §2295 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b16–17): “Dicit ergo [Philosophus] primo, quod ex hoc manifestum est verum esse, motum esse hoc quod dictum est.”

<sup>52</sup> *In Metaph.* 11, l. 9, §2295 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b17–20): “Manifestum est enim quod aedificabile significat aliquid existens in potentia. Et ista potentia significatur esse reducta in actum per hoc quod dicitur aedificari. Et iste actus vocatur aedificatio. Et similiter in omnibus aliis motibus, ut in ambulatione et alteratione et huiusmodi.”

<sup>53</sup> *In Metaph.* 11, l. 9, §2295 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b20–23): “Dicitur autem aliquid moveri, cum huiusmodi fiat in actu, et huiusmodi fuerit in potentia, et non prius nec posterius. Cum ergo ita sit, sequetur, quod motus est alicuius existentis in potentia, cum sit reductum ad actum. Et hoc dico, scilicet quod sit reductum ad actum, inquantum est mobile; nam mobile dicitur aliquid per hoc, quod est in potentia ad moveri; et sic reducitur huiusmodi potentia in actum quando movetur actu: non autem habet reduci in actum per motum id quod in potentia est «inquantum ipsum,» idest secundum id quod actu est, et secundum seipsum. Nam hoc etiam est in actu antequam incipiat moveri. Neque etiam reducitur ad actum per motum, secundum quod est in potentia ad terminum motus, qui dum movetur adhuc remanet in potentia ad terminum motus. Sed solum per motum reducitur aliquid de potentia in actum, de illa potentia quae significatur cum dicitur aliquid esse mobile, idest potens moveri.”

<sup>54</sup> *In Metaph.* 11, l. 9, §2296 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b23–33): “Exponit [Philosophus] hanc particulam positam in definitione motus; scilicet inquantum huiusmodi, vel inquantum tale.”

is other than the *ratio* of bronze insofar as it has some potency. And this is what he says, that it is not the same to be bronze and to be in potency (< ταὐτὸν χαλκῷ εἶναι καὶ δυνάμει τινί, i.e., the essence of bronze and of potency are not the same; and for something to be bronze is not for it to be in potency to something else: at least according to *ratio*).<sup>55</sup>

Indeed, if it should be the same simply according to *ratio* (*simpliciter secundum rationem* = ἀπλῶς κατὰ τὸν λόγον), then, just like motion is the act of bronze insofar as it is bronze in potency, so would it be the act of bronze insofar as it is bronze: but *bronze* and *the potency of bronze* (to become a statue) is not the same according to *ratio*.<sup>56</sup> And it is evident that this is in potency of contraries. For (example), *being capable of becoming healthy* is not the same in *ratio* as *being capable of becoming ill*, for the *ratio* of a potency is taken from the act; whence, if *being capable of becoming healthy* and *being capable of becoming ill* should be the same according to *ratio*, it would follow that *becoming healthy* and *becoming ill* would be the same, which is impossible.

Hence, a potency is not the same (in relation) to one and to the other of (two) contraries according to the *ratio* of potency: rather, it is the same in subject, for it is the same subject that can be healthy or ill.<sup>57</sup> Therefore, since *being capable of becoming healthy* and *being capable of becoming ill* is not the same according to *ratio*, it is manifest that neither of them is the same according to *ratio* with its subject: for those (things) that are—by themselves—the same as one and the same (third thing), are—by themselves—the same as each other (i.e., if *a* is the same as *c*, and *b* is the same as *c*, then *a* is the same as *b*).

Therefore, since *bronze* is not the same as *bronze in potency (in relation) to a statue*,<sup>58</sup> just like *color* (is not the same) as *visible*—which is *being capable of being seen*—, hence,

<sup>55</sup> *In Metaph.* 11, I. 9, §2296 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b23–26): “Ad cuius expositionem dicit [Philosophus] quod aes est in potentia ad statuam. Et sic idem est subiectum aes, et aes in potentia ad statuam. Tamen non est idem ratione. Sed alia est ratio aeris in quantum aes, et alia est ratio aeris in quantum habet aliquam potentiam. Et hoc est quod dicit quod non est idem aeri esse, et alicui potentiae.”

<sup>56</sup> *In Metaph.* 11, I. 9, §2296 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b26–30): “Si enim esset idem simpliciter secundum rationem, tunc, sicut motus est actus aeris in quantum est aes in potentia, ita esset actus aeris in quantum est aes. Sed non est idem secundum rationem aes et potentia aeris. Et hoc manifestum est in potentia contrariorum; quia posse «sanari et posse laborare,» id est infirmari, non est idem secundum rationem: ratio enim potentiae sumitur ex actu. Unde, si posse sanari et posse infirmari esset idem secundum rationem, sequeretur, quod idem esset infirmari et sanari, quod est impossibile.”

<sup>57</sup> *In Metaph.* 11, I. 9, §2296 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b30–32): “Sic igitur non est eadem potentia ad utrumque contrariorum secundum rationem potentiae, sed est eadem subiecto; idem enim est subiectum quod potest esse sanum et languens; sive illud subiectum sit quicumque humorum in corpore animalis, sive sanguis, qui est naturalior et magis proprius vitae et animalium nutrimento, possit esse causa sanitatis et aegritudinis. Quia ergo posse sanari et posse infirmari non est idem secundum rationem, manifestum est quod neutrum horum est idem secundum rationem cum suo subiecto; quia quae uni et eidem per se sunt eadem, sibi invicem sunt eadem per se.”

<sup>58</sup> *In Metaph.* 11, I. 9, §2296 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b32–33): “Quia ergo non est idem secundum rationem aes, et aes in potentia ad statuam, sicut neque color et visibile, quod est potens

in the definition of **motion** that has been said—that (motion) is *the act of that which exists in potency*—, it was necessary to add *insofar as (it is) such*.

#### 48.14. The Genus in the Definition of Motion

ARISTOTLE explains what (it is that) he posits as a genus in the definition of *motion*—i.e., *act*.<sup>59</sup> He says that it is manifest that motion should be this (i.e., an act; ►32), for we say that there is motion because (a subject; ►48.13) happens to be moved when that which is in potency should be in act—and neither priorly nor posteriorly.

Indeed, it is manifest that any one of the mobile (bodies) may sometimes be in act, (and may) sometimes not (be in act).<sup>60</sup> For example, the buildable insofar as it is buildable (*aedificabile inquantum aedificabile* = τὸ οἰκοδομητὸν ἢ οἰκοδομητόν) is sometimes in potency and sometimes in act.

He says *the buildable insofar as it is buildable* because the matter of the house is in potency (in relation) to two (acts): namely, (in relation) to the form of the house, and (in relation) to (the act of) being built.<sup>61</sup> And (he says) that it may sometimes be in potency (and) sometimes in act (in relation) to one or to the other (of these two acts). Yet, the potency that is in the matter of the house (in relation) to being built is signified by (the name) *buildable*. Therefore, the buildable insofar as it is buildable comes to be in act when it is (in the act of being) built. And thus, (the act of) building (*aedificatio* = οἰκοδόμησις) is the act of the buildable insofar as it is buildable.

He therefore proves this as follows.<sup>62</sup> The matter of the house is in potency (in relation) to two acts: to wit, (in relation) to the (act of) building the house and (in relation) to the form

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videri, ideo necessarium fuit quod in definitione motus, dicto quod est actus existentis in potentia, adderetur, inquantum huiusmodi.”

<sup>59</sup> *In Metaph.* 11, l. 9, §2297 (cf. ARISTOTLE, *Metaphysica* K.9, 1065b33–35): “*Exponit [Philosophus] id quod ponitur in definitione motus tamquam genus; dicens manifestum esse quod hoc sit motus, quia dico motus tunc est, quia tunc accidit moveri «quando hic,» idest actu existentis in potentia fuerit actu, et neque prius neque posterius.*” Ibid., §2299: “Non enim potest poni [motus] in alio genere nisi in genere actus.”

<sup>60</sup> *In Metaph.* 11, l. 9, §2297 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a1–3): “Manifestum est enim quod unumquodque mobilium contingit aliquando esse actu, aliquando non. Sicut aedificabile inquantum aedificabile, quandoque est in potentia, et quandoque est in actu.”

<sup>61</sup> *In Metaph.* 11, l. 9, §2297 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a3–4): “Dicit autem quod aedificabile inquantum aedificabile, quia materia domus est ad duo in potentia; scilicet ad formam domus et ad hoc quod aedificetur. Et quod ad utrumque contingit esse quandoque in potentia quandoque in actu. Sed potentia quae est in materia domus ad hoc quod aedificetur, significatur in hoc quod dicitur aedificabile. Tunc ergo aedificabile inquantum aedificabile fit actu, quando aedificatur. Et sic aedificatio est actus aedificabilis, inquantum aedificabile.”

<sup>62</sup> *In Metaph.* 11, l. 9, §2298 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a1–6): “Quod sic probat: quia materia domus non est in potentia nisi ad duos actus; scilicet ad aedificationem domus et ad formam. Aedificabile autem significat quamdam potentiam in materia domus existentem. Oportet igitur, cum omni potentiae respondeat aliquis actus, quod potentiae significatae per hoc quod dico aedificabile, respondeat alter duorum actuum; scilicet vel forma domus, vel aedificatio. Sed non est actus aedificabilis inquantum

(of the house, οἰκία). And *buildable* signifies some potency that exists in the matter of the house. Hence, since some act must respond to every potency, one of the two acts—namely, either the form of the house or (the act of) building—must respond to the potency signified by *buildable*. Yet, the form of the house is not the act of the buildable insofar as it is buildable, since (when) the form of the house (is) present, it is no longer buildable: instead, it is already built. The buildable, on the other hand, is in act when it is being built in act. Hence, it is necessary for (the act of) building to be the act of the buildable. Now, (the act of) building is some motion; and thus, motion is the act of the buildable.

And the same argument (*eadem ratio* = ὁ... αὐτὸς λόγος) is (true) of all other motions.<sup>63</sup> Whence, it is manifest that **motion** is *the act of that which exists in potency (actus existentis in potentia, i.e., insofar as it is in potency)*.

#### 48.15. Motion is an Imperfect Act

As shown above, motion must be an act—but it is an imperfect act (*actus imperfectus* = ἐνέργεια... ἀτελής).<sup>64</sup> The cause of this is as follows: that whose act (motion) is (i.e., the subject) is imperfect (for it is not in act; ►23.4); and this is the possible being or being in potency (< ἀτελὲς τὸ δυνατόν οὐ ἔστιν ἐνέργεια).

Indeed, if (motion) should be a perfect act, the whole potency would be removed (i.e., even the potency of being moved further would be removed); which (potency) is in matter (in relation) to something determinate.<sup>65</sup> Whence, perfect acts are not acts of (beings) that exist in potency, but of (beings) existing in act. On the other hand, motion is (the act) of a (being) existing in potency such that it does not remove the potency from it. Thus, as long as there is motion, a potency remains in the mobile (in relation) to that which it intends by the motion (i.e., that towards which the motion tends). Rather, only the potency that was (in relation) to being moved is removed by motion: but not totally, since that which is moved is still in potency (in relation) to being moved, for everything that is moved will be moved on account of the division of continuous motion.

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aedificabile forma domus; quia adveniente forma domus non est adhuc aedificabile, sed est iam aedificatum. Sed aedificabile est actu, quando aedificatur actu. Necesse est igitur quod aedificare sit actus aedificabilis. Aedificare autem est quidam motus; et sic motus est actus aedificabilis.”

<sup>63</sup> *In Metaph.* 11, l. 9, §2298 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a7): “Et eadem ratio est de omnibus aliis motibus. Unde manifestum est quod motus est actus existentis in potentia.”

<sup>64</sup> *In Metaph.* 11, l. 9, §2305 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a20–22): “Sed oportet, quod motus sit actus quidam, ut supra probatum est: sed est actus imperfectus. Et huius causa est, quia illud cuius est actus, est imperfectum, et hoc est ens possibile sive ens potentia.”

<sup>65</sup> *In Metaph.* 11, l. 9, §2305: “Si enim esset actus perfectus, tolleretur tota potentia, quae est in materia ad aliquid determinatum. Unde actus perfecti non sunt actus existentis in potentia, sed existentis in actu. Motus autem ita est existentis in potentia, quod non tollit ab eo potentiam. Quamdiu enim est motus, remanet potentia in mobili ad id quod intendit per motum. Sed solum potentia quae erat ad moveri tollitur per motum; et tamen non totaliter; quia id quod movetur, adhuc in potentia est ad moveri, quia omne quod movetur, movebitur, propter divisionem motus continui, ut probatur in sexto Physicorum.”

Whence, it remains that **motion** is *the act of that which exists in potency*: and in this way, it is an imperfect act and (an act) of an imperfect (subject).<sup>66</sup>

#### 48.16. Relation of Motion to Mover

ARISTOTLE shows how motion is related to mover. He proposes two (things):<sup>67</sup>

1. Motion is the act of that which is capable of moving (*actus motivi*).

He proves this as follows.<sup>68</sup> That is the act of something by which it comes to be in act; and (something) is said (to be) **capable of moving** (*motivum*) because *it can move* (*est potens movere*); and (it is said to be a) **mover** (*movens*) because *it operates in act*. Thus, since (something) is said (to be a) *mover* on account of an act, motion will be the act of that which is capable of moving.

2. The motion that is the act of the mover is no other than that (motion) which is of the mobile, for motion must be the act of both.

He proves this as follows.<sup>69</sup> It has been said that motion is the act of that which is capable of moving insofar as it causes motion (*inquantum facit motum*); and it is (the act) of the mobile insofar as motion comes to be in it; but that which is capable of moving causes the motion that is in the mobile, and no other; and the mover is what causes the mobile to be active; whence, it remains that one motion is the act of both the mover and the mobile.

ARISTOTLE explains this using an example.<sup>70</sup> Thus, the distance of two to one (i.e., 2 : 1) and of one to two (i.e., 1 : 2) is one, but it differs in *ratio* insofar as it is signified in a diverse mode: namely, by *double* and (by) *half*. Likewise, the way up and the way down is one,

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<sup>66</sup> *In Metaph.* 11, l. 9, §2305: “Unde relinquitur, quod motus est actus existentis in potentia: et sic est actus imperfectus et imperfecti.”

<sup>67</sup> *In Metaph.* 11, l. 9, §2309 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a27–29): “Ostendit [Philosophus] qualiter se habeat motus ad movens: et proponit duo: scilicet quod motus est actus motivi: et quod non est alius motus qui est actus motivi, et qui est mobilis: oportet enim motum esse actum amborum.”

<sup>68</sup> *In Metaph.* 11, l. 9, §2310 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a29–31): “Primum eorum duorum probat [Philosophus]: scilicet quod motus sit motivi actus. Illud enim actus est alicuius, quo fit actu. Sed motivum dicitur ex eo quod est potens movere; movens autem in operari, idest in eo quod est esse actu; et ita, cum movens dicatur propter motum, motus erit actus motivi.”

<sup>69</sup> *In Metaph.* 11, l. 9, §2311 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a29–32): “Probat [Philosophus] secundum propositum: scilicet quod unus motus sit actus motivi et mobilis, hoc modo. Dictum est enim quod motus est actus motivi inquantum facit motum. Est autem mobilis inquantum fit in eo motus: sed motivum facit illum motum qui est in mobili et non alium. Et hoc quod est dicit quod movens est activum mobilis. Unde relinquitur quod unus motus sit actus et moventis et mobilis.”

<sup>70</sup> *In Metaph.* 11, l. 9, §2312 (cf. ARISTOTLE, *Metaphysica* K.9, 1066a31–34): “Manifestat [Philosophus] hoc per exempla: et dicit quod una est distantia duorum ad unum et unius ad duo. Sed differt ratione. Propter quod diversimode significatur: scilicet per duplum et dimidium. Similiter una est via ad ascendendum et descendendum, sed differt ratione. Et propter hoc dicuntur hi ascendentes et illi descendentes. Et ita est de movente et moto. Nam unus motus secundum substantiam est actus utriusque, sed differt ratione. Est enim actus moventis ut a quo, mobilis autem ut in quo; et non actus mobilis ut a quo, neque moventis ut in quo. Et ideo actus moventis dicitur actio, mobilis vero passio.”



but it differs in *ratio*; whereby *these* are said to be ascending and *those* (are said) to be descending. And concerning the mover and the moved, it is likewise, for one motion according to substance (i.e., according to essence) is the act of one and of the other, but differs in *ratio*: the act of the mover is as (that act) by which (*a quo*), while (the act) of the mobile (is) as (the act) in which (*in quo*), and not the other way around. Hence, the act of the mover is called *action* (*actio*), while (the act) of the mobile (is called) *affection* (*passio*).

#### 48.17. **Action, Affection Denominated from Motion; Quantity, Where, from Place**

If action and affection are the same according to substance (as just said), it seems that they should not be diverse categories.<sup>71</sup> However, it is to be known that categories are diversified according to diverse modes of predicating. Whence, insofar as it is diversely predicated of diverse (subjects), the same (thing) pertains to diverse categories.

1. Thus, **motion**, insofar as it is predicated of the subject in which it is, constitutes the category of **affection**; but insofar as it is predicated of that whereby it is, constitutes the category of **action** (► 33.5).<sup>72</sup>

2. Likewise, **place**, insofar as it is predicated of the placer (*de locante*), pertains to the genus of **quantity**; but insofar as it is denominatively (*denominative*) predicated of the (thing) placed (*de locato*), it constitutes the category **where** (*ubi*; ► 33.6, ¶2; 35.4, ¶3).<sup>73</sup>

#### 48.18. **The Natural vs. the Mathematical Body**

Just like the transmutation of forms about one matter has led to the cognition of matter, it became necessary to posit that a place is (something) other than the (thing) placed because two bodies are successively found in the same place; and likewise, one body (is successively found) in two places.<sup>74</sup> Hence, there would have never been an inquiry concerning place if there should be no motion according to place.

As ARISTOTLE says, every sensible body is in a place (*omne corpus sensibile est in loco* < τὸ αἰσθητὸν σῶμα πού), and all bodies that are in a place are sensible. He says *sensible*

<sup>71</sup> *In Metaph.* 11, l. 9, §2313: “Sed si actio et passio sunt idem secundum substantiam, videtur quod non sint diversa praedicamenta. Sed sciendum quod praedicamenta diversificantur secundum diversos modos praedicandi. Unde idem, secundum quod diversimode de diversis praedicatur, ad diversa praedicamenta pertinet.”

<sup>72</sup> *In Metaph.* 11, l. 9, §2313: “Similiter motus, secundum quod praedicatur de subiecto in quo est, constituit praedicamentum passionis. Secundum autem quod praedicatur de eo a quo est, constituit praedicamentum actionis.”

<sup>73</sup> *In Metaph.* 11, l. 9, §2313: “Locus enim, secundum quod praedicatur de locante, pertinet ad genus quantitatis. Secundum autem quod praedicatur denominative de locato, constituit praedicamentum ubi.”

<sup>74</sup> *In Physic.* 4, l. 5, n. 5 (cf. ARISTOTLE, *Physica* Δ.4, 211a12–13): “nunquam fuisset inquisitum de loco, nisi esset aliquis motus secundum locum. Ex hoc enim necesse fuit ponere locum aliud a locato, quia inveniuntur in eodem loco successive duo corpora, et similiter unum corpus in duobus locis; sicut etiam transmutatio formarum circa unam materiam, induxit in cognitionem materiae.”

to differentiate it from the mathematical body, to which *place* and *contact* are attributed only by likeness, for *place* is owed to such (mathematical bodies) only according to metaphor. Indeed, a place is only sought on account of motion, as ARISTOTLE says; and only sensible, natural bodies are moved, for mathematical (bodies) are outside of motion. Therefore, it is thus manifest that whatever bodies are in a place are sensible, and that every natural body, which as such (*inquantum huiusmodi*) is naturally apt to move (other natural bodies) and to be moved (by other natural bodies), can be said (to be a) *sensible body*.<sup>75</sup>

Indeed, in all natural things, the proper affections of some genus or species follow upon some intrinsic principle.<sup>76</sup> And natural (things) are (those) whose principle of motion is in them. Whence, a mathematical body is not a natural body, since it is immobile, while every natural body is mobile; and it does not exist by itself, since dimensions are accidents (i.e., a natural body exists by itself, while accidents, such as quantity, exist in them).

Thus, a surface absolutely taken is something mathematical.<sup>77</sup> On the other hand, insofar as it is said (to be) *colored*, it is drawn into a genus of nature. Therefore, concerning a line, the natural (philosopher, scientist) does not consider the (same) affections that the geometer (considers): instead, (he considers) only those (affections) that happen to it insofar as it is the terminus of a natural body.

It is necessary for a sensible body to be composed from sensible (parts), for it cannot be said that a sensible body should be composed from mathematical bodies, in which quantity is considered without sensible qualities.<sup>78</sup> Indeed, a difference of mathematical

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<sup>75</sup> *In Metaph.* 11, l. 10, §2339 (cf. ARISTOTLE, *Metaphysica* K.10, 1067a7–8): “omne corpus sensibile est in loco. Et dicit [Philosophus] notanter, sensibile, ad differentiam corporis mathematici, cui non attribuitur locus et tactus nisi per similitudinem.” *In De caelo* 1, l. 14, n. 7 (cf. ARISTOTLE, *De caelo* A.7, 275b4–6): “Dicitur autem hic corpus *sensibile* ad differentiam corporis *mathematici*: ita quod corpus sensibile dicatur omne corpus naturale, quod inquantum huiusmodi, natum est movere et moveri.” Ibid. n. 8 (cf. ARISTOTLE, *De caelo* A.7, 275b6–7): “Et dicit [Philosophus] quod omnia corpora quae sunt in loco, sunt sensibilia. Non enim sunt corpora mathematica, quia talibus non debetur locus nisi secundum metaphoram, ut dicitur in I *de Generat.*: locus enim non quaeritur nisi propter motum, ut dicitur in IV *Physic.*; non autem moventur nisi corpora sensibilia et naturalia, nam mathematica sunt extra motum. Sic igitur manifestum est quod quaecumque corpora sunt in loco, sunt sensibilia.” See ARISTOTLE, *De generatione* A.6, 322a29–323a12, not commented by St. Thomas.

<sup>76</sup> *De motu cordis*, 27–31: “In omnibus enim rebus naturalibus propriae passiones alicuius generis vel speciei aliquod principium intrinsecum consequuntur. Naturalia enim sunt quorum principium motus in ipsis est.” *ScG* 1, 20 n. 4: “corpus mathematicum non est per se existens, ut Philosophus probat, eo quod dimensiones accidentia sunt. Non autem est corpus naturale: cum sit immobilis, ut ostensum est; omne autem corpus naturale mobile est.”

<sup>77</sup> *De veritate*, q. 16 a. 1 ad 2: “In quantum superficies absolute sumpta, est quid mathematicum; per hoc vero quod dicitur colorata, trahitur ad genus naturae.” *ScG* 2, 4 n. 2: “nec naturalis circa lineam illas passiones considerat quas geometra: sed solum ea quae accidunt sibi inquantum est terminus corporis naturalis.”

<sup>78</sup> *In De sensu* 1, c. 14, 67–71 (cf. ARISTOTLE, *De sensu* 6, 445b11–15): “necesse est sensibile corpus ex sensibilibus componi, non enim potest dici quod corpus sensibile componatur ex *mathematicis* corporibus, in quibus consideratur quantitas sine qualitatibus sensibilibus.” Ibid., 209–217 (cf. ARISTOTLE,

(things) does not diversify a nature. Thus, as ARISTOTLE says, if exceedingly small parts should be separated from a whole, it seems reasonable that they could not remain (the same in species, and consequently in number) due to the smallness of the preserving virtue, since the corporeal virtue is divided following the division of magnitude. Hence, (if) those minimal parts (are) separated, they are immediately converted into a containing body: e.g., (into) one element or another.

Wherefrom, it is evident that the mathematical body is infinitely divisible.<sup>79</sup> In it, only the *ratio* of quantity is considered, in which there is nothing incompatible with (*repugnans*) infinite division. On the other hand, the natural body, which is considered under a whole form, cannot be infinitely divided: indeed, when it has already been brought (*deducitur*) to a minimum, it is immediately converted into another on account of a weakness of virtue. Whence, a minimal flesh is to be found; and a natural body is not composed from mathematical (parts).

Of motions, some (motion) is by itself according to place: namely, the mutation of place; and another (motion is not by itself, but) consequent (*ex consequenti*): to wit, increase and decrease, since (if) quantity (is) increased or decreased, a body takes a greater or a smaller place.<sup>80</sup> However, unlike physical bodies, there can be increase without alteration in mathematical bodies. For example, if a square is increased by the addition of a gnomon, it is not altered (i.e., no proper, sensible qualities—such as color—are changed in it), as ARISTOTLE says.

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*De sensu* 6, 446a7–10): “Dicit ergo [Philosophus] primo quod, si partes in paruitate superhabundantes separantur a toto, *rationabiliter* uidetur quod non possint permanere propter paruitatem uirtutis conseruantis, quia uirtus corporalis diuiditur secundum diuisionem magnitudinis, ut patet in VII Phisicorum, et ideo statim illa minima separata conuertuntur in corpus continens, puta aerem uel aquam.” Substituting “air or water” for “one element or another,” which is what must happen regardless of what the true elements should be. *In De caelo* 1, l. 16, n. 10 (cf. ARISTOTLE, *De caelo* A.7, 276b24–25): “differentia mathematicorum non diversificat naturam.”

<sup>79</sup> *In De sensu* 1, c. 14, 218–228: “Et ex hoc patet quare corpus mathematicum est diuisibile in infinitum, in quo consideratur sola ratio quantitatis, in qua nichil est repugnans diuisioni infinite; set corpus naturale, quod consideratur sub tota forma, non potest in infinitum diuidi, quia, quando iam ad minimum deducitur, statim propter debilitatem uirtutis conuertitur in aliud; unde est inuenire minimam carnem, sicut dicitur in I Phisicorum. Nec tamen corpus natulale componitur ex mathematicis, ut obiciebatur.”

<sup>80</sup> *In Physic.* 4, l. 5, n. 5 (cf. ARISTOTLE, *Physica* Δ.4, 211a14–17): “Sed motuum aliquis est secundum locum per se, scilicet loci mutatio: alius autem ex consequenti, scilicet augmentum et decrementum; quia augmentata quantitate vel diminuta, corpus accipit maiorem vel minorem locum.” *In De caelo* 1, l. 7, n. 4 (cf. ARISTOTLE, *De caelo* A.3, 270a25–4): “Est autem considerandum quod signanter in hac ratione mentionem facit [Aristoteles] de corporibus *physicis*: quia in corporibus mathematicis potest esse augmentum sine alteratione, puta cum quadratum creuit apposito gnomone, sed non est alteratum, ut dicitur in *Praedicamentis*; et e converso potest aliquid alterari sine hoc quod augeatur, sicut cum fit triangulus aequalis quadrato.” See ARISTOTLE, *Categoriae* 14, 15a28–30: “ῶσαύτως δὲ καὶ τὸ αὐξανόμενον ἢ τινα ἄλλην κίνησιν κινούμενον ἀλλοιοῦσθαι ἔδει· ἀλλ’ ἔστι τινα αὐξανόμενα ἃ οὐκ ἀλλοιοῦται, οἷον τὸ τετράγωνον γνῶμονος περιτεθέντος ἠϋξῆται μὲν, ἀλλοιότερον δὲ οὐδὲν γεγένηται· ῶσαύτως δὲ καὶ ἐπὶ τῶν ἄλλων τῶν τοιούτων.” To understand what a **gnomon** is, we can imagine a  $4 \times 4$  square that is cut down to a  $3 \times 3$  square by removing an equal area of  $3 \times 1$  from two adjacent sides and the remaining  $1 \times 1$  corner: what is thus removed, taken as one area having an L-shape, is a gnomon.

#### 48.19. Comparison of Body to Place

*Body* is not compared to *place* as *matter* to *form*, but rather as *subject* to *accident*.<sup>81</sup> And although the comparison of subject to accident should in some mode be like (that of matter to form, however, *subject* is not altogether *matter* (i.e., because *subject* is matter *in which*, while *matter* properly said is matter *from which*; ► 14.8).

Moreover, a twofold comparison of a body to a place is found:<sup>82</sup>

1. Insofar as (a body) is posited in *this* or in *that* determinate place.<sup>83</sup> This comparison follows upon the special nature of *this* or *that* body: for example, by the nature of gravity, heavy (bodies) are below, while, by the nature of lightness, light (bodies are) above.

2. Insofar as (a body) is said to be in a place simply.<sup>84</sup> This comparison follows upon a body from the nature itself of corporeity, and not from something added. Thus, according to this, (that) body is in a place which is commensurate (*commetitur*) to the place. This is insofar as it is dimensioned by dimensions equal and similar to the dimensions of the place.<sup>85</sup> And dimensions are in whichever body from the nature itself of corporeity (► 46.11).

#### 48.20. Why Multiple Bodies Cannot Be in the Same Place

Whether multiple bodies are or are not in the same place does not refer to a determinate place, but to place absolutely (► 48.19, ¶2).<sup>86</sup> Whence, the cause of this impediment must be referred to the nature itself of corporeity, wherefrom it befits every body, insofar as it is a body, to be naturally apt to be in a place.

Some (philosophers) concede simply that no two bodies can be in the same place and refer the reason of this (impediment) to mathematical principles, which must be preserved

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<sup>81</sup> *In Metaph.* 8, l. 4, §1742 (cf. ARISTOTLE, *Metaphysica* H.4, 1044b6–8): “Corpus autem comparatur ad locum non sicut materia ad formam, sed magis sicut subiectum ad accidens. Et licet comparatio subiecti ad accidens sit quodammodo ut materiae ad formam, non tamen subiectum est omnino materia.”

<sup>82</sup> *In De Trin.*, q. 4 a. 3 co., 122–123: “Inuenitur enim duplex comparatio corporis ad locum.”

<sup>83</sup> *In De Trin.*, q. 4 a. 3 co., 123–127: “Vna secundum quam ponitur in loco hoc uel illo determinato, et hec comparatio sequitur naturam specialem huius uel illius corporis; sicut quod graua ex natura grauitatis sunt deorsum, leuia uero sursum ex natura leuitatis.”

<sup>84</sup> *In De Trin.*, q. 4 a. 3 co., 127–136: “Alia uero comparatio est secundum quam dicitur esse in loco simpliciter, et hec comparatio sequitur corpus ex ipsa natura corporeitatis, non propter aliquid additum: secundum hoc enim corpus est in loco, quod loco se commetitur; hoc autem est secundum quod est dimensionatum dimensionibus equalibus et similibus dimensionibus loci, dimensiones autem insunt cuilibet corpori ex ipsa corporeitatis natura.”

<sup>85</sup> See EUCLID, *Opera Omnia*, vol. 4, 4.7–9: “Ἴσα δὲ καὶ ὁμοία στερεὰ σχήματά ἐστι τὰ ὑπὸ ὁμοίων ἐπιπέδων περιεχόμενα ἴσων τῷ πλήθει καὶ τῷ μεγέθει.” HEIBERG’s version (*ibid.*, 5): “Aequales autem et similes figurae solidae sunt, quae planis similibus continentur et numero et magnitudine aequalibus.”

<sup>86</sup> *In De Trin.*, q. 4 a. 3 co., 136–142: “Esse autem plura corpora in eodem loco uel non esse, non respicit locum determinatum, set locum absolute; unde oportet quod causa huius impedimenti referatur ad ipsam naturam corporeitatis, ex qua conuenit omni corpori quod in quantum est corpus natum sit esse in loco.”

in all natural (principles).<sup>87</sup> Indeed, as ARISTOTLE says, whatever impossible (conclusions) occur concerning mathematical bodies, it is necessary that they should follow into natural bodies. This is so because mathematical (principles) are said through abstraction from natural (principles); and natural (principles) are related to mathematical (principles) through addition (*per appositionem*), for they add to mathematical (principles) sensible nature and motion, from which mathematical (principles) abstract. Thus, it is evident that those (principles) that belong to the *ratio* of mathematical (things) are preserved in natural (things), but not conversely. And any incongruities (*inconvenientia*) against mathematical (principles) are also against natural (principles), but not conversely.

However, this does not seem to be enough, since it does not befit mathematical (things) to be in a place—except by likeness (*similitudinarie*), and not properly, as ARISTOTLE says (► 48.18).<sup>88</sup> Therefore, the reason of the aforesaid impediment is not to be taken from mathematical principles, but from natural principles, to which place is properly due.

Moreover, mathematical reasons do not sufficiently conclude in this matter.<sup>89</sup> Indeed, even if mathematical *ratios* should be preserved in natural (*ratios*), however, natural (*ratios*) add something over mathematical (*ratios*): to wit, sensible matter; and, from this addition, the *ratio* of something can be assigned in natural (things), which *ratio* could not be assigned in mathematical (things).

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<sup>87</sup> *In De Trin.*, q. 4 a. 3 co., 145–149: “alii concedunt simpliciter quod nulla duo corpora possunt esse in eodem loco, et rationem huius referunt ad principia mathematica, que oportet saluari in omnibus naturalibus, ut dicitur in III Celi et mundi.” *In De caelo* 3, l. 3, n. 6 (cf. ARISTOTLE, *De caelo* Γ.1, 299a11–17): “quaecumque impossibilia accidunt circa mathematica corpora, necesse est quod consequantur ad corpora naturalia. Et hoc ideo, quia mathematica dicuntur per abstractionem a naturalibus; naturalia autem se habent per appositionem ad mathematica (superaddunt enim mathematicis naturam sensibilem et motum, a quibus mathematica abstrahunt); et sic patet quod ea quae sunt de ratione mathematicorum, salvantur in naturalibus, et non e converso. Et ideo quaecumque inconvenientia sunt contra mathematica, sunt etiam contra naturalia sed non convertitur.”

<sup>88</sup> *In De Trin.*, q. 4 a. 3 co., 149–155: “Set hoc non uidetur esse conueniens, quia mathematicis non competit esse in loco nisi similitudinarie et non proprie, ut habetur in I De generatione; et ideo ratio predicti impedimenti non est sumenda ex principiis mathematicis, set ex principiis naturalibus, quibus proprie locus debetur.” See ARISTOTLE, *De generatione* A.7, 323a1–3: “καὶ γὰρ τοῖς μαθηματικοῖς ὁμοίως ἀποδοτέον ἀφήν καὶ τόπον, εἴτ’ ἐστὶ κενωρισμένον ἕκαστον αὐτῶν εἴτ’ ἄλλον τρόπον.” St. Thomas, whose Commentary ends a few lines above, did not comment on this passage. An anonymous continuation reads as follows. *In De gen. continuatio* 1, l. 18, n. 2: “cum mathematica habeat positionem, sive sint separata secundum rem sive secundum rationem tantum, habent etiam locum. Nam sicut dicit Commentator super loco isto, licet mathematica abstrahantur ab aliis accidentibus, scilicet a motu et materia, impossibile est tamen ea imaginari sine loco, cum corpus naturale non sit in loco nisi secundum suas dimensiones, et non per alia accidentia. Locus ergo inseparabilis est a mathematicis corporibus. Ipsi tamen non convenit locus et tactus nisi per quandam similitudinem ad naturalia. Nulla enim vere sunt in loco, nisi naturalia secundum esse accepta; in quibus sunt mathematica secundum esse suum: et ideo etiam in ipsis habent locum et tactum. Nec accipiuntur hic secundum abstractionem ab esse, quia talis consideratio non est naturalis, sed mathematica; et ideo locus et tactus convenit eis, secundum quod talia, per posterius.”

<sup>89</sup> *In De Trin.*, q. 4 a. 3 co., 155–162: “Et preterea, rationes mathematicae non sufficienter concludunt in ista materia: etsi enim mathematica saluentur in naturalibus, tamen naturalia addunt aliquid supra mathematica, scilicet materiam sensibilem, et ex hoc addito potest assignari ratio alicuius in naturalibus, cuius ratio in mathematicis non poterat assignari.”

Thus, in mathematical things, the *ratio* of diversity of *these* two lines can only be assigned on account of (their) proper site (► 35.7).<sup>90</sup> Whence, (if) the diversity of site (is) removed, the plurality of mathematical lines does not remain; likewise, nor (would the plurality) of surfaces or of bodies (remain). Wherefrom, mathematical bodies cannot be many and be simultaneous (in respect of site); and (this is the case) likewise concerning lines and surfaces. Thus, the natural body does not have (the property) that it should repel a place from the part of (its) matter (alone) or from the part of (its) dimensions (alone).<sup>91</sup> Whence, according to ARISTOTLE, if dimensions—or the mathematical body, which is the same—should be posited to be (i.e., to exist) separated, they would repel a place, and it would be impossible for them to simultaneously be (in the same place) with another body.

In natural bodies, on the other hand, an adversary could assign another *ratio* of diversity even (if) the diversity of site (is) removed: to wit, (a *ratio* of diversity) from sensible matter.<sup>92</sup> Hence, that (reason) that proves that two mathematical bodies are not simultaneous (in respect of site) is not sufficient to prove that two natural bodies are not simultaneous (in respect of place). Indeed, it is impossible for two mathematical straight lines to be under (the same) two points, since a *ratio* of distinction can be understood in them only from the site.<sup>93</sup> On the other hand, for two natural lines to be between (the same) two points is indeed impossible by nature, but not absolutely impossible: for there remains another *ratio* of distinction in the two lines from the diversity of the subjected (natural) bodies, which can be preserved even (if) the diversity of site (is) removed.

Therefore, the way of AVICENNA is to be accepted, through which he assigns the cause of the aforesaid impediment from the nature itself of corporeity through natural principles.<sup>94</sup>

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<sup>90</sup> *In De Trin.*, q. 4 a. 3 co., 162–169: “In mathematicis enim non potest assignari ratio diuersitatis harum duarum linearum nisi propter situm; unde remota diuersitate situs non remanet pluralitas linearum mathematicarum, et similiter nec superficierum aut corporum; et propter hoc non potest esse quod corpora mathematica sint plura et sint simul, et similiter de lineis et superficiebus.”

<sup>91</sup> *In Sent.* 4, d. 10 q. 1 a. 3 qc. 1 ad 4: “corpus naturale non habet quod repleat locum ex parte materiae, neque ex parte dimensionum; unde secundum Philosophum in 4 Phys., et in 3 Metaph., dimensiones separatae si ponantur esse (vel corpus mathematicum, quod idem est), replent locum, et non possunt esse simul cum alio corpore.”

<sup>92</sup> *In De Trin.*, q. 4 a. 3 co., 169–175: “Set in corporibus naturalibus posset ab aduersario assignari alia ratio diuersitatis, scilicet ex materia sensibili, etiam remota diuersitate situs; et ideo illa que probabat duo corpora mathematica non esse simul, non est sufficiens ad probandum duo corpora naturalia simul non esse.”

<sup>93</sup> *Quodlibet* 1, q. 10 a. 2 ad 2: “duas lineas rectas mathematicas esse infra duo puncta, est impossibile, quia in eis nulla alia ratio distinctionis potest intelligi nisi ex situ; sed duas lineas naturales esse infra duo puncta est impossibile quidem per naturam, sed possibile per miraculum: quia remanet alia ratio distinctionis in lineis duabus ex diuersitate corporum subiectorum, quae conservatur virtute divina, etiam remota diuersitate situs.”

<sup>94</sup> *In De Trin.*, q. 4 a. 3 co., 176–192: “Et ideo accipienda est uia Auicenne, qua utitur in sua Sufficientia in tractatu de loco, per quam assignat causam prohibitionis predictae ex ipsa natura corporeitatis per principia naturalia: dicit enim quod non potest esse causa huius prohibitionis nisi illud cui primo et per se competit esse in loco, hoc est enim quod natum est replere locum; forme autem non competit esse in loco nisi per accidens, quamuis aliquae forme sint principium quo corpus determinatur ad hunc uel illum

Thus, he says that the cause of this impediment can only be that to which it befits to be in a place first and by itself, for this is what is naturally apt to repel a place. Now, it does not befit form to be in a place, except by accident, even though some forms should be the principle whereby a body is determined to *this* or *that* place. Likewise, nor (is) matter considered according to itself (that which is naturally apt to be in a place), since in this mode it is considered apart from (*praeter*) all the other genera. Whence, matter must prevent this (i.e., must prevent two bodies from being in the same place) insofar as it underlies that which has the first comparison to place—and it is compared to place insofar as it underlies dimensions.

Hence, multiple bodies are prevented from being in the same place because of the nature of matter subjected to dimensions.<sup>95</sup> Indeed, there must be multiple bodies in which the form of corporeity is found (to be) divided; which (form) is only divided according to the division of matter. And since the division (of matter) is only by dimensions, to which the *ratio* of site belongs, it is only possible for *this* matter to be distinct from *that* (matter) when it is distinct according to site—which is not (the case) when two bodies are posited to be in the same place, for it follows that those two bodies are one body, which is impossible.

Therefore, since matter subjected to dimensions should be found in whichever body, it is necessary that two bodies be prevented from being in the same place due to the nature itself of corporeity.<sup>96</sup>

#### 48.21. Every Transmutation Takes Its Species from Its Terminus

Since contrariety should be a difference according to form (►43.22), something receives the name and the species from that whereby it receives contrariety.<sup>97</sup> Now, the motion of

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locum; similiter nec materia secundum se considerata, quia sic intelligitur preter omnia alia genera, ut dicitur in VII Metaphisice. Vnde oportet quod materia secundum quod subest ei per quod habet primam comparisonem ad locum hoc prohibeat; comparatur autem ad locum <prout> subest dimensionibus.” Cf. *In Metaph.* 7, l. 2, §1285 (cf. ARISTOTLE, *Metaphysica* Z.3, 1029a20–21): “dicit, quid sit materia est secundum rei veritatem, prout declaratur in primo Physicorum. Materia enim in se non potest sufficienter cognosci, nisi per motum; et eius investigatio praecipue videtur ad naturalem pertinere. Unde et Philosophus accipit hic de materia, quae in Physicis sunt investigata, dicens: dico autem materiam esse quae secundum se, idest secundum sui essentiam considerata, nullatenus est neque quid, idest neque substantia, neque qualitas, neque aliquid aliorum generum, quibus ens dividitur, vel determinatur.”

<sup>95</sup> *In De Trin.*, q. 4 a. 3 co., 192–203: “Et ideo ex natura materie subiecte dimensionibus prohibentur corpora esse in eodem loco plura. Oportet enim esse plura corpora in quibus forma corporeitatis inuenitur diuisa; que quidem non diuiditur nisi secundum diuisionem materie; cuius diuisio cum sit solum per dimensiones, de quarum ratione est situs, impossibile est esse hanc materiam distinctam ab illa nisi quando est distincta secundum situm, quod non est quando duo corpora ponuntur esse in eodem loco; unde sequitur illa duo corpora esse unum corpus. Quod est impossibile.”

<sup>96</sup> *In De Trin.*, q. 4 a. 3 co., 204–207: “Cum ergo materia dimensionibus subiecta inueniatur in quibuslibet corporibus, oportet quolibet duo corpora prohiberi ex ipsa natura corporeitatis ne sint in eodem loco.”

<sup>97</sup> *In Physic.* 5, l. 8, n. 6 (cf. ARISTOTLE, *Physica* E.5, 229a25–27): “Ab eo a quo aliquid recipit nomen et speciem, recipit etiam contrarietatem, cum contrarietas sit differentia secundum formam, ut patet in X *Metaphys.* Sed unusquisque motus magis dicitur, idest denominatur, et speciem recipit a termino in quem, quam a termino ex quo, sicut sanatio dicitur motus in sanitatem, et aegritudo motus in

any one thing is denominated and receives the species from the terminus towards which (*ad quem*, *in quem* = εἰς ὃ), rather than the terminus from which (*a quo*, *ex quo* = ἐξ οὗ). For example, healing is said (to be) a motion towards health; and becoming sick (is a motion) towards sickness. Therefore, the contrariety of motions is to be taken according to the terminus towards which, rather than the terminus from which.

Indeed, every motion or mutation is terminated by a terminus towards which (*ad quem*), from which it has a species.<sup>98</sup> And no motion or mutation is denominated from the subject that is moved, but from the terminus of the motion, from which it has a species.<sup>99</sup> But motion does not receive (its) species from the terminus from which (*a quo*), but from the terminus towards which (*ad quem*).<sup>100</sup> And motion does not receive (its) species from that which is a terminus by accident, but only from that which is a terminus by itself.<sup>101</sup> And it is evident that a motion does not have a complete species until it attains the terminus, for motion towards a mean is not the same in species as (motion) towards the terminus.<sup>102</sup>

Therefore, it is not the same according to species to pass through *this* line and (to pass through) *that* line.<sup>103</sup> Indeed, even though all lines, insofar as they are lines (*in quantum huiusmodi*), should be of the same species, however, insofar as they are constituted in a certain situation or place (► 33.6), they are received as different in species according to the diversity of places, which (diversity) is considered according to a diverse order to a first container. That which passes through a line does not merely pass through a line, but (through) a line that exists in a place, since one line is in a place (and) another (line is) in

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aegritudinem; et hoc etiam supra dictum est. Magis ergo accipienda est contrarietas motuum secundum terminum in quem, quam secundum terminum a quo.”

<sup>98</sup> *In Sent.* 1, d. 5 q. 3 a. 1 expos.: “omnis motus et mutatio terminatur per terminum ad quem, a quo speciem habet.”

<sup>99</sup> *STh III*, q. 35 a. 1 ad 2: “nullus motus seu mutatio denominatur a subiecto quod movetur, sed a termino motus, a quo speciem habet.”

<sup>100</sup> *In Sent.* 4, d. 43 q. 1 a. 4 qc. 2 ad 4: “motus non accipit speciem a termino a quo, sed a termino ad quem.” *STh I*, q. 23 a. 1 ad 3: “motus non accipit speciem a termino a quo, sed a termino ad quem.” *STh I-II*, q. 113 a. 6 ad 1: “omnis motus accipit speciem a termino.” *STh II-II*, q. 61 a. 1 ad 4: “motus accipiunt speciem a termino ad quem.” *STh II-II*, q. 118 a. 6 ad 2: “motus recipit speciem secundum terminum ad quem, non autem secundum terminum a quo.” *De malo*, q. 16 a. 3 ad 14: “motus recipit speciem a termino.” *In De caelo* 2, l. 7, n. 5: “motus enim accipit speciem a termino.”

<sup>101</sup> *STh I-II*, q. 1 a. 3 ad 3: “Non enim motus recipit speciem ab eo quod est terminus per accidens, sed solum ab eo quod est terminus per se.”

<sup>102</sup> *De veritate*, q. 8 a. 14 ad 12: “patet de motu, qui non habet speciem completam quousque ad terminum perducatur: non est enim idem specie motus ad medium et ad terminum.”

<sup>103</sup> *In Ethic.* 10, l. 5, 109–123 (cf. ARISTOTLE, *Ethica Nicomachea* K.3, 1174a34–b2): “non enim est idem secundum speciem pertransire hanc lineam et illam; quamvis enim omnes lineae in quantum huiusmodi sint eiusdem speciei, tamen secundum quod in certo situ seu loco constituuntur accipiuntur ut specie differentes secundum diversitatem locorum, quae attenditur secundum diversum ordinem ad primum continens; ille autem qui pertransit lineam, non solum pertransit lineam, sed lineam in loco existentem, quia in alio loco est una linea ab alia. Et ita manifestum est quod secundum diversitatem terminorum differt specie totus motus localis a singulis partibus, ita tamen quod totus motus habet perfectam speciem, partes autem habent speciem imperfectam.”



another (place). And thus, it is manifest that a whole local motion differs from (its) singular parts according to the diversity of the termini, but in such a way that the whole motion has a perfect species, and the parts have an imperfect species (►48.22, ¶12).

To be from a contrary into a contrary is not a proper *ratio* of contrariety in local motions that are according to a straight line: rather, it is the common *ratio* of contrariety in all motions.<sup>104</sup> The reason for this is, again, that contrariety is a difference according to form (►43.22); and motion has (its) form or species from its terminus. Hence, in no motion can there be contrariety without the contrariety of the termini.

Therefore, since circular motion is the first motion, it has the minimal of diversity and the maximum of uniformity.<sup>105</sup> This is proportionately apparent **(a)** in the mobile and **(b)** in the motion. **(a)** In the mobile, indeed, because it does not mutate its *where (ubi)* according to the whole subject but only according to *ratio*, while whichever part (of the mobile) mutates its *where (ubi)* also in subject. Likewise, **(b)** a part of a circular motion, too, is from one into another that differs in subject, while the whole circular motion is indeed from the same into the same according to subject but is from one into another that differs in *ratio* alone. Thus, if a circulation should be taken (such) that from *A* it returns into *A*, the same *A*, which is the terminus *from which (a quo)* and *into which (in quem)*, is the same in subject but differs in *ratio* insofar as it is taken as a principle and (as) an end. Hence, since circular motion has the maximum of unity, its nature is far removed (*longinqua*) from contrariety, which is the maximum distance.

Thus, natural motions are diversified in species according to a relation to some terminus.<sup>106</sup> For example, the motion that is from whiteness is not the same in species as that which is towards whiteness. On the other hand, the species of a quality or of the form of something is not diversified on account of being the terminus from which or towards

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<sup>104</sup> *In De caelo* 1, l. 8, n. 13: “esse a contrario in contrarium non est ratio contrarietatis propria in motibus localibus qui sunt secundum lineam rectam; sed est communis ratio contrarietatis in omnibus motibus, ut patet in V *Physic*. Et huius ratio est, quia contrarietas est differentia secundum formam, ut ostenditur in X *Metaphys*.; motus autem habet formam seu speciem ex suo termino; et ideo in nullo motu potest esse contrarietas absque contrarietate terminorum.” This is a response to an objection posited by John PHILOPONUS.

<sup>105</sup> *In De caelo* 1, l. 8, n. 13: “motus circularis, quia est primus motuum, minimum habet de diversitate et plurimum de uniformitate. Et hoc quidem apparet proportionaliter in mobili et in motu. In mobili quidem, quia non mutat suum ubi secundum totum subiecto, sed solum ratione: pars vero quaelibet mutat suum ubi etiam subiecto, ut ostensum est in VI *Physic*. Et similiter etiam pars motus circularis est de uno in aliud subiecto differens: totus autem motus circularis est quidem de eodem in idem secundum subiectum, sed est de uno in aliud differens sola ratione. Si enim accipiatur circulatio una quae ab *A* redit in *A*, ipsum *A*, quod est terminus a quo et in quem, est idem subiecto, sed differt ratione, inquantum accipitur ut principium et finis. Et ideo, quia motus circularis plurimum habet de unitate, est natura eius longinqua a contrarietate, quae est maxima distantia.” This is a response to an objection posited by John PHILOPONUS.

<sup>106</sup> *STh* II-II, q. 19 a. 5 ad 2: “motus naturales secundum habitudinem ad aliquem terminum specie diversificantur, non enim est idem motus specie qui est ab albedine et qui est ad albedinem.”

which of a motion; rather, conversely, they are considered (*attenduntur*) according to the termini of the motions (e.g., if a moved point should produce a line, the species of the line would be determined by the terminus of such a motion, which is the last site of the moved point, and not the length of the line itself: for site is as a formal difference of continuous quantity having position; ►45.5, ¶1).<sup>107</sup>

#### 48.22. Diversification According to the *Ratio* of End

Those (things) that are ordered to an end can be diversified in two modes according to the *ratio* of end:<sup>108</sup>

1. Because they are ordered to diverse ends.<sup>109</sup> And this is a diversity of species—maximally if it should be a proximate end.
2. According to the proximity to the end or the distance from it.<sup>110</sup> For example, it is evident that motions differ in species insofar as they are ordered to diverse termini; but insofar as one part of motion is more proximate to the terminus than another, a difference in motion is considered according to the perfect and the imperfect.

#### 48.23. The Genera in Which There Is Motion

As ARISTOTLE says,<sup>111</sup> since: (1) motion should be from a subject into a subject (►48.2, ¶3; 48.5); (2) subjects should be in some genus of the categories, for motion draws the denomination and the species from the terminus (►48.21; 48.22, ¶1); (3) categories are divided into substance, quality, and such (►33.1); and (4) in the other genera there cannot

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<sup>107</sup> *STh* II-II, q. 12 a. 1 ad 3: “species alicuius qualitatis vel formae non diversificatur per hoc quod est terminus motus a quo vel ad quem, sed potius e converso secundum terminos motuum species attenduntur.”

<sup>108</sup> *STh* I-II, q. 107 a. 1 co.: “Ea autem quae ordinantur ad finem, secundum rationem finis dupliciter diversificari possunt.”

<sup>109</sup> *STh* I-II, q. 107 a. 1 co.: “Uno modo, quia ordinantur ad diversos fines, et haec est diversitas speciei, maxime si sit finis proximus.”

<sup>110</sup> *STh* I-II, q. 107 a. 1 co.: “Alio modo, secundum propinquitatem ad finem vel distantiam ab ipso. Sicut patet quod motus differunt specie secundum quod ordinantur ad diversos terminos, secundum vero quod una pars motus est propinquior termino quam alia, attenditur differentia in motu secundum perfectum et imperfectum.”

<sup>111</sup> *In Metaph.* 11, l. 12, §2376 (cf. ARISTOTLE, *Metaphysica* K.12, 1068a8–10): “Dicit ergo [Philosophus] primo, quod cum praedicamenta dividantur per substantiam, qualitatem, et huiusmodi; et in aliis generibus non possit esse motus; erunt igitur tria genera entis in quibus potest esse motus: quae sunt qualitas, quantitas et ubi: loco cuius ponit locum, quia nihil aliud significat esse ubi, nisi esse in loco; et moveri secundum locum, nihil est aliud quam moveri secundum ubi. Non enim motus secundum locum attribuitur subiecto loco, in quo est locus, sed ei quod est in loco.” *In Physic.* 5, l. 3, n. 2 (cf. ARISTOTLE, *Physica* E.1, 225b5–9): “Concludit ergo ex praemissis, quod cum motus sit de subiecto in subiectum, subiecta autem sint in aliquo genere praedicamentorum; necesse est quod species motus distinguantur secundum genera praedicamentorum, cum motus denominationem et speciem a termino trahat, ut supra dictum est. Si ergo praedicamenta sunt divisa in decem rerum genera, scilicet substantiam et qualitatem etc. ut dictum est in libro Praedicamentorum et in V Metaphys. et in tribus illorum inveniatur motus; necesse est esse tres species motus, scilicet motus qui est in genere quantitatis, et motus qui est in genere qualitatis, et motus qui est in genere ubi, qui dicitur secundum locum.”

be motion (which proof we have omitted); therefore, there will be three genera of *being* in which there can be motion: **quality**, **quantity**, and **where**. Instead of *where*, he posits *place* (< τόπου) because to be **where** only signifies to be *in a place*, and *to be moved according to place* is only *to be moved according to where*: for motion according to place is not attributed to the subjected place, in which the place is, but to that which is in a place.

Thus, any motion is the same in genus with its terminus: not indeed in such a way that a motion that is towards a quality should be a species of quality, but by reduction.<sup>112</sup> Indeed, just like potency is reduced to the genus of act on account of every genus being divided by potency and act, so, (too), motion, which is an imperfect act (► 48.15), must be reduced to the genus of a perfect act. However, insofar as motion is considered as it is *in this from that* (*in hoc ab alio*), it pertains to the category of *affection*; (and insofar as it is considered as it is) *from this into another* (*ab hoc in aliud*), (motion is in the genus) of *action* (► 33.5).

It is to be considered that ARISTOTLE seems to omit three genera: namely, *when* (► 33.6, ¶1), *situation* (► 33.6, ¶3), and *habitus* (► 33.7).<sup>113</sup> However, since (to be) **when** signifies to be *in a time*, and **time** is *the number of motion*, it belongs to the same *ratio* not to be moved in the genus of *when* and not to be moved in the genus of *action* (► 33.5, ¶2) and of *affection* (► 33.5, ¶1), which signify—in some mode—motion itself (► 48.17, ¶1). *Position* (i.e., *situation*; ► 33.6, ¶3), on the other hand, adds over *where* only a determinate order of parts, which is nothing other than a determinate relation of the parts to each other. *Habitus*, in turn, conveys (*importat*) a relation of clothing to clothed (► 33.7; 42.15, ¶1c). Thus, it seems to belong to the same *ratio* that there should not be motion in *situation* and in *habitus* because there should not be (motion) in *relation*.

#### 48.24. Order Among the Species of Motion

All the species of motion equally agree in the common *ratio* of motion, for *motion* is univocally predicated (*univocatur*) at least in the intention of the genus.<sup>114</sup> Whence, one

<sup>112</sup> *In Physic.* 5, l. 3, n. 2: “quilibet motus est in eodem genere cum suo termino, non quidem ita quod motus qui est ad qualitatem sit species qualitatis, sed per reductionem. Sicut enim potentia reducitur ad genus actus, propter hoc quod omne genus dividitur per potentiam et actum: ita oportet quod motus, qui est actus imperfectus, reducatur ad genus actus perfecti. Secundum autem quod motus consideratur ut est in hoc ab alio, vel ab hoc in aliud, sic pertinet ad praedicamentum actionis et passionis.”

<sup>113</sup> *In Metaph.* 11, l. 12, §2377: “Attendendum est autem quod praetermittere videtur [Philosophus] tria genera, scilicet quando, situm et habere. Cum enim quando significet esse «in tempore,» tempus autem sit numerus motus, eiusdem rationis est non esse motum in genere quando, et non esse motum in genere actionis et passionis, quae significant aliquid ipsum motum. Positio vero non addit supra ubi, nisi ordinem partium determinatum, qui nihil aliud est quam determinata relatio partium adinvicem. Habitus etiam importat habitudinem indumenti ad indutum. Et sic eiusdem rationis videtur esse quod non sit motus in situ et habere, et quod non sit in ad aliquid.” ARISTOTLE subsequently provides the proof.

<sup>114</sup> *In Sent.* 1, d. 15 q. 4 a. 2 ad 2: “omnes species motus aequaliter conveniunt in ratione communi motus; tamen secundum esse suum proprium, motus localis est prior aliis motibus.” ScG 3, 102 n. 7: “Inter species motus ordo quidam naturalis attenditur: nam primus motuum est motus localis, unde et causa aliorum existit; primum enim in quolibet genere causa invenitur eorum quae in illo genere

measure can respond to all the motions (that are) ordered to each other. However, among the species of motion, some natural order is considered, for the first of (all) motions is local motion. Whence, too, a cause of the others exists, for the first in any genus is found (to be) the cause (and the measure) of those that follow in that genus (► 27.4). Whence, local motion is the cause of alteration (and, consequently, of increase and decrease in the genus of quantity).

Matter is immediately the subject of generation and corruption; and of the other motions, according to prior and posterior: the more that-according-to-which-there-is-mutation presupposes a greater perfection of motion, the more (priorly is matter its subject).<sup>115</sup> Hence, there is a unity of first matter only in those that agree in generation and corruption. And consequently, too, (there is a unity of first matter in) those that agree in the three (remaining) modes (of motion)—to wit, increase, decrease, and alteration—insofar as increase and decrease is not (found) without generation and corruption, which is also the terminus of alteration. On the other hand, mutation of place is maximally perfect, since it varies nothing of that which is inner of the thing.

#### 48.25. Order of Motions to Each Other

Motions themselves have some order to each other in two modes:<sup>116</sup>

##### 1. According to (their) proper *ratio*.<sup>117</sup>

According to this, local motion has a twofold comparison to other motions:<sup>118</sup>

##### (a) Because it is the first motion.<sup>119</sup>

##### (b) Because a minimal variation comes to be through local motion in respect to the mobile.

Thus, something that is intrinsic to the thing—for example, a quality, a quantity, or even a

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consequuntur.” *In De caelo* 2, l. 10, n. 10: “sicut probatur in VIII Physic. motus localis est primus motuum. In quolibet autem genere id quod est primum est causa eorum quae sunt post in eodem genere: unde motus localis est causa alterationis.” *In Sent.* 2, d. 2 q. 1 a. 1 ad 3: “motus univocatur ad minus in intentione generis; et ideo omnibus motibus ordinatis ad invicem, potest una mensura respondere.”

<sup>115</sup> *In Sent.* 2, d. 12 q. 1 a. 1 ad 5: “sicut in 1 de Gen. dicitur, materia est immediate subjectum generationis et corruptionis; aliorum autem motuum per prius et posterius, tanto plus quanto illud secundum quod est mutatio, majorem perfectionem motus praesupponit: et ideo in illis tantum est unitas materiae primae quae in generatione et corruptione conveniunt, et per consequens etiam illa quae conveniunt in tribus motibus, scilicet augmento et diminutione et alteratione, secundum quod augmentum et diminutio non est sine generatione et corruptione, quae etiam alterationis terminus est. Sed loci mutatio, ut in 8 Phys. probatur, est maxime perfecta, quia nihil variat de eo quod est intraneum rei.”

<sup>116</sup> *De malo*, q. 16 a. 10 co.: “habent enim et ipsi motus quemdam ordinem ad invicem. Et hoc dupliciter.”

<sup>117</sup> *De malo*, q. 16 a. 10 co.: “Uno modo secundum propriam rationem.”

<sup>118</sup> *De malo*, q. 16 a. 10 co.: “Et secundum hoc motus localis ad alios motus duplicem habet comparisonem.”

<sup>119</sup> *De malo*, q. 16 a. 10 co.: “uno modo, quia est primus motuum.”

substantial form—should be varied by the other motions, while by local motion a body is varied only according to something extrinsic: namely, according to place.<sup>120</sup>

## 2. According to the order of mobiles.<sup>121</sup>

For example, the motion of the heaven (according to ancient science) is prior to the motion of elementary bodies.<sup>122</sup>

### 48.26. Order between Magnitude, Motion, and Time

As ARISTOTLE says, everything that is moved, is moved from something into something (*omne quod movetur, movetur ex quodam in quiddam* = τὸ κινούμενον κινεῖται ἔκ τινος εἰς τι).<sup>123</sup>

This happens in such a way that (the mobile) should priorly be in the terminus from which (*in termino a quo*) it is moved, and posteriorly in the terminus towards which (*in termino ad quem*) it is moved.<sup>124</sup> Otherwise, if it should simultaneously be in one terminus and in the other, it would not be moved from one into the other.

Now, among motions, the first is local motion, which is from a place into a place following some magnitude.<sup>125</sup> And time follows upon the first motion; hence, to investigate (the truth) about time, it is necessary to take motion according to place.

A body is in a place insofar as it is contained under the place and is commensurate to the place (► 35.4; 48.17, ¶2).<sup>126</sup> Whence, the motion of a body according to place must be commensurate to the place and be according to its requirement.

Therefore, since motion according to place is from something into something according to magnitude, and every magnitude is continuous, it is necessary for motion to follow upon

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<sup>120</sup> *De malo*, q. 16 a. 10 co.: “alio modo, quia per motum localem minima variatio fit circa mobile; nam cum per alios motus varietur aliquid quod est intrinsecum rei, puta qualitas, aut quantitas, aut etiam forma substantialis per motum localem variatur corpus solum secundum aliquid extrinsecum, scilicet secundum locum.”

<sup>121</sup> *De malo*, q. 16 a. 10 co.: “Alio modo consideratur ordo motuum secundum ordinem mobilium.”

<sup>122</sup> *De malo*, q. 16 a. 10 co.: “sicut motus caeli est prior motu corporis elementaris.”

<sup>123</sup> *In Physic.* 4, l. 17, n. 6 (cf. ARISTOTLE, *Physica* Δ.11, 219a10–11): “Dicit ergo [Philosophus] primo quod omne quod movetur, movetur ex quodam in quiddam.”

<sup>124</sup> *In De sensu* 1, c. 15, 53–58 (cf. ARISTOTLE, *De sensu* 6, 446a29): “Omne autem quod mouetur, mouetur ab aliquo in aliquid, ita scilicet quod prius sit in termino a quo mouetur et posterius in termino ad quem mouetur (alioquin, si simul esset in utroque termino, non moueretur de uno in aliud).”

<sup>125</sup> *In Physic.* 4, l. 17, n. 6 (cf. ARISTOTLE, *Physica* Δ.11, 219a11–12): “Sed inter alios motus, primus est motus localis, qui est a loco in locum secundum aliquam magnitudinem. Primum autem motum consequitur tempus; et ideo ad investigandum de tempore oportet accipere motum secundum locum.”

<sup>126</sup> *STh I*, q. 53 a. 1 co.: “Corpus enim est in loco, in quantum continetur sub loco, et commensuratur loco. Unde oportet quod etiam motus corporis secundum locum, commensuretur loco, et sit secundum exigentiam eius.”

magnitude in continuity, such that motion should be continuous because magnitude is continuous.<sup>127</sup> And consequently, also time is continuous: because the first motion is a quantum, time seems to come to be as much.

ARISTOTLE shows how this same order is considered in the prior and the posterior.<sup>128</sup> He says that the prior and the posterior are priorly in place or in magnitude (*prius et posterius sunt prius in loco <sive in magnitudine>* = τὸ πρότερον καὶ ὕστερον ἐν τόπῳ πρῶτόν ἐστιν). This is so because magnitude is a quantity that has position (< ἐνταῦθα μὲν δὴ τῆ θέσει), and *prior* and *posterior* belong to the *ratio* of position (►39.19). Whence, from position itself, place has a prior and a posterior.

Since there is a prior and a posterior in magnitude, it is necessary for there to be a prior and a posterior in motion proportionately (*proportionaliter* = ἀνάλογον) for those (things) that are there (*his <quae sunt> ibi* = τοῖς ἐκεῖ): to wit, (for those that are) in magnitude and in motion (correspondingly).<sup>129</sup> Consequently, there is also a prior and a posterior in time, for motion and time are so related that one of them always follows the other (i.e., time always follows upon motion).

Since, in any motion, a prior and a posterior is to be taken, before any designation (*signum*) in a designated motion (*in motu signato*)—to wit, as long as something is in (the act of) being moved and coming to be—, a prior is to be taken; and also something after it (is to be taken), since that which is in the principle of motion or in the terminus is not in (the act of) being moved.<sup>130</sup>

The prior and the posterior in motion cause the succession of time.<sup>131</sup> Whence, succession is found only in those (things) that are subjected to motion in some mode.

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<sup>127</sup> *In Physic.* 4, l. 17, n. 6 (cf. ARISTOTLE, *Physica* Δ.11, 219a12–14): “Quia ergo motus secundum locum, est secundum magnitudinem ex quodam in quiddam et omnis magnitudo est continua; oportet quod motus consequatur magnitudinem in continuitate, ut, quia magnitudo continua est, et motus continuus sit. Et per consequens etiam tempus continuum est: quia quantus est motus primus, tantum videtur fieri tempus.” *STh* I, q. 53 a. 1 co.: “Et inde est quod secundum continuitatem magnitudinis est continuus motus; et secundum prius et posterius in magnitudine, est prius et posterius in motu locali corporis, ut dicitur in IV *Physic.*”

<sup>128</sup> *In Physic.* 4, l. 17, n. 7 (cf. ARISTOTLE, *Physica* Δ.11, 219a14–16): “ostendit [Philosophus] etiam, quod idem ordo consideratur in priori et posteriori: et dicit quod prius et posterius sunt prius in loco sive in magnitudine. Et hoc ideo, quia magnitudo est quantitas positionem habens: de ratione autem positionis est prius et posterius: unde ex ipsa positione, locus habet prius et posterius.”

<sup>129</sup> *In Physic.* 4, l. 17, n. 7 (cf. ARISTOTLE, *Physica* Δ.11, 219a16–19): “Et quia in magnitudine est prius et posterius, necesse est quod in motu sit prius et posterius proportionaliter his *quae sunt ibi*, scilicet in magnitudine et in loco. Et per consequens etiam in tempore est prius et posterius; quia motus et tempus ita se habent, quod semper alterum eorum sequitur ad alterum.”

<sup>130</sup> *STh* I, q. 46 a. 3 ad 2: “Quia cum in quolibet motu sit accipere prius et posterius, ante quodcumque signum in motu signato, dum scilicet aliquid est in moveri et fieri, est accipere prius, et etiam aliquid post ipsum, quia quod est in principio motus, vel in termino, non est in moveri.”

<sup>131</sup> *Comp. th.* 1, c. 7, 3–5: “Successio enim non inuenitur nisi in illis que sunt aliquantulum motui subiecta; prius enim et posterius in motu causant temporis successionem.”

Thus, in motion properly taken, two (properties) are to be found: namely, **(1) continuity** and **(2) succession**. Insofar as **(1)** it has continuity, it is properly measured by place, since the continuity of motion is (had) from the continuity of magnitude.<sup>132</sup> On the other hand, insofar as **(2)** it has succession, it is properly measured by time; whence, **time** is said (to be) *the number of motion according to the prior and the posterior (numerus motus secundum prius et posterius)*.

#### **48.27. The Analogy *punctus : linea :: mobile : motus :: nunc : tempus***

As just said, motion—in respect of continuity and the prior and the posterior—follows upon magnitude; and time (follows upon) motion.<sup>133</sup> Moreover, some diversity of parts is found in time according to a prior and a succeeding posterior, just like diverse parts are found in a line ordered to each other according to site.<sup>134</sup>

Let us therefore imagine (*imaginemur*), following (the use of) the geometers (*secundum geometras*), that a moved point should produce a line (*quod punctus motus faciat lineam*; ► 46.22, ¶2).<sup>135</sup>

Thus, something would have to be similarly in time as the same thing is in motion.<sup>136</sup> And if a point should produce a line by its motion (*suo motu*), the point itself that is set in motion (*fertur*) is that by which we know motion—and the prior and the posterior in it (< ὁμοίως δὴ τῆ στιγμῆ τὸ φερόμενον, ὡ τὴν κίνησιν γνωρίζομεν καὶ τὸ πρότερον ἐν αὐτῇ καὶ τὸ ὕστερον).

Indeed, motion is perceived only because the mobile is diversely related (*aliter et aliter se habet*): according to that which pertains to the preceding disposition of the mobile, we judge the prior in motion; and according to that which pertains to a subsequent disposition of the mobile, we judge the posterior in motion.<sup>137</sup>

<sup>132</sup> *In Sent.* 1, d. 8 q. 3 a. 3 co.: “in motu proprie accepto est duo reperire, scilicet continuitatem et successionem: et secundum quod habet continuitatem, sic proprie mensuratur per locum, quia ex continuitate magnitudinis est continuitas motus; secundum autem quod habet successionem, sic proprie mensuratur per tempus; unde tempus dicitur numerus motus secundum prius et posterius.”

<sup>133</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b15–16): “Dicit ergo [Philosophus] primo quod sicut supra dictum est, motus quantum ad continuitatem et prius et posterius, sequitur magnitudinem, et tempus motum.”

<sup>134</sup> *De rat. Fidei*, 10: “In tempore enim invenitur diversitas quaedam partium secundum prius et posterius sibi succedentium, sicut in linea inveniuntur diversae partes secundum situm ad invicem ordinatae.”

<sup>135</sup> *In Physic.* 4, l. 18, n. 4: “Imaginemur igitur secundum geometras, quod punctus motus faciat lineam.”

<sup>136</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b16–18): “similiter oportebit esse aliquid idem in tempore, sicut est aliquid idem in motu. Si autem punctum suo motu faciat lineam, ipsum punctum quod fertur, est quo cognoscimus motum, et prius et posterius in ipso.”

<sup>137</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b16–18): “Non enim motus percipitur nisi ex hoc, quod mobile aliter et aliter se habet: et secundum id quod pertinet ad praecedentem dispositionem mobilis, iudicamus prius in motu: secundum autem id quod pertinet ad sequentem dispositionem mobilis, iudicamus posterius in motu.”

Therefore, this (thing) that is moved, by which we know motion—and discern the prior and the posterior in it—, whether it should be a point, a stone, or anything else, from that part from which it is some being, whatever it should be, is the same (*idem* = τὸ αὐτό)—to wit, in number—but it is other in *ratio* (*ratione est alterum* < τῷ λόγῳ δὲ ἄλλο).<sup>138</sup> Thus, evidently, that which is moved is diverse (*alterum* < ἕτερον) according to *ratio* insofar as it is in diverse places (*in eo quod est alibi et alibi* < τῷ ἄλλοθι καὶ ἄλλοθι εἶναι), even if it should be the same in subject (*idem subiecto*).<sup>139</sup>

On the other hand, just as time follows upon motion, so the now itself follows upon that which is set in motion.<sup>140</sup> ARISTOTLE proves this, for through the mobile we know the prior and the posterior in motion. Thus, when we find the mobile in some part of the magnitude through which it is moved, we judge that the motion that was through one part of the magnitude passed away (*praeteriit*) priorly; and it followed afterwards through another part of the magnitude. Likewise, in the numeration of motion, which comes to be through time, that which distinguishes the prior and the posterior of time is the now itself, which is the terminus of the past and the principle of the future.<sup>141</sup> Hence, the now is related to time as the mobile (is related) to motion. Therefore, according to commuted proportion (i.e., to an alternate ratio, so that if  $a : b :: c : d$ , then by alternation  $a : c :: b : d$ ; ► 6.11, ¶1), just as time (is) to motion, so, too, the now (is) to the mobile (i.e., if  $now : time :: mobile : motion$ , then, by alternation,  $time : motion :: now : mobile$ ).

Whence, if the mobile in the whole motion is the same in subject but differs in *ratio*, it must be thus also in the now: that it be the same in subject and other in *ratio*.<sup>142</sup> For that which

<sup>138</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b18–20): “Hoc ergo quod movetur, quo motum cognoscimus, et discernimus prius et posterius in ipso, sive sit punctum, sive sit lapis, sive quodcumque aliud, ex ea parte qua est quoddam ens, quodcumque sit, est idem, scilicet subiecto, sed ratione est alterum.” As ARISTOTLE says, and St. Thomas explains, it is in this mode (i.e., according to diversity in *ratio*) that sophists use “other” when they say that Coriscus in the theater is other than in the forum, arguing according to the sophism of accident thus: being in the forum is other than being in the theater; and Coriscus is now in the forum, now in the theater; therefore, he is other than himself. Ibid. (cf. ARISTOTLE, *Physica* Δ.11, 219b20–22): “Et hoc modo sophistae utuntur altero, cum dicunt Coriscum alterum esse in theatro et in foro, sic arguentes secundum sophisma accidentis: esse in foro est aliud ab eo quod est esse in theatro; sed Coriscus est nunc in foro, nunc in theatro; ergo est alius a se.”

<sup>139</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b21–22): “Sic igitur patet quod id quod movetur est alterum secundum rationem, in eo quod est alibi et alibi, licet sit idem subiecto.”

<sup>140</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b22–25): “Sed sicut tempus sequitur ad motum, ita ipsum nunc sequitur ad id quod fertur. Et hoc probat, quia per mobile cognoscimus prius et posterius in motu. Cum enim invenimus mobile in aliqua parte magnitudinis per quam movetur, iudicamus quod motus qui fuit per unam partem magnitudinis, prius praeteriit, et per aliam partem magnitudinis post sequetur.”

<sup>141</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b25–28): “Et similiter in numeratione motus, quae fit per tempus, id quod distinguit prius et posterius temporis, est ipsum nunc, quod est terminus praeteriti et principium futuri. Sic igitur se habet nunc ad tempus, sicut mobile ad motum: ergo secundum commutatam proportionem, sicut tempus ad motum, ita et nunc ad mobile.”

<sup>142</sup> *In Physic.* 4, l. 18, n. 4 (cf. ARISTOTLE, *Physica* Δ.11, 219b25–28): “Unde si mobile in toto motu est idem subiecto, sed differt ratione, oportebit ita esse et in nunc, quod sit idem subiecto et aliud et aliud



is discerned in motion (to be) prior or posterior—to wit, the mobile—is the same in subject, but diverse in *ratio*; and the now itself is that according to which the prior and the posterior is numerated in time.

What has been said about time and the now, in some mode follows upon that which is found in the line and in the point, for the point continues the line and distinguishes it insofar as it is the principle of one part and the end of another.<sup>143</sup> However, this is differently had in the line and in the point (on one hand), and in time and in the now (in the other).<sup>144</sup> For a point is something at rest; and, likewise, the line. Whence, man can take the same point twice, and use it as two: to wit, as a principle and as an end (► 34.26). And when we thus use the point as two, a rest occurs, as is evident in reflective motion, in which that which was the end of the first motion is the principle of the second—reflected—motion. Wherefrom, ARISTOTLE proves that reflective motion is not continuous, and a rest occurs in between.

On the other hand, the now itself is not at rest on account of that which responds to the mobile, which is always borne (*fertur*) during motion.<sup>145</sup> Wherefrom, the now must always be diverse according to *ratio* (*alterum et alterum secundum rationem*), as has been said. And hence, since **time** is *the number of motion*, it does not numerate motion in such a way that some same thing in time should be taken as the principle of one and the end of another; rather, it numerates motion taking two extremities of time—to wit, two nows—, which nonetheless are not parts of it (as explained shortly).

The reason why this—rather than (some) other—mode of numbering—whereby the parts of a line are numbered by a point insofar as it is a principle and an end—should benefit time, is what has been said: that according to this mode, someone uses a point as two; and thus, a mean rest occurs which cannot be in time or in motion. However, it should not be

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ratione: quia illud quo discernitur in motu prius et posterius, est idem subiecto, sed alterum ratione, scilicet mobile; et id secundum quod numeratur prius et posterius in tempore est ipsum nunc.”

<sup>143</sup> *In Physic.* 4, l. 18, n. 10 (cf. ARISTOTLE, *Physica* Δ.11, 220a9–11): “dicit [Philosophus] quod hoc quod dictum est de tempore et nunc, consequitur quodammodo ad id quod invenitur in linea et puncto: quia punctum continuat lineam, et distinguit ipsam in quantum est principium unius partis et finis alterius.”

<sup>144</sup> *In Physic.* 4, l. 18, n. 10 (cf. ARISTOTLE, *Physica* Δ.11, 220a12–13): “Sed tamen differenter se habet in linea et puncto, et tempore et nunc. Quia punctum est quoddam stans, et linea similiter: unde potest homo accipere idem punctum bis, et uti eo *ut duobus*, ut scilicet principio et ut fine. Et cum sic utimur puncto ut duobus, accidit quies; sicut patet in motu reflexo, in quo id quod erat finis primi motus est principium secundi motus reflexi. Et propter hoc probatur infra in octavo, quod motus reflexus non est continuus, sed intercidit quies media.”

<sup>145</sup> *In Physic.* 4, l. 18, n. 10 (cf. ARISTOTLE, *Physica* Δ.11, 220a14–17): “Sed ipsum nunc non est stans, propter id quod respondet mobili, quod semper fertur durante motu; et propter hoc oportet nunc esse semper alterum et alterum secundum rationem, ut supra dictum est. Et ideo, cum tempus sit numerus motus, non hoc modo numerat motum, quod aliquid idem temporis accipiatur ut principium unius et finis alterius; sed magis numerat motum accipiendo duo ultima temporis, scilicet duo nunc, quae tamen non sunt partes eius.”

understood by what is said (here), that the same now should not be the principle of the future and the end of the past: rather, that we do not perceive time by numbering motion by one now, but by two, as has been said; (otherwise), it would follow that in the numbering of motion the same now would be taken twice.<sup>146</sup>

ARISTOTLE assigns the reason of what he says: that the now is not a part of time.<sup>147</sup> He says that it is manifest that the now is not a part of time, just like that whereby time is distinguished—to wit, some designated disposition in the mobile—is not a part of time, and as points are not parts of a line, for two lines are parts of one line. And he manifests the properties of time itself from motion and the line: for, as was said above, motion is continuous on account of magnitude, and time (is continuous) on account of motion.

Finally, ARISTOTLE concludes that the now itself, insofar as it is some terminus, is not a time, but happens to time, as a terminus (happens) to a terminated (thing).<sup>148</sup> Yet, insofar as time or the now numbers other (things), in this way, the now is also a number of (things) other than time. The reason for this is that a terminus is only of that whose terminus it is, while a number can be of diverse (things), as the number ten, of horses, is a number of other things too. Therefore, the now is thus a terminus only of time, while it is a number of all mobiles that are moved in time.

#### **48.28. The Analogy *punctus : linea :: factum esse : fieri :: factum : fiens***

As ARISTOTLE says, we must theorize what it is that conjoins or continues a having-come-to-be (*factum esse* = τὸ γεγονέναι) to a coming-to-be (*fieri* = τὸ γίνεσθαι), such that one would continuously follow upon the other.<sup>149</sup>

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<sup>146</sup> *In Physic.* 4, l. 18, n. 10 (cf. ARISTOTLE, *Physica* Δ.11, 220a17–18): “Et quare competat iste modus numerandi in tempore magis quam alius, quo per punctum numerantur partes lineae, in quantum est principium et finis, ratio est quae dicta est, quia secundum hunc modum utitur aliquis puncto ut duobus; et sic accidit quies media, quae non potest esse in tempore et in motu. Non tamen intelligendum est per id quod dicitur, quod idem nunc non sit principium futuri et finis praeteriti, sed quod non percipimus tempus numerando motum per unum nunc, sed magis per duo, ut dictum est: quia sequeretur quod in numeratione motus idem nunc sumeretur bis.”

<sup>147</sup> *In Physic.* 4, l. 18, n. 11 (cf. ARISTOTLE, *Physica* Δ.11, 220a18–21): “assignat [Philosophus] rationem eius quod dicitur, quod nunc non est pars temporis. Et dicit manifestum esse quod nunc non est pars temporis, sicut neque id per quod distinguitur motus, est pars motus, scilicet aliqua dispositio signata in mobili; sicut etiam nec puncta sunt partes lineae. Duae enim lineae sunt partes unius lineae. Manifestat autem proprietates ipsius temporis ex motu et linea: quia, sicut dictum est supra, motus est continuus propter magnitudinem, et tempus propter motum.”

<sup>148</sup> *In Physic.* 4, l. 18, n. 11 (cf. ARISTOTLE, *Physica* Δ.11, 220a21–24): “Concludit ergo [Philosophus] finaliter, quod ipsum nunc secundum quod est terminus quidam, non est tempus, sed accidit tempori, ut terminus terminato: sed secundum quod tempus vel nunc numerat alia, sic etiam nunc est numerus aliorum quam temporis. Et huius ratio est, quia terminus non est nisi eius cuius est terminus; sed numerus potest esse diversorum, sicut numerus decem equorum numerus est et aliarum rerum. Sic igitur nunc est terminus solius temporis, sed est numerus omnium mobilium quae moventur in tempore.”

<sup>149</sup> *In Post. an.* 2, l. 11, 12–15 (cf. ARISTOTLE, *Analytica Posteriora* B.12, 95b1–3): “Dicit ergo [Philosophus] primo quod ad ostendendum propositum oportet speculari *quid* est coniungens uel continuans *factum esse* ei quod est *fieri*, *ut post* unum continuo sequatur aliud.”

He says that it is manifest that that-which-is-coming-to-be (*fieri* < *fiens* = γινόμενον) is not related consequently to that-which-has-come-to-be (*quod est factum esse* < *factum* = γεγονός).<sup>150</sup> Those are said to be related consequently of which there is no mean of the same genus (► 39.4), as two soldiers in a file, or two clerics in a choir. And *contiguous* adds *contact* over *consequent* (► 39.3). Therefore, he says that a coming-to-be (*fieri*) cannot be related consequently and (be) contiguous with a having-come-to-be (*factum esse*).

He proves it: for nor is a that-which-has-come-to-be (*factum esse* < *factum* = γινόμενον) contiguous or consequently related with another that-which-has-come-to-be, since two those-which-have-come-to-be are related as some extremities and indivisibles (*ultima et indivisibilia* = πέρατα... καὶ ἄτομα) in time, just like two points in a line.<sup>151</sup>

Indeed, it is of the same *ratio* for an indivisible to be moved, for time to be composed from nows, for motion (to be composed) from moments, and for a line (to be composed) from points.<sup>152</sup>

Whence, just like two points are not related consequently to each other (< οὐδὲ σπιγμαί εἰσιν ἀλλήλων ἐχόμεναι), so, too, nor (are) two those-which-have-come-to-be (< οὐδὲ γενόμενα); for both, points and those-which-have-come-to-be are as indivisibles (< ἄμφω γὰρ ἀδιαίρετα), and such (indivisible things) are not related consequently in continua, as has been shown (► 39.9).<sup>153</sup>

Moreover, since two those-which-have-come-to-be are not related consequently, it is therefore manifest that that-which-is-coming-to-be and that-which-has-come-to-be are not related consequently (< οὐδὲ δὴ γινόμενον γεγεννημένου διὰ τὸ αὐτό).<sup>154</sup> For that-which-

<sup>150</sup> *In Post. an. 2*, l. 11, 12–25 (cf. ARISTOTLE, *Analytica Posteriora* B.12, 95b3–4): “Et circa hoc dicit primo manifestum esse quod fieri cum eo quod est factum esse non est habitum, idest consequenter se habens; dicuntur autem consequenter se habencia, quorum nichil est medium eiusdem generis, sicut duo milites in acie uel duo clerici in choro; habitum autem supra id quod est consequenter addit contactum, sicut dicitur in V Phisicorum; sic ergo dicit quod fieri non potest esse consequenter se habens et contiguum cum hoc quod est factum esse.”

<sup>151</sup> *In Post. an. 2*, l. 11, 25–29 (cf. ARISTOTLE, *Analytica Posteriora* B.12, 95b3–6): “Et hoc probat, quia neque etiam factum esse est contiguum uel consequenter se habens cum alio factum esse, eo quod duo facta esse hoc modo se habent ut quedam ultima et indiuisibilia in tempore sicut duo puncta in linea.”

<sup>152</sup> *In Sent. 1*, d. 37 q. 4 a. 3 co.: “ejusdem rationis est indivisibile moveri, et tempus componi ex nunc, et motum ex momentis, et lineam ex punctis.”

<sup>153</sup> *In Post. an. 2*, l. 11, 30–34 (cf. ARISTOTLE, *Analytica Posteriora* B.12, 95b5–6): “Vnde sicut duo puncta non sunt consequenter se habencia ad inuicem, ita etiam neque duo facta esse, quia tam puncta quam facta esse sunt sicut indiuisibilia, et talia non se habent consequenter in continuis, ut probatur in VI Phisicorum.”

<sup>154</sup> *In Post. an. 2*, l. 11, 34–43 (cf. ARISTOTLE, *Analytica Posteriora* B.12, 95b6–10): “Et, quia duo facta esse non sunt consequenter se habencia, propter hoc etiam manifestum est quod fieri et factum esse non consequenter se habent; fieri enim est diuisibile, sicut et moueri, set factum esse est indiuisibile, sicut et punctus. Sicut igitur se habet linea ad punctum, sic fieri ad factum esse: sunt enim infinita facta esse in eo quod est fieri, sicut et infinita puncta sunt potencialiter in linea.”

is-coming-to-be is divisible (< τὸ μὲν γὰρ γινόμενον διαίρετόν), as (is) being-moved (*moveri*) too; but that-which-has-come-to-be is indivisible (< τὸ δὲ γεγονός ἀδιαίρετον), as (is) a point too. Therefore, just as a line is related to a point (< ὥσπερ οὖν γραμμὴ πρὸς στιγμὴν ἔχει), so are (related) that-which-is-coming-to-be and that-which-has-come-to-be (< οὕτω τὸ γινόμενον πρὸς τὸ γεγονός): for there are infinite those-which-have-come-to-be in that-which-is-coming-to-be (< ἐνυπάρχει γὰρ ἄπειρα γεγονότα ἐν τῷ γινομένῳ), just like there are infinite points potentially in a line.

This is the cause why two points cannot be taken (as) related consequently: to wit, because between whatever two points another point can be taken.<sup>155</sup> Likewise, between whichever two those-which-have-come-to-be, another (that-which-has-come-to-be) can be taken. Whence, two those-which-have-come-to-be are not related consequently. And since a that-which-has-come-to-be is the terminus of a that-which-is-coming-to-be, it consequently follows that nor is that-which-is-coming-to-be related consequently with that-which-has-come-to-be, since then two those-which-have-come-to-be would be related consequently to each other; rather, that-which-is-coming-to-be is immediately terminated at that-which-has-come-to-be, just like a line (is terminated) at a point.

#### **48.29. The Analogy *punctus : linea :: factum esse : fieri :: motum esse : moveri***

Just as a line is some continuum and the point is some indivisible that terminates and divides the line, so, too, coming-to-be or being-moved itself (*ipsum fieri vel moveri*) is some continuum, and having-come-to-be or having-been-moved itself (*ipsum autem quod est motum esse vel factum esse*) is some indivisible that can be taken either **(1)** as that which terminates the whole motion; or **(2)** as that which divides motion as the end of the first part and the principle of the second, as is evident of the point that it divides the line.<sup>156</sup>

Therefore, the having-come-to-be is a cause that precedes the coming-to-be itself of which it is the principle; and it is an effect that follows upon that coming-to-be whose terminus it is.<sup>157</sup>

<sup>155</sup> *In Post. an. 2, l. 11, 44–55*: “Et hec est causa quare in linea non possunt accipi duo puncta consequenter se habencia, quia scilicet inter quelibet duo puncta est accipere aliud punctum; et similiter inter quelibet duo facta esse est accipere aliud, unde duo facta esse non se habent consequenter; et quia factum esse est terminus eius quod est fieri, sequitur consequenter quod nec fieri se habeat consequenter cum eo quod est factum esse, quia tunc duo facta esse se haberent consequenter ad inuicem; set fieri immediate terminatur ad factum esse, sicut linea ad punctum.”

<sup>156</sup> *In Post. an. 2, l. 10, 159–168*: “considerandum est quod, sicut linea est quoddam continuum, punctus autem est quoddam indiuisibile quod terminat et diuidit lineam, ita etiam ipsum fieri uel moueri est quoddam continuum, ipsum autem quod est motum esse uel factum esse est quoddam indiuisibile quod potest accipi uel ut terminans totum motum, uel ut diuidens motum tanquam finis prime partis motus et principium secunde, sicut patet de puncto quod diuidit lineam.”

<sup>157</sup> *In Post. an. 2, l. 10, 168–171*: “Sic igitur ipsum factum esse est causa precedens ipsum fieri cuius est principium, et est effectus consequens illud fieri cuius est terminus.”

### 48.30. Why Simple Things Cannot Come to Be

ARISTOTLE manifests the aforesaid reason (that, on account of their simplicity, it is impossible to posit some matter from which the extremities of magnitudes would be generated and into which they would be corrupted) in a simile.<sup>158</sup>

Thus, the now is had in time as the point in a line (► 48.27). And the now does not seem to be generated or to be corrupted; for if it should be generated or corrupted, its generation or corruption would have to be measured by some time or instant. And thus, the measure of the now itself would be either another now in the infinite or a time—which is impossible. And although the now should not be generated or corrupted, however, it seems always to be another and another now: not indeed that it should differ according to substance (*secundum substantiam*), but according to being (*secundum esse*), for the substance of the now itself responds to the mobile subject; and the variation of the now itself according to being responds to the variation of motion.

Therefore, (this) seems to be likewise had concerning the point in comparison to the line, concerning the line in comparison to a surface, and concerning a surface in comparison to a body: to wit, that they should neither be corrupted nor generated.<sup>159</sup> And yet, some variation would be considered about such (things). Indeed, the same *ratio* (*eadem... ratio* = ὁ... αὐτὸς λόγος) is of all of them: for all such (things) are likewise termini insofar as they are considered in an extremity; or (they are) divisions insofar as they are (considered) in a mean.

Whence, just like the now is varied according to being following the flow of motion, even though it should remain the same according to substance on account of the identity of the mobile, so, too, the point is varied; nor does it come to be another and another on account of the division of the line, even if it should not be corrupted or generated simply. And the same *ratio* is of other (such simple things).

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<sup>158</sup> *In Metaph.* 3, l. 13, §513 (cf. ARISTOTLE, *Metaphysica* B.5, 1002b5–8): “*Manifestat* [Philosophus] *praedictam rationem in simili*. Ita enim se habet nunc in tempore, sicut punctus in linea. Nunc autem non videtur generari et corrumpi: quia si generaretur vel corrumpetur, oporteret quod generatio et corruptio ipsius mensurarentur aliquo tempore vel instanti. Et sic mensura ipsius nunc, esset vel aliud nunc in infinitum, vel tempus, quod est impossibile. Et licet nunc non generetur et corrumpatur, tamen videtur semper esse aliud et aliud nunc: non quidem quod differant secundum substantiam, sed secundum esse. Quia substantia ipsius nunc, respondet subiecto mobili. Variatio autem ipsius nunc secundum esse, respondet variationi motus, ut ostenditur in quarto Physicorum.”

<sup>159</sup> *In Metaph.* 3, l. 13, §513 (cf. ARISTOTLE, *Metaphysica* B.5, 1002b8–11): “*Similiter ergo videtur se habere de puncto in comparatione ad lineam, et de linea in comparatione ad superficiem, et de superficie in comparatione ad corpus; scilicet quod non corrumpantur nec generentur, et tamen aliqua variatio attendatur circa huiusmodi. Eadem enim ratio est de omnibus his: omnia enim huiusmodi similiter sunt termini, secundum quod in extremo considerantur, vel divisiones secundum quod sunt in medio. Unde, sicut secundum defluxum motus variatur nunc secundum esse, licet maneat idem secundum substantiam propter identitatem mobilis, ita etiam variatur punctus, nec fit aliud et aliud propter divisionem lineae, licet non corrumpatur nec generetur simpliciter. Et eadem ratio est de aliis.*”

### 48.31. Time in Mediated vs. Immediate Mutations

Since every mutation should have two termini which cannot simultaneously be, for every mutation is into (something) contiguous (*in incontingens*), it is necessary for there to be a succession in every motion or mutation, since two terms cannot simultaneously be.<sup>160</sup> Thus, (it is necessary for there to be) time too, which is the number of *the prior and the posterior*, in which the whole *ratio* of **succession** consists (i.e., succession consists in there being *a prior and a posterior*; ► 48.1).

However, this occurs diversely in diverse (things):<sup>161</sup>

1. Sometimes, the terminus of motion is mediated (in relation) to the principle of motion (*est mediatum principio motus*), whether according to dimensive quantity—for example, in local motion and in the motion of increase and decrease—or according to a mean of virtual quantity, the division of which is considered according to the intension or remission of some form—for example, in the alteration of sensible qualities.<sup>162</sup>

(In these motions), time by itself (*per se ipsum*) measures motion, since (such a motion) arrives at the terminus successively, for (such a quantity, and consequently the motion itself) is divisible.<sup>163</sup>

2. Sometimes, however, the terminus towards which (*ad quem*) is not mediated (in relation) to the terminus from which (*a quo*), as occurs in those mutations in which there is a mutation from privation into form, or conversely.<sup>164</sup> For example, in generation and corruption, in illumination, and in all such (immediate mutations).

In these mutations, too, there must be an annex time, since it is evident that matter is not simultaneously under a form and (under) a privation, as air is not simultaneously under light and (under) darkness.<sup>165</sup> Not, however, in such a way that the egress (*exitus*) or

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<sup>160</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “cum omnis mutatio habeat duos terminos qui non possunt esse simul quia omnis mutatio est in incontingens, ut dicitur in 1 Physic., oportet cuilibet motui vel mutationi adesse successionem ex hoc quod non possunt duo termini esse simul; et ita tempus, quod est numerus prioris et posterioris, in quibus consistit tota successionis ratio.”

<sup>161</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “Sed hoc diversimode in diversis contingit.”

<sup>162</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “Quandoque enim terminus motus est mediatum principio motus, vel secundum medium quantitatis dimensivae, sicut est in motu locali corporum et in motu augmenti et diminutionis, vel secundum medium quantitatis virtualis cujus divisio attenditur secundum intensionem et remissionem alicujus formae, sicut in alteratione qualitatum sensibilium.”

<sup>163</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “et tunc tempus per se ipsum motum mensurat: quia ad terminum successive pervenitur, eo quod divisibilis est.”

<sup>164</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “Quandoque vero terminus ad quem, non est mediatum termino a quo, sicut est in illis mutationibus in quibus est mutatio de privatione in formam, vel e converso, ut in generatione et corruptione, et illuminatione, et in omnibus hujusmodi.”

<sup>165</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “et in istis etiam mutationibus oportet annexum esse tempus, cum constet materiam non simul esse sub forma et privatione, nec aerem esse simul sub luce et tenebris.”

transit from one extremity into the other should come to be in time. Rather, one of the extremities—to wit, the first, which is abandoned (*abjicitur*) in the mutation—is conjoined to some motion or alteration—as in generation or corruption—or to the local motion of the sun—as in illumination—and in the terminus of that motion is also the terminus of the mutation.

Wherefrom, this mutation is said to be sudden (*subito*), or in an instant, since that form or privation is acquired in the last instant of the time that measured the preceding motion, in which there was nothing priorly.<sup>166</sup> And it is said *to have been generated* in that instant, and not properly *to be generated*, since everything that is generated was being generated. Whence, all such instantaneous mutations are the termini of some motion.

#### 48.32. Priority in Generation and Corruption

The more something is common, the more it is prior in the way of generation.<sup>167</sup>

And what is prior in generation is posterior in corruption (*in destructione*).<sup>168</sup>

#### 48.33. Priority in Motion

Since *prior* and *posterior* are said in order to some principle, and there is a principle in coming-to-be (*in fieri*),<sup>169</sup> ARISTOTLE says in what mode something is prior according to motion and quantity: for order in motion follows upon order in quantity, since there is a prior and a posterior in motion through a prior and a posterior in magnitude (►48.26).

Thus, ARISTOTLE does two (things):<sup>170</sup> (1) he shows in what mode something should be prior or posterior according to quantity in **continuous** things (►48.34); (2) (he shows) in what mode (something should be prior and posterior) in **discrete** things (►48.35).

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Non autem ita quod exitus vel transitus de uno extremo in aliud fiat in tempore; sed alterum extremorum, scilicet primum quod in mutatione abjicitur, est conjunctum cuidam motui vel alterationi (sicut in generatione et corruptione), vel motui locali solis (sicut in illuminatione), et in termino illius motus est etiam terminus mutationis.”

<sup>166</sup> *In Sent.* 1, d. 37 q. 4 a. 3 co.: “Et pro tanto mutatio illa dicitur esse subito, vel in instanti, quia in ultimo instanti temporis, quod mensurabat motum praecedentem, acquiritur illa forma vel privatio, cujus nihil prius inerat. Et in illo instanti dicitur generatum esse, non autem proprie generari: quia omne quod generatur, generabatur, ut in 6 Physic. probatur. Unde omnes tales mutationes instantaneae sunt termini cujusdam motus; ut in 6 Physic., Commentator dicit.”

<sup>167</sup> *ScG* 2, 21 n. 7: “quanto aliquid est communius, tanto est prius in via generationis; sicut prius est animal quam homo in generatione hominis, ut Philosophus dicit, in libro de generatione animalium.”

<sup>168</sup> *In Sent.* 4, d. 18 q. 1 a. 2 qc. 3 co.: “quod est prius in generatione, est posterius in destructione.”

<sup>169</sup> *In Metaph.* 5, l. 13, §937 (*Metaphysica* Δ.11, 1018b9–30): “*Distinguit* [Philosophus] *modos diversos, quibus dicitur aliquid prius et posterius*. Et quia prius et posterius dicuntur in ordinem ad principium aliquid, principium autem est [...], aut in fieri, [...] dicit *quomodo dicitur aliquid esse prius secundum motum et quantitatem*; nam ordo in motu, sequitur ordinem in quantitate. Per prius enim et posterius in magnitudine, est prius et posterius in motu, ut dicitur in quarto Physicorum.”

<sup>170</sup> *In Metaph.* 5, l. 13, §937 (*Metaphysica* Δ.11, 1018b9–30): “duo facit [Philosophus]. Primo ostendit *quomodo aliquid sit prius et posterius secundum quantitatem in rebus continuis*. Secundo, quomodo in

#### 48.34. Priority in Continuous Things

ARISTOTLE posits three modes (in which something should be prior or posterior according to quantity in continuous things):<sup>171</sup>

1. The first mode is considered according to an order **in place** (*secundum ordinem in loco* < κατὰ τόπον), such that something is said to be prior according to place because it is closer to some determinate place (< τῷ εἶναι ἐγγύτερον ἢ φύσει τινὸς τόπου ὠρισμένου), whether that determinate place should be taken as a mean in some magnitude or as an extremity (< τοῦ μέσου ἢ τοῦ ἐσχάτου).<sup>172</sup>

Thus, in local order, the center of the world (*centrum mundi*) can be taken as a principle (i.e., as a mean, according to ancient science) towards which heavy (bodies) are drawn, so that we would order the elements (of antiquity) saying that earth is first, water (is) second, and so on.<sup>173</sup> Also, heaven itself can be taken as a principle (i.e., as an extremity), such that we would say that fire is first, air (is) second, and so on.

However, in place, *closeness to a principle*—whatever that may be—can be said in two modes:<sup>174</sup>

(a) According to a natural order (*secundum ordinem naturalem* < φύσει).<sup>175</sup> For example, water is naturally closer than air to the mean (i.e., to the center of the world, according to ancient science), while air is closer to an extremity—namely, (to) the heaven.

(b) Insofar as some (things) are ordered in a place by chance (*a casu* < πρὸς τὸ τυχόν), or by whatever cause other than (*praeter*) nature.<sup>176</sup> For example, in stones superposed one over another in a pile, the highest is prior in one order, while in another (order), the prior (is) the lowest.

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rebus discretis.” Ibid., §945: “Ista ergo dicuntur priora per hunc modum, scilicet per ordinem quantitatis vel continuae vel discretiae.”

<sup>171</sup> In *Metaph.* 5, l. 13, §938 (*Metaphysica* Δ.11, 1018b12–26): “Et circa primum ponit tres modos.”

<sup>172</sup> In *Metaph.* 5, l. 13, §938 (*Metaphysica* Δ.11, 1018b12–13): “*Primus modus* attenditur secundum ordinem in loco: sicut aliquid dicitur esse prius secundum locum in hoc, quod est propinquius alicui loco determinato; sive ille locus determinatus accipiatur ut medium in aliqua magnitudine, sive ut extremum.”

<sup>173</sup> In *Metaph.* 5, l. 13, §938: “Potest enim in ordine locali accipi ut principium, centrum mundi, ad quod feruntur gravia: ut sic ordinemus elementa, dicentes terram esse primum, aquam secundum etc. Et potest etiam accipi ut principium etiam ipsum caelum, ut si dicamus ignem esse primum, aerem secundum, et sic deinceps.”

<sup>174</sup> In *Metaph.* 5, l. 13, §939 (*Metaphysica* Δ.11, 1018b12–14): “Propinquitas autem ad principium in loco, quidquid sit illud, potest esse dupliciter.”

<sup>175</sup> In *Metaph.* 5, l. 13, §939 (*Metaphysica* Δ.11, 1018b12–13): “Uno modo secundum ordinem naturalem: sicut aqua propinquior est medio naturaliter quam aer, aer vero propinquior extremo, scilicet caelo.”

<sup>176</sup> In *Metaph.* 5, l. 13, §939 (*Metaphysica* Δ.11, 1018b14): “Alio modo «sicut evenit,» idest secundum quod ordinantur aliqua in loco a casu, vel a quacumque causa praeter naturam; sicut in lapidibus superpositis invicem in acervo, supremus est prior uno ordine, et alio est prior infimus.”



And just as that which is closer to the principle is prior, so is posterior that which is farther from the principle (< τὸ δὲ πορρώτερον ὕστερον).<sup>177</sup>

2. The second mode is considered according to the order of **time** (*secundum ordinem temporis*), which ARISTOTLE posits saying that other (things) are said to be prior according to time (κατὰ χρόνον) diversely too:<sup>178</sup>

(a) Some are said (to be) *prior* because they are farther from the present now (< τῷ πορρώτερον τοῦ νῦν), as happens in past things.<sup>179</sup> Thus, the Trojan wars are said (to be) *prior* to the wars of the Medes and the Persians—in which Xerxes, king of Persians and Medes, fought against Greece—because they are farther from the present now.

(b) Some (others) are said (to be) *prior* because they are closer or more proximate to the now itself.<sup>180</sup> For example, when ARISTOTLE was writing, the Nemean feasts were prior to the Pythian because they were closer (in his future) to that now. Likewise, Meneleus is said to be prior to Pyrrho because (he is) closer to some present now, in respect of which one and the other was yet to be (*erat futurum*).

It is evident that—in this (mode)—we use the now itself as a principle and a first in time, since we say that something is prior or posterior due to closeness or remoteness in respect of it.<sup>181</sup> And it is necessary to say this according to those who posit the eternity of time; for (if) this position (is) adopted (*facta*), some principle in time can be taken only from some now that is a mean of the past and of the future, such that time would proceed infinitely from one part of time and from the other.

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<sup>177</sup> *In Metaph.* 5, l. 13, §939 (*Metaphysica* Δ.11, 1018b14): “Et sicut id quod est propinquius principio, est prius, ita quod remotius a principio, est posterius.”

<sup>178</sup> *In Metaph.* 5, l. 13, §940 (*Metaphysica* Δ.11, 1018b14–26): “*Secundus modus* attenditur secundum ordinem temporis; quem ponit [Philosophus], dicens, quod alia dicuntur priora secundum tempus, et diversimode.”

<sup>179</sup> *In Metaph.* 5, l. 13, §940 (*Metaphysica* Δ.11, 1018b15–17): “Quaedam namque dicuntur priora, eo quod sunt remotiora a praesenti nunc, ut accidit «in factis,» idest in praeteritis. Bella enim Troiana dicuntur priora bellis Medis et Persicis, quibus Xerses rex Persarum et Medorum Graeciam expugnavit, quia remotiora sunt a praesenti nunc.”

<sup>180</sup> As St. Thomas observes, the *Traslatio Anonyma* provides a false reading. It renders Νέμεα Πυθίων as *Menelaus Pyrrho* instead of *Nemea Pythion*, which is what MOERBEKE provides. However, we transmit both versions, since St. Thomas uses them as examples of this mode of priority. *In Metaph.* 5, l. 13, §940 (*Metaphysica* Δ.11, 1018b17–19): “Quaedam vero dicuntur priora, quia sunt affinia vel propinquiora ipsi nunc; sicut dicitur quod prius est Menelaus Pyrrho, quia propinquius alicui nunc praesenti, respectu cuius utrumque erat futurum. Videtur autem haec litera falsa esse, quia utrumque erat praeteritum tempore Aristotelis quando haec sunt scripta. In Graeco autem habetur, quod prius est Nemea Pythion, quae quidem erant duae nundinae vel duo festa, quorum unum erat propinquius illi nunc quo haec scripta sunt, cum tamen utrumque esset futurum.”

<sup>181</sup> *In Metaph.* 5, l. 13, §941: “Patet autem quod in hoc utimur ipso nunc, ut principio et primo in tempore; quia per propinquitatem vel remotionem respectu eius, dicimus aliquid esse prius vel posterius. Et hoc necessarium est dicere secundum ponentes aeternitatem temporis. Non enim potest accipi hac positione facta, aliquod principium in tempore, nisi ab aliquo nunc, quod est medium praeteriti et futuri, ut ex utraque parte tempus in infinitum procedat.”

3. The third mode is according to an order **in motion** (*secundum ordinem in motu* < κατὰ κίνησιν).<sup>182</sup>

(a) In respect of **natural** (things), some are said to be prior according to an order in motion because that is prior which is closer to the first mover.<sup>183</sup> For example, the child is prior to the adult because it is closer to the first—to wit, (to the first) begetter. And this is also said (to be) prior because of proximity to some principle. Indeed, that—namely, the mover and begetter—is in some mode a principle, (but) not in any way whatsoever, as happened (the case of being by chance) in (some) place (¶1b), but simply and according to nature.

(b) In **voluntary** things, some are said (to be) prior according to power (*secundum potestatem* < κατὰ δύναμιν): for example, men that are invested (*constituti*) in powers, for he who exceeds (others) in power, and is more powerful, is said to be prior.<sup>184</sup> And this is the order of dignity.

It is evident that this order is also according to motion.<sup>185</sup> For it is necessary for something to follow upon the purpose of the more powerful, of he who exceeds in power, who is prior to it in moving: namely, such that if the prior or more powerful does not move, the posterior should not be moved; and if (the prior) moves, (the posterior) should be moved. This is how the prince is had in a state: for, at his command, others are moved to execute (the actions that are) commanded; if he does not command, they are not moved. And it is evident that this, too, is said (to be) prior on account of proximity to some principle, for the purpose of he who commands is here taken as a principle; and those closer, and consequently prior, are those by whom the purpose and command of the prince is brought down to the subjects.

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<sup>182</sup> *In Metaph.* 5, l. 13, §942 (*Metaphysica* Δ.11, 1018b19–26): “*Tertius modus* est secundum ordinem in motu.”

<sup>183</sup> *In Metaph.* 5, l. 13, §942 (*Metaphysica* Δ.11, 1018b20–21): “et hoc primo ponit [Philosophus] quantum ad naturalia; dicens, quod aliqua dicuntur esse priora secundum ordinem in motu. Illud enim, quod est propinquius primo moventi, est prius; sicut puer est prius viro, quia est propinquior primo, scilicet generanti. Et hoc etiam prius dicitur per propinquitatem ad aliquod principium. Id enim, scilicet movens et generans, est principium quodammodo, non qualitercumque, sicut in loco accidebat, sed simpliciter et secundum naturam.”

<sup>184</sup> *In Metaph.* 5, l. 13, §942 (*Metaphysica* Δ.11, 1018b21–23): “Secundo ponit [Philosophus] hunc ordinem motus etiam in rebus voluntariis; dicens, quod quaedam priora dicuntur secundum potestatem, sicuti homines, qui sunt in potestatibus constituti. Ille enim, qui excedit potestate, et qui est potentior, dicitur esse prior. Et hic est ordo dignitatis.”

<sup>185</sup> *In Metaph.* 5, l. 13, §943 (*Metaphysica* Δ.11, 1018b23–26): “Patet autem, quod hic ordo etiam est secundum motum, quia potentius et potestate excedens est secundum «cuius praevoluntatem,» idest propositum, necesse est sequi aliquid, quod est eo posterius in movendo; ita scilicet quod non movente illo potentiori vel priori, non moveatur posterius, et movente moveatur. Sicut se habet princeps in civitate. Nam ex eius imperio moventur alii ad exequendum imperata; eo vero non imperante, non moventur. Et patet, quod hoc etiam prius dicitur propter propinquitatem ad aliquod principium. Nam «praevoluntas,» idest propositum imperantis, hic accipitur ut principium, cui propinquiores sunt, et per consequens priores per quos propositum et imperium principis ad subditos defertur.”

### 48.35. Priority in Discrete Things

ARISTOTLE posits a mode (of priority) according to an order in discrete things, saying that other (things) are said (to be) *prior* only according to an order (*secundum ordinem* = κατὰ τάξιν) that is found in some things not associated by continuity, as happened in the preceding (modes; ► 48.34).<sup>186</sup>

Of such a mode are those that are distant (*distant* = διέστηκε) from some one determinate thing (*ab aliquo uno determinato* < πρὸς τι ἔν ὠρισμένον) according to some determinate ratio (*secundum aliquam rationem determinatam* < κατὰ τινα λόγον).<sup>187</sup>

For example, he who stands second to someone—say, to a king—is said (to be prior) to he who stands third (< παραστάτης τριτοστάτου πρότερον).<sup>188</sup> And it is evident that the ratio of *distant* is diverse (for that which is) distant as second (compared to that which is distant) as third.

Likewise, *paranete* (i.e., a musical note in the Greek system; ► 6.2) is prior to *nete* (< παρανήτη νήτης).<sup>189</sup> For in the strings (of a lyre), those that are low-pitched are called *hypate*, (those that are) high-pitched are called *nete*, and (those that are) means are called *mese*. Those (notes) are called *paranete* which are next to *nete*, closer to *mese*.

It is also evident that something is here said to be prior due to proximity to some principle—but differently in one and in the other of the aforesaid examples.<sup>190</sup> In the first one, that which is a true beginning and an extremity is taken (as) the principle; namely, he who is highest and the head (*vertex*) among others, such as the king or someone like that. In strings, on the other hand, a mean is taken as the principle: for mean strings, which are called *mese*, (are taken as principles), to which are closer those that are called *paranete*; wherefrom, these (i.e., *paranete*) are said (to be) prior to the *nete*.

<sup>186</sup> *In Metaph.* 5, l. 13, §944 (*Metaphysica* Δ.11, 1018b26–30): “Ponit *modum* [Philosophus] *secundum ordinem in rebus discretis*; dicens, quod alia dicuntur priora secundum ordinem, qui invenitur in aliquibus rebus tantummodo quodam ordine associatis sibi, non per continuitatem, ut in praecedentibus accidebat.”

<sup>187</sup> *In Metaph.* 5, l. 13, §944 (*Metaphysica* Δ.11, 1018b26–27): “Huiusmodi autem sunt, quae distant ab aliquo uno determinato secundum aliquam rationem determinatam.”

<sup>188</sup> *In Metaph.* 5, l. 13, §944 (*Metaphysica* Δ.11, 1018b27–28): “ut parastata, tritostata. Parastata est prius tritostata. Parastata dicitur ille, qui stat iuxta aliquem, puta regem. Tritostata autem ille, qui stat tertius ab eo. Unde alia litera habet, «Praestans, tertio stante prius est.» Patet autem, quod alia ratio distantiae est distare ut secundum, vel tertium.”

<sup>189</sup> *In Metaph.* 5, l. 13, §944 (*Metaphysica* Δ.11, 1018b28): “Et similiter paranitae sunt priores nitae. In chordis enim hypatae dicuntur quae sunt graves, nitae vero acutae dicuntur, mediocres autem vocantur mesae. Paranitae autem dicuntur quae sunt iuxta nitae mesae propinquiores.”

<sup>190</sup> *In Metaph.* 5, l. 13, §945 (*Metaphysica* Δ.11, 1018b28–30): “Patet etiam, quod hic dicitur etiam esse aliquid prius per propinquitatem ad aliquod principium. Sed differenter in utroque praedictorum exemplorum: quia in illis, scilicet parastata et tritostata, accipitur principium id quod est verum initium et extremum, scilicet ille, qui est summus inter alios vel vertex aliorum, ut rex vel aliquis alius talis. Sed in chordis accipitur ut principium, medium, et media chorda quae dicitur mesa, cui propinquiores dicuntur paranitae, et per hoc priores dicuntur nitae.”



## 49. The Order of Cognition

We turn our attention here to the order of cognition, which is founded on psychological principles that depend on the natural order discussed in the preceding chapter. A thorough account of the principles of mathematics would therefore require a lengthy discussion on things such as sensible and intelligible objects, faculties and their acts, and even on fear and hope, and many other principles, which—however important—are outside our scope. Hence, we omit what is not strictly necessary for our present purpose.

### 49.1. Priority in Cognition

ARISTOTLE shows in what mode something is said (to be) *prior* to another in cognition (*in cognitione* < τῆ γνώσει): that is prior in cognition which is also prior simply (*simpliciter* = ἀπλῶς) and not according to something (*secundum quid*), as is (the case) in (knowledge of) place (i.e., although place is prior to motion from place to place, it comes to be known through just that motion; ► 48.18), for a thing is known by its principles.<sup>1</sup>

However, since cognition is twofold—namely, (cognition) of the intellect or of the *ratio*, and (cognition) of sense—, we diversely (*aliter* = ἄλλως) say (that) some (things are) *prior* according to *ratio* (*secundum rationem* = κατὰ τὸν λόγον), and (that some things are prior) according to sense (*secundum sensum* = κατὰ τὴν αἴσθησιν).<sup>2</sup>

### 49.2. Priority According to *Ratio* vs. According to Sense

ARISTOTLE posits three modes according to which something is prior in *ratio*, or (according) to intellectual cognition:<sup>3</sup>

1. Insofar as universals are prior (*universalia <sunt> priora* = τὰ καθόλου πρότερα) to singulars, even though in sensitive cognition (< κατὰ... τὴν αἴσθησιν) it should happen conversely, for singulars (< τὰ καθ' ἕκαστα) are prior there.<sup>4</sup>

Indeed, a *ratio* (or reason) is of universals, and sense (is) of singulars. Whence, sense knows universals only by accident insofar as it knows the singulars of which the universals

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<sup>1</sup> *In Metaph.* 5, l. 13, §937 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b29–31): “ostendit [Philosophus], quomodo aliquid dicitur prius altero in cognitione.” Ibid., §946: “Ostendit quomodo aliquid dicitur prius altero in cognitione. Illud autem prius est cognitione, quod etiam prius est simpliciter, non secundum quid, sicut erat in loco: nam res per sua principia cognoscitur.” *In fine*, ibid., §949 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1019a1–2): “Haec igitur dicuntur priora per hunc modum, scilicet per ordinem cognoscendi.”

<sup>2</sup> *In Metaph.* 5, l. 13, §946 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b31–32): “Sed, cum cognitio sit duplex, scilicet intellectus vel rationis, et sensus, aliter dicimus aliqua priora secundum rationem, et aliter secundum sensum.”

<sup>3</sup> *In Metaph.* 5, l. 13, §947 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b32–1019a1): “Ponit autem [Philosophus] tres modos, secundum quos aliquid est prius ratione sive cognitione intellectiva.”

<sup>4</sup> *In Metaph.* 5, l. 13, §947 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b32–34): “*primus* est secundum quod universalia sunt priora singularibus, licet in cognitione sensitiva accidat e converso. Ibi enim singularia sunt priora.”

are predicated. Thus, it knows *man* insofar as it knows Socrates, who is a man. And contrarily, the intellect knows Socrates insofar as it knows *man*. However, that which is by itself is always prior to that which is by accident.<sup>5</sup>

2. Again, according to *ratio*, accident is prior to whole (*prius est «accidens quam totum»* = τὸ συμβεβηκὸς τοῦ ὅλου πρότερον): that is, (prior) than the (whole) composite from subject and accident.<sup>6</sup>

For example, the musical man (i.e., the musician) cannot be known without the *ratio* of the part *musical* (i.e., because a *ratio* is not whole without a part, οὐ γὰρ ἔσται ὁ λόγος ὅλος ἄνευ τοῦ μέρους).<sup>7</sup>

In the same mode, any other simple (things) are prior to composites according to *ratio*, even though it should be conversely in sense, for composites are offered first to sense.<sup>8</sup>

According to *ratio*, too, the affections (►15.17) of prior (things) are said to be prior (< *priora dicuntur priorum passionibus* < πρότερα λέγεται τὰ τῶν προτέρων πάθη).<sup>9</sup>

For example, straightness (*rectitudo* = εὐθύτης) is by itself an affection of the line, while lightness (according to ancient science) is an affection of surface; and the line is naturally prior to the surface (►46.22, ¶2).<sup>10</sup> However, according to sense, the surface is prior to the line, and the affections of composites (are prior according to sense) to the affections of simple (things).

### 49.3. The Order of Intellectual Cognition

Two (things) must be considered in the cognition of our intellect:<sup>11</sup>

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<sup>5</sup> *In Metaph.* 5, l. 13, §947: “Ratio enim est universalium, sensus autem singularium. Unde sensus non cognoscit universalia nisi per accidens, in quantum cognoscit singularia, de quibus universalia praedicantur. Cognoscit enim hominem in quantum cognoscit Socratem, qui est homo. E contrario autem intellectus cognoscit Socratem in quantum cognoscit hominem. Semper autem quod est per se est prius eo quod est per accidens.”

<sup>6</sup> *In Metaph.* 5, l. 13, §948 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b34–35): “Secundum modum ponit [Philosophus...] Dicit, quod secundum rationem prius est «accidens quam totum,» id est quam compositum ex subiecto et accidente.”

<sup>7</sup> *In Metaph.* 5, l. 13, §948 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b35–37): “et musicus homo cognosci non potest sine ratione huius partis, quod est musicum.”

<sup>8</sup> *In Metaph.* 5, l. 13, §948: “Eodem modo quaecumque alia simplicia sunt priora secundum rationem compositis, cum in sensu sit e converso. Nam sensui primo composita offeruntur.”

<sup>9</sup> *In Metaph.* 5, l. 13, §949 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b37–38): “Tertium modum ponit [Philosophus...] Dicit, quod priora dicuntur etiam secundum rationem, passionibus (1).” The edition we are using adds in a footnote: “(1) *Supple* priorum.” Indeed, this is to be understood to correspond to *priorum passionibus* (found in both MOERBEKE and the *Traslatio Anonyma*), for τὰ τῶν προτέρων πάθη.

<sup>10</sup> *In Metaph.* 5, l. 13, §949 (cf. ARISTOTLE, *Metaphysica* Δ.11, 1018b38–1019a1): “sicut rectitudo habetur prior levitate. Rectitudo enim est per se passio lineae, levitas autem superficiei, linea vero naturaliter est prior superficiei. Secundum autem sensum prior est superficies lineae, et passionibus compositorum passionibus simplicium.”

<sup>11</sup> *STh* I, q. 85 a. 3 co.: “in cognitione nostri intellectus duo oportet considerare.”

1. Intellective cognition takes its origin from sensitive (cognition; ►49.4) in some mode.<sup>12</sup> And since sense is of singulars and the intellect (is) of universals, the cognition of singulars must be prior in respect of us (*quoad nos*) than the cognition of universals.

2. Our intellect proceeds from potency into act.<sup>13</sup> And everything that proceeds from potency into act arrives at an incomplete act, which is a mean between potency and act, before (it arrives) at the perfect act.

The perfect act at which the intellect arrives is a complete science whereby things are distinctly and determinately known.<sup>14</sup> An incomplete act is an imperfect science, by which things are indistinctly known under some confounding: for that which is thus known is known in act according to something (*secundum quid*), and (is known) in potency in some mode. Whence, ARISTOTLE says that, at first, manifest and certain (things) are to us confounded (►49.5); and later, we distinctly know the principles and elements by distinguishing (them).

However, it is manifest that to know something in which many (things) are contained without having a proper knowledge of any one (thing) of those that are contained in it is to know something under some confounding. Both a universal whole—in which the parts are contained in potency—as much as an integral whole can be known in this way.<sup>15</sup> For one and the other whole can be known in some confounding, without the parts being distinctly known.

Distinctly to know that which is contained in a universal whole is to have cognition of a less common thing:<sup>16</sup> for example, indistinctly to know *animal* is to know *animal* insofar as

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<sup>12</sup> *STh* I, q. 85 a. 3 co.: “Primo quidem, quod cognitio intellectiva aliquo modo a sensitiva primordium sumit. Et quia sensus est singularium, intellectus autem universalium; necesse est quod cognitio singularium, quoad nos, prior sit quam universalium cognitio.”

<sup>13</sup> *STh* I, q. 85 a. 3 co.: “Secundo oportet considerare quod intellectus noster de potentia in actum procedit. Omne autem quod procedit de potentia in actum, prius pervenit ad actum incompletum, qui est medius inter potentiam et actum, quam ad actum perfectum.”

<sup>14</sup> *STh* I, q. 85 a. 3 co.: “Actus autem perfectus ad quem pervenit intellectus, est scientia completa, per quam distincte et determinate res cognoscuntur. Actus autem incompletus est scientia imperfecta, per quam sciuntur res indistincte sub quadam confusione, quod enim sic cognoscitur, secundum quid cognoscitur in actu, et quodammodo in potentia. Unde Philosophus dicit, in I Physic., quod sunt primo nobis manifesta et certa confusa magis; posterius autem cognoscimus distinguendo distincte principia et elementa.”

<sup>15</sup> *STh* I, q. 85 a. 3 co.: “Manifestum est autem quod cognoscere aliquid in quo plura continentur, sine hoc quod habeatur propria notitia uniuscuiusque eorum quae continentur in illo, est cognoscere aliquid sub confusione quadam. Sic autem potest cognosci tam totum universale, in quo partes continentur in potentia, quam etiam totum integrale, utrumque enim totum potest cognosci in quadam confusione, sine hoc quod partes distincte cognoscantur.”

<sup>16</sup> *STh* I, q. 85 a. 3 co.: “Cognoscere autem distincte id quod continetur in toto universali, est habere cognitionem de re minus communi. Sicut cognoscere animal indistincte, est cognoscere animal in quantum est animal, cognoscere autem animal distincte, est cognoscere animal in quantum est animal rationale vel irrationale, quod est cognoscere hominem vel leonem. Prius igitur occurrit intellectui nostro

it is *animal*; and distinctly to know *animal* is to know *animal* insofar as *animal* is (either) *rational* or *irrational*, which is to know *man* or *lion*. Therefore, knowing *animal* happens to our intellect before knowing *man*. And the same reason is (true) if we should compare any (thing that is) more universal to (something that is) less universal.

The reason for this is manifest.<sup>17</sup> Whoever knows something indistinctly is still in potency to know the principle of distinction. For example, who knows a genus is in potency to know a difference. Thus, evidently, indistinct cognition is a mean between potency and act.

#### 49.4. The Order of Sense Cognition

According to sense, as much as according to intellect, cognition of the more common is prior than cognition of the less common.<sup>18</sup> And just like sensitive cognition (is prior) to intellective cognition, cognition of singulars is—in respect of us—prior than is the cognition of universals.

Hence, since sense goes forth (*exit*) from potency into act, as (does) the intellect too, the same order of cognition is apparent in sense.<sup>19</sup> Thus, according to sense, we judge the more common before (we judge) the less common; and (we priorly judge) according to place and according to time:

1. According to **place**, as when someone is seen from afar.<sup>20</sup> For it would be discerned (*deprehendatur*) to be a body prior to it being discerned to be an animal; to be an animal, prior to it being discerned to be a man; and (discerned to be) a man before (it would be discerned to be) Socrates or Plato.

2. According to **time** because, in the beginning (*a principio*), a child distinguishes a man from a non-man before it distinguishes *this* man from another man.<sup>21</sup> And thus, in the beginning, the child calls *father* all men; and later determines each one.

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cognoscere animal quam cognoscere hominem, et eadem ratio est si comparemus quodcumque magis universale ad minus universale.”

<sup>17</sup> *STh* I, q. 85 a. 3 co.: “Et huius ratio manifesta est. Quia qui scit aliquid indistincte, adhuc est in potentia ut sciat distinctionis principium; sicut qui scit genus, est in potentia ut sciat differentiam. Et sic patet quod cognitio indistincta media est inter potentiam et actum.”

<sup>18</sup> *STh* I, q. 85 a. 3 co.: “Est ergo dicendum quod cognitio singularium est prior quoad nos quam cognitio universalium, sicut cognitio sensitiva quam cognitio intellectiva. Sed tam secundum sensum quam secundum intellectum, cognitio magis communis est prior quam cognitio minus communis.”

<sup>19</sup> *STh* I, q. 85 a. 3 co.: “Et quia sensus exit de potentia in actum sicut et intellectus, idem etiam ordo cognitionis apparet in sensu. Nam prius secundum sensum diiudicamus magis commune quam minus commune, et secundum locum et secundum tempus.”

<sup>20</sup> *STh* I, q. 85 a. 3 co.: “Secundum locum quidem, sicut, cum aliquid videtur a remotis, prius deprehenditur esse corpus, quam deprehendatur esse animal; et prius deprehenditur esse animal, quam deprehendatur esse homo; et prius homo, quam Socrates vel Plato.”

<sup>21</sup> *STh* I, q. 85 a. 3 co.: “Secundum tempus autem, quia puer a principio prius distinguit hominem a non homine, quam distinguit hunc hominem ab alio homine; et ideo pueri a principio appellant omnes viros patres, posterius autem determinat unumquemque, ut dicitur in I Physic.”



#### 49.5. Priority in Determining Principles

ARISTOTLE shows that, among principles, we must priorly determine (the truth) concerning the more universal.<sup>22</sup> He shows this through an argument and through some signs:

1. He posits the following reason: It is innate (*innatum est* < πέφυκε, i.e., it is natural) for us, in knowing (*cognoscendo*), to proceed from those (things) that are more knowable to us (*ab iis quae sunt nobis magis nota* < ἐκ τῶν γνωριμωτέρων ἡμῖν... καὶ σαφεστέρων) into those that are more knowable (according) to nature (*in ea quae sunt magis nota naturae* < ἐπὶ τὰ σαφέστερα τῇ φύσει καὶ γνωριμώτερα); and those that are more knowable to us are confounded (*confusa* = συγκεχυμένα), as are universals (*universalia* = καθόλου); therefore, we must proceed from more universal (things) towards singulars (*singularia* = καθ' ἕκαστα, i.e., towards the species of genera, as explained below).<sup>23</sup>

To manifest the first proposition, he brings in that (the things that are) more knowable to us are not the same as (the things that are more knowable) also according to nature (< ἀπλῶς).<sup>24</sup> Rather, those that are more knowable according to nature are less knowable according to us. And since this is the natural mode or order of learning further—to come to the (things that are) unknown to us from (those that are) known by us—, hence, we must arrive at the more knowable (according) to nature from the more knowable to us.

It is to be noted that ARISTOTLE says that *knowable (according) to nature* (*naturae* = τῇ φύσει) is the same as *knowable simply* (*simpliciter* = ἀπλῶς).<sup>25</sup> Those are more knowable simply which are more knowable according to themselves (*secundum se*); and those are more knowable according to themselves which have more of being (*quae plus habent de entitate*). For any one (thing) is knowable insofar as it is a being; and those are more beings which are more in act; whence, these (i.e., things that are more knowable in themselves) are maximally cognoscible (according) to nature.

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<sup>22</sup> *In Physic.* 1, l. 1, n. 6 (cf. ARISTOTLE, *Physica* A.1, 184a16–24): “ostendit [Philosophus] quod inter principia oportet praedeterminare de universalioribus: et primo ostendit hoc per rationem; secundo per quaedam signa.”

<sup>23</sup> *In Physic.* 1, l. 1, n. 6 (cf. ARISTOTLE, *Physica* A.1, 184a16–b14): “Circa primum ponit [Philosophus] talem rationem. Innatum est nobis ut procedamus cognoscendo ab iis quae sunt nobis magis nota, in ea quae sunt magis nota naturae; sed ea quae sunt nobis magis nota, sunt confusa, qualia sunt universalia; ergo oportet nos ab universalibus ad singularia procedere.”

<sup>24</sup> *In Physic.* 1, l. 1, n. 7 (cf. ARISTOTLE, *Physica* A.1, 184a16–21): “Ad manifestationem autem primae propositionis, inducit [Philosophus] quod non sunt eadem magis nota nobis et secundum naturam; sed illa quae sunt magis nota secundum naturam, sunt minus nota secundum nos. Et quia iste est naturalis modus sive ordo addiscendi, ut veniatur a nobis notis ad ignota nobis; inde est quod oportet nos devenire ex notioribus nobis ad notiora naturae.”

<sup>25</sup> *In Physic.* 1, l. 1, n. 7 (cf. ARISTOTLE, *Physica* A.1, 184a16–21): “Notandum autem est quod idem dicit [Philosophus] nota esse naturae et nota simpliciter. Simpliciter autem notiora sunt, quae secundum se sunt notiora. Sunt autem secundum se notiora, quae plus habent de entitate: quia unumquodque cognoscibile est in quantum est ens. Magis autem entia sunt, quae sunt magis in actu: unde ista maxime sunt cognoscibilia naturae.”

This happens conversely to us, since, in understanding (*intelligendo*), we proceed from potency into act; and the principle of our cognition is from sensible (things), which are intelligible in potency and material.<sup>26</sup> Whence, those (sensible things) are (more) priorly knowable to us than separate substances, which are more knowable according to nature. Therefore, ARISTOTLE does not say *more knowable (according) to nature* as though nature should know them, but because they are more knowable according to themselves and according to (their) proper nature. And he says *more knowable and more certain* (σαφέστερα... καὶ γνωριμώτερα) because, in the sciences, not any sort of cognition is sought, but the certitude of cognition.

To understand the second proposition (i.e., that those things that are more knowable to us are confounded), it is to be known that those are here said (to be) *confounded (confusa = συγκεχυμένα)* which contain in themselves some (things) in potency and indistinctly.<sup>27</sup> And since to know something indistinctly is a mean between pure potency and perfect act, hence, while our intellect proceeds from potency into act, the confounded, (rather) than the distinct, occurs to it first. On the other hand, there is complete science in act when one arrives through resolution at a distinct cognition of principles and elements. And this is the reason why confounded, rather than distinct (things), are more knowable to us first.

That universals should be confounded is manifest, since universals contain in themselves their species in potency; and thus, who knows something universally (*in universali*) knows it indistinctly; and his cognition is distinct (*distinguitur eius cognitio*) when any one of those (differences) that are contained in potency in the universal are known in act.<sup>28</sup> Thus, who knows *animal* knows *rational* only in potency. And something is to be known first in potency rather than in act: hence, according to this order of learning further, whereby we proceed from potency into act, to know *animal*—rather than *man*—is prior.

<sup>26</sup> *In Physic.* 1, l. 1, n. 7 (cf. ARISTOTLE, *Physica* A.1, 184a16–24): “Nobis autem e converso accidit, eo quod nos procedimus intelligendo de potentia in actum; et principium cognitionis nostrae est a sensibilibus, quae sunt materialia, et intelligibilia in potentia: unde illa sunt prius nobis nota quam substantiae separatae, quae sunt magis notae secundum naturam, ut patet in II *Metaphys.* Non ergo dicit [Philosophus] notiora naturae, quasi natura cognoscat ea; sed quia sunt notiora secundum se et secundum propriam naturam. Dicit autem *notiora et certiora*, quia in scientiis non quaeritur qualicumque cognitio, sed cognitionis certitudo.”

<sup>27</sup> *In Physic.* 1, l. 1, n. 7 (cf. ARISTOTLE, *Physica* A.1, 184a21–23): “Ad intellectum autem secundae propositionis, sciendum est quod *confusa* hic dicuntur quae continent in se aliqua in potentia et indistincte. Et quia cognoscere aliquid indistincte, medium est inter puram potentiam et actum perfectum, ideo, dum intellectus noster procedit de potentia in actum, primo occurrit sibi confusum quam distinctum; sed tunc est scientia completa in actu, quando pervenitur per resolutionem ad distinctam cognitionem principiorum et elementorum. Et haec est ratio quare confusa sunt primo nobis nota quam distincta.”

<sup>28</sup> *In Physic.* 1, l. 1, n. 7 (cf. ARISTOTLE, *Physica* A.1, 184a23–24): “Quod autem universalis sint confusa manifestum est, quia universalis continent in se suas species in potentia, et qui scit aliquid in universali scit illud indistincte; tunc autem distinguitur eius cognitio, quando unumquodque eorum quae continentur potentia in universali, actu cognoscitur: qui enim scit animal, non scit rationale nisi in potentia. Prius autem est scire aliquid in potentia quam in actu: secundum igitur hunc ordinem addiscendi quo procedimus de potentia in actum, prius quoad nos est scire animal quam hominem.”

What ARISTOTLE says here seems to be contrary to what he says in his *Posterior Analytics*: that singulars are more knowable in respect of us, while universals (are more knowable) by nature or simply.<sup>29</sup> However, it is to be understood that there (i.e., in his *Posterior Analytics*), he takes *singulars* (to stand for) sensible individuals themselves, which are more knowable in respect to us, since in us the cognition of sense, which is of singulars, precedes the cognition of the intellect, which is of universals. However, since intellectual cognition is more perfect, and universals are intelligible in act, while singulars (are) not (intelligible in act) because they are material, universals are more knowable simply and according to nature.

Here, on the other hand, he calls *singulars* (καθ' ἕκαστα) not the individuals themselves, but the species (as he does elsewhere, calling ἄτομα the most special species; ►43.22), which are more knowable according to nature, as being more perfect existents and having distinct cognition.<sup>30</sup> Genera, on the other hand, are known to us priorly, as having cognition in potency and confounded.

2. ARISTOTLE (also) manifests what he proposes through three signs:<sup>31</sup>

(a) The first (sign) is taken from the sensible integral whole.<sup>32</sup> He says that the sensible whole is more knowable according to sense (< τὸ γὰρ ὅλον κατὰ τὴν αἴσθησιν γνωριμώτερον); therefore, the intelligible whole, too, is more knowable according to intellect. And the

<sup>29</sup> *In Physic.* 1, l. 1, n. 8: “Contrarium autem huic videtur esse quod dicit Philosophus in I *Poster.*, quod singularia sunt magis nota quoad nos, universalia vero naturae sive simpliciter. Sed intelligendum est quod ibi accipit singularia ipsa individua sensibilia: quae sunt magis nota quoad nos, quia sensus cognitio, quae est singularium, praecedat cognitionem intellectus in nobis, quae est universalium. Sed quia cognitio intellectualis est perfectior, universalia autem sunt intelligibilia in actu, non autem singularia (cum sint materialia); simpliciter et secundum naturam universalia sunt notiora.”

<sup>30</sup> *In Physic.* 1, l. 1, n. 8: “Hic autem singularia dicit [Philosophus] non ipsa individua, sed species; quae sunt notiores secundum naturam, utpote perfectiores existentes et distinctam cognitionem habentes: genera vero sunt prius nota quoad nos, utpote habentia cognitionem in potentia et confusam.” St. Thomas adds (ibid., *in fine*) a criticism of AVERROES's interpretation of this passage: *In Physic.* 1, l. 1, n. 8: “Sciendum autem quod Commentator aliter exponit. Dicit enim quod ibi, *Innata autem est etc.*, vult ostendere Philosophus modum demonstrationis huius scientiae, quia scilicet demonstrat per effectus et posteriora secundum naturam: ut sic quod ibi dicitur, intelligatur de processu in demonstrando, et non in determinando. Cum autem dicit, *Sunt autem nobis etc.*, intendit manifestare, secundum eum, quae sunt magis nota quoad nos et minus nota secundum naturam, scilicet composita simplicibus, intelligens composita per confusa. Ultimo autem concludit quod procedendum est ab universalioribus ad minus universalia, quasi quoddam corollarium. Unde patet quod eius expositio non est conveniens, quia non coniungit totum ad unam intentionem; et quia hic non intendit Philosophus ostendere modum demonstrationis huius scientiae, hoc enim faciet in secundo libro secundum ordinem determinandi; iterum quia confusa non debent exponi composita, sed indistincta; non enim posset concludi aliquid ex universalibus, cum genera non componantur ex speciebus.”

<sup>31</sup> *In Physic.* 1, l. 1, n. 9 (cf. ARISTOTLE, *Physica* A.1, 184a24–26): “manifestat [Philosophus] propositum per tria signa.”

<sup>32</sup> *In Physic.* 1, l. 1, n. 9 (cf. ARISTOTLE, *Physica* A.1, 184a24–b14): “Quorum primum sumitur a toto integrali sensibili: et dicit quod totum sensibile est notius secundum sensum; ergo et totum intelligibile est notius secundum intellectum. Universale autem est quoddam totum intelligibile, quia comprehendit multa ut partes, scilicet sua inferiora; ergo universale est notius secundum intellectum quoad nos.”

universal is some intelligible whole (< τὸ δὲ καθόλου ὅλον τί ἐστὶ) because it comprehends many—to wit, its inferiors—as parts (< πολλὰ γὰρ περιλαμβάνει ὡς μέρη τὸ καθόλου); therefore, the universal is more known according to intellect in respect of us.

This proof would seem to be inefficacious, since it equivocally uses *whole*, *part*, and *comprehension*.<sup>33</sup> However, it is to be said that the integral whole and the universal (whole) agree (*conveniunt*) in that one and the other is confounded and indistinct. Indeed, just like he who apprehends a genus does not yet apprehend a species distinctly, but only in potency, so, (too), he who apprehends a house does not yet distinguish (its) parts. Whence, since a whole should be known priorly in respect of us according to the *ratio* of confounding (*ratione confusionis*), the same *ratio* belongs to one whole and to the other. However, *to be composed* is not common to one whole and to the other; whence, it is manifest that he clearly (*signanter*) said, above, *confounded*, and not *composite*.

**(b)** He posits another sign concerning the integral intelligible whole.<sup>34</sup> Thus, in some mode, the (name, < τὰ ὀνόματα) defined (*definitum*) is related to those (parts of the *ratio*, < πρὸς τὸν λόγον) that define [it] (*definientia*) as an integral whole (► 13.16), insofar as those (parts of the *ratio*) that define (the name) are in act in the (name) defined. Yet, he who apprehends a name—such as *man* or *circle*—does not immediately (*statim*) distinguish the principles that define [it] (*principia definientia*). Whence, a name is as some whole, and indistinct, but (its) definition (< ὁ... ὀρισμὸς αὐτοῦ) distinctly posits the principles of the (name) defined (< διαίρει εἰς τὰ καθ' ἕκαστα).

This would seem to be contrary to what he said above; for the defining (parts) seem to be more universal, which he priorly said that are more knowable to us.<sup>35</sup> Moreover, if the (name) defined should be more knowable to us than the defining (parts), the (name)

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<sup>33</sup> *In Physic.* 1, l. 1, n. 9: “Videtur autem haec probatio inefficax, quia utitur *toto* et *parte* et *comprehensione* aequivoce. Dicendum est autem quod totum integrale et universale conveniunt in hoc, quod utrumque est confusum et indistinctum. Sicuti enim qui apprehendit genus, non apprehendit species distincte sed in potentia tantum, ita qui apprehendit domum, nondum distinguit partes: unde cum ratione confusionis totum sit prius cognitum quoad nos, eadem ratio est de utroque toto. Esse autem compositum non est commune utrique toti: unde manifestum est quod signanter dixit [Philosophus] supra *confusa*, et non *composita*.”

<sup>34</sup> *In Physic.* 1, l. 1, n. 10 (cf. ARISTOTLE, *Physica* A.1, 184a26–b12): “ponit [Philosophus] aliud signum de toto integrali intelligibili. Definitum enim se habet ad definientia quodammodo ut totum integrale, in quantum actu sunt definientia in definito; sed tamen qui apprehendit nomen, ut puta *hominem* aut *circulum*, non statim distinguit principia definientia; unde nomen est sicut quoddam totum et indistinctum, sed definitio *dividit in singularia*, idest distincte ponit principia definiti.”

<sup>35</sup> *In Physic.* 1, l. 1, n. 10: “Videtur autem hoc esse contrarium ei quod supra dixit; nam definientia videntur esse universaliora, quae dixit prius esse nota nobis. Item si definitum esset notius nobis quam definientia, non notificaretur nobis definitionem: nihil enim notificatur nobis nisi ex magis notis nobis. Sed dicendum quod definientia secundum se sunt prius nota nobis quam definitum; sed prius est notum nobis definitum, quam quod talia sint definientia ipsius: sicut prius sunt nota nobis animal et rationale quam homo; sed prius est nobis notus homo confuse, quam quod animal et rationale sint definientia ipsius.”

defined would not be made known to us by the definition; for something is made known to us only from what is more known to us. However, it is to be said that the defining (parts) according to themselves are known to us before the (name) defined; but the (name) defined is priorly known to us than that such (parts of the *ratio*) should be the ones that define it (*definiencia ipsius*). For example, *animal* and *rational* are known to us prior to our knowing *man*; but we know *man* confoundedly before we know that *animal* and *rational* should be *man's* defining (parts).

(c) He posits a third sign taken from the more universal sensible.<sup>36</sup> Thus, just like the more universal intelligible is priorly knowable to us according to intellect—as *animal* (is priorly knowable to us according to intellect) than *man*—, so, (too), the more common sensible is priorly knowable to us according to sense—as *this* animal (is priorly knowable to us according to sense) than *this* man.

And I call *prior according to sense* both (that which is prior) according to **place** and (that which is prior) according to **time**.<sup>37</sup> According to **place**, indeed, because when someone is seen from afar we priorly perceive that it is a body than that it is an animal; (we) priorly (perceive) the latter than that it is a man; and, lastly, (we perceive) that it should be Socrates.

Likewise, according to **time**, a child (more) priorly apprehends *this* as some man than as *this man*, who is Plato, who is his father.<sup>38</sup> And this is what ARISTOTLE says, (that) children first call all men *father*, and all women *mother*, but they later know each one determinately. Wherefrom, it is manifestly shown that we priorly know something under confounding than distinctly.

#### 49.6. How All Philosophers Posited Contraries to Be Principles

ARISTOTLE shows how the philosophers that preceded him differed in positing principles to be contraries.<sup>39</sup> For some of them, reasonably positing (them), took the prior contraries

<sup>36</sup> *In Physic.* 1, l. 1, n. 11: “ponit [Philosophus] tertium signum sumptum ex universaliori sensibili. Sicut enim universalis intelligibile est prius notum nobis secundum intellectum, ut puta animal homine, ita communius sensibile est prius notum nobis secundum sensum, ut puta hoc animal quam hic homo.”

<sup>37</sup> *In Physic.* 1, l. 1, n. 11: “Et dico prius secundum sensum et secundum locum et secundum tempus. Secundum locum quidem, quia cum aliquis a remotis videtur, prius percipimus ipsum esse corpus quam esse animal, et hoc prius quam quod sit homo, et ultimo quod sit Socrates.”

<sup>38</sup> *In Physic.* 1, l. 1, n. 11 (cf. ARISTOTLE, *Physica* A.1, 184b12–14): “Et similiter secundum tempus puer prius apprehendit hunc ut quendam hominem, quam ut hunc hominem qui est Plato, qui est pater eius: et hoc est quod dicit, *pueri primum appellant omnes viros patres et feminas matres, sed posterius determinant*, idest determinate cognoscunt, unumquodque. Ex quo manifeste ostenditur quod prius cognoscimus aliquid sub confusione quam distincte.”

<sup>39</sup> *In Physic.* 1, l. 10, n. 6 (cf. ARISTOTLE, *Physica* A.5, 188b30–33): “ostendit [Philosophus] quomodo praedicti philosophi se habebant in ipsa positione. [...] primo ostendit quomodo differebant in ponendo principia esse contraria [...]. Dicit ergo primo quod philosophi, ponentes principia esse contraria, dupliciter differebant. Primo quidem quia aliqui eorum rationabiliter ponentes, accipiebant pro principiis

(as) principles, while others, less carefully considering (the question), took posterior contraries as principles. And of those who took prior contraries, some directed their attention to those (contraries) that are more knowable (*notiora* = γνώριμα; or, more known) according to *ratio* (*secundum rationem* < κατὰ τὸν λόγον γνώριμον, or according to reason), while some (others directed their attention) to those (principles) that are more knowable according to sense (*secundum sensum* < κατὰ τὴν αἴσθησιν).

Or, it can be said that the reason of the former difference is assigned through the latter difference.<sup>40</sup> For those (things) that are more knowable according to *ratio* are prior simply, while those that are more knowable according to sense are posterior simply and prior in respect to us (*priora quoad nos*). And it is manifest that principles must be first (► 8.3); whence, those who judged the prior according to that which is more knowable to reason posited simply prior contrary principles, while those who judged the prior according to that which is more knowable to sense, posited simply posterior (contrary) principles.

ARISTOTLE shows in what mode there is also some agreement in the difference of the aforesaid opinions.<sup>41</sup> He concludes from the aforesaid that, in some mode, the ancient philosophers said (i.e., posited) the same principles and in some mode (they posited) diverse (principles): diverse, indeed, insofar as they adopted diverse contraries of diverse (modes of knowing), as has been said; the same, on the other hand, according to analogy (< ἢ ἀνάλογον): that is, (according to) proportion, since the principles accepted by all have the same proportion in three modes:

1. Whatever principles are taken by them are related to each other as **contraries** (< ἐκ τῆς αὐτῆς συστοιχίας, lit., *from the same columns*, i.e., they took diverse principles from the same series of contrary pairs, such as *odd* and *even*, *one* and *many*, *right* and *left*).<sup>42</sup>

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priora contraria; alii vero minus provide considerantes, accipiebant posteriora contraria ut principia. Et eorum qui accipiebant priora contraria, quidam attendebant ad ea quae erant notiora secundum rationem; quidam vero ad ea quae sunt notiora secundum sensum.”

<sup>40</sup> *In Physic.* 1, l. 10, n. 6: “Vel potest dici quod per hanc secundam differentiam assignatur ratio primae differentiae: nam ea quae sunt notiora secundum rationem, sunt priora simpliciter; quae vero sunt notiora secundum sensum, sunt posteriora simpliciter et priora quoad nos. Manifestum est autem quod oportet principia esse prima. Unde illi qui iudicabant prius secundum id quod est notius rationi, ponebant principia contraria priora simpliciter: qui vero iudicabant prius secundum id quod est notius sensui, ponebant principia posteriora simpliciter.”

<sup>41</sup> *In Physic.* 1, l. 10, n. 7 (cf. ARISTOTLE, *Physica* A.5, 188b36–189a1): “ostendit [Philosophus] quomodo in differentia praedictarum opinionum est etiam quaedam convenientia, concludens ex praedictis quod quodammodo antiqui philosophi dixerunt eadem principia et quodammodo altera: altera quidem secundum quod diversi diversa contraria assumpserunt, sicut dictum est; eadem vero secundum *analogiam*, idest proportionem, quia principia accepta ab omnibus habent eandem proportionem. Et hoc tripliciter.”

<sup>42</sup> *In Physic.* 1, l. 10, n. 7 (cf. ARISTOTLE, *Physica* A.5, 188a1–2): “Primo quidem quia quaecumque principia accipiuntur ab eis, se habent ad invicem ut contraria: et hoc est quod dicit, quod omnes accipiunt principia ex *eadem coordinatione*, scilicet contrariorum; omnes enim accipiunt contraria pro principiis, sed tamen diversa. Nec est mirum si ex coordinatione contrariorum diversa accipiantur principia; quia

For all accepted contraries for principles—but diverse (contraries). Nor is it astonishing if diverse principles should be taken from a coordination of contraries, since among the contraries (< τῶν ἐναντίων) some are **containers** (*continentia* < τὰ... περιέχει), as prior and more common, and some (others) are **contained** (*continentia* < τὰ... περιέχεται), as posterior and less common. This is, hence, one mode in which (the ancient philosophers) similarly say (that contraries are principles), insofar as all (of them) accept principles from an order of contraries.

2. Whatever principles are taken by them, one of them is related as **better and** the other as **worse**.<sup>43</sup> For example, concord, full, or hot, as better; discord, empty, cold, as worse; and in this way, it is to be considered in the others. This is so because, always, one of (two) contraries has admixed privation, for the principle of contrariety is the opposition of privation and habit (i.e., having, possession; ►43.7).

3. All (philosophers) accept **more knowable** principles.<sup>44</sup> However, some (are more knowable) according to reason, while some (others are more knowable) according to sense. Thus, since reason is of universals (< ὁ... λόγος τοῦ καθόλου), while sense (is) of particulars (< ἡ... αἴσθησις τοῦ κατὰ μέρος), universals are more knowable according to reason, as the great and the small (< τὸ... μέγα καὶ τὸ μικρὸν κατὰ τὸν λόγον); singulars, on the other hand, (are more knowable) according to sense, as the sparse and the dense (< τὸ... μανὸν καὶ τὸ πυκνὸν κατὰ τὴν αἴσθησιν).

Wherefrom, ARISTOTLE concludes that principles are contraries (►43).<sup>45</sup>

#### 49.7. The Order of the *Ratios* of Being, Non-Being, Division, One, and Multitude

According to sense or to imagination, composite things are prior to simple things; the whole is prior to its parts; and undivided things are prior to divided things.<sup>46</sup> On the other

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inter contraria quaedam sunt continentia, ut priora et communiora, et quaedam contenta, ut posteriora et minus communia. Iste est igitur unus modus quo similiter dicunt, in quantum omnes accipiunt principia ex ordine contrariorum.”

<sup>43</sup> *In Physic.* 1, l. 10, n. 7 (cf. ARISTOTLE, *Physica* A.5, 188a2–4): “Alius modus in quo conveniunt secundum analogiam est, quod quaecumque principia accipiuntur ab eis, unum eorum se habet ut melius et aliud ut peius; sicut concordia vel plenum vel calidum ut melius, discordia vero vel vacuum vel frigidum ut peius; et sic est considerare in aliis. Et hoc ideo est, quia semper alterum contrariorum habet privationem admixtam: principium enim contrarietatis est oppositio privationis et habitus, ut dicitur in X *Metaphys.*”

<sup>44</sup> *In Physic.* 1, l. 10, n. 7 (cf. ARISTOTLE, *Physica* A.5, 188a4–9): “Tertio modo conveniunt secundum analogiam in hoc quod omnes accipiunt principia notiora: sed quidam notiora secundum rationem, quidam vero secundum sensum. Cum enim ratio sit universalis, sensus vero particularis, universalis sunt notiora secundum rationem, ut magnum et parvum; singularia vero secundum sensum, ut rarum et densum, quae sunt minus communia.”

<sup>45</sup> *In Physic.* 1, l. 10, n. 7 (cf. ARISTOTLE, *Physica* A.5, 188a9–10): “Et sic ultimo quasi epilogando concludit [Philosophus] quod principaliter intendit, scilicet quod principia sunt contraria.”

<sup>46</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “unum in intellectu est prius quam multitudo, quamvis secundum sensum vel imaginationem sit e converso, ut dicit Philosophus; quia sic composita priora sunt simplicibus et divisa

hand, *one* is prior to *multitude* naturally, in understanding, and according to *ratio*, although according to sense or to imagination it is conversely, as ARISTOTLE says.

Since *one* conveys a negation only in *ratio* (and not in thing), while *multitude* conveys a real negation—according to which thing is distinguished from thing—, *one* is related to positing (*ad positionem*) according to the thing (*secundum rem*) more than multitude.<sup>47</sup> On the other hand, privation is posterior (to habit or possession, just like negation is posterior to affirmation) according to *ratio*, since its opposite (i.e., habit or possession), by which it is defined, is in its understanding (i.e., *privation* can only be understood and defined by negating *possession*; and negating *possession* is posterior to positing it).

Seemingly, then, the priority of *multitude* over *one* according to sense or to imagination does not suffice for *one* to be opposed to *multitude* privatively—unless perhaps this is referred only to the *ratio* of the name (i.e., according to the mode of signifying), insofar as the name *one* signifies privatively and the name *multitude* signifies positively (i.e., by positing), for names are imposed by us according as we know things; whence, for something to be signified by (the mode of) privation, it suffices that it be posterior in whatever way in our cognition, even if this does not suffice for the thing itself to be privative unless it is posterior according to *ratio*.<sup>48</sup>

Therefore, it is better to say that *division* is the cause of *multitude* and is prior to *multitude* according to understanding, while *one* is said privatively in respect of *division*—since it is *undivided being*—but not in respect of *multitude*.<sup>49</sup> Whence, *division* is prior to *one*

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indivisus." *De potentia*, q. 9 a. 7 ad 15: "secundum Philosophum, multitudo est prior uno secundum sensum, sicut totum partibus et compositum simpliciter; sed unum est prius multitudine naturaliter et secundum rationem."

<sup>47</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: "unum non importat negationem nisi in ratione. Unde secundum rem magis se habet ad positionem quam multitudo, in qua importatur realis negatio, secundum quam res a re distinguitur." *De potentia*, q. 9 a. 7 ad 15: "privatio est posterior secundum rationem, cum in intellectu privationis sit eius oppositum, per quod definitur."

<sup>48</sup> *De potentia*, q. 9 a. 7 ad 15: "Hoc autem [sc., *multitudo est prior uno secundum sensum, sicut totum partibus et compositum simpliciter; sed unum est prius multitudine naturaliter et secundum rationem*] non videtur sufficere ad hoc quod unum opponatur multitudini privative [...] nisi forte hoc referatur solum ad nominis rationem, prout hoc nomen unum significat privative, nomen vero multitudinis positive; nomina enim imponuntur a nobis secundum quod cognoscimus res. Unde ad hoc quod aliquid significetur per nomen ut privatio, sufficit qualitercumque sit posterius in nostra cognitione; quamvis hoc non sufficiat ad hoc quod res ipsa sit privativa, nisi sit posterius secundum rationem."

<sup>49</sup> *De potentia*, q. 9 a. 7 ad 15: "Et ideo potest melius dici, quod divisio est causa multitudinis, et est prior secundum intellectum quam multitudo; unum autem dicitur privative respectu divisionis, cum sit ens indivisum, non autem respectu multitudinis. Unde divisio est prior, secundum rationem, quam unum; sed multitudo posterius." *STh I*, q. 16 a. 4 ad 2: "secundum hoc est aliquid prius ratione, quod prius cadit in intellectu." The full order, as explained here, is: **(1)** being, **(2)** non-being, **(3)** division, **(4)** one, and **(5)** multitude. However, St. Thomas offers various—more or less detailed—accounts, which we merge here. Thus, *De potentia*, q. 9 a. 7 ad 15: "primum enim quod in intellectum cadit, est [1] ens; secundum vero est [2] negatio entis; ex his autem duobus sequitur tertio [3] intellectus divisionis [...]; quarto autem sequitur in intellectu [4] ratio unius [...]; quinto autem sequitur [5] intellectus multitudinis." *In Metaph.* 4, l. 3, §566: "Primo igitur intelligitur [1] ipsum ens, et ex consequenti [2] non ens, et per consequens [3]



according to *ratio*; but *multitude* is posterior (to both *division* and *one*). Indeed, that is prior in *ratio* which falls prior in understanding. Wherefrom, the order of these *ratios* is thus:

1. That which falls first in understanding—i.e., what is apprehended by the intellect first, what falls first in the apprehension of the intellect, what is understood first—is *being* itself (*ipsum ens*).<sup>50</sup> And (the *ratio* of) **being** (*ens*) is *that which is* (therefore, this is the first *ratio* of all).

2. Thereafter and consequently, what falls in the intellect is the negation of *being*: i.e., **non-being** (*non ens*, i.e., *that which is not*).<sup>51</sup> Indeed, nothing is opposed to the *ratio* of *being* except (for the *ratio* of) *non-being*: that is opposed to the *ratio* of *being* which takes away (*tollit*) the *ratio* of *being*; and the *ratio* of *being* is taken away by its opposite, just as the *ratio* of *man* (i.e., of *human being*) is taken away by those that are opposite to it (e.g., *non-man* takes away the *ratio* of *man*) or to its particulars (e.g., *non-rational*, which is the negation of the specific difference of *man*, also takes away the *ratio* of *man*).

3. Thereafter and consequently, the understanding of **division** falls in the intellect from (the *ratios* of) *being* and *non-being* thus: *being* is understood; and then, it is understood *not to be that being*; whence, the apprehension in understanding follows: *it is divided from it*—that is, *this being is not that being*.<sup>52</sup>

4. Thereafter and consequently, follows in understanding the *ratio* of **one**, which deprives of (*privat*) division insofar as *this being* is understood *not to be divided in itself*—that is, we understand *one* to be a *being* in which there is no distinction according to *being* and

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divisio, et per consequens [4] unum [...], et per consequens [5] multitudo.” Sometimes, St. Thomas omits the details and simplifies the account, e.g., *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “Primum enim quod cadit in apprehensione intellectus, est [1] ens et [2] non ens: et ista sufficiunt ad definitionem [4] unius [...]; et tunc definit [5] multitudinem.” *STh* I, q. 11 a. 2 ad 4: “primo cadit in intellectu [1] ens; [...] secundo apprehendimus [3] divisionem; tertio, [4] unum; quarto, [5] multitudinem.”

<sup>50</sup> *STh* I, q. 16 a. 4 ad 2: “Intellectus autem per prius apprehendit ipsum ens.” *In Metaph.* 4, l. 3, §566: “Primo igitur intelligitur ipsum ens.” *De potentia*, q. 9 a. 7 ad 15: “primum enim quod in intellectum cadit, est ens.” *STh* I, q. 11 a. 2 ad 4: “quod primo cadit in intellectu ens.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “Primum enim quod cadit in apprehensione intellectus, est ens.” *In De ebdo.*, l. 2: “id quod est, sive ens.” *In Physic.* 1, l. 3 n. 2 (cf. ARISTOTLE, *Physica* A.2, 185a21): “*id quod est* [τὸ ὄν], idest ens.”

<sup>51</sup> *De potentia*, q. 9 a. 7 ad 15: “secundum vero [quod in intellectum cadit] est negatio entis.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “Primum enim quod cadit in apprehensione intellectus, est ens et non ens.” *In De Trin.*, q. 4 a. 1 co., 121–122: “quod primo sint intelligenda ens et non ens.” *In Metaph.* 4, l. 3, §566: “et ex consequenti [intelligitur] non ens.” *STh* I, q. 25 a. 3 co.: “Nihil autem opponitur rationi entis, nisi non ens.” *ScG* 2, 25 n. 11: “contra rationem entis est quod entis rationem tollit. Tollitur autem ratio entis per suum oppositum: sicut ratio hominis per opposita eius vel particularum ipsius. Oppositum autem entis est non ens.”

<sup>52</sup> *In Metaph.* 4, l. 3, §566: “et per consequens divisio.” *De potentia*, q. 9 a. 7 ad 15: “ex his autem duobus [sc., *ens* et *negatio entis*] sequitur tertio intellectus divisionis (ex hoc enim quod aliquid intelligitur ens, et intelligitur non esse hoc ens, sequitur in intellectu quod sit divisum ab eo).” *STh* I, q. 11 a. 2 ad 4: “divisio cadit in intellectu ex ipsa negatione entis.” *In De Trin.*, q. 4 a. 1 co., 120–122: “ut talis ordo originis [...] intelligatur, quod primo sint intelligenda ens et non ens, ex quibus ipsa prima diuisa constituuntur.” *STh* I, q. 11 a. 2 ad 4: “secundo, quod hoc ens non est illud ens, et sic secundo apprehendimus divisionem.”

*non-being*.<sup>53</sup> And *one* conveys the privation of *division*, but not the division that is according to quantity, for this division is determined to one particular genus of being, and cannot fall in the definition of *one*; rather, the *one* that is convertible with being involves the privation of formal division that comes to be through opposites, whose first root is the opposition of affirmation and negation: for those are divided—one from another—which are related in such a way that *this* is not *that*. And thus, *division* is prior to *unity* not simply, but according to the *ratio* of our apprehension. Thus, *distinction* is opposed to *unity* because *one* adds (the *ratio* of) *non-division* over the *ratio* of *being*. Therefore, according to *ratio*, *distinction* is prior to both *one* and *multitude*.

5. Thereafter and consequently, follows the understanding of **multitude** or **many** insofar as it is understood that *this being* is divided from *another* (being), and that one and the other is *one* in itself.<sup>54</sup> Whenever some things are understood to be divided, *multitude* is understood only if whichever of the things divided is understood to be *one*. Hence, things distinct by *being* and *non-being* only have the *ratio* of *multitude* after the intellect attributes the intention of *unity* to one and to the other; and then it defines **multitude** (as) *that which is* (composed) *from ones, of which one is not the other*. Therefore, *one* falls in the definition of *multitude*, but not conversely. And thus, it is evident that the definition of *one* and *multitude* is not circular.

<sup>53</sup> *In Metaph.* 4, l. 3, §566: “et per consequens unum quod divisionem privat.” *STh* I, q. 11 a. 2 ad 4: “tertio, [cedit in intellectu] unum.” *De potentia*, q. 9 a. 7 ad 15: “quarto autem sequitur in intellectu ratio unius, prout scilicet intelligitur hoc ens non esse in se divisum.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “et ista [sc., *ens et non ens et ejus divisio*] sufficiunt ad definitionem unius, secundum quod intelligimus unum esse ens, in quo non est distinctio per ens et non ens.” *In Metaph.* 4, l. 3, §566: “unum importat privationem divisionis, non quidem divisionis quae est secundum quantitatem, nam ista divisio determinatur ad unum particulare genus entis, et non posset cadere in definitione unius. Sed unum quod cum ente convertitur importat privationem divisionis formalis quae fit per opposita, cuius prima radix est oppositio affirmationis et negationis. Nam illa dividuntur adinvicem, quae ita se habent, quod hoc non est illud.” *STh* I, q. 11 a. 2 ad 4: “oportet quod divisio sit prius unitate, non simpliciter, sed secundum rationem nostrae apprehensionis.” *In De div. nom.*, c. 4, l. 6: “unum addit supra rationem entis, indivisionem: est enim unum, ens indivisum; unde unitati distinctio sive discretio opponitur.” *STh* I, q. 30 a. 3 ad 3: “unum non est remotivum multitudinis, sed divisionis, quae est prior, secundum rationem, quam unum vel multitudo.”

<sup>54</sup> *STh* I, q. 11 a. 2 ad 4: “quarto, [cedit in intellectu] multitudinem.” *In De Trin.*, q. 4 a. 1 co., 122–123: “ac per hoc [sc., *prima diuisa*] plura [constituuntur].” *De potentia*, q. 9 a. 7 ad 15: “quinto autem sequitur intellectus multitudinis, prout scilicet hoc ens intelligitur divisum ab alio, et utrumque ipsorum esse in se unum. Quantumcumque enim aliqua intelligantur divisa, non intelligetur multitudo, nisi quodlibet divisorum intelligatur esse unum.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “et haec, scilicet distincta per ens et non ens, non habent rationem multitudinis, nisi postquam intellectus utrique attribuit intentionem unitatis; et tunc definit multitudinem id quod est ex unis, quorum unum non est alterum; et sic in definitione multitudinis cedit unitas, licet non e converso.” *In Metaph.* 4, l. 3, §566: “et per consequens multitudo, in cuius ratione cedit divisio, sicut in ratione unius indivisio; quamvis aliqua divisa modo praedicto rationem multitudinis habere non possint nisi prius cuilibet divisorum ratio unius attribuat.” *STh* I, q. 11 a. 2 ad 4: “multitudo, etiam secundum rationem, consequenter se habet ad unum, quia divisa non intelligimus habere rationem multitudinis, nisi per hoc quod utrique divisorum attribuimus unitatem. Unde unum ponitur in definitione multitudinis, non autem multitudo in definitione unius. Sed divisio cedit in intellectu ex ipsa negatione entis.” *In Sent.* 1, d. 24 q. 1 a. 3 ad 2: “et ideo in definitione unius non cedit multitudo, sed illud quod est prius secundum intellectum unitate.” *De potentia*, q. 9 a. 7 ad 15: “Et sic etiam patet quod non erit circulus in definitione unius et multitudinis.”

Indeed, although *one* involves an implicit privation, it does not involve the privation of *multitude*.<sup>55</sup> Otherwise, since privation is naturally posterior to that of which there is privation, it would follow that *one* would be naturally posterior to *multitude*; and that *multitude* would be posited in the definition of *one*. For privation can only be defined by its opposite: for example, “What is blindness? The privation of sight.” Whence, since one is posited in the definition of multitude—for **multitude** is *an aggregation of units*—, a circular definition would follow.

Wherefrom, according to ARISTOTLE, whosoever does not understand some *one* thing, understands nothing.<sup>56</sup> Indeed, something is *one* because it is undivided and distinct from others. Whence, whosoever knows something, necessarily knows its distinction from others. Moreover, since the first *ratio* of distinction is in affirmation and negation, whosoever knows affirmation, necessarily knows negation. And finally, since privation is but a negation having a subject (►42.1), and of (two) contraries, one is always the privation of the other, hence, because something is known, its privation and its contrary are known.

#### **49.8. Abstraction and the Principles that Respond to the Operations of the Intellect**

We must now consider in what mode the intellect should be able to abstract according to its operation.<sup>57</sup> Hence, it is to be known that, according to ARISTOTLE, there is a twofold operation of the intellect (►19.1): one that is called *understanding of indivisibles*, whereby it knows of any one (thing) *what* it is; and another one whereby it composes and divides, forming an affirmative or a negative enunciation. And to these two operations respond two (principles) that are in things (*in rebus*).

**1. The first operation** (i.e., the understanding of indivisibles) has a regard to (*respicit*) **the nature itself of the thing**, according to which the thing understood obtains some

<sup>55</sup> *In Metaph.* 4, l. 3, §566: “quamvis unum importet privationem implicitam, non tamen est dicendum quod importet privationem multitudinis: quia cum privatio sit posterior naturaliter eo cuius est privatio, sequeretur quod unum esset posterius naturaliter multitudine. Item quod multitudo poneretur in definitione unius. Nam privatio definiri non potest nisi per suum oppositum, ut quid est caecitas? Privatio visus. Unde cum in definitione multitudinis ponatur unum (nam multitudo est aggregatio unitatum), sequitur quod sit circulus in definitionibus.”

<sup>56</sup> *De veritate*, q. 2 a. 15 co., 43–58: “secundum Philosophum in IV Metaphysicae, qui non intelligit aliquid unum nihil intelligit; per hoc autem aliquid est unum quod est in se indivisum et ab aliis distinctum; unde oportet quod quicumque cognoscit aliquid quod sciat distinctionem eius ab aliis; prima autem ratio distinctionis est in affirmatione et negatione; et ideo oportet quod quicumque scit affirmationem cognoscat negationem; et quia privatio nihil aliud est quam negatio subiectum habens, ut dicitur in IV Metaphysicae, et «alterum contrariorum semper est privatio», ut dicitur in eodem <et> in I Physicorum, inde est quod ex hoc ipso quod cognoscitur aliquid cognoscitur eius privatio et eius contrarium.”

<sup>57</sup> *In De Trin.*, q. 5 a. 3 co., 87–97: “oportet <uidere> qua<liter> intellectus secundum suam operationem abstraere possit. Sciendum est igitur quod secundum Philosophum in III De anima duplex est operatio intellectus: una que dicitur intelligentia indivisibilium, qua cognoscit de unoquoque quid est, alia uero qua componit et diuidit, scilicet enuntiationem affirmatiuam uel negatiuam formando. Et hee quidem due operationes duobus que sunt in rebus respondent.”

degree among beings, whether it should be a complete thing, as some whole, or an incomplete thing, as a part or an accident.<sup>58</sup>

According to ARISTOTLE, the things understood are the natures themselves of the things that are in the singulars.<sup>59</sup> These (natures) fall under the apprehension of sense insofar as they are in singulars. The intellect, in turn, apprehends such natures absolutely, and attributes to them some intelligible intentions: to wit, that it is a genus or a species. These intentions are only in the intellect, and not outside; whence, only the intellect knows them.

2. The second operation (i.e., whereby the intellect composes and divides) has a regard to the being itself of the thing (*ipsum esse rei*), which results from the congregation of the principles of the thing in composites; or accompanies (*concomitatur*) the simple nature itself of the thing, as in simple substances.<sup>60</sup>

Since the truth of the intellect is (had) from its being conformed to the thing, it is evident that, according to this second operation, the intellect cannot truly abstract that which is conjoined according to thing (*secundum rem*).<sup>61</sup> Indeed, in abstracting, it would be signified that there is a separation according to the being itself of the thing (*secundum ipsum esse rei*). For example, if I abstract *man* from *whiteness* saying, “man is not white,” I signify that there is a separation in the thing; whence, if according to thing, man and whiteness should not be separated, the understanding will be false. Therefore, the intellect can truly abstract by this operation only those that are separated according to thing: for example, when we say, “a man is not an ass.”

#### 49.9. Requirements for Abstraction

According to the first operation, (the intellect) can abstract those (principles) that are not separated according to thing (*secundum rem*): not all, however, but some. Indeed, since

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<sup>58</sup> *In De Trin.*, q. 5 a. 3 co., 97–101: “Prima quidem operatio respicit ipsam naturam rei, secundum quam res intellecta aliquem gradum in entibus obtinet, siue sit res completa, ut totum aliquod, siue res incompleta, ut pars uel accidens.”

<sup>59</sup> *In De sensu* 1, c. 14, 89–97 (cf. ARISTOTLE, *De sensu* 6, 445b15–17): “secundum Aristotilem autem res intellecte sunt ipse nature rerum que sunt in singularibus, que quidem secundum quod in singularibus sunt cadunt sub apprehensione sensus, intellectus autem apprehendit huiusmodi naturas absolute et attribuit eis quasdam intentiones intelligiles, scilicet esse genus uel speciem; que quidem intentiones sunt solum in intellectu, non autem exterius, unde solus intellectus ea cognoscit.”

<sup>60</sup> *In De Trin.*, q. 5 a. 3 co., 101–105: “Secunda uero operatio respicit ipsum esse rei; quod quidem resultat ex congregatione principiorum rei in compositis, uel ipsam simplicem naturam rei concomitatur, ut in substantiis simplicibus.”

<sup>61</sup> *In De Trin.*, q. 5 a. 3 co., 105–118: “Et quia ueritas intellectus est ex hoc quod conformatur <rei>, patet quod secundum hanc secundam operationem intellectus non potest uere abstraere quod secundum rem coniunctum est; quia in abstraendo significaretur esse separatio secundum ipsum esse rei: sicut si abstrao hominem ab albedine dicendo ‘homo non est albus’, significo esse separationem in re, unde si secundum rem homo et albedo non sint separata, erit intellectus falsus. Hac ergo operatione intellectus uere abstraere non potest nisi ea que sunt secundum rem separata, ut cum dicitur ‘homo non est asinus’.”

any one thing should be intelligible insofar as it is in act, the nature or quiddity itself of the thing must be understood either: **(a)** insofar as it is some act, as happens concerning the forms themselves, and (concerning) simple substances; or **(b)** according to that which is its act, as composite substances (are understood) through their forms; or **(c)** according to that which belongs to it instead of an act, as the first matter (is understood) through (its) relation to form, and the vacuum (is understood) through the privation of the (thing) located. And this (i.e., a corresponding act) is that from which any one nature receives its *ratio*.<sup>62</sup> Therefore:

1. When a nature itself **has an order and dependence** to something else according to this (act) whereby the *ratio* of a nature is constituted and through which the nature itself is understood, then it is evident (*constat*) that the nature cannot be understood without that other (thing), whether: **(a)** it should be conjoined by that conjunction whereby a part is conjoined to a whole, as *foot* cannot be understood without the understanding of *animal*, since that from which *foot* has the *ratio* of *foot* depends upon that from which an animal is an animal; or **(b)** it should be conjoined by the mode in which a form is conjoined to matter, or as a part (is conjoined) to a co-part, or (as) an accident (is conjoined) to a subject, as *snub* cannot be understood without *nose* (► 18.16); or, even, **(c)** whether they should be separated according to thing, as *father* cannot be understood without *son*, even though these relations should be found in diverse things.<sup>63</sup>

2. On the other hand, **if one should not depend upon the other** according to that which constitutes the *ratio* of the nature, then one can be abstracted from the other by the intellect, such that it would be understood without it not only if they should be separated according to thing, as man and stone (are separated according to thing, can be abstracted one from the other, and can be understood one without the other), but even if they should be conjoined according to thing, whether: (► 49.10) they should be conjoined by the mode in which form is conjoined to matter, and accident (is conjoined) to subject, as *whiteness*

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<sup>62</sup> *In De Trin.*, q. 5 a. 3 co., 119–132: “Set secundum primam operationem potest abstraere ea que secundum rem separata non sunt, non tamen omnia, set aliqua. Cum enim unaqueque res sit intelligibilis secundum quod est in actu, ut dicitur in IX Metaphisice, oportet quod ipsa natura siue quidditas rei intelligatur uel secundum quod est actus quidam, sicut accidit de ipsis formis et substantiis simplicibus, uel secundum id quod est actus eius, sicut substantie composite per suas formas, uel secundum id quod est ei loco actus, sicut materia prima per habitudinem ad formam et uacuum per priuationem locati; et hoc est illud ex quo unaqueque natura suam rationem sortitur.”

<sup>63</sup> *In De Trin.*, q. 5 a. 3 co., 132–147: “Quando ergo secundum hoc per quod constituitur ratio nature et per quod ipsa natura intelligitur, natura ipsa habet ordinem et dependentiam ad aliquid aliud, tunc constat quod natura illa sine illo alio intelligi non potest, siue sint coniuncta coniunctione illa qua pars coniungitur toti, sicut pes non potest intelligi sine intellectu animalis, quia illud a quo pes habet rationem pedis dependet ab eo a quo animal est animal, siue sint coniuncta per modum quo forma coniungitur materie, uel ut pars comparti uel accidens subiecto, sicut simum non potest intelligi sine naso; siue etiam sint secundum rem separata, sicut pater non potest intelligi sine intellectu filii, quamuis iste relationes inueniantur in diuersis rebus.”

can be understood without *man*, and conversely; or (►49.11) they should be conjoined by that conjunction whereby part and whole are conjoined, as *letter* can be understood without *syllable*, but not conversely; and *animal* (can be understood) without *foot*, but not conversely.<sup>64</sup>

#### 49.10. Abstraction of Form from Matter

A form can be abstracted from some matter if the *ratio* of (its) essence does not depend upon such matter (►49.9, ¶2); and a form cannot be abstracted by the intellect from that matter upon which the *ratio* of its essence depends (►49.9, ¶1).<sup>65</sup> Whence, since all accidents should be compared to the subjected substance as form to matter, and the *ratio* of whatsoever accident should depend upon a substance, it is impossible for some such form to be separated from matter.

However, accidents fall upon substance in some order (►47.6).<sup>66</sup> For **quantity**, which immediately inheres in substance, falls upon it first; thereafter, **sensible qualities**, such as white and black, hot and cold, which are founded on quantity; thereafter, **affections** and **motion**. And (if) the posterior (is) removed, the prior remains (►47.2). Whence, (if) sensible qualities (are) removed according to understanding (*secundum intellectum*), continuous quantity still remains in the intellect. Whence, quantity can be understood (to be) in a subjected matter before sensible qualities should be understood in it; wherefrom, matter is said (to be) *sensible*. And thus, according to the *ratio* of its substance (i.e., essence), quantity does not depend upon sensible matter: rather, (it depends) only upon intelligible matter. For (if) accidents (are) removed, substance remains in the intellect only comprehensible (i.e., no longer sensible), because sensitive potencies cannot reach as

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<sup>64</sup> *In De Trin.*, q. 5 a. 3 co., 147–158: “Si uero unum ab altero non dependeat secundum id quod constituit rationem nature, tunc unum potest ab altero abstrahi per intellectum ut sine eo intelligatur non solum si sint separata secundum rem, sicut homo et lapis, set etiam si secundum rem coniuncta sint, siue ea coniunctione qua pars et totum coniunguntur, sicut littera potest intelligi sine sillaba set non e conuerso, et animal sine pede set non e conuerso; siue etiam sint coniuncta per modum quo forma coniungitur materie et accidens subiecto, sicut albedo potest intelligi sine homine, et e conuerso.”

<sup>65</sup> *In De Trin.*, q. 5 a. 3 co., 180–188: “Forma autem illa potest a materia aliqua abstrahi, cuius ratio essentie non dependet a tali materia, ab illa autem materia non potest forma abstrahi per intellectum a qua secundum sue essentie rationem dependet; unde cum omnia accidentia comparentur ad substantiam subiectam sicut forma ad materiam, et cuiuslibet accidentis ratio dependeat ad substantiam, impossibile est aliquam talem formam a substantia separari.”

<sup>66</sup> *In De Trin.*, q. 5 a. 3 co., 189–202: “Set accidentia superueniunt substantie quodam ordine: nam primo aduenit ei quantitas, deinde qualitas, deinde passiones et motus. Vnde quantitas potest intelligi in materia subiecta antequam intelligantur in ea qualitates sensibiles, a quibus dicitur materia sensibilis; et sic secundum rationem sue substantie non dependet quantitas a materia sensibili, set solum a materia intelligibili: substantia enim remotis accidentibus non manet nisi intellectu comprehensibilis, eo quod sensitue potentie non pertingunt usque ad substantie comprehensionem. Et de huiusmodi abstractis est mathematica, que considerat quantitates et ea que quantitates consequuntur, ut figuras et huiusmodi.” *In De anima* 3, c. 2, 98–104: “manifestum est enim quod quantitas inmediate inheret substantie; qualitates autem sensibiles in quantitate fundantur, ut album et nigrum, calidum et frigidum; remoto autem posteriori, remanet prius; unde, remotis qualitatibus sensibilibus secundum intellectum, adhuc remanet quantitas continua in intellectu.”

far as the comprehension of substance. And mathematics—which considers quantities and those that follow upon quantities, such as figures, and so on—is of such abstracted (things).

Therefore, there are some forms that require matter under a determinate disposition of sensible qualities—and such are all the natural forms.<sup>67</sup> Hence, natural (things) involve (*concernunt*) sensible matter. On the other hand, there are some forms that do not require matter under a determinate disposition of sensible qualities, even though they require a matter that exists under quantity: for example, a triangle, a square, and so on. These are said (to be) *mathematical* (things), and they abstract from sensible matter, but not from intelligible matter, insofar as continuous quantity—abstracted from sensible quality—remains in (its) understanding. Wherefrom, it is evident that, just as natural (things) have a form in matter, so, too, (do) mathematical (things); and on account of this, the thing and the essence (of the thing) differ in natural as much as in mathematical (things; ► 13.13); whence, in both (kinds of things), many individuals are found under one species, as there are many men of one species, and multiple triangles under one species.

Since the mathematical body is said (to be an) *abstract body* (*corpus abstractum*), to say that a mathematical body is in sensible (things) is to say two opposites simultaneously, as ARISTOTLE says against some Platonists who posited this.<sup>68</sup> Nor does it follow, however, that it should be proper of those who abstract to be mistaken (*mendacium*) if a mathematical body should be in the intellect only, for the intellect that abstracts does not understand that some body is not in sensible (things): rather, it understands the same (sensible body) by not understanding (that it is) sensible, just as it would not be mistaken for someone to understand man by not understanding its risibility; for it would be mistaken

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<sup>67</sup> *In De anima* 3, c. 2, 104–123: “sunt ergo quedam forme que requirunt materiam sub determinata dispositione sensibilium qualitatum, et huiusmodi sunt omnes forme naturales et ideo naturalia concernunt materiam sensibilem; quedam uero forme sunt que non exingunt materiam sub determinata dispositione sensibilium qualitatum, tamen requirunt materiam sub quantitate existentem, sicut triangulus et quadratum et huiusmodi, et hec dicuntur mathematica et abstrahunt a materia sensibili, set non a materia intelligibili, in quantum in intellectu remanet continua quantitas abstracta a sensibili qualitate. Sic igitur patet quod, sicut naturalia habent formam in materia, ita et mathematica, et propter hoc tam in naturalibus quam in mathematicis differt res et quod quid est; unde in utrisque inveniuntur plura individua sub una specie: sicut enim sunt plures homines unius speciei, ita et plures trianguli sub una specie.”

<sup>68</sup> *De spirit. creat.*, a. 3 ad 14: “corpus mathematicum dicitur corpus abstractum; unde dicere corpus mathematicum esse in sensibilibus, est dicere duo opposita simul, ut Aristoteles argumentatur in III Metaph. contra quosdam Platonicos hoc ponentes. Nec tamen sequitur quod abstrahentium sit mendacium, si corpus mathematicum sit in intellectu tantum: quia non intelligit intellectus abstrahens corpus aliquod esse non in sensibilibus, sed intelligit ipsum, non intelligendo sensibilia; sicut si quis intelligat hominem, non intelligendo eius risibilitatem, non mentitur; mentiretur autem, si intelligeret hominem non esse risibilem. Dico tamen quod si corpus mathematicum esset in corpore sensibili, cum corpus mathematicum sit dimensionale, tantum pertineret ad genus quantitatis; unde non requireretur ad ipsum aliqua forma substantialis. Corpus autem quod est in genere substantiae, habet formam substantialem quae dicitur corporeitas, quae non est tres dimensiones, sed quaecumque forma substantialis ex qua sequuntur in materia tres dimensiones; et haec forma in igne est igneitas, in animali anima sensitiva, et in homine anima intellectiva.”

if he were to understand man not to be risible. However, I say that, since the mathematical body is dimensional, if the mathematical body should be in a sensible body, it would pertain only to the genus of quantity; whence, no substantial form would be required for it. However, the body that is in the genus of substance has a substantial form that is called *corporeity* (► 46.10, ¶1; 46.11), which is not (the same as) the three dimensions (► 46.10, ¶2), but whatever substantial form upon which follow three dimensions in matter. And this form is fire-ness in fire; the sensitive soul in an animal; and the intellective soul in man.

Therefore, as ARISTOTLE says, in mathematical (things), which are through abstraction (and) whose *ratio* abstracts from sensible matter, *straight* is had as *snub*.<sup>69</sup> That is, mathematical (things), like natural (things) too, have matter, for the straight is in a mathematical (thing), and the snub (is) in a natural (thing): thus, the *ratio* of *straight* is with *continuum*, just like the *ratio* of *snub* is with *nose*. And the continuum is intelligible matter, just like nose (is) sensible matter.

Since it is manifest that, in mathematical (things), the thing is other than the essence—for example, a straight (continuum) and the essence of the straight (i.e., straightness)—, it is necessary for (one faculty) to know the essence of those (things) and for another (faculty to know the straight thing) itself.<sup>70</sup>

For example, let us at present suppose that twoness (*dualitas* = δυάς) should be the essence of the straight line—for Plato posited that numbers were the species and quiddities of mathematical (things): the unit (would be the species and quiddity) of the point; twoness (would be the species and quiddity) of the straight line, and so on.<sup>71</sup> Therefore, it would be necessary for the soul either to know by another (faculty) the mathematical (things) themselves and (by another faculty) their quiddities, or (to know both) by the same (faculty, but) diversely had. Whence, just like it is shown through natural (things) that the intellect that knows the quiddities of natural (things) should be other than

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<sup>69</sup> *In De anima* 3, c. 2, 196–206 (cf. ARISTOTLE, *De anima* Γ.4, 429b18–19): “supra dixerat [Philosophus] in naturalibus exponit in mathematicis, dicens quod *iterum in hiis que sunt per abstractionem*, id est in mathematicis, quorum ratio abstrahit a materia sensibili, *rectum se habet sicut simum*, hoc est mathematica habent materiam sicut et naturalia (rectum enim mathematicum est, simum autem naturale): ratio enim recti est *cum continuo* sicut ratio simi cum naso; continuum autem est materia intelligibilis sicut nasus materia sensibilis.”

<sup>70</sup> *In De anima* 3, c. 2, 206–209 (cf. ARISTOTLE, *De anima* Γ.4, 429b19–20): “Vnde manifestum est quod aliud est in mathematicis res et quod quid erat esse, ut *rectum et recto esse*, unde oportet quod *alio cognoscat quod quid erat esse horum et alio ipsa*.”

<sup>71</sup> *In De anima* 3, c. 2, 209–222 (cf. ARISTOTLE, *De anima* Γ.4, 429b20–21): “et supponamus ad presens causa exempli quod dualitas sit quod quid erat esse linee recte (Plato enim ponebat quod numeri erant species et quidditates mathematicorum, puta unitas puncti, dualitas linee recte, et sic de aliis). Oportet igitur quod anima aut alio cognoscat ipsa mathematica et quidditates eorum, *aut eodem aliter se habenti*; unde sicut per naturalia ostenditur quod intellectus qui cognoscit quidditates naturalium sit aliud a sensu qui cognoscit ipsa naturalia singularia, ita ex mathematicis ostenditur quod intellectus qui cognoscit quod quid est eorum sit aliud ab ymaginativa uirtute que apprehendit ipsa mathematica.”



the sense that knows natural singular (things) themselves, so, (too), it is shown from mathematical (things) that the intellect that knows the essence should be other than the imaginative (faculty) that apprehends the mathematical (things) themselves.

Since dimensive quantity does not depend upon sensible matter according to its *ratio* (*secundum suam rationem*), even though it should depend (on sensitive matter) according to its being (*secundum suum esse*), hence, in predicating (dimensive quantity of a subject, *in praedicando*) and in being a subject (of predication, [*in*] *subiiciendo*), it takes the mode of substance and of accident.<sup>72</sup> Thus, we say that a line (is) both a *quantity* (*quantitas*) and a *quantum* (*quanta*); and both (that it is) a *magnitude* (*magnitudo*) and (that it is) *large* (*magna*).

(To summarize), mathematical (things) depend upon matter, for they can only be in matter, even though they can be understood without sensible matter (► 13.13).<sup>73</sup> However, matter is twofold (► 13.12): **common**, as flesh and bone; and **designated** or **individual** (*signata vel individualis*), as *this* flesh and *these* bones. Mathematical species can be abstracted by the intellect from sensible matter: not only (from) individual (sensible matter) but also (from) common (sensible matter). *Corporeal matter* is said (to be) **sensible matter insofar as it underlies sensible qualities**: to wit, cold and hot, hard and soft, and so on. On the other hand, *substance* is said (to be) **intelligible matter insofar as it underlies quantity**. It is manifest that quantity is priorly in substance than sensible qualities. Whence, quantities, such as numbers, dimensions, and figures—which are the terminations of (continuous) quantity—, can be considered without sensible qualities, which is to abstract them from sensible matter; but they cannot be considered without the understanding of *substance subjected to quantity*, which is to abstract them from common intelligible matter. However, they can be considered without *this* or *that* substance, which is to be abstracted from

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<sup>72</sup> *In Sent.* 4, d. 12 q. 1 a. 1 qc. 3 ad 2: “Quantitas dimensiva secundum suam rationem non dependet a materia sensibili, quamvis dependeat secundum suum esse; ideo in praedicando et subiiciendo accipit modum substantiae et accidentis; unde lineam dicimus et quantitatem et quantam, et magnitudinem et magnam.”

<sup>73</sup> *In De Trin.*, q. 5 a. 4 co., 196–198: “sicut mathematica dependebant [a materia et motu], que numquam nisi in materia esse possunt, quamvis sine materia sensibili possint intelligi.” *STh* I, q. 85 a. 1 ad 2: “materia est duplex, scilicet communis, et signata vel individualis, communis quidem, ut caro et os; individualis autem, ut haec carnes et haec ossa. Species autem mathematicae possunt abstrahi per intellectum a materia sensibili non solum individuali, sed etiam communi; non tamen a materia intelligibili communi, sed solum individuali. Materia enim sensibilis dicitur materia corporalis secundum quod subiacet qualitatibus sensibilibus, scilicet calido et frigido, duro et molli, et huiusmodi. Materia vero intelligibilis dicitur substantia secundum quod subiacet quantitati. Manifestum est autem quod quantitas prius inest substantiae quam qualitates sensibiles. Unde quantitates, ut numeri et dimensiones et figurae, quae sunt terminationes quantitatum, possunt considerari absque qualitatibus sensibilibus, quod est eas abstrahi a materia sensibili, non tamen possunt considerari sine intellectu substantiae substantiae subiectae, quod esset eas abstrahi a materia intelligibili communi. Possunt tamen considerari sine hac vel illa substantia; quod est eas abstrahi a materia intelligibili individuali. Quaedam vero sunt quae possunt abstrahi etiam a materia intelligibili communi, sicut ens, unum, potentia et actus, et alia huiusmodi, quae etiam esse possunt absque omni materia, ut patet in substantiis immaterialibus.”

individual intelligible matter. There are, however, some (other *ratios*) that can be abstracted (properly speaking, *separated*; ►49.12) also from common intelligible matter, such as *being* (*ens*), *one* (*unum*), *potency* (*potentia*), *act* (*actus*), and other such (things), which can also be without any matter, as is evident of immaterial substances (i.e., because the *ratio* of substance does not depend on the *ratio* of matter).

#### 49.11. Abstraction of Whole from Parts

A whole cannot be abstracted from whatsoever parts.<sup>74</sup> For there are some parts upon which the *ratio* of the whole depends (►49.9, ¶1): to wit, when there should be such a whole which is to be composed from such parts, as *syllable* is related to *letters*; and (as) compound (is related) to elements (e.g., the *ratio* of H<sub>2</sub>O depends on the *ratio* of H and of O). Such parts are said (to be) *parts of the species* and *of the form* (►13.14), without which the whole cannot be understood, since they should be posited in its definition.

On the other hand, there are some parts that happen to the whole as such (*in quantum huiusmodi*), as *semicircle* is related to *circle*.<sup>75</sup> For it happens to the circle that two or more of its parts, equal or unequal, should be taken through division. But it does not happen to the triangle that three lines should be designated in it, since the triangle is a triangle from this (►4.4, ¶4).

Likewise, too, it befits man by itself that a rational soul and a body composed from elements should be found in it.<sup>76</sup> Whence, *man* cannot be understood without these parts: rather, this must be posited in its definition. Whence, they are parts of the species and of the form. But *finger*, *foot*, *hand*, and other such parts, are (understood) after the understanding of *man*. Whence, the essential *ratio* of *man* does not depend upon them; and *man* can be understood without them. Indeed, whether it should have feet or not, as long as (a composite) should be posited conjoined from a rational animal and a body compounded from elements, (according to the) proper compounding that such a form requires, it will be a man.

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<sup>74</sup> *In De Trin.*, q. 5 a. 3 co., 203–210: “Totum etiam non a quibuslibet partibus abstrahi potest. Sunt enim quedam partes ex quibus ratio totius dependet, quando scilicet hoc est esse tali toti quod ex talibus partibus componi, sicut se habet sillaba ad litteras, et mixtum ad elementa; et tales partes dicuntur partes speciei et forme, sine quibus totum intelligi non potest, cum ponantur in eius diffinitione.”

<sup>75</sup> *In De Trin.*, q. 5 a. 3 co., 210–217: “Quedam uero partes sunt que accidunt toti in quantum huiusmodi, sicut semicirculus se habet ad circulum: accidit enim circulo quod sumantur per diuisionem due eius partes equales uel inequales uel etiam plures, non autem accidit triangulo quod in eo designentur tres linee, quia ex hoc triangulus est triangulus.”

<sup>76</sup> *In De Trin.*, q. 5 a. 3 co., 217–229: “Similiter etiam per se competit homini quod inueniatur in eo anima rationalis et corpus compositum ex quattuor elementis, unde sine his partibus homo intelligi non potest, set hec oportet poni in diffinitione eius, unde sunt partes speciei et forme; set digitus, pes, et manus, et alie huiusmodi partes sunt post intellectum hominis, unde ex eis ratio essentialis hominis non dependet, et homo sine his intelligi potest: siue enim habeat pedes siue non, dummodo ponatur coniunctum ex anima rationali et corpore mixto ex elementis propria mixtione quam requirit talis forma, erit homo.”

These (latter) parts are said (to be) *parts of matter*, which are not posited in the definition of the whole: rather, conversely.<sup>77</sup> And in this mode are related to *man* all designated parts (*partes signate*), such as *this* soul, *this* body, *this* nail, *this* bone, and so on. For these parts are indeed parts of Sortes and of Plato, but not of *man* insofar as (it is a) *man*. Hence, man can be abstracted from these parts by the intellect. And such abstraction is of the universal from the particular.

Thus, the intellect abstracts the species of a natural thing from individual sensible matter, and not from common sensible matter (► 13.13).<sup>78</sup> For example, it abstracts the species of *man* from *this* flesh and *these* bones, which do not belong to the *ratio* of the species: rather, they are parts of the individual; hence, (the species) can be considered without them; but the species of man cannot be abstracted by the intellect from flesh and bones.

Since someone could believe that mathematical and natural (things) should be understood in the same mode, ARISTOTLE says that, just as things are separable from matter, so are they related to the intellect.<sup>79</sup> Whence, those (things) that are separated from matter according to being (*secundum esse*) can only be perceived by the intellect; and those that are not separated from sensible matter according to being but according to *ratio* (*secundum rationem*) are understood without sensible matter, but not without intelligible matter. Natural (things), on the other hand, are understood through abstraction from individual matter, but not totally through abstraction from sensible matter. Thus, man is understood as a composite from flesh and bones by abstraction from *this* flesh and *these* bones. Wherefrom, not the intellect, but sense or imagination, directly knows singulars.

From that which ARISTOTLE says, it is apparent that the proper object of the intellect is the quiddity of the thing—which is not separated from things, as Platonists posited. Whence, that which is the object of our intellect is not something outside sensible things, as

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<sup>77</sup> *In De Trin.*, q. 5 a. 3 co., 229–238: “Et hee partes dicuntur partes materie, que non ponuntur in diffinitione totius, set magis e conuerso; et hoc modo se habent ad hominem omnes partes signate, sicut hec anima, et hoc corpus, et hic unguis, et hoc os, et huiusmodi: hee enim partes sunt quidem partes essentie Sortis et Platonis, non autem hominis in quantum homo, et ideo potest homo abstrahi per intellectum ab istis partibus. Et talis abstractio est uniuersalis a particulari.”

<sup>78</sup> *STh* I, q. 85 a. 1 ad 2: “Intellectus igitur abstrahit speciem rei naturalis a materia sensibili individuali, non autem a materia sensibili communi. Sicut speciem hominis abstrahit ab his carnibus et his ossibus, quae non sunt de ratione speciei, sed sunt partes individui, ut dicitur in VII Metaphys.; et ideo sine eis considerari potest. Sed species hominis non potest abstrahi per intellectum a carnibus et ossibus.”

<sup>79</sup> *In De anima* 3, c. 2, 222–238 (cf. ARISTOTLE, *De anima* Γ.4, 429b21–22): “Et quia posset aliquis credere quod eodem modo intelligerentur mathematica et naturalia, subiungit [Philosophus] quod, *sicut res sunt separabiles a materia*, ita se habent ad *intellectum*. Vnde illa que sunt secundum esse separata a materia solo intellectu percipi possunt, que autem non sunt separata a materia sensibili secundum esse set secundum rationem intelliguntur absque materia sensibili, non autem absque materia intelligibili; naturalia uero intelliguntur per abstractionem a materia individuali, non autem per abstractionem a materia sensibili totaliter: intelligitur enim homo ut compositus ex carnibus et ossibus, per abstractionem tamen ab hiis carnibus et hiis ossibus; et inde est quod intellectus non cognoscit directe singularia, set sensus uel ymaginatio.”

Platonists posited, but something that exists in sensible things, even though the intellect should apprehend the quiddities of things in a mode other than (the mode in which) they should be (i.e., exist) in sensible things: for it does not apprehend them with the individuating conditions that are adjoined to them in sensible things. And the intellect can (do this) without falsity: for nothing prevents one of two (things) conjoined to each other from being understood without the other being understood, just like sight apprehends color without apprehending odor; but not that it should apprehend (color) without magnitude, which is the proper subject of color. Whence, the intellect, too, can understand some form without the individuating principles; but not without the matter upon which the *ratio* of that form depends. Therefore, it cannot understand *snub* without *nose*; but it can (understand) *curved* without *nose*. And since Platonists did not distinguish this, they posited that mathematical (things) and the quiddities of things should be separated in being just like they are separated in the intellect (►49.14).<sup>80</sup>

It is manifest, too, that the intelligible species, whereby the possible intellect comes to be in act, are not the object of the intellect.<sup>81</sup> For they are not related to the intellect as *that which is understood*, but as *that whereby it understands*, just like the species that is in sight is not *that which is seen*, but *that whereby sight sees*: what is seen is the color that is in the body. Likewise, that which the intellect understands is the quiddity that is in things, and not the intelligible species—except insofar as the intellect is reflected over itself. Thus, it is manifest that sciences are of those (things) that the intellect understands: they are *sciences of things* (►49.16), and not of species or of an intelligible intention—except for the rational science alone (►50). Whence, it is manifest that the intelligible species is not the object of the intellect, but the quiddity of the thing understood.

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<sup>80</sup> *In De anima* 3, c. 2, 239–263: “Apparet autem ex hoc quod Philosophus dicit hic quod proprium obiectum intellectus est quidditas rei, que non est separata a rebus, ut Platonici posuerunt. Vnde id quod est obiectum intellectus nostri non est aliquid extra res sensibiles existens, ut Platonici posuerunt, set aliquid in rebus sensibilibus existens, licet intellectus apprehendat alio modo quidditates rerum quam sint in rebus sensibilibus: non enim apprehendit eas cum condicionibus individuantibus que eis in rebus sensibilibus adiunguntur. Et hoc sine falsitate intellectus contingere potest: nichil enim prohibet duorum ad inuicem coniuictorum unum intelligi absque hoc quod aliud intelligatur, sicut uisus apprehendit colorem absque hoc quod apprehendat odorem, non tamen absque hoc quod apprehendat magnitudinem, que est proprium subiectum coloris; unde et intellectus potest intelligere aliquam formam absque individuantibus principiis, non tamen absque materia a qua dependet ratio illius forme, sicut non potest intelligere simum sine naso, set potest curuum sine naso intelligere. Et quia hoc non distinxerunt Platonici, posuerunt quod mathematica et quidditates rerum sint separate in esse sicut sunt separate in intellectu.”

<sup>81</sup> *In De anima* 3, c. 2, 264–279: “Manifestum est etiam quod species intelligibiles, quibus intellectus possibilis fit in actu, non sunt obiectum intellectus. Non enim se habent ad intellectum sicut quod intelligitur, set sicut quo intellectus intelligit, sicut et species que est in uisu non est quod uidetur, set quo uisus uidet, quod autem uidetur est color qui est in corpore; similiter et quod intellectus intelligit est quidditas que est in rebus, non autem species intelligibilis, nisi in quantum intellectus super se ipsum reflectitur. Manifestum est enim quod sciencie sunt de hiis que intellectus intelligit; sunt autem sciencie de rebus, non autem de speciebus uel intentionibus intelligibilibus, nisi sola sciencia rationalis; unde manifestum est quod species intelligibilis non est obiectum intellectus, set quidditas rei intellecte.”

Wherefrom, it is evident that the argument is vain of those (such as AVERROES) who would want to show that the possible intellect should be one in all (humans) because that which is understood by all is the same, for the number of intelligible species would have to be multiple if there are multiple intellects.<sup>82</sup> Indeed, the intelligible species is not the (thing) understood itself but its likeness in the soul (► 21.4); and hence, if there should be multiple intellects that have the likeness of one and the same thing, the thing understood will be (specifically) the same for all.

#### 49.12. Abstraction vs. Separation

(From what has been said), the intellect distinguishes one (thing) from another diversely (*aliter et aliter*) according to diverse operations:<sup>83</sup>

**1. The distinction of abstraction:** In the (first) operation whereby it understands *what* any one thing is, (the intellect) distinguishes one (thing) from another by understanding nothing of the other—neither that it should be with it, nor that it should be separated from it—while it understands what *this* is.<sup>84</sup>

Whence, this distinction does not properly have the name of *separation*: rather, only the other (i.e., the distinction of the second operation of the intellect properly has the name of *separation*; ¶2). And this distinction is rightly called *abstraction*: but only when those—of which one is understood without the other—are simultaneous according to thing: for *animal* is not said to be abstracted from *stone* (even) if *animal* should be understood without the understanding of *stone*.

Whence, since abstraction properly said can only be of (those things that are) conjoined in being, according to the two aforesaid modes of conjunction—namely, whereby part and whole are united, or (whereby) form and matter (are united)—, there is a twofold abstraction:<sup>85</sup>

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<sup>82</sup> *In De anima* 3, c. 2, 280–289: “Ex quo patet uanam esse rationem quorundam uolencium ostendere quod intellectus possibilis sit unus in omnibus ex hoc quod idem est quod est intellectum ab omnibus, cum oporteat esse plures numero species intelligibiles si sunt plures intellectus. Non enim est species intelligibilis ipsum intellectum, set similitudo eius in anima, et ideo, si sint plures intellectus habentes similitudinem unius et eiusdem rei, erit eadem res intellecta apud omnes.”

<sup>83</sup> *In De Trin.*, q. 5 a. 3 co., 159–160: “Sic ergo intellectus distinguit unum ab altero aliter et aliter secundum diuersas operationes.”

<sup>84</sup> *In De Trin.*, q. 5 a. 3 co., 163–173: “in operatione uero qua intelligit quid est unumquodque, distinguit unum ab alio dum intelligit quid est hoc, nichil intelligendo de alio, neque quod sit cum eo, neque quod sit ab eo separatum; unde ista distinctio non proprie habet nomen separationis, set prima tantum. Hec autem distinctio recte dicitur abstractio, set tunc tantum quando ea quorum unum sine altero intelligitur sunt simul secundum rem: non enim dicitur animal a lapide abstrai si animal absque intellectu lapidis intelligatur.”

<sup>85</sup> *In De Trin.*, q. 5 a. 3 co., 173–178: “Vnde cum abstractio non possit esse proprie loquendo nisi coniuictorum in esse, secundum duos modos coniuictionis predictos, scilicet quo pars et totum uniuntur, uel forma et materia, duplex est abstractio.” *Ibid.*, 239: “Et ita sunt due abstractiones intellectus.”

**(a) The abstraction of form from sensible matter** (►49.10), which responds to the union of form and matter, or of accident and subject.<sup>86</sup>

No abstraction opposite to this is found, whereby matter should be abstracted from form.<sup>87</sup> For when we say that a form is abstracted from matter, (this) is not understood of the substantial form, since a substantial form and the matter that corresponds to it depend upon each other, such that one could not be understood without the other, since the proper act comes to be in the proper matter. Rather, (this) is understood of the accidental form, which is **quantity** and **figure**, from which sensible matter cannot, indeed, be abstracted by the intellect, since sensible qualities cannot be understood (if) quantity (is) not fore-understood, as happens in surface and color: for *surface* is posited in the definition of *color*, just like *number* (is posited) in the definition of *even*. Nor can there be understood to be a subject of motion that is not understood (to be a) quantum.

On the other hand, substance, which is the intelligible matter of quantity, can be (i.e., can exist and be understood) without quantity.<sup>88</sup> Whence, to consider substance without quantity pertains to the genus of separation (¶2) rather than (to that) of abstraction.

**(b) The abstraction of the universal from the particular**, which is the **abstraction of the whole from the parts** (►49.11), and responds to the union of whole and part.<sup>89</sup> In this abstraction, some nature is considered absolutely according to its essential *ratio*, (abstracted) from all the parts that are not parts of the species but are accidental parts.

No abstraction opposite to this is found,<sup>90</sup> whereby a part should be abstracted from a whole (►49.9, ¶1), since a part either cannot be abstracted from the whole by the intellect

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<sup>86</sup> *In De Trin.*, q. 5 a. 3 co., 178: “una qua forma abstrahitur a materia.” Ibid., 239–242: “una que respondet unioni forme et materie uel accidentis et subiecti, et hec est abstractio forme a materia sensibili.”

<sup>87</sup> *In De Trin.*, q. 5 a. 3 co., 248–250: “Non autem inueniuntur abstractiones eis opposite, quibus pars abstrahatur a toto uel materia a forma.” Ibid. 258–270: “Similiter autem cum dicimus formam abstrahi a materia non intelligitur de forma substantiali, quia forma substantialis et materia sibi correspondens dependent ad inuicem, ut unum sine alio non possit intelligi, eo quod proprius actus in propria materia fit; set intelligitur de forma accidentali, que est quantitas et figura, a qua quidem materia sensibilis per intellectum abstrahi non potest, cum qualitates sensibiles non possint intelligi non preintellecta quantitate, sicut patet in superficie et colore; nec etiam potest intelligi esse subiectum motus quod non intelligitur quantum.” *Q. d. de anima*, a. 11 co.: “Superficies enim ponitur in definitione coloris sicut numerus in definitione paris.”

<sup>88</sup> *In De Trin.*, q. 5 a. 3 co., 270–274: “Substantia autem, que est materia intelligibilis quantitatis, potest esse sine quantitate; unde considerare substantiam sine quantitate magis pertinet ad genus separationis quam abstractionis.”

<sup>89</sup> *In De Trin.*, q. 5 a. 3 co., 179: “alia qua totum abstrahitur a partibus.” Ibid., 242–248: “alia que respondet unioni totius et partis, et huic respondet abstractio uniuersalis a particulari, que est abstractio totius, in quo consideratur absolute natura aliqua secundum suam rationem essentialem, ab omnibus partibus que non sunt partes speciei set sunt partes accidentales.”

<sup>90</sup> *In De Trin.*, q. 5 a. 3 co., 248–258: “Non autem inueniuntur abstractiones eis opposite, quibus pars abstrahatur a toto uel materia a forma; quia pars uel non potest abstrahi a toto per intellectum si sit de partibus materie in quarum diffinitione ponitur totum, uel potest etiam sine toto esse si sit de partibus

if it should belong the parts of matter in whose definition the whole is posited; or it can be (i.e., it can exist and be understood) without the whole if it should be of the parts of the species, as a line without a triangle, or a an element without a compound.

However, in these (latter), which can be divided according to being (*secundum esse*), separation (¶2) rather than abstraction takes place (*habet locum*).

**2. The distinction of separation.** According to the (second) operation whereby (the intellect) composes and divides, it distinguishes one (thing) from another because it understands that *one is not in the other*.<sup>91</sup>

### **49.13. Correlation between Separation/Abstraction and the Theoretical Sciences**

(From what has been said), therefore, in the operation of the intellect there is found a triple distinction:<sup>92</sup>

**1.** One, which is properly called **separation**, according to the operation of the intellect that composes and divides.<sup>93</sup> This pertains to (*competit*) **metaphysics**.

**2.** The **abstraction of form from sensible matter**, according to the operation whereby the quiddities of things are formed.<sup>94</sup> This pertains to **mathematics**.

**3.** The **abstraction of universal from particular**, according to the same operation.<sup>95</sup> This pertains also to **physics**, and is **common to all the sciences**, since, in science, that which is by accident is omitted; and that which is by itself is taken.

Since some (philosophers)—such as the Pythagoreans and the Platonists—did not understand the difference between the former (¶1) and the latter two (¶2; ¶3), they fell into error (►49.14), such that they posited mathematical (things) and universals (to be) separated from sensible (things).<sup>96</sup>

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speciei, sicut linea sine triangulo, uel littera sine sillaba, uel elementum sine mixto. In his autem que secundum esse possunt esse diuisa magis habet locum separatio quam abstractio.”

<sup>91</sup> *In De Trin.*, q. 5 a. 3 co., 161–163: “quia secundum operationem qua componit et diuidit distinguit unum ab alio per hoc quod intelligit unum alii non inesse.”

<sup>92</sup> *In De Trin.*, q. 5 a. 3 co., 275–276: “Sic ergo in operatione intellectus triplex distinctio inuenitur.”

<sup>93</sup> *In De Trin.*, q. 5 a. 3 co., 276–279: “una secundum operationem intellectus componentis et diuidentis, que separatio dicitur proprie, et hec competit scientie diuine siue metaphisice.”

<sup>94</sup> *In De Trin.*, q. 5 a. 3 co., 279–282: “alia secundum operationem qua formantur quidditates rerum, que est abstractio forme a materia sensibili, et hec competit mathematice.”

<sup>95</sup> *In De Trin.*, q. 5 a. 3 co., 282–286: “tertia, secundum eandem operationem, uniuersalis a particulari, et hec competit etiam physice et est communis omnibus scientiis, quia in scientia pretermittitur quod per accidens est et accipitur quod per se est.”

<sup>96</sup> *In De Trin.*, q. 5 a. 3 co., 287–290: “Et quia quidam non intellexerunt differentiam duarum ultimarum a prima, inciderunt in errorem ut ponerent mathematica et uniuersalia a sensibilibus separata, ut Pythagorici et Platonici.”

#### 49.14. Abstraction and the Pythagorean and Platonist Errors

The first of those who philosophized about the things of nature reckoned that there are only bodies, (and) posited the first principles of things (to be) some corporeal elements—either one or many.<sup>97</sup> And if (only) one (principle), (it would be) either water, as THALES of Miletus (posited); or air, as DIOGENES; or fire, as HIPPASUS; or vapor, as HERACLITUS. And if (there should be) multiple (principles), (they would) either (be) finite, as EMPEDOCLES (posited) four elements (i.e., earth, water, air, fire) and two mover (principles), friendship and strife; or infinite, as DEMOCRITUS and ANAXAGORAS, each of whom posited that the principles of all things are infinite minimal parts—except that DEMOCRITUS posited them (to be) similar in genus and to differ only in figure, order, and position, while ANAXAGORAS reckoned that, of diverse things that are of similar parts, the first principles of things are infinite minimal parts. However, ancient philosophers resisted these opinions.

The Pythagoreans agreed with the natural (philosophers) in one (position) and differed from them in another.<sup>98</sup> They differed, indeed, in the position of principles, for they would use the principles of things in a mode extraneous to natural (things). The cause of this is that they did not take the principles of things from sensible (bodies), as the natural (philosophers did), but from mathematical (bodies), which are without motion; whence, they are not natural (bodies). And that mathematical (things) are said to be without motion is to be referred to those sciences that are purely mathematical, such as arithmetic and geometry. Indeed, astronomy considers motion, since astronomy is a mean science between the mathematical and the natural, for astronomy and other mean sciences apply its principles (i.e., the principles of mathematics) to natural things.

On the other hand, PYTHAGORAS agreed with the natural (philosophers) in respect of those (things) whose principles they sought, for he disputed and treated of all natural (things).

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<sup>97</sup> *De sub. sep.*, c. 1, co., 1–17: “Primi quidem igitur philosophantium de rerum naturis sola corpora esse aestimaverunt, ponentes prima rerum principia aliqua corporalia elementa, aut unum aut plura. Et si unum, aut aquam ut Thales Milesius, aut aerem ut Diogenes, aut ignem ut Hippasus, aut vaporem ut Heraclitus. Et si plura, aut finita sicut Empedocles quatuor elementa et cum his duo moventia amicitiam et litem; aut infinita, sicut Democritus et Anaxagoras, quorum uterque posuit infinitas partes minimas esse omnium rerum principia, nisi quod Democritus eas posuit genere similes, differre autem eas solum figura et ordine et positione, Anaxagoras autem diversarum rerum quae sunt similium partium infinitas partes minimas prima rerum principia aestimavit.” *Ibid.*, 34–35: “Huic autem opinioni triplici via antiqui philosophi restiterunt.”

<sup>98</sup> *In Metaph.* 1, l. 13, §202 (cf. ARISTOTLE, *Metaphysica* A.8, 989b29–990a8): “Sciendum est ergo, quod Pythagorici in uno conveniebant cum naturalibus, in alio ab eis differebant.” *Ibid.* (cf. ARISTOTLE, *Metaphysica* A.8, 989b29–33): “Differebant quidem in positione principiorum; usi sunt enim principii rerum extraneo modo a naturalibus. — Cuius causa est, quia principia rerum non acceperunt ex sensibilibus sicut naturales, sed ex mathematicis, quae sunt sine motu, unde non sunt naturalia. Quod autem mathematica dicuntur esse sine motu, referendum est ad illas scientias, quae sunt pure mathematicae, sicut arithmetica et geometria. Astrologia enim considerat motum, quia astrologia est media scientia inter mathematicam et naturalem. Principia enim sua astrologia et aliae mediae applicant ad res naturales, ut patet secundo Physicorum.”



Thus, he treated of the generation of heaven, and observed all (those things) that happen concerning the parts of heaven, which are said (to be) the diverse spheres, or also the diverse stars; those (things) that happen concerning the affections or about the eclipses of luminaries; those (things) that happen concerning the operations and concerning the motions of celestial bodies; and about their effects in lower things; and he dispensed the causes of each such (things), adapting to each one (its) proper cause.<sup>99</sup>

Also, PYTHAGORAS seemed to agree with other natural (philosophers) in that there should only be that being which is sensible, which is comprehended by the heaven that we see.<sup>100</sup> For he did not posit some infinite sensible body, as other natural (philosophers) posited. Nor, again, did he posit multiple worlds, as DEMOCRITUS did. And thus, he seemed to reckon that all beings should only be sensible, yet they were capable of ascending to higher—that is, intellectual—beings. Moreover, they were more befitting than the reasons of the natural (philosophers), which could not be extended beyond sensible (things), since they posited corporeal principles. Yet, PYTHAGORAS, who posited incorporeal principles—i.e., numbers—, even though he should have posited only principles of sensible bodies, nonetheless posited intelligible beings—which are not bodies—almost (as though they should be) principles, as PLATO later did.

ANAXAGORAS, in turn, even though he had—with the other natural philosophers—posited corporeal, material principles, he was nonetheless first among the philosophers to posit some incorporeal principle: namely, the intellect.<sup>101</sup> Since, according to his position, all corporeal (things) should be compounded in all (things), it did not seem (possible) that

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<sup>99</sup> *In Metaph.* 1, l. 13, §203 (cf. ARISTOTLE, *Metaphysica* A.8, 989b33–990a8): “Conveniebat autem Pythagoras cum naturalibus quantum ad ea quorum principia quaerebat. Disputabat enim et tractabat de omnibus naturalibus. Tractabat enim de generatione caeli, et observabat omnia quae accidunt circa partes caeli, quae dicuntur diversae sphaerae, vel etiam diversae stellae: et quae accidunt circa passiones vel circa eclipses luminarium, et quae accidunt circa operationes et circa motus corporum caelestium, et circa eorum effectus in rebus inferioribus; et singulis huiusmodi dispensabat causas, adaptando scilicet unicuique propriam causam.”

<sup>100</sup> *In Metaph.* 1, l. 13, §203 (cf. ARISTOTLE, *Metaphysica* A.8, 989b33–990a8): “Et videbatur etiam in hoc consentire aliis naturalibus, quod solum sit illud ens, quod est sensibile, quod comprehenditur a caelo quod videmus. Non enim ponebat aliquod corpus sensibile infinitum, sicut alii naturales posuerunt. Nec iterum ponebat plures mundos, sicut posuit Democritus. Ideo autem videbatur aestimare quod nulla entia essent nisi sensibilia, quia non assignabat principia et causas nisi talibus substantiis. Nihilominus tamen causae et principia, quae assignabat, non erant propria et determinata sensibilibus, sed erant sufficientia ascendere ad superiora entia, idest ad entia intellectualia. Et erant adhuc magis convenientia quam rationes naturalium, quae non poterant extendi ultra sensibilia, quia ponebant principia corporea. Pythagoras vero, quia ponebat principia incorporea, scilicet numeros, quamvis non poneret principia nisi corporum sensibilibus, ponebat tamen entium intelligibilium, quae non sunt corpora, principia pene, sicut et Plato posterius fecit.”

<sup>101</sup> *De sub. sep.*, c. 1, co., 35–45: “Primo namque Anaxagoras, etsi cum ceteris philosophis Naturalibus materialia principia corporalia poneret, posuit tamen primus inter philosophos quoddam incorporale principium, scilicet intellectum. Cum enim secundum suam positionem omnia corporalia in omnibus mixta essent, non videbatur quod ab invicem corpora distingui potuissent nisi fuisset aliquod distinctionis principium quod ipsum secundum se penitus esset immixtum et nihil cum natura corporali habens commune.”

bodies could be distinguished from each other unless there should be some principle of distinction that would itself be, according to itself, thoroughly uncompounded, and having nothing in common with a corporeal nature.

In a more satisfactory way, PLATO proceeded to lay aside the opinion of the first natural (philosophers).<sup>102</sup> Thus, among the ancient natural (philosophers), it was posited that it was impossible for men to know the certain truth of things, both on account of the continuous flow of corporeal things and on account of the deception of the senses by which bodies are known. Wherefrom, he posited some natures separated from the matter of flowing things, in which (separated natures) there would be fixed truth; and thus, inhering in them, the soul would know the truth. Whence, insofar as the intellect that knows the truth separately apprehends some (things) apart from the matter of sensible things, in this way, he reckoned that there were some (things) separated from sensible (bodies).

However, concerning the understanding of truth, our intellect uses a twofold abstraction (► 49.12).<sup>103</sup> One (► 49.10), insofar as it apprehends mathematical numbers, magnitudes, and mathematical figures without the understanding of sensible matter. For, by understanding two or three (i.e., numbers), or line and surface (i.e., magnitudes), or triangle and square (i.e., figures), nothing falls in our apprehension that should pertain to the hot or to the cold, or to something of this sort that can be perceived by sense.

On the other hand, our intellect uses another abstraction (► 49.11) in understanding something universal without the consideration of something particular: for example, when we understand *man* (while simultaneously) understanding nothing of Socrates Plato, or anyone else; and the same (abstraction of universals from particulars) is apparent in other (things).<sup>104</sup>

Whence, PLATO posited two genera of things abstracted from sensible (things): to wit, mathematical (things) and universals, (the latter of) which he called *species* or *Ideas*. The

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<sup>102</sup> *De sub. sep.*, c. 1, co., 66–79: “Plato sufficientiori via processit ad opinionem primorum Naturalium evacuandam. Cum enim apud antiquos Naturales poneretur ab hominibus certam rerum veritatem sciri non posse, tum propter rerum corporalium continuum fluxum tum propter deceptionem sensuum quibus corpora cognoscuntur, posuit naturas quasdam a materia fluxibilium rerum separatas, in quibus esset veritas fixa et sic eis inhaerendo anima nostra veritatem cognosceret; unde secundum hoc quod intellectus veritatem cognoscens aliqua seorsum apprehendit praeter materiam sensibilium rerum, sic aestimavit esse aliqua a sensibilibus separata.”

<sup>103</sup> *De sub. sep.*, c. 1, co., 80–89: “Intellectus autem noster duplici abstractione utitur circa intelligentiam veritatis. Una quidem secundum quod apprehendit numeros mathematicos et magnitudines et figuras mathematicas sine materiae sensibilis intellectu; non enim intelligendo binarium aut ternarium aut lineam et superficiem aut triangulum et quadratum, simul in nostra apprehensione aliquid cadit quod pertineat ad calidum vel frigidum aut aliquid huiusmodi quod sensu percipi possit.”

<sup>104</sup> *De sub. sep.*, c. 1, co., 89–94: “Alia vero abstractione utitur intellectus noster intelligendo aliquid universale absque consideratione alicuius particularis, puta cum intelligimus hominem nihil intelligentes de Socrate vel Platone aut alio quocumque; et idem apparet in aliis.”

difference between these seemed (to be) that, in mathematical (things), we can apprehend multiple (things) of one species: for example, two equal lines or two equal equilateral triangles. This is altogether impossible in species: instead, there is only one *man* universally taken. Therefore, he posited mathematical (things to be) a mean between species or Ideas and sensible (things), which (mathematical things) agree with sensible (things) in that many (things) are contained under the same species, while (mathematical things) agree with species in that they are separated from sensible matter.<sup>105</sup>

Hence, PLATO ordered those three according to the order of materiality.<sup>106</sup> For, since sensible (things) are more material than mathematical (things), and universals (are) more immaterial than mathematical (things), hence, he first posited sensible (things), above which he posited mathematical (things); and above these, (he posited) separated universals and Ideas, which differ from mathematical (things) because, in mathematical (things), in one species there are some (things) that differ according to number, while in Ideas and separated substances no things are found that would differ in number. Thus, he posited one idea for one species.

PLATO also posited some order in the species themselves, for insofar as something was simpler in understanding, it was—according to this—prior in the order of things.<sup>107</sup> Now, that which is in the intellect firstly is *one* and *good*, for whosoever does not understand *one* understands nothing. And *one* and *good* follow upon themselves; whence, he posited that the first idea itself of *one*—which he called *One by itself* and *Good by itself*—is the first principle of things. Under this One, he instituted diverse orders of active and passive participants (*participantium et participatorum*) in substances separated from matter, as some second units after the first, simple unit.

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<sup>105</sup> *De sub. sep.*, c. 1, co., 94–108: “Unde Plato duo genera rerum a sensibilibus abstracta ponebat, scilicet mathematica et universalia quae species sive ideas nominabat. Inter quae tamen haec differentia videbatur quod in mathematicis apprehendere possumus plura unius speciei, puta duas lineas aequales vel duos triangulos aequilateros et aequales: quod in speciebus omnino esse non potest, sed homo in universali acceptus secundum speciem est unus tantum. Sic igitur mathematica ponebat media inter species seu ideas et sensibilia; quae quidem cum sensibilibus conveniunt in hoc quod plura sub eadem specie continentur, cum speciebus autem in hoc quod sunt a materia sensibili separata.”

<sup>106</sup> *In De anima* 1, c. 4, 136–147: “Et secundum ordinem materialitatis ordinabat illa tria; quia enim sensibilia sunt magis materialia quam mathematica et uniuersalia inmaterialiora mathematicis, ideo primo posuit sensibilia supra quae posuit mathematica et supra haec uniuersalia separata et ydeas; quae differunt a mathematicis, quia in mathematicis in una specie sunt aliqua quae differunt secundum numerum, set in ydeis et substantiis separatis non inveniuntur aliqua unius speciei quae differant numero: unius enim speciei unam posuit ydeam.”

<sup>107</sup> *De sub. sep.*, c. 1, co., 109–123: “In ipsis etiam speciebus ordinem quendam ponebat, quia secundum quod aliquid erat simplicius in intellectu secundum hoc prius erat in ordine rerum. Id autem quod primo est in intellectu est unum et bonum, nihil enim intelligit qui non intelligit unum; unum autem et bonum se consequuntur: unde ipsam primam ideam unius, quod nominabat secundum se unum et secundum se bonum, primum rerum principium esse ponebat [...]. Sub hoc autem uno diversos ordines participantium et participatorum instituebat in substantiis a materia separatis, [...] quasi quasdam unitates secundas post primam simplicem unitatem.”

Hence, PLATO posited that numbers are a cause of things, for he did not know (how) to distinguish between the *one* that is convertible with *being* and the *one* that is the principle of number insofar as it is a species of quantity (►38.1).<sup>108</sup> Wherefrom, it followed that, since he would posit that the separate universal is the cause of things, and that numbers are the substance of things, such universals would be (composed) from numbers. Thus, he said that the principle of all beings were species (i.e., Ideas) and specific numbers, which he called specific “as composed from species,” for he reduced number itself into *one* and *twoness* as into principles and elements, since nothing would proceed from one (alone); and thus, some subjected nature was necessary for the One itself, from which (nature) a multitude should be produced—and this, he called *twoness*.

Thus, PLATO said that (geometric) Ideas are (composed) from numbers, and that the *ratios* of sensible (things) are in them according to numbers.<sup>109</sup> Hence, he said that the Idea of length is “the first twoness,” for length is from one to one—namely, from point to point. In turn, (he said that the Idea) of width (is) “the first three-ness,” for the triangular figure is “the first of the figured surfaces.” In turn, (he said that the Idea) of depth, which contains length and width, is “the first four-ness,” for, of bodies, the first figure is the pyramid, which consists in four (solid) angles.

#### 49.15. Aristotle’s Criticism of Plato

As ARISTOTLE says, the reason why species (i.e., Ideas) and mathematical (things) should be posited apart from sensible (things) seems to be this: that mathematical (things) differ in something from the sensible things (δεῦρο) that are in the universe, since mathematical (things) abstract from sensible matter.<sup>110</sup> However, they do not differ—rather, they

<sup>108</sup> *In De anima* 1, c. 4, 121–136: “Item ponebat Plato numeros esse causam rerum (et hoc faciebat quia nesciuit distinguere inter unum quod conuertitur cum ente et unum quod est principium numeri prout est species quantitatis); ex quo sequebatur quod, cum uniuersale separatum poneret causam rerum et numeros esse substantiam rerum, quod huiusmodi uniuersalia essent ex numeris; dicebat enim quod principium omnium encium essent species et numerus specificus, quem uocabat specificum «tanquam compositum ex speciebus»; nam ipsum numerum reducebat tanquam in principia et elementa in unum et dualitatem; nam ex uno nichil procederet et ideo necessaria fuit ipsi uno aliqua subiecta natura a qua multitudo produceretur, et hanc uocauit dualitatem.”

<sup>109</sup> *In De anima* 1, c. 4, 147–159: “Quas ydeas dicit esse ex numeris et secundum numeros in eis esse rationes rerum sensibilium, que quidem constant «ex longitudine, latitudine et profunditate»; et ideo dixit ydeam longitudinis esse «primam dualitatem»: longitudo enim est «ab uno ad unum», scilicet de «puncto ad punctum»; latitudinis autem «primam trinitatem»: nam figura triangularis est prima «superficialium figurarum»; profunditatis autem, que continet longitudinem et latitudinem, ydeam dixit esse «primam quaternitatem»: prima enim figura corporum «est piramis», que in quatuor angulis consistit.”

<sup>110</sup> *In Metaph.* 3, l. 14, §516 (cf. ARISTOTLE, *Metaphysica* B.6, 1002b14–16): “*Obiicit* [Philosophus] *ad unam partem*: et videtur haec esse ratio quare oportet species ponere praeter sensibilia et mathematica: quia mathematica «a praesentibus» idest a sensibilibus, quae in universo sunt, differunt quidem in aliquo, quia mathematica abstrahunt a materia sensibili; non tamen differunt in hoc, sed magis conveniunt, quia sicut in sensibilibus inveniuntur plura numero differentia eiusdem speciei, utpote plures homines, aut plures equi, ita etiam in mathematicis inveniuntur plura numero differentia eiusdem speciei, puta plures trianguli aequilateri, et plures lineae aequales.” There are numerous other places in which this question is taken up, even if we restrict ourselves to the Commentary on the *Metaphysics*. See, for example, *In*

agree—in that, just like many (individuals) of the same species are found in sensible (things) that differ in number, such as multiple men or multiple horses, so, too, many (individuals) of the same species are found in mathematical (things) that differ in number, such as multiple equilateral triangles (in the genus of width), and multiple equal lines (in the genus of length).

And if (this) is so, it follows that, just like the principles of sensible (things) are not determined according to number but according to species, so, too, it should be in mathematical (things).<sup>111</sup> For it is manifest that in sensible (things), on account of there being multiple individuals of one sensible species, the principles of sensible (things) are not determined in number, but in species—except, perhaps, if the principles proper to *this* individual should be taken, which (principles) are determined and individual (not only in species, but) also in number.

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*Metaph.* 8, l. 1, §1683 (cf. ARISTOTLE, *Metaphysica* H.1, 1042a11–12): “Resumit [Philosophus] aliquid superius dictorum; scilicet modos quibus accipitur substantia. [...] Quasdam vero substantias non omnes confitentur in rerum natura subsistere. Sed quidam posuerunt singulariter eas esse, qui ponunt species et mathematica separata secundum esse, volentes quod cuilibet abstractioni intellectus, respondeat abstractio in esse rerum. Et quia intellectus abstrahit universale a particularibus ut hominem a Socrate et Platone, posuerunt species separatim per se subsistere. Quia vero intellectus abstrahit aliquas formas a materiis sensibilibus, ut puta curvum, de cuius intellectu non est nasus sicut de ratione simi, et linea et alia huiusmodi, quae mathematica dicuntur, posuerunt mathematica separata.” *In Metaph.* 3, l. 2, §351 (cf. ARISTOTLE, *Metaphysica* B.1, 995b13–18): “quidam attendentes duplicem abstractionem, scilicet universalis a particulari, et formae mathematicae a materia sensibili, posuerunt utrumque genus subsistere. Et ita ponebant substantias separatas quae sunt universalis abstracta subsistentia, inter quae et substantias sensibiles particulares posuerunt mathematica subsistentia separata, scilicet numeros, magnitudines et figuras.” *In Metaph.* 3, l. 7, §404 (cf. ARISTOTLE, *Metaphysica* B.2, 997a34–b3): “*Secunda* quaestio est, supposito quod sint aliquae substantiae, praeter sensibiles, utrum illae substantiae sint unius generis, aut magis sint plura genera harum substantiarum. Utramque enim opinionem recipit [Philosophus]. Quidam enim posuerunt praeter substantias sensibiles esse solas species separatas, id est per se hominem immaterialem, et per se equum: et sic de aliis speciebus. — Alii vero posuerunt quasdam alias intermedias substantias inter species et sensibilia, scilicet mathematica, de quibus dicebant esse mathematicas scientias.” *In Metaph.* 3, l. 7, §405: “Et huius ratio est, quia ponebant duplicem abstractionem rerum: puta abstractionem intellectus, qui dicitur abstrahere uno modo universale a particulari, iuxta quam abstractionem ponebant species separatas per se subsistentes. Alio modo formas quasdam a materia sensibili, in quarum scilicet definitione non ponitur materia sensibilis, sicut circulus abstrahitur ab aere. Iuxta quam ponebant mathematica abstracta, quae dicebant media inter species et sensibilia, quia conveniunt cum utrisque. Cum speciebus quidem, in quantum sunt separata a materia sensibili; cum sensibilibus autem, in quantum inveniuntur plura ex eis in una specie, sicut plures circuli et plures lineae.” *In Metaph.* 3, l. 7, §422: “Has autem quaestiones pertractat Philosophus infra, duodecimo, tertiodecimo et quartodecimo huius, ostendens non esse mathematicas substantias separatas, nec etiam species. Et ratio quae movebat ponentes mathematica et species sumpta ab abstractione intellectus, solvitur in principio decimitertii. Nihil enim prohibet aliquid quod est tale, salva veritate considerari ab intellectu non in quantum tale; sicut homo albus potest considerari non in quantum albus: et hoc modo intellectus potest considerare res sensibiles, non in quantum mobiles et materiales, sed in quantum sunt quaedam substantiae vel magnitudines; et hoc est intellectum abstrahere a materia et motu. Non autem sic abstrahit secundum intellectum, quod intelligat magnitudines et species esse sine materia et motu. Sic enim sequeretur quod vel esset falsitas intellectus abstrahentis, vel quod ea quae intellectus abstrahit, sint separata secundum rem.”

<sup>111</sup> *In Metaph.* 3, l. 14, §516 (cf. ARISTOTLE, *Metaphysica* B.6, 1002b16–17): “Et si ita est, sequitur quod sicut principia sensibilibus non sunt determinata secundum numerum, sed secundum speciem, ita etiam sit «in mediis» id est in mathematicis. Manifestum est enim quod in sensibilibus propter hoc quod sunt plura individua unius speciei sensibilis, principia sensibilibus non sunt determinata numero, sed specie, nisi forte accipiantur principia propria huius individui, quae sunt etiam in numero determinata et individualia.”

ARISTOTLE posits an example in (the genus of) voices.<sup>112</sup> Thus, it is manifest that the principles of lettered voices (i.e., of voices composed from elementary phonemes) are the letters. However, (such letters or phonemes) are not (the principles) of some individual lettered (voices) determined in some number; rather, according (only) to (their) species are the letters determined according to some number, of which (letters) some are vocals and other consonants—yet, this determination is according to species and not according to number. Indeed, there is not only one *A*, but many; and likewise, (the same can be said) of the other letters. On the other hand, if *these* letters should be taken, which are the principles of *this* determined syllable, diction, or statement, in this mode (the letters) are determined in number.

And for the same reason, since there are many mathematical (individuals) in one species that differ in number, the mathematical principles of mathematical (things) cannot be determined in number, but determined in only species: for example, if we should say that the principles of triangles are three sides or three angles (►4.4). Yet, this determination is according to species: for any of them can be multiplied infinitely.<sup>113</sup> Therefore, if there should be nothing besides sensible and mathematical (things), it would follow that the substance of a species would not be one according to number, and that the principles of beings would not be determined in some number but will be determined only according to species. Therefore, if it is necessary that they be determined according to number—otherwise the principles of things could be infinite in number—, it follows that it should be necessary for there to be species besides mathematical and sensible (individuals).

And this is what Platonists said, which follows of necessity from their positions: that the species should be something one among the substance of singulars, to which nothing would befit according to accident.<sup>114</sup> Thus, something befits an individual man according

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<sup>112</sup> *In Metaph.* 3, l. 14, §516 (cf. ARISTOTLE, *Metaphysica* B.6, 1002b17–20): “Et ponit [Philosophus] exemplum in vocibus. Manifestum est enim quod vocis literatae, literae sunt principia; non tamen sunt aliquo numero determinato individualium literarum, sed solum secundum speciem sunt determinatae literae secundum aliquem numerum, quarum aliae sunt vocales, et aliae consonantes: sed haec determinatio est secundum speciem, non secundum numerum. Non enim unum solum est *A* sed multa, et sic de aliis literis. Sed si accipiantur hae literae, quae sunt principia huius determinatae syllabae vel dictionis aut orationis, sic sunt determinatae numero.”

<sup>113</sup> *In Metaph.* 3, l. 14, §516 (cf. ARISTOTLE, *Metaphysica* B.6, 1002b20–26): “Et eadem ratione, cum sint multa mathematica numero differentia in una specie, non poterunt esse mathematica principia mathematicorum determinata numero, sed determinata specie solum: puta si dicamus quod principia triangulorum sunt tria latera et tres anguli. Sed haec determinatio est secundum speciem: contingit enim quodlibet eorum in infinitum multiplicari. Si igitur nihil esset praeter sensibilia et mathematica; sequeretur quod substantia speciei non esset una secundum numerum, et quod principia entium non essent determinata in aliquo numero, sed erunt determinata solum secundum speciem. Si ergo est necessarium quod sint determinata secundum numerum (alioquin contingeret esse principia rerum infinita numero), sequitur quod necesse sit species esse praeter mathematica et sensibilia.”

<sup>114</sup> *In Metaph.* 3, l. 14, §517 (cf. ARISTOTLE, *Metaphysica* B.6, 1002b27–30): “Et hoc est quod Platonici volunt dicere, quod sequitur ex necessitate ad positiones eorum quod sit in singularium substantia species aliquid unum, cui non conveniat aliquid secundum accidens. Homini enim individuo convenit

to accident: namely, white or black; but to the separated (Idea of) *Man*, which is a species according to Platonists, nothing befits by accident: instead, only that (befits it) which pertains to the *ratio* of the species. And although they should intend to say this, they do not articulate it well—that is, they do not distinguish well.

Objecting against (this position), ARISTOTLE says that, if we should posit species to be separated, and that the principles of things are not only determined in species but also in number, some difficulties (*inconvenientia*) follow.<sup>115</sup> Indeed, if the principles of things are one in number, in such a way that whichever of the principles considered in itself should be one, it will be impossible to say, concerning the principles of existing (things), that they are had in the same mode as the principles of sensible (things). For we see in sensible (things) that the principles of diverse (things) are diverse according to number but the same according to species, just like (the things) of which the principles are, are diverse according to number but the same according to species. For example, we see that, of syllables (which are) diverse according to number, which agree in species, the principles are the same letters according to species but not according to number.

Hence, if someone should say that it is not so in the principles of beings, but (that) the principles of all beings are one in number, it would follow that, among things, there would only be elements, since that which is one in number is singular.<sup>116</sup> Indeed, we call **singular** (*singulare* = καθ' ἕκαστον) *that which is one in number* (*quod est unum numero* = τὸ ἀριθμῷ ἓν), just like (we call) **universal** (*universale* = καθόλου) *that which is in many* (*quod est in multis* < τὸ ἐπὶ τούτων). What is singular is not multiplied, and is it found only

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aliquid secundum accidens, scilicet album vel nigrum; sed homini separato, qui est species secundum Platonicos, nihil convenit per accidens, sed solum quod pertinet ad rationem speciei. Et quamvis hoc dicere intendant, non tamen bene «dearticulant,» idest non bene distinguunt.”

<sup>115</sup> *In Metaph.* 3, l. 14, §518 (cf. ARISTOTLE, *Metaphysica* B.6, 1002b30–32): “*Obiicit* [Philosophus] *in contrarium*: et dicit, quod si ponamus species separatas esse, et quod principia rerum non sunt solum determinata specie, sed etiam numero, quaedam inconvenientia sequuntur, quae superius in quadam quaestione sunt tacta.” Ibid., l. 10, §464 (cf. ARISTOTLE, *Metaphysica* B.4, 999b27–31): “*Obiicit* [Philosophus] *in contrarium* tali ratione. Si principia sunt unum numero, ita quod quodlibet principiorum in se consideratum sit unum, non erit dicere de principiis existentium, quod hoc modo se habent sicut principia sensibilium. Videmus enim in sensibilibus, quod diversorum sunt diversa principia secundum numerum, sed eadem secundum speciem; sicut et eorum quorum sunt principia, sunt diversa secundum numerum, sed eadem secundum speciem. Sicut videmus quod diversarum syllabarum secundum numerum, quae conveniunt in specie, sunt principia eadem literae secundum speciem, sed non secundum numerum.”

<sup>116</sup> *In Metaph.* 3, l. 10, §464 (cf. ARISTOTLE, *Metaphysica* B.4, 999b31–1000a4): “Si quis autem dicat quod non est ita in principiis entium, sed omnium entium principia sunt unum numero; sequetur quod nihil sit in rebus praeter elementa; quia quod est unum numero, est singulare. Sic enim appellamus singulare quod est unum numero, sicut universale quod est in multis. Quod autem est singulare, non multiplicatur nec invenitur nisi singulariter. Si igitur ponatur quod omnium syllabarum essent principia eadem literae numero, sequeretur quod illae literae nunquam possent multiplicari, ut scilicet essent duo aut plura: et sic non posset seorsum inveniri in syllaba ista BA, vel DA. Et eadem ratio est de aliis literis. Pari igitur ratione si omnium entium sint principia eadem numero, sequetur quod nihil sit praeter principia: quod videtur inconveniens: quia cum principium alicuius sit, non erit principium nisi sit aliquid praeter ipsum.”

singularly. Therefore, if it should be posited that the principles of all syllables should be the same letters in number, it would follow that the principles of all syllables should be the same letters in number; (and) it would follow that those letters could never be multiplied—to wit, such that there would be two or more (e.g., two or more letters *A*). And thus, (the letter *A*) could not be found separately in this syllable *BA* or *DA*. And the same reason is (true) of the other letters. Hence, for the same reason, if the principles of all beings should be the same in number, it would follow that there would be nothing but principles. This seems unsuitable, for, since there should be a principle *of something*, it will only be a principle if there is *something* besides it.

ARISTOTLE determines (the truth concerning) this question (►45.16).<sup>117</sup> And the truth is that, just like mathematical (things) do not exist apart from sensible (things), nor do the species of things (exist) separated apart from mathematical and sensible (things). For the efficient and mover principles of things are indeed determined in number; but the formal principles of things of which there are many individuals of one species are not determined in number but only in species.

For someone who diligently considers PLATO's arguments, it is evident that he erred in his position in this: that he believed that the mode of the thing understood should be, in its being (*in suo esse*), as the mode of understanding the thing itself.<sup>118</sup> Hence, since he finds that our intellect understands abstract (things) in two (modes)—one mode, as we understand universals abstracted from singulars, (and) the other mode as we understand mathematical (things) abstracted from sensible (things)—, he posited that an abstraction in the essences of things responds to one and to the other abstraction of the intellect. Whence, he posited that both mathematical (things) and species are separated. However,

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<sup>117</sup> *In Metaph.* 3, l. 14, §518: "Hanc autem dubitationem Philosophus determinat duodecimo et quartodecimo huius libri. Et veritas dubitationis est quod sicut mathematica non sunt praeter sensibilia, ita nec species rerum separatae praeter mathematica et sensibilia. Principia autem rerum efficientia et moventia sunt quidem determinata numero; sed principia rerum formalia quorum sunt multa individua unius speciei, non sunt determinata numero, sed solum specie."

<sup>118</sup> *In Metaph.* 1, l. 10, §158 (cf. ARISTOTLE, *Metaphysica* A.6, 987b14–18): "Patet autem diligenter intuenti rationes Platonis, quod ex hoc in sua positione erravit, quia credit, quod modus rei intellectae in suo esse sit sicut modus intelligendi rem ipsam. Et ideo quia invenit intellectum nostrum dupliciter abstracta intelligere, uno modo sicut universalia intelligimus abstracta a singularibus, alio modo sicut mathematica abstracta a sensibilibus, utrique abstractioni intellectus posuit respondere abstractionem in essentiis rerum: unde posuit et mathematica esse separata et species. Hoc autem non est necessarium. Nam intellectus etsi intelligat res per hoc, quod similis est eis quantum ad speciem intelligibilem, per quam fit in actu; non tamen oportet quod modo illo sit species illa in intellectu quo in re intellecta: nam omne quod est in aliquo, est per modum eius in quo est. Et ideo ex natura intellectus, quae est alia a natura rei intellectae, necessarium est quod alius sit modus intelligendi quo intellectus intelligit, et alius sit modus essendi quo res existit. Licet enim id in re esse oporteat quod intellectus intelligit, non tamen eodem modo. Unde quamvis intellectus intelligat mathematica non cointelligendo sensibilia, et universalia praeter particularia, non tamen oportet quod mathematica sint praeter sensibilia, et universalia praeter particularia. Nam videmus quod etiam visus percipit colorem sine sapore, cum tamen in sensibilibus sapor et color simul inveniuntur."



this is not necessary. For the intellect, even if it should understand a thing because it is like it in respect of the intelligible species whereby it comes to be in act, however, it is not necessary for the species to be in the intellect in the (same) mode in which (it is) in the thing understood. Indeed, everything that is in something is in it according to the mode of that in which it is (►26.3). And hence, from the nature of the intellect, which is other than the nature of the thing understood, it is necessary for the mode of understanding—by which the intellect understands—to be other than the mode of being—by which the thing exists. Thus, although it is necessary for the intellect to understand that which is in the thing, (it is) not (necessary), however, (that this be) in the same mode. Whence, although the intellect should understand mathematical (things) not co-understanding sensible (things), and (although the intellect should understand) universals apart from particulars, it is not necessary, however, that mathematical (things) should be (i.e., exist) apart from sensible (things), and (that) universals (should exist) apart from particulars. For we see that also sight perceives color without savor; and yet, color and savor are simultaneously found in sensible (things).

#### 49.16. Abstraction and Science

It belongs to the *ratio* of science that it should be of true (conclusions). And this would not be (so) if (science) should not be of things as they are.<sup>119</sup> Therefore, the things of which a science (treats) must be such as they are transmitted in the sciences. Yet, sensible lines are not such as the geometer says. For the geometer proves that the circle touches a line in only one point, as is evident in EUCLID'S *Elements*. However, this is not found (to be) true in the sensible circle and line. And this reason was used by PROTAGORAS, who destroyed the certitude of the sciences against the geometers. Likewise, celestial motions and revolutions are not such as the astronomer consigns. For it seems to be incompatible with nature to posit the motion of celestial bodies through eccentric and epicyclic (orbits), and other diverse motions that the astronomers describe in the heaven. Likewise, nor are the quantities of celestial bodies such as the astronomers describe them. For they use stars as points, when these are bodies that have a magnitude. Whence, it seems that

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<sup>119</sup> *In Metaph.* 3, l. 7, §416 (cf. ARISTOTLE, *Metaphysica* B.2, 997b34–998a6): “*Obiicit* [Philosophus] *pro praedicta positione* in hunc modum. De ratione scientiae est, quod sit verorum. Hoc autem non esset, nisi esset de rebus prout sunt. Oportet igitur res, de quibus sunt scientiae, tales esse, quales traduntur in scientiis. Sed sensibiles lineae non sunt tales, quales dicit geometra. Et hoc probat per hoc, quod geometria probat, quod circulus tangit «regulam,» idest rectam lineam solum in puncto, ut patet in tertio Euclidis. Hoc autem non invenitur verum in circulo et linea sensibilibus. Et hac ratione usus fuit Protagoras, destruens certitudines scientiarum contra geometras. — Similiter etiam motus et revolutiones caelestes non sunt tales, quales astrologus tradit. Videtur enim naturae repugnare, quod ponantur motus corporum caelestium per excentricos, et epicyclos, et alios diversos motus, quos in caelo describunt astrologi. — Similiter etiam nec quantitates corporum caelestium sunt tales, sicut describunt eas astrologi. Utuntur enim astris ut punctis, cum tamen sint corpora magnitudinem habentia. Unde videtur quod nec geometria sit de sensibilibus magnitudinibus, nec astrologia de caelo sensibili. Relinquitur igitur, quod sint de aliquibus aliis mediis.”

neither geometry should be about sensible magnitudes nor astronomy about the sensible heaven. It therefore remains that (sciences) should be of some other means (*mediis*).

However, just because sciences are about universals, it is not necessary for universals to be subsisting by themselves outside the soul (as the Platonists claimed).<sup>120</sup> For, although it should be necessary for the truth of cognition that cognition respond to the thing, it is not necessary for the mode of cognition and (for the mode) of the thing to be the same. Indeed, those that are conjoined in the thing are sometimes known dividedly. Thus, one thing is simultaneously white and sweet, but sight knows only whiteness, while taste (knows) only sweetness. In the same mode, too, the intellect understands a line that exists in sensible matter without sensible matter. even though it could also understand (it) with sensible matter. And this diversity occurs according to (or following, *secundum*) the diversity of intelligible species received in the intellect, which is sometimes a likeness of a quantity only, while sometimes (it is a likeness) of a quantified sensible substance.

Likewise, although the nature of a genus or of a species should always be in *these* individuals, (the intellect) nonetheless understands the nature of a genus and of a species not understanding (simultaneously) the individuating principles—and this is to understand universals.<sup>121</sup> And thus, these two are not inconsistent (*non repugnant*): that universals should not subsist outside the soul, and that the intellect, (while) understanding universals, should understand the things that are outside the soul. That the intellect should understand the nature of a genus or of a species denuded of individuating principles happens on account of the condition of the intelligible species received in it, which is caused to be (*effecta*) immaterial by the agent intellect, as (it is) abstracted from matter and from the conditions of matter whereby something is individuated. And hence, sensitive potencies (i.e., sense faculties) cannot know universals because they cannot receive an immaterial form, since they always receive (the likeness of a thing) in a corporeal organ.

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<sup>120</sup> ScG 2, c. 75 n. 8: “Nec tamen oportet quod, quia scientiae sunt de universalibus, quod universalia sint extra animam per se subsistentia: sicut Plato posuit. Quamvis enim ad veritatem cognitionis necesse sit ut cognitio rei respondeat, non tamen oportet ut idem sit modus cognitionis et rei. Quae enim coniuncta sunt in re, interdum divisim cognoscuntur: simul enim una res est et alba et dulcis; visus tamen cognoscit solam albedinem, et gustus solam dulcedinem. Sic etiam et intellectus intelligit lineam in materia sensibili existentem, absque materia sensibili: licet et cum materia sensibili intelligere possit. Haec autem diversitas accidit secundum diversitatem specierum intelligibilium in intellectu receptorum: quae quandoque est similitudo quantitatis tantum, quandoque vero substantiae sensibilis quantae.”

<sup>121</sup> ScG 2, c. 75 n. 8: “Similiter autem, licet natura generis et speciei nunquam sit nisi in his individuis, intelligit tamen intellectus naturam speciei et generis non intelligendo principia individuantia: et hoc est intelligere universalia. Et sic haec duo non repugnant, quod universalia non subsistant extra animam: et quod intellectus, intelligens universalia, intelligat res quae sunt extra animam. Quod autem intelligat intellectus naturam generis vel speciei denudatam a principis individuantibus, contingit ex conditione speciei intelligibilis in ipso receptorum, quae est immaterialis effecta per intellectum agentem, utpote abstracta a materia et conditionibus materiae, quibus aliquid individuatur. Et ideo potentiae sensitivae non possunt cognoscere universalia: quia non possunt recipere formam immaterialem, cum recipiant semper in organo corporali.”

#### 49.17. Names Transferred from Sense/Imagination into Intellectualive Cognition

In us, intellectualive cognition takes (its) principle from imagination (*phantasia*) and sense, which do not extend themselves beyond the continuum.<sup>122</sup> Wherefrom, from those (things) that are found in the continuum, we transfer (*transumimus*) the names to all those (things) that we understand (*capimus*, i.e., seize) in the intellect.

This is evident in the name of *distance*, which is first found in place.<sup>123</sup> And thence it is transferred to whatever difference of forms, since all contraries, in whatsoever genus they should be, are said to be maximally distant, even if distance should be found first in (the category) *where*.

Likewise, the name of *procession* (or process, *processio*) was first devised (*inventum*) to signify local motion, according to which something orderly passes (*transit*) from one place, through (some) ordered means, into an extremity.<sup>124</sup> From this, it was transferred to signify everything in which there is an order of one from another: wherefrom, in every motion, we use the name of *procession*. For example, we say that a body proceeds from whiteness into blackness; from a small quantity to a large (quantity); from non-being into being, and conversely. Likewise, we use the name of *procession* where there is some emanation of something from something. For example, we say that a ray (*radius*, i.e., a sunbeam) proceeds from the sun; (that) every operation (proceeds) from an operator; and (we) also (say that every) operated (thing proceeds from an operator), as an artifact from an artificer; or (that every) begotten (proceeds) from a begetter; and, universally, we signify every such order by the name of *procession*.

#### 49.18. Procession and Knowledge of Increase in Qualities and Forms

It remains to consider how some qualities and forms are said to be increased, and which are those that can be increased.<sup>125</sup>

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<sup>122</sup> *De potentia*, q. 10 a. 1 co.: “cognitio intellectualiva in nobis sumit principium a phantasia et sensu, quae ultra continuum se non extendunt; et inde est quod ex his quae in continuo inveniuntur, transumimus nomina ad omnia quae capimus intellectu.”

<sup>123</sup> *De potentia*, q. 10 a. 1 co.: “sicut patet in nomine distantiae, quae primo invenitur in loco, et exinde transumitur ad quamcumque formarum differentiam, propter quod omnia contraria, in quocumque sint genere, dicuntur esse maxime distantia, licet distantia primo inveniatur in ubi, ut Philosophus dicit in X Metaph.”

<sup>124</sup> *De potentia*, q. 10 a. 1 co.: “Similiter autem nomen processionis primo est inventum ad significandum motum localem, secundum quem aliquid ordinate ab uno loco per media ordinatim in extremum transit; et ex hoc transumitur ad significandum omne illud in quo est aliquis ordo unius ex alio, vel post aliud; et inde est quod in omni motu utimur nomine processionis; sicut dicimus, quod corpus procedit ab albedine in nigredinem, et de parva quantitate ad magnam et de non esse in esse, et e converso, et similiter utimur nomine processionis, ubi est aliqua emanatio alicuius ab aliquo; sicut dicimus quod radius procedit a sole, et omnis operatio ab operante, et etiam operatum, sicut artificiatum ab artifice, vel genitum a generante; et universaliter omnium huiusmodi ordinem nomine processionis significamus.”

<sup>125</sup> *De virtutibus*, q. 1 a. 11 co.: “considerandum restat quomodo aliquae qualitates et formae augeri dicuntur; et quae sunt quae augeri possunt.”

Therefore, it is to be known that, since names are signs of (things) understood, as ARISTOTLE says, just like we know the less knowable (*minus nota*) from the more knowable (*ex magis notis*), so, too, we name the less known (*minus nota*) from the more known (*ex magis notis*).<sup>126</sup>

Wherefrom, since local motion is the more knowable (*notior*) among all motions, the name *distance* is derived from contrariety according to place towards all contraries between which there can be some motion (►49.17), as ARISTOTLE says.<sup>127</sup>

Likewise, since the motion of substance according to quantity is more sensible than motion according to alteration, hence, names that befit motion according to quantity are derived towards alteration.<sup>128</sup> Wherefrom, just like a body that is moved towards a perfect quantity is said to be increased, and the perfect quantity itself is said to be great (*magna*) in respect of the imperfect, so, (too), that which is moved from an imperfect to a perfect quality is said to be increased according to quality; and the perfect quality itself is said to be great in respect to the imperfect. And since the perfection of any one thing is its good(ness), hence, AUGUSTINE says that in those (things) that are not great in bulk (*magna mole*) to be greater (*maius*) is the same as (to be) better (*melius*; ►22).

Now, to be moved from an imperfect to a perfect form is nothing other than for a subject to be reduced more from potency into act, for form is an act.<sup>129</sup> Whence, for a subject to receive (*percipere*) a form more is nothing other than for it to be reduced more into the act of that form. And just as something is reduced by an agent from pure potency into the act of a form, so, too, is (something) reduced from an imperfect into a perfect act by the action of an agent.

However, on account of two (reasons), this does not happen in all forms:<sup>130</sup>

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<sup>126</sup> *De virtutibus*, q. 1 a. 11 co.: “Sciendum est ergo, quod cum nomina sint signa intellectuum, ut dicitur I Periher.; sicut ex magis notis cognoscimus minus nota, ita etiam ex magis notis minus nota nominamus.”

<sup>127</sup> *De virtutibus*, q. 1 a. 11 co.: “Et inde est quod, quia motus localis est notior inter omnes motus, ex contrarietate secundum locum derivatur nomen distantiae ad omnia contraria inter quae potest esse aliquis motus; ut dicit Philosophus X Metaph.”

<sup>128</sup> *De virtutibus*, q. 1 a. 11 co.: “Et similiter, quia motus substantiae secundum quantitatem est sensibillior quam motus secundum alterationem; inde est quod nomina convenientia motui secundum quantitatem derivantur ad alterationem. Et inde est quod, sicut corpus quod movetur ad quantitatem perfectam dicitur augeri, et ipsa quantitas perfecta dicitur magna respectu imperfectae; ita illud quod movetur de qualitate imperfecta ad perfectam, dicitur augeri secundum qualitatem; et ipsa qualitas perfecta dicitur magna respectu imperfectae. Et quia perfectio uniuscuiusque rei est eius bonitas; ideo Augustinus dicit, quod in his quae non magna mole sunt, idem est esse maius quod melius.”

<sup>129</sup> *De virtutibus*, q. 1 a. 11 co.: “Moveri autem de forma imperfecta ad perfectam, nihil est aliud quam subiectum magis reduci in actum: nam forma actus est; unde subiectum magis percipere formam, nihil aliud est quam ipsum reduci magis in actum illius formae. Et sicut ab agente reducitur aliquid de pura potentia in actum formae; ita etiam per actionem agentis reducitur de actu imperfecto in actum perfectum.”

<sup>130</sup> *De virtutibus*, q. 1 a. 11 co.: “Sed hoc non contingit in omnibus formis, propter duo.”

1. Because that which perfects the *ratio* of a form is something indivisible.<sup>131</sup> For example, a number, for an added unit constitutes a species; whence, *two* or *three* are not said according to more or less (i.e., no number two is more or less two than another). Consequently, the more and the less are found neither in quantities that are denominated from numbers—e.g., *bi-cubit* or *tri-cubit*—nor in figures—e.g., *triangular* or *square*—nor in proportions—e.g., *double* or *triple*.

2. From the comparison of form to subject, since (the form) inheres in it in an indivisible mode.<sup>132</sup> Wherefrom, a substantial form receives neither intension nor remission, since it gives a substantial (act of) being, which is in one mode. Indeed, wherever there is another substantial (act of) being, there is another thing; wherefrom, ARISTOTLE assimilates definitions to numbers (►16.7). Therefore, too, nothing that is substantially predicated of another—even if it should be in a genus of accident—is predicated according to more or less. Thus, whiteness is not said (to be) more or less a color. Wherefrom, too, (if) qualities (are) abstractly designated (*in abstracto signatae*), they are neither extended nor (are they) remitted, since they are designated by the mode of substance. Thus, whiteness not said (to be) more or less: rather, (it is) the white (that is said to be more or less white).

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<sup>131</sup> *De virtutibus*, q. 1 a. 11 co.: “Primo quidem ex ipsa ratione formae; eo scilicet quod id quod perficit rationem formae, est aliquid indivisibile, puta numerus. Nam unitas addita constituit speciem: unde binarius aut trinaris non dicitur secundum magis et minus; et per consequens non invenitur magis et minus neque in quantitibus quae denominantur a numeris, puta bicubitum vel tricubitum, neque in figuris, puta triangulare et quadratum; et in proportionibus, puta duplum et triplum.”

<sup>132</sup> *De virtutibus*, q. 1 a. 11 co.: “Alio modo ex comparatione formae ad subiectum; quia inhaeret ei modo indivisibili. Et propter hoc forma substantialis non recipit intensionem vel remissionem, quia dat esse substantiale, quod est uno modo: ubi enim est aliud esse substantiale, est alia res; et propter hoc Philosophus, VIII Metaphys., assimilat definitiones numeris. Et inde est etiam quod nihil quod substantialiter de altero praedicatur, etiam si sit in genere accidentis, praedicatur secundum magis et minus; non enim dicitur albedo magis et minus color. Et propter hoc etiam qualitates in abstracto signatae, quia signantur per modum substantiae, nec intenduntur nec remittuntur; non enim dicitur albedo magis et minus, sed album.”



## 50. The First Principles of Cognition

*To determine the principles of science, we seek the first principles in the order of cognition.*

### 50.1. The Preexistent Cognitive Potency

As ARISTOTLE says, there must be in us, from the beginning (*a principio*), some cognitive potency: to wit, (a faculty) that should exist before the cognition of principles.<sup>1</sup> Not, however, such that it would be more effective (*potior* = τιμιωτέρα) than the cognition of principles in respect of certitude (*quantum ad certitudinem* = κατ' ἀκρίβειαν); whence, the cognition of principles is not produced in us from preexistent cognition, (i.e.), in the same mode as (the production of new cognition from preexistent cognition) happens in those (conclusions) that are known through demonstration.

ARISTOTLE shows what should be the preexistent cognitive principle.<sup>2</sup> And in respect of this, he posits three degrees in animals:

1. There seems to be in all animals (something) in common: that all have some connatural potency to judge about sensible (things), called *sense*, which is not acquired anew (*de novo*), but follows upon the nature itself (of the animal).<sup>3</sup>
2. Although sense is in all animals, in some of them there remains some sensible impression (when) the sensible thing (is) absent, as happens in all perfect animals, while in others this does not happen, as in some imperfect animals: for example, it is evident in them (i.e., in the latter, imperfect animals) that they do not move in progressive motion.<sup>4</sup>

And—concerning some animals—it may happen that there remains some impression that is more vehement in respect of some sensible (things), but not in respect of others, which are weaker. Hence, any animals in which there remains no impression of sensible (things),

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<sup>1</sup> *In Post. an. 2*, l. 20, 95–102 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 99b32–34): “Dicit ergo [Philosophus] primo quod *necesse est* a principio in nobis esse *quandam potenciam cognoscitiuam*, que scilicet preexistat cognitioni principiorum, non tamen talem que sit *potior* quantum ad *certitudinem* cognitione principiorum. Vnde non eodem modo principiorum cognitio fit in nobis ex preexistenti cognitione sicut accidit in hiis que cognoscuntur per demonstrationem.”

<sup>2</sup> *In Post. an. 2*, l. 20, 103–106 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 99b34–100a3): “ostendit [Philosophus] quid sit principium cognoscitiuum preexistens. Et quantum ad hoc ponit tres gradus in animalibus.”

<sup>3</sup> *In Post. an. 2*, l. 20, 107–111 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 99b34–35): “Quorum primus est hoc quod *uidetur inesse* communiter *omnibus animalibus*, que omnia habent quandam *connaturalem potenciam* ad iudicandum de sensibilibus, que uocatur *sensus*, que non acquiritur de nouo, set ipsam naturam consequitur.”

<sup>4</sup> *In Post. an. 2*, l. 20, 112–119 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 99b36–37): “Secundum gradum ponit [Philosophus...]. Et dicit quod, *cum sensus* sit in omnibus animalibus, in quibusdam eorum remanet aliqua impressio *sensibilis*, abeunte re sensibili, sicut contingit in omnibus animalibus perfectis, in quibusdam autem hoc non contingit, sicut in quibusdam animalibus imperfectis, sicut patet in hiis que non mouentur motu progressiuo.”

such animals have cognition only while they sense; and, likewise, the animals in which such an impression is naturally apt to remain, if there should not remain in them (an impression) about some sensible (things), they can only have some cognition while they sense.<sup>5</sup>

On the other hand, concerning the animals in which there is a remainder of such an impression, there may, again, be some cognition in the soul apart from sense.<sup>6</sup> And these are the (animals) that have memory.

3. Although there are many such animals that have memory, among them, there is moreover some difference: for in some of them, a reasoning is produced that remains in memory—as in men—, while in some (other animals, reasoning is) not (produced)—as in irrational animals (*in brutis*).<sup>7</sup>

## 50.2. The Cognition of First Principles

ARISTOTLE shows, according to the aforesaid, in what mode the cognition of first principles should be produced in us.<sup>8</sup> He concludes, from the aforesaid, that memory is produced from sense—to wit, in those animals in which a sensible impression remains. And experience is produced from many memories produced about the same thing but in diverse singulars; for experience seems to be nothing other than to receive something from many (impressions) retained in memory.

However, experience requires some reasoning about particulars, through which (reasoning) one (knowledge) is joined (*confertur*) to another—which is proper of reason.<sup>9</sup>

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<sup>5</sup> *In Post. an. 2, l. 20, 119–130* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 99b37–39): “Et forte contingit quod circa aliqua animalia remanet aliqua impressio quantum ad aliqua sensibilia, que sunt uehementiora, non autem quantum ad alia, que sunt debiliora. *In quibuscunque igitur* animalibus omnino nulla impressio remanet sensibilibus, huiusmodi animalia nullam cognitionem habent nisi dum sentiunt; et similiter animalia in quibus nata est remanere talis impressio, si *circa* aliqua sensibilia in eis non remaneat, non possunt habere aliquam cognitionem nisi dum sentiunt.”

<sup>6</sup> *In Post. an. 2, l. 20, 130–133* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 99b39–100a1): “Set <circa> animalia *in quibus* inest huiusmodi remansio impressionis, contingit *adhuc* esse quandam cognitionem *in anima* preter sensum. Et ista sunt que habent memoriam.”

<sup>7</sup> *In Post. an. 2, l. 20, 134–140* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a1–3): “Tercium gradum ponit [Philosophus...]. Et dicit quod, cum multa sint talia animalia habencia memoriam, inter ea ulterius est *quedam differentia*: nam in quibusdam eorum fit *ratiocinatio* de hiis que remanent in memoria, sicut in hominibus, in quibusdam autem non, sicut in brutis.”

<sup>8</sup> *In Post. an. 2, l. 20, 142–151* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a3–6): “ostendit [Philosophus] secundum predicta quomodo in nobis fiat cognitio primorum principiorum. Et concludit ex premissis quod *ex sensu fit memoria*, in illis scilicet animalibus in quibus remanet impressio sensibilis, sicut supra dictum est, *ex memoria autem multocius facta* circa eandem rem, in diuersis tamen singularibus, fit *experimentum*, quia *experimentum* nichil aliud esse uidetur quam accipere aliquid ex multis in memoria retentis.”

<sup>9</sup> *In Post. an. 2, l. 20, 152–157* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a6–8): “Set tamen experimentum indiget aliqua ratiocinatione circa particularia, per quam confertur unum ad aliud, quod est proprium rationis. Puta, cum aliquis recordatur quod talis herba multocius sanauit multos a febre, dicitur esse expertum quod talis sit sanatiua febris.”



For example, when someone remembers that such an herb healed many of fever, it is said to have been experienced (*esse expertum*) that such (an herb) should be capable of healing fever.

However, reason does not stop at a particular experience.<sup>10</sup> Rather, from many particulars in which (something) has (come to be) experienced, it takes one common (principle) that is secured (*firmatur*) in the soul; and (reason) considers it without considering some singulars. This common (principle), (reason) takes as the principle of art and of science. For example, inasmuch as the physician considered that this herb healed Sortes, who had a fever, and Plato, and many other singular men, there is experience (in him); but when, by his consideration, it arises (*ascendit*) that such species of herb heals (whosoever) has fever simply, this is taken as some rule of the art of medicine.

And this is, therefore, what ARISTOTLE says: that just as experience is produced from memory, so, too, (a new form of knowledge is produced) from what has been experienced (*ex experimento* = ἐκ... ἐμπειρίας); or—even further—from a universal resting in the soul (*ex uniuersali quiescente in anima* < ἐκ παντὸς ἡρεμήσαντος τοῦ καθόλου ἐν τῇ ψυχῇ): to wit, which is received as though it should be in all (things in a manner) such as it has been experienced in some (things).<sup>11</sup> Which universal is said to be resting in the soul: to wit, insofar as it is considered apart from singulars, in which there is motion.

### 50.3. Need for a Possible and an Agent Intellect

Someone might believe that sense and memory of singulars alone should suffice to cause the intelligible cognition of principles, as some ancient (philosophers)—who did not distinguish between sense and intellect—posited.<sup>12</sup> And hence, to exclude this, ARISTOTLE adds that, simultaneously with sense, we must suppose the nature of a soul such that it

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<sup>10</sup> *In Post. an. 2*, l. 20, 157–169 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a6–8): “Ratio autem non sistit in experimento particularium, set ex multis particularibus in quibus expertus est, accipit unum commune, quod firmatur in anima, et considerat illud absque consideratione alicuius singularium. Et hoc commune accipit ut principium artis et scientie: puta, quamdiu medicus considerauit hanc herbam sanasse Sortem febrientem et Platonem et multos alios singulares homines, <est experimentum>; cum autem sua consideratio ad hoc ascendit quod talis species herbe sanat febrientem simpliciter, hoc accipitur ut quedam regula artis medicine.”

<sup>11</sup> *In Post. an. 2*, l. 20, 170–177 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a6–7): “Hoc est ergo quod dicit [Philosophus] quod, sicut ex memoria fit experimentum, ita etiam ex *experimento*, aut etiam ulterius ex *uniuersali quiescente in anima*, quod scilicet accipitur ac si in omnibus ita sit sicut est expertum in quibusdam, quod quidem uniuersale dicitur esse quiescens in anima, in quantum scilicet consideratur preter singularia, in quibus est motus.”

<sup>12</sup> *In Post. an. 2*, l. 20, 223–235 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a13–14): “Posset autem aliquis credere quod solus sensus uel memoria singularium sufficiat ad causandum cognitionem intelligibilem principiorum, sicut posuerunt quidam Antiqui, non discernentes inter sensum et intellectum. Et ideo ad hoc excludendum Philosophus subdit quod simul cum sensu oportet presupponere talem naturam anime que *possit pati hoc*, id est que sit susceptiua cognitionis uniuersalis, quod quidem fit per intellectum possibilem, et iterum que possit agere hoc secundum intellectum agentem, qui facit intelligibilia in actu per abstractionem uniuersalium a singularibus.”

could be affected by this (*possit pati hoc* = δύνασθαι πάσχειν τοῦτο): that is, that it be susceptible of universal cognition, which is indeed produced by the possible intellect; and, again, (such) that it could do this according to the agent intellect, which produces intelligible (species) in act through the abstraction of universals from singulars.

#### 50.4. The First Universal

As ARISTOTLE says, the universal is *one apart from* (or *beyond, over and above*) *the many* (*unum praeter multa* = [ἐν] παρὰ τὰ πολλὰ): not indeed according to being (*secundum esse*), but according to the consideration of the intellect (*secundum considerationem intellectus*), which considers some nature: for example, (the nature) of man, not turning its attention (*non respiciendo*) to Sortes and Plato.<sup>13</sup>

Even if, according to the consideration of the intellect, there should be one apart from many, however, there is—according to being—in all singulars (something) one and the same: not indeed in number, as though humanity would be the same in number for all men, but according to the *ratio* of the species.<sup>14</sup> Thus, just like *this* white (thing) is similar to *that* white (thing) in a whiteness that exists in one and in the other, (but) not as one whiteness in number, so, too, Sortes is like Plato in humanity, (but) not as one humanity in number that exists in one and in the other.

ARISTOTLE manifests what has been said in the preceding solution in respect of this: that the universal is received from what has been experienced of singulars (*ex experimento singularium*).<sup>15</sup> And he says that what has been said, but not clearly—to wit, in what mode the universal should be produced in the soul from what has been experienced of singulars—must be said again so that it be more clearly manifested. Thus, if many singulars that are indifferent in respect of something *one* that exists in them should be received (in the soul), that *one* (universal that is) received in the soul insofar as (many

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<sup>13</sup> *In Post. an. 2, l. 20, 178–182* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a7): “quod etiam [uniuersale] dicit [Philosophus] esse unum *praeter multa*, non quidem secundum esse, set secundum considerationem intellectus qui considerat naturam aliquam, puta hominis, non respiciendo ad Sortem et Platonem.”

<sup>14</sup> *In Post. an. 2, l. 20, 183–192* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a7–8): “*quodcun<que>*, etsi secundum considerationem intellectus sit unum *praeter multa*, tamen secundum esse est *in omnibus* singularibus unum et *idem*, non quidem numero, quasi sit eadem humanitas numero omnium hominum, set secundum rationem speciei; sicut enim hoc album est simile illi albo in albedine non quasi una numero albedine existente in utroque, ita etiam Sortes est similis Platoni in humanitate non quasi una humanitate numero in utroque existente.”

<sup>15</sup> *In Post. an. 2, l. 20, 237–249* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a14–16): “manifestat [Philosophus] quod dictum est in precedenti solutione, quantum ad hoc quod ex experimento singularium accipitur uniuersale. Et dicit quod illud *quod supra dictum est*, set *non plane*, quomodo scilicet ex experimento singularium fiat uniuersale in anima, *iterum* oportet dicere ut planius manifestetur. Si enim accipiantur multa singularia que sunt indifferentia quantum ad aliquid unum in eis existens, illud unum secundum quod non differunt *in anima* acceptum, est *primum uniuersale*, quicquid sit illud, siue scilicet pertineat ad essentiam singularium siue non.”

singulars) do not differ (in respect of something *one*), is a **first universal** (< πρῶτον... ἐν τῇ ψυχῇ καθόλου), whatever that should be: to wit. whether it should pertain to the essence of singulars or not (i.e., whether the universal should be the species itself of many individuals or a genus that is derived from many species; ►50.5).

Thus, since we find that Sortes, Plato, and many others, are indifferent in respect of whiteness, we receive this *one*—namely, *white*—as a universal that is an accident.<sup>16</sup> Likewise, since we find that Sortes, Plato, and many others, are indifferent in respect of rationality, we receive this *one* in which they do not differ—namely, *rational*—as a universal that is a difference.

ARISTOTLE consequently manifests how this *one* can be received.<sup>17</sup> For it is manifest that the singular is sensed properly and by itself; but sense, too, is in some mode of the universal itself. Thus, (sense) knows Callias not only insofar as it is Callias, but also insofar as it is *this* man; and likewise, (sense knows) Sortes insofar as it is *this* man. Therefrom, (when) such a reception of sense preexists, the intellective soul can consider *man* in one and in the other. If it should be (the case) that sense would apprehend that which is of the particularity alone, and in no mode would apprehend with this the universal nature in particular, it would not be possible for the cognition of the universal to be caused in us from the apprehension of sense.

### 50.5. From Species to Genus

ARISTOTLE consequently manifests the same (mode of knowing universal principles) in the process that is from the species to the genus.<sup>18</sup> Whence, he adds that, again, in *man* and in *horse*, the soul rests through (its) consideration until something impartible is found in them, which is the universal. For example, that we consider such and such animal—as

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<sup>16</sup> *In Post. an. 2*, I. 20, 249–256: “Quia enim inuenimus Sortem et Platonem et multos alios esse indifferentes quantum ad albedinem, accipimus hoc unum, scilicet album, quasi uniuersale quod est accidens; et similiter quia inuenimus Sortem et Platonem et alios esse indifferentes quantum ad rationalitatem, hoc unum in quo non differunt, scilicet rationale, accipimus quasi uniuersale quod est differencia.”

<sup>17</sup> *In Post. an. 2*, I. 20, 257–271 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a16–b1): “Qualiter autem hoc unum accipi possit, manifestat [Philosophus] consequenter. Manifestum est enim quod *singulare sentitur*, proprie et per se, set tamen *sensus* est quodam modo etiam ipsius *uniuersalis*: cognoscit enim Calliam non solum in quantum est Callias, set etiam in quantum est hic homo, et similiter Sortem in quantum est hic homo. Et exinde est quod, tali acceptione sensus preexistente, anima intellectiua potest considerare hominem in utroque. Si autem ita esset quod sensus apprehenderet solum id quod est particularitatis et nullo modo cum hoc apprehenderet uniuersalem naturam in particulari, non esset possibile quod ex apprehensione sensus causaretur in nobis cognitio uniuersalis.”

<sup>18</sup> *In Post. an. 2*, I. 20, 272–281 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b1–3): “Et hoc idem manifestat [Philosophus] consequenter in processu qui est a speciebus ad genus. Vnde subdit quod *iterum in hiis*, scilicet in homine et equo, anima stat per considerationem quousque inueniatur aliquid impartibile in eis, quod est uniuersale, *ut puta* consideramus tale *animal* et tale, puta hominem et equum, *quousque* perueniamus ad commune *animal*, quod est genus; *et in hoc similiter* facimus quousque perueniamus ad aliquod genus superius.”

man and horse—, until we arrive at the common *animal*, which is a genus. And we do something similar until we arrive at some higher genus.

### 50.6. The Generation of Experience from Memory

To show that there are diverse degrees of human cognition, ARISTOTLE compares experience to art, positing the generation of experience.<sup>19</sup>

Thus, as ARISTOTLE says, experience is caused in men from memory (< γίγνεται... ἐκ τῆς μνήμης ἐμπειρία τοῖς ἀνθρώποις).<sup>20</sup> And the mode of causing is this: from many memories of one (same) thing, man receives (a single) experience about something (< αἰ... πολλὰ μνημαὶ τοῦ αὐτοῦ πράγματος μιᾶς ἐμπειρίας δύνανται ἀποτελοῦσιν). By which experience, he is able to operate easily and rightly.

Hence, since experience furnishes (*praebet*) potency to rightly and easily operate, the arts and the sciences seem to be almost alike (< δοκεῖ σχεδὸν ἐπιστήμη καὶ τέχνη ὅμοιον εἶναι καὶ ἐμπειρία).<sup>21</sup> Indeed, there is likeness because, in one and in the other, one reception of something is taken; and (there is) unlikeness because universals are received through art, while singulars (are received) through experience.

### 50.7. The Generation of Art and Science from Experience

ARISTOTLE posits the generation of art.<sup>22</sup> He says that, in men, science and art is produced from experience. And he proves (this) through the authority of POLUS, who says that experience produces art, while inexperience (produces) chance; for when someone (who is) inexperienced operates rightly, it is by chance.

Now, the mode by which art is produced from experience is the same as the aforesaid mode whereby experience is produced from memory. For just as one experimental science is produced from many memories, so, (too), (one) universal reception concerning

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<sup>19</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 980b28–981a2): “*Ostendit* [Philosophus] *diversos gradus* humanae cognitionis.”

<sup>20</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 980b28–981a1): “*Primo comparat* [Philosophus] *experimentum ad artem* quidem. [...] *Primo ostendit generationem artis et experimenti*. [...] *Primo proponit utriusque praedictorum generationem*. [...] *Primo ponit generationem experimenti*. [...] *Dicit ergo primo, quod ex memoria in hominibus experimentum causatur. Modus autem causandi est iste; quia ex multis memoriis unius rei accipit homo experimentum de aliquo, quo experimento potens est ad facile et recte operandum.*”

<sup>21</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a1–2): “*Et ideo quia potentiam recte et faciliter operandi praebet experimentum, videtur fere esse simile arti et scientiae. Est enim similitudo eo quod utrobique ex multis una acceptio alicuius rei sumitur. Dissimilitudo autem, quia per artem accipiuntur universalialia, per experimentum singularialia, ut postea dicitur.*”

<sup>22</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a2–5): “*ponit* [Philosophus...] *artis generationem.*” *Ibid.*, §18: “*Ponit generationem artis: et dicit, quod ex experientia in hominibus fit scientia et ars: et probat per auctoritatem Poli, qui dicit, quod experientia facit artem, sed inexperientia casum. Quando enim aliquis inexpertus recte operatur, a casu est.*”

all (things that are) alike is produced from many apprehended experiences. Whence, art has this more than (i.e., over and above) experience: for experience is concerned (*versatur*) only about singulars, while art (is) about universals.<sup>23</sup>

ARISTOTLE manifests (this) through an example.<sup>24</sup> Thus, when man receives in his cognition that *this* medicine conferred (health) to Socrates, Plato, and many other singular (men who were) afflicted by such a disease, whatever that should be, this pertains to experience. On the other hand, the same already pertains to art when someone receives (the cognition) that this should confer (health) in such a species of determinate illness, and according to such a complexion: for example, that it should confer (health) to those who have a fever, both phlegmatic and choleric (i.e., kinds of complexions according to ancient science).

### 50.8. The Principle of Art and Science

Therefore, from experience, and from such universal received through experience, there is in the soul that which is the principle of art and of science.<sup>25</sup>

And this mode that has been said, befits in the principles of all sciences and arts.<sup>26</sup> Whence, ARISTOTLE concludes that neither do the habits of principles preexist in us as determined and complete, nor are they produced anew from some more known preexistent habits—as the habit of science is generated in us from the foreknowledge of principles. Instead, the habits of principles are produced in us from preexisting sense.

He posits an example in battles that are produced by the withdrawal of an army (that has been) defeated and (has) fled.<sup>27</sup> For when one of them (i.e., of the soldiers) more nobly

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<sup>23</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a5–7): “Modus autem, quo ars fit ex experimento, est idem cum modo praedicto, quo experimentum fit ex memoria. Nam sicut ex multis memoriis fit una experimentalis scientia, ita ex multis experimentis apprehensis fit universalis acceptio de omnibus similibus. Unde plus habet hoc ars quam experimentum: quia experimentum tantum circa singularia versatur, ars autem circa universalia.”

<sup>24</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a7–12): “manifestat [Philosophus] per exemplum.” Ibid., §19: “Quod consequenter *per exempla exponit*, [...] quia cum homo accepit in sua cognitione quod haec medicina contulit Socrati et Platoni tali infirmitate laborantibus, et multis aliis singularibus, quidquid sit illud, hoc ad experientiam pertinet: sed, cum aliquis accipit, quod hoc omnibus conferat in tali specie aegritudinis determinata, et secundum talem complexionem, sicut quod contulit febricitantibus et phlegmaticis et cholericis, id iam ad artem pertinet.”

<sup>25</sup> *In Post. an.* 2, l. 20, 193–195 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a7–8): “ex hoc igitur experimento et ex tali uniuersali per experimentum accepto, est in anima id quod est *principium artis et scientie*.”

<sup>26</sup> *In Post. an.* 2, l. 20, 206–213 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a10–11): “Et iste modus qui dictus est competit in principiis omnium scienciarum et artium; unde concludit [Philosophus] quod neque preexistunt in nobis *habitus* principiorum quasi *determinati* et completi, *neque* etiam *fiunt* de nouo *ab* aliquibus *notioribus habitibus* preexistentibus, sicut generatur in nobis habitus scientie ex precognitione principiorum, *set* habitus principiorum fiunt in nobis *a sensu* preexistente.”

<sup>27</sup> *In Post. an.* 2, l. 20, 214–222 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a12–13): “Et ponit [Philosophus] exemplum in pugnis que fiunt per reuersionem exercitus deuicti et fugati: *cum enim unus*

takes a stand and does not flee, another one stands joining him; and thereafter, another, until so many are congregated that they would produce the principle of a battle. So, too, (universal knowledge begins) from sense and memory of one particular, and again of another, and another, until we arrive at that which is the principle of an art or a science, as has been said.

### 50.9. Preeminence of Art over Experience in Action

ARISTOTLE shows the preeminence of art compared to experience both in respect of action (here) and in respect of cognition (► 50.10).<sup>28</sup>

Inasmuch as it pertains to the act, experience seems to differ from art in nothing.<sup>29</sup> Thus, when it comes to action, the difference—according to universal and singular—that there was between experience and art is removed: for just as experience operates about singulars, so, too, art (operates about singulars). Whence, the aforesaid difference was only in cognition.

On the other hand, even though art ad experience should not differ in the mode of operating, since one and the other should operate about singulars, they nonetheless differ in the efficacy of operating.<sup>30</sup> For experts accomplish more, in operating, than those who have the universal art without experience.

The reason for this is that actions are about singulars, and generations are all about singulars.<sup>31</sup> Indeed, universals are only generated or moved by accident insofar as

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eorum *perfecerit statum*, id est nobiliter ceperit stare et non fugere, *alter stat* adiungens se ei, et *postea alter*, quousque tot congregentur quod faciant *principium* pugne, sic etiam ex sensu et memoria unius particularis, et iterum alterius et alterius, quandoque peruenitur ad id quod est principium artis et sciencie, ut dictum est.”

<sup>28</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a12–27): “*ostendit* [Philosophus...] praeeminentiam unius ad alterum [sc., artis ad experimentum].” Ibid., §20: “*Comparat* artem ad experimentum *per modum praeeminentiae*: et secundum hoc duo facit. Primo comparat *quantum ad actionem*. Secundo quantum ad cognitionem.”

<sup>29</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a12–13): “Dicit ergo [Philosophus], quod quantum ad actum pertinet, experientia nihil videtur differre ab arte. Cum enim ad actionem venitur, tollitur differentia, quae inter experimentum et artem erat per universale et singulare: quia sicut experimentum circa singularia operatur, ita et ars; unde praedicta differentia erat in cognoscendo tantum.”

<sup>30</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981a13–17): “Sed quamvis in modo operandi ars et experimentum non differant, quia utraque circa singularia operatur, differunt tamen in efficacia operandi. Nam experti magis proficiunt in operando illis qui habent rationem universalem artis sine experimento.”

<sup>31</sup> *In Metaph.* 1, l. 1, §21 (cf. ARISTOTLE, *Metaphysica* A.1, 981a18–20): “Cujus causa est, quia actiones sunt circa singularia, et singularium sunt omnes generationes. Universalia enim non generantur nec moventur nisi per accidens, in quantum hoc singularibus competit. Homo enim generatur hoc homine generato. Unde medicus non sanat hominem nisi per accidens; sed per se sanat Platonem aut Socratem, aut aliquem hominem singulariter dictum, cui convenit esse hominem, vel accidit in quantum est curatus. Quamvis enim esse hominem per se conveniat Socrati, tamen curato et medicato per accidens convenit: haec est enim per se, Socrates est homo: quia si Socrates definiretur, poneretur homo in eius definitione, ut in quarto dicitur. Sed haec est per accidens, curatus vel sanatus est homo.”

(generation or motion) concerns *these* singulars. Thus, *man* (i.e., the universal species) is generated (when) *this* man (is) generated (i.e., an individual of the universal species *man*). Whence, a physician heals *man* only by accident; but (he heals) by itself Plato or Socrates, or some man singularly speaking, to whom it befits to be a man; or it happens (that *man* is healed) insofar as *he* (i.e., an individual) is healed. Thus, although it befits Socrates to be a man, however, it befits the healed or the medicated (to be a man) by accident: for it is by itself that Socrates is a man; and if Socrates should be defined, *man* would be posited in his definition. On the other hand, it is by accident if *man* is healed.

Whence, since art should be of universals, (and) experience (should be) of singulars, if someone has the *ratio* of art without experience, he will indeed be perfect in knowing the universal.<sup>32</sup> On the other hand, since he ignores the singular, for he lacks experience, he will err many times in healing, because healing pertains more to the singular than to the universal, since it pertains to the former by itself; (and) to the latter, by accident.

#### 50.10. Preeminence of Art and Science over Experience in Cognition

ARISTOTLE compares experience to art in respect of cognition, positing the preeminence of art and science (in relation) to experience in respect of three (things):<sup>33</sup>

1. In respect of knowing (*quantum ad scire* < τὸ... εἰδέναι), which we judge to be more by art than by experience.<sup>34</sup>
2. In respect of posing objections (*quantum ad obviare* < τὸ ἐπιδίειν), which happens in disputations; for, in disputing, those who have the art—but not those who have (only) experience—can pose objections to those (arguments) that are said against the art.<sup>35</sup>
3. In respect of artificers approaching the end of wisdom more than the experts.<sup>36</sup> For the artificer is judged to be wiser than the expert because he considers universals; and those who know—rather than those who operate—are said to be wiser.

<sup>32</sup> *In Metaph.* 1, l. 1, §23 (cf. ARISTOTLE, *Metaphysica* A.1, 981a24–25): “Scilicet quantum ad scire, quod quidem magis arbitramur esse per artem quam per experimentum.”

<sup>33</sup> *In Metaph.* 1, l. 1, §23 (cf. ARISTOTLE, *Metaphysica* A.1, 981a24–27): “Comparat [Philosophus] experimentum ad artem *quantum ad cognitionem*. Et circa hoc duo facit. Primo *ponit praeeminentiam artis ad experimentum*. [...] Proponit autem praeeminentiam artis et scientiae quantum ad tria.”

<sup>34</sup> *In Metaph.* 1, l. 1, §22 (cf. ARISTOTLE, *Metaphysica* A.1, 981a21–24): “Unde cum ars sit universalium, experientia singularium, si aliquis habet rationem artis sine experientia, erit quidem perfectus in hoc quod universale cognoscat; sed quia ignorat singulare cum experimento careat, multotiens in curando peccabit: quia curatio magis pertinet ad singulare quam ad universale, cum ad hoc pertineat per se, ad illud per accidens.”

<sup>35</sup> *In Metaph.* 1, l. 1, §23 (cf. ARISTOTLE, *Metaphysica* A.1, 981a24–25): “Item quantum ad obviare, quod in disputationibus accidit. Nam habens artem potest disputando obviare his quae contra artem dicuntur, non autem habens experimentum.”

<sup>36</sup> We have merged and summarized the interpretations that St. Thomas discerns from the diverse versions that he is reading. *In Metaph.* 1, l. 1, §23 (cf. ARISTOTLE, *Metaphysica* A.1, 981a25–27): “Item

## 50.11. Proofs of the Preeminence of Art and Science over Experience in Cognition

ARISTOTLE proves the aforesaid preeminence through three reasons:<sup>37</sup>

1. Those who know *that* (something is so) and *on account of what* (it is so) are more knowers and wiser than those who ignore the cause and know only *that* (it is so).<sup>38</sup> And experts know *that* (something is so), but do not know *on account of what* (it is so). On the other hand, artificers know the cause and *on account of what* (something is so), and not only *that* (it is so). Therefore, artificers are more knowers and wiser than experts.

ARISTOTLE proves the first (premise of this argument) as follows.<sup>39</sup> Those who know the cause and *on account of what* (something is so) are compared to those who know only *that* (it is so) as the architectural arts (are compared) to the arts of artificers who operate by hand. And the architectural are nobler. Therefore, those who know the causes and *on account of what* (something is so) are more knowers and wiser than those who know only *that* (it is so).

The proof of this first (premise) is apparent because architects know the causes of the (things) produced.<sup>40</sup> To understand this, it is to be known that an **architect** (*architector*) is said (to be) as a *principal artificer* (*principalis artifex*) from ἀρχός, which is principal, and τέχνη, which is art. Now, that art is said to be more principal which has more principal

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quantum ad hoc quod artifices plus accedunt ad finem sapientiae, quam experti, «Tamquam magis sit,» idest contingat, «Scire sapientiam sequentem omnia,» idest dum sequitur universalia. Ex hoc enim artifex sapientior iudicatur, quam expertus quia universalia considerat. Vel aliter. «Tamquam magis sit scire secundum sapientiam omnia sequentem,» idest universalia. Alia litera, «Tamquam magis secundum scire sapientia omnia sequente:» quasi dicat: «Tamquam sapientia sequente omnia» idest consequente ad unumquodque, «Magis sit secundum scire,» quam secundum operari: ut scilicet dicantur sapientes magis qui magis sciunt, non qui magis sunt operativi. Unde alia litera hunc sensum habet planiorem, qui sic dicit: «Tamquam secundum illud quod est scire magis, omnes sequuntur sapientiam.»

<sup>37</sup> *In Metaph.* 1, l. 1, §24 (cf. ARISTOTLE, *Metaphysica* A.1, 981a28–30): “probat [Philosophus] praedictam praeeminentiam tripliciter.”

<sup>38</sup> *In Metaph.* 1, l. 1, §24 (cf. ARISTOTLE, *Metaphysica* A.1, 981a28–30): “Prima probatio talis est. Illi, qui sciunt causam et propter quid, scientiores sunt et sapientiores illis qui ignorant causam, sed solum sciunt quia. Experti autem sciunt quia, sed nesciunt propter quid. Artifices vero sciunt causam, et propter quid, et non solum quia: ergo sapientiores et scientiores sunt artifices expertis.”

<sup>39</sup> *In Metaph.* 1, l. 1, §25 (cf. ARISTOTLE, *Metaphysica* A.1, 981a30–b3): “Primo primam probat [Philosophus...]. Probatio talis est. Illi qui sciunt causam et propter quid comparantur ad scientes tantum quia, sicut architectonicae artes ad artes artificum manu operantium. Sed architectonicae artes sunt nobiliores: ergo et illi qui sciunt causas et propter quid, sunt scientiores et sapientiores scientibus tantum quia.”

<sup>40</sup> *In Metaph.* 1, l. 1, §26: “Huius probationis prima ex hoc apparet, quia architectores sciunt causas factorum. Ad cuius intellectum sciendum est, quod architector dicitur quasi principalis artifex: ab ἀρχός quod est princeps, et τέχνη quod est ars. Dicitur autem ars principalior illa, quae principaliozem operationem habet. Operationes autem artificum hoc modo distinguuntur: quia quaedam sunt ad disponendum materiam artificii, sicut carpentarii secando ligna et complanando disponunt materiam ad formam navis. Alia est operatio ad inductionem formae; sicut cum aliquis ex lignis dispositis et praeparatis navem compaginat. Alia est operatio in usum rei iam constitutae; et ista est principalissima. Prima autem est infima, quia prima ordinatur ad secundam, et secunda ad tertiam. Unde navisfactor est architector respectu eius qui praeparat ligna. Gubernator autem, qui utitur navi iam facta, est architector respectu navis factoris.”



operations. And the operations of artificers are distinguished in this mode: because some are (ordered) to dispose the matter of the artificer, as carpenters dispose matter (in relation) to the form of a ship by cutting wood and making it even. Another is the operation that induces the form: for example, when someone puts together a ship from wood that has been disposed and prepared. Another operation is in using the thing already constituted: and this is the most principal. The first (operation), on the other hand, is the lowest, for the first is ordered to the second, and the second (is ordered) to the third. Whence, the shipbuilder is an architect in respect of he who prepares the wood. But the pilot, who uses the ship already produced, is an architect in respect to the shipbuilder.

Moreover, since matter is on account of (*propter*) form, and such must be the matter as befits the form, hence, the shipbuilder knows the cause why the (pieces of) wood must be disposed (i.e., arranged) thus—which those who prepare the (pieces of) wood do not know.<sup>41</sup> Likewise, since the whole ship should be on account of use, he who uses the ship knows why such must be the form (of the ship): for it must be so because it should befit such a use. And thus, it is evident that the cause of the operations that concern the disposition of matter is taken from the form of the artificer; and the cause of the operations that concern the form of the artifact is taken from the use (i.e., the end of the artifact).

And thus, it is manifest that architects know the causes of the (things) produced.<sup>42</sup> On the other hand, we judge or call the manufacturers as some inanimate (operators). And this not because they make artificial operations, but because the (things) that they produce are unknown (to them). Indeed, they know *that* (something should be so), but they do not know the causes, just like fire burns without some cognition. Therefore, there is in respect of this a likeness between inanimate (things) and manufacturers: that, just like inanimate (things) operate as ordered by some higher intellect into the proper end without cognition of the cause, so, too, manufacturers (act without knowledge of the cause). However, there

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<sup>41</sup> *In Metaph.* 1, l. 1, §27: “Et, quia materia est propter formam, et talis debet esse materia quae formae competat, ideo navisfactor scit causam, quare ligna debeant esse sic disposita; quod nesciunt illi qui praeparant ligna. Similiter, cum tota navis sit propter usum ipsius, ille qui navi utitur, scit quare talis forma debeat esse; ad hoc enim debet talis esse, ut tali usui conveniens sit. Et sic patet, quod ex forma artificii sumitur causa operationum, quae sunt circa dispositionem materiae. Et ex usu sumitur causa operationum, quae sunt circa formam artificii.”

<sup>42</sup> *In Metaph.* 1, l. 1, §28 (cf. ARISTOTLE, *Metaphysica* A.1, 981b3–5): “Et sic manifestum est, quod architectores factorum causas sciunt. Illos vero, scilicet manu artifices, iudicamus vel denominamus, sicut quaedam inanimatorum. Et hoc non ideo quia faciunt operationes artificiales, sed quia quae faciunt, incognita faciunt. Sciunt enim quia, sed causas non cognoscunt; sicut etiam ignis exurit absque aliqua cognitione. Est igitur quantum ad hoc similitudo inter inanimata et manu artifices, quod sicut absque causae cognitione inanimata operantur ut ordinata ab aliquo superiori intellectu in proprium finem, ita et manu artifices. Sed in hoc est differentia: quia inanimata faciunt unumquodque suorum operum per naturam, sed manu artifices per consuetudinem: quae licet vim naturae habeat inquantum ad unum inclinatur determinate, tamen a natura differt in hoc, quod est circa ea quae sunt ad utrumlibet secundum humanam cognitionem. Naturalia enim non consuescimus, sicut dicitur in secundo Ethicorum. Nec etiam cognitione carentium est consuescere.”

is in this a difference: that inanimate (things) each produce their operations by nature, while manufacturers (produce them) by custom (*per consuetudinem* < δὴ ἔθος); which, even though it should have the virtue of nature insofar as it determinately inclines towards *one*, however, it differs from nature in that it is about those (things) that are (related) to any of two (contraries) according to human cognition (i.e., custom determines the one mode in which reason is to operate). For we do not become accustomed by nature—nor does it befit those that lack knowledge to become accustomed.

And these (things) that have been said are to be considered in such a way as they appear to them: that some are not wiser insofar as they are practical operators, which befits the experts, but insofar as some have the reason of the things that are to be done and know the causes of the things that are done, from which the reasons are taken—which befits the architects.<sup>43</sup>

**2.** A sign of someone who knows is that he can teach—which is so because each is then perfect in its act when it can produce another like itself.<sup>44</sup> Therefore, just as a sign of heat is that something can heat, so a sign of science is that he can teach—which is to cause science in another. Artificers can teach because they know the causes; hence, they can demonstrate from them—and demonstration is a syllogism that produces science. Experts, on the other hand, cannot teach because they cannot lead to science, since they ignore the cause. And if they should transmit to others those (things) that they know through experience, (the things taught) would not be received by the mode of science, but by the mode of opinion or credulity. Whence, it is evident that artificers are wiser and more knowers than experts.

**3.** Cognitions of singulars are more proper to the senses than some other cognition, since every cognition of singulars originates in sense.<sup>45</sup> However, no sense do we call

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<sup>43</sup> *In Metaph.* 1, l. 1, §28 (cf. ARISTOTLE, *Metaphysica* A.1, 981b5–6): “Haec autem quae dicta sunt, sic sunt considerata tamquam ex eis appareat, quod aliqui non sunt sapientiores secundum quod est «practicos,» id est operatores esse, quod convenit expertis; sed secundum quod aliqui habent rationem de agendis, et cognoscunt causas agendorum, ex quibus rationes sumuntur: quod convenit architectoribus.”

<sup>44</sup> *In Metaph.* 1, l. 1, §29 (cf. ARISTOTLE, *Metaphysica* A.1, 981b7–9): “Ponit [Philosophus] secundam rationem: quae talis est. Signum scientis est posse docere: quod ideo est, quia unumquodque tunc est perfectum in actu suo, quando potest facere alterum sibi simile, ut dicitur quarto Meteororum. Sicut igitur signum caliditatis est quod possit aliquid calefacere, ita signum scientis est, quod possit docere, quod est scientiam in alio causare. Artifices autem docere possunt, quia cum causas cognoscant, ex eis possunt demonstrare: demonstratio autem est syllogismus faciens scire, ut dicitur primo Posteriorum. Experti autem non possunt docere, quia non possunt ad scientiam perducere cum causam ignorent. Et si ea quae experimento cognoscunt aliis tradant, non recipiuntur per modum scientiae, sed per modum opinionis vel credulitatis. Unde patet quod artifices sunt magis sapientes et scientes expertis.”

<sup>45</sup> *In Metaph.* 1, l. 1, §30 (cf. ARISTOTLE, *Metaphysica* A.1, 981b9–13): “Ponit [Philosophus] tertiam rationem; quae talis est. Cognitiones singularium magis sunt propriae sensibus quam alicui alteri cognitioni, cum omnis cognitio singularium a sensu oriatur. Sed tamen, «nec unum,» id est nullum sensum dicimus sapientiam, scilicet propter hoc quod licet aliquis sensus cognoscat quia, tamen, non

*wisdom*: to wit, because, although some sense knows *that* (something is so), however, it does not know *on account of what* (it is so; i.e., sense cannot know causes because they are universal). Thus, (the sense of) touch judges that fire is hot but does not apprehend *on account of what* (it is hot). Therefore, the experts, who have cognition of singulars (while) ignoring the cause cannot be said (to be) *wise*.

#### 50.12. Speculative vs. Active Art or Science

ARISTOTLE compares the speculative to the active art and shows that the speculative art is more wisdom than the active (art) through the following reason.<sup>46</sup> It is found, in any of the sciences or arts, that men who scientifically know are held in (greater) admiration or honor in comparison with other men on account of the sciences (that) are more honorable and more worthy of the name of *wisdom*. And any discoverer of an art is held in admiration on account of having sense, judgment, and discernment of the cause beyond the sense of other men, and not on account of the utility of those who discover: rather, we admire (them) more as wise (*sicut sapientem* = ὡς σοφόν) in respect of the subtle inquiry of the causes of the thing discovered; and (as) distinguishing (*distinguentem* = διαφέροντα) in respect of (their) investigation into the differences of one thing to another or in respect of their being distinguished from the others (*ab aliis differentem* = διαφέροντα τῶν ἄλλων). Therefore, some sciences are more admirable and more worthy of the name of *wisdom* on account of a more eminent sense, and not on account of (their) utility.

Now, many arts are found in respect of utility, of which some are (ordered) to a necessity of life, such as the mechanical (arts), while others (are ordered) to the introduction in other sciences, such as the logical (arts).<sup>47</sup> Therefore, those artificers are said to be wiser whose sciences are not found to (obtain some) utility, but on account of the scientific knowing itself (*ipsum scire*)—and such are the speculative sciences.

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propter quid cognoscit. Tactus enim iudicat quod ignis calidus est, non tamen apprehendit propter quid: ergo experti qui habent singularium cognitionem causam ignorantes, sapientes dici non possunt.”

<sup>46</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981b13–17): “comparat [Philosophus] artem speculativam ad activam.” Ibid., §31: “*Comparat artem activam speculativae. [...] ostendit, quod ars speculativa magis est sapientia quam activa. [...] Ostendit autem quod primo dictum est, tali ratione. In quibuscumque scientiis vel artibus invenitur id propter quod homines scientes prae aliis hominibus in admiratione vel honore habentur, illae scientiae sunt magis honorabiles, et magis dignae nomine sapientiae. Quilibet autem inventor artis habetur in admiratione, propter hoc quod habet sensum et iudicium et discretionem causae ultra aliorum hominum sensum, et non propter utilitatem illorum quae invenit: sed magis admiramur, «sicut sapientem et ab aliis distinguentem.» Sapientem quidem, quantum ad subtilem inquisitionem causarum rei inventae: distinguentem vero, quantum ad investigationem differentiarum unius rei ad aliam. Vel aliter, «Ab aliis distinguentem,» ut passive legatur, quasi in hoc ab aliis distinguatur. Unde alia litera habet, «Differentem.» Ergo scientiae aliquae sunt magis admirabiles et magis dignae nomine sapientiae propter eminentiorem sensum, et non propter utilitatem.»*

<sup>47</sup> *In Metaph.* 1, l. 1, §32 (cf. ARISTOTLE, *Metaphysica* A.1, 981b17–20): “Cum igitur plures artes sint repertae quantum ad utilitatem, quarum quaedam sunt ad vitae necessitatem, sicut mechanicae; quaedam vero ad introductionem in aliis scientiis, sicut scientiae logicales: illi artifices dicendi sunt sapientiores, quorum scientiae non sunt ad utilitatem inventae, sed propter ipsum scire, cuiusmodi sunt scientiae speculativae.”

That the speculative sciences should not be found to (obtain some) utility is evident through this sign: that (while) all such arts (are) acquired or found that can be (ordered) to the introduction in the sciences, to a necessity of life, or to enjoyment—as the arts that are ordered to the pleasure of men—, the speculative (sciences) are not found for the sake of such (ends), but for the sake of themselves.<sup>48</sup> And that they should not be found for (the sake of) utility is evident from the place in which they have been found. For they have been first found in the places where men first had leisure. Whence, the mathematical arts, which are maximally speculative, were first discovered in Egypt by priests, who were given leisure to study, and had their expenses (covered for) from the public (treasury).

### 50.13. Wisdom is Speculative

To show that wisdom is not active but speculative, ARISTOTLE posits the following reason.<sup>49</sup> No science in which scientific knowing itself (*ipsum scire*) is sought for the sake of itself (*propter seipsum*) is an active science, but a speculative (one). Now, that science which is wisdom—or (which) is called *philosophy* (► 50.14)—is for the sake of scientifically knowing. Therefore, it is speculative and not active.

He manifests the minor (premise) in the following mode.<sup>50</sup> Whosoever seeks to escape (*fugere* = φεύγειν) ignorance as an end tends to scientific knowing itself (*ipsum scire*) for the sake of itself (*propter seipsum*).

ARISTOTLE proves the same (conclusion) through a sign: that wisdom or philosophy should not be sought for the sake of some utility, but for the sake of science itself, is testified by an event that concerns those who have sought philosophy.<sup>51</sup> For such wisdom (*prudentia*

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<sup>48</sup> *In Metaph.* 1, l. 1, §33 (cf. ARISTOTLE, *Metaphysica* A.1, 981b20–25): “Et quod speculativae scientiae non sint inventae ad utilitatem, patet per hoc signum: quia, «iam partis,» id est acquisitis vel repertis omnibus huiusmodi, quae possunt esse ad introductionem in scientiis, vel ad necessitatem vitae, vel ad voluptatem, sicut artes quae sunt ordinatae ad hominum delectationem: speculativae non sunt propter huiusmodi repertae, sed propter seipsas. Et quod non sint ad utilitatem inventae, patet ex loco quo inventae sunt. In locis enim illis primo repertae sunt, ubi primo homines studuerunt circa talia. Alia litera habet, «Et primum his locis ubi vacabant,» id est ab aliis occupationibus quiescentes studio vacabant quasi necessariis abundantes. Unde et circa Aegyptum primo inventae sunt artes mathematicae, quae sunt maxime speculativae, a sacerdotibus, qui sunt concessi studio vacare, et de publico expensas habebant, sicut etiam legitur in Genesi.”

<sup>49</sup> *In Metaph.* 1, l. 3, §52 (cf. ARISTOTLE, *Metaphysica* A.2, 982b11–17): “ostendit [Philosophus] qualis sit scientia ista. [...] Primo ostendit quod non est scientia activa, sed speculativa.” Ibid. §53: “Primo ergo ponit talem rationem. Nulla scientia in qua quaeritur ipsum scire propter seipsum, est scientia activa, sed speculativa: sed illa scientia, quae sapientia est, vel philosophia dicitur, est propter ipsum scire: ergo est speculativa et non activa.”

<sup>50</sup> *In Metaph.* 1, l. 3, §53 (cf. ARISTOTLE, *Metaphysica* A.2, 982b17–21): “Minorem hoc modo manifestat [Philosophus]. Quicumque quaerit fugere ignorantiam sicut finem, tendit ad ipsum scire propter seipsum: sed illi, qui philosophantur, quaerunt fugere ignorantiam sicut finem: ergo tendunt in ipsum scire propter seipsum.”

<sup>51</sup> *In Metaph.* 1, l. 3, §57 (cf. ARISTOTLE, *Metaphysica* A.2, 982b22–25): “Probat [Philosophus] idem per signum; dicens, quod hoc quod dictum est, scilicet quod sapientia vel philosophia non sit propter aliquam utilitatem quaesita, sed propter ipsam scientiam, testatur «accidens,» id est eventus, qui circa inquisitores philosophiae provenit. Nam cum eis cuncta fere existerent, quae sunt ad necessitatem vitae, et quae

= φρόνησις, *idest sapientia*) was first begun to be sought when almost all those (things) that are (ordered) to the necessity of life existed, and those that are (ordered) to leisure, and also those that are necessary to erudition—such as the logical sciences, which are not sought for themselves, but (are sought only insofar) as (they are) introductory to the other arts. Wherefrom, it is evident that it is not sought for the sake of some necessity other than itself, but for the sake of itself: for no one seeks that which is (already) had. Whence, since (wisdom) is sought (when) all the other (things are already) had, it is evident that it is not sought for the sake of something else, but for the sake of itself.

#### 50.14. Wisdom-Philosophy

It should be noted that (in the preceding discussion) ARISTOTLE uses first the name *wisdom*, which he then transfers to the name *philosophy*, for it is taken for the same.<sup>52</sup>

Indeed, the ancients who pursued the study of wisdom were called *sophists*—that is, *wise*.<sup>53</sup> However, when PYTHAGORAS was asked what he professed to be, he did not want to call himself wise as his predecessors because it seemed to be presumptuous. Instead, he called himself *philosopher*—that is, *lover of wisdom*.

Wherefrom, the name *wise* was transmuted into the name *philosopher*—and the name *wisdom*, into the name *philosophy*.<sup>54</sup> Which name (i.e., *philosophy*) serves the purpose (fittingly): for those seem to love wisdom who seek wisdom not for the sake of (some) other (thing), but for itself; and whoever seeks (wisdom) for the sake of (some) other (thing) loves this (other thing) more than that (wisdom) which he seeks.

#### 50.15. Ignorance and Wonder as Principles of Philosophy

That (philosophers) should seek to escape ignorance is evident from this: that those who have first philosophized, and who philosophize now, begin to philosophize because of wondering (*propter admirationem* = διὰ... τὸ θαυμάζειν) about some cause. However,

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sunt «ad pigritiam,» idest ad voluptatem, quae in quadam vitae quiete consistit, et quae sunt etiam ad eruditionem necessaria, sicut scientiae logicae, quae non propter se quaeruntur, sed ut introductoriae ad alias artes, tunc primo incoepit quaeri talis prudentia, idest sapientia. Ex quo patet, quod non quaeritur propter aliquam necessitatem aliam a se, sed propter seipsam: nullus enim quaerit hoc quod habetur. Unde, quia omnibus aliis habitis ipsa quaesita est, patet quod non propter aliquid aliud ipsa quaesita est, sed propter seipsam.”

<sup>52</sup> *In Metaph.* 1, l. 3, §56: “Notandum est autem, quod cum prius nomine sapientiae uteretur, nunc ad nomen philosophiae se transfert. Nam pro eodem accipiuntur.”

<sup>53</sup> *In Metaph.* 1, l. 3, §56: “Cum enim antiqui studio sapientiae insistentes sophistae, idest sapientes vocarentur, Pythagoras interrogatus quid se esse profiteretur, noluit se sapientem nominare, sicut sui antecessores, quia hoc praesumptuosum videbatur esse; sed vocavit se philosophum, idest amatorem sapientiae.”

<sup>54</sup> *In Metaph.* 1, l. 3, §56: “Et exinde nomen sapientis immutatum est in nomen philosophi, et nomen sapientiae in nomen philosophiae. Quod etiam nomen ad propositum aliquid facit. Nam ille videtur sapientiae amator, qui sapientiam non propter aliud, sed propter seipsam quaerit. Qui enim aliquid propter alterum quaerit, magis hoc amat propter quod quaerit, quam quod quaerit.”

(they wonder) diversely in the beginning (*a principio*) and in the mode. For in the beginning they wondered at less dubitable (things), whose causes were easier to know. But thereafter, proceeding slowly from the cognition of the more manifest (things) towards an inquiry (into) the concealed (things), they began to question (*dubitare*) about greater and more concealed (things).<sup>55</sup>

For example, (they began to question) about the eclipses of the moon, and the mutation of its figure, which seems to variate insofar as it is diversely had (in relation) to the sun.<sup>56</sup> Likewise, they questioned about those (causes) that concern the sun, such as its eclipse, its motion, and its magnitude; about those that concern the stars, such as their quantity, order, and other such (questions); and about the generation of the whole universe, which some said was generated by chance, some by an intellect, some by love.

It is evident that doubt and wonder come from ignorance.<sup>57</sup> Indeed, because we see some manifest effects whose cause lies concealed (*latet*) to us, we then wonder about the cause. And since (philosophy) comes out of wonder and ignorance, it is evident that (men) were moved to philosophize (in order) to escape ignorance.<sup>58</sup> Thus, it is evident that they have pursued science only (in order) to know (< διὰ τὸ εἰδέναι τὸ ἐπίστασθαι ἐδίωκον), and not because of some utility (< οὐ χρήσεώς τινος ἔνεκεν).

### 50.16. Philosophy and Poetry Compared

Since the cause that led to philosophy was wonder, it is evident that the philosopher is in some mode a lover of myths or fables (*philomythes* = φιλόμυθος, *idest amator fabulae*), which is proper of poets.<sup>59</sup>

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<sup>55</sup> *In Metaph.* 1, l. 3, §54 (cf. ARISTOTLE, *Metaphysica* A.2, 982b12–15): “Quod autem ignorantiam fugere quaerant, patet ex hoc, quia illi, qui primo philosophati sunt, et qui nunc philosophantur, incipiunt philosophari propter admirationem alicuius causae: aliter tamen a principio, et modo: quia a principio admirabantur dubitabilia pauciora, quae magis erant in promptu, ut eorum causae cognoscerentur: sed postea ex cognitione manifestorum ad inquisitionem occultorum paulatim procedentes incoeperunt dubitare de maioribus et occultioribus.”

<sup>56</sup> *In Metaph.* 1, l. 3, §54 (cf. ARISTOTLE, *Metaphysica* A.2, 982b14–17): “sicut de passionibus lunae, videlicet de eclipysi eius, et mutatione figurae eius, quae variari videtur, secundum quod diversimode se habet ad solem. Et similiter dubitaverunt de his quae sunt circa solem, ut de eclipysi eius, et motu ipsius, et magnitudine eius. Et de his quae sunt circa astra, sicut de quantitate ipsorum, et ordine, et aliis huiusmodi, et de totius universi generatione. Quod quidam dicebant esse generatum casu, quidam intellectu, quidam amore.”

<sup>57</sup> *In Metaph.* 1, l. 3, §55 (cf. ARISTOTLE, *Metaphysica* A.2, 982b17–18): “Constat autem, quod dubitatio et admiratio ex ignorantia provenit. Cum enim aliquos manifestos effectus videamus, quorum causa nos latet, eorum tunc causam admiramur.”

<sup>58</sup> *In Metaph.* 1, l. 3, §55 (cf. ARISTOTLE, *Metaphysica* A.2, 982b19–21): “Et quia admiratio ex ignorantia provenit, patet quod ad hoc moti sunt ad philosophandum ut ignorantiam effugarent. Et sic deinde patet, quod scientiam, «persecuti sunt,» idest studiose quaesierunt, solum ad cognoscendum, et non causa alicuius «usus» idest utilitatis.”

<sup>59</sup> *In Metaph.* 1, l. 3, §55 (cf. ARISTOTLE, *Metaphysica* A.2, 982b18–19): “Et ex quo admiratio fuit causa inducens ad philosophiam, patet quod philosophus est aliquantulum philomythes, idest amator fabulae, quod proprium est poetarum.”

Whence, the first (men) who were concerned—through some fabulous mode—with the principles of things are said (to be the) *theologizing poets*, as was Perseus, and some others who were the seven wise.<sup>60</sup>

And the reason (*causa*) why the philosopher is compared to the poet is that both are concerned with wonders.<sup>61</sup> For fables, with which the poets are concerned, are constituted from some wonders; and the philosophers, too, are moved to philosophize out of wonder.

### 50.17. The Terminus of Wisdom-Philosophy

ARISTOTLE shows at what terminus this science (i.e., wisdom-philosophy) attempts to arrive.<sup>62</sup> He says that its order comes to rest or is terminated at (*consistit vel terminatur* = καταστῆναι) the contrary of that which was in those (men) who priorly sought it, as happens in natural generations and motions too (► 48.21). For each motion is terminated at the contrary of that from which motion begins. Whence, since an inquiry is some motion to science, it must be terminated at the contrary of that from which it begins.

Now, the inquiry of this science was initiated from wonder about all (things), since the first (men who inquired) wondered about less (occult things), while the posterior (wondered about) more concealed (things).<sup>63</sup> This wonder was (about) whether a thing should be so had as the wonders that seem to happen by chance (< καθάπερ τῶν θαυμάτων ταυτόματα), as happening by themselves (*quasi per se accidentia*).

Indeed, men wonder, above all, when some (things) happen (*eveniunt*) by chance in this mode, as though they should be foreseen or determined from some cause.<sup>64</sup> For chance (events) are not determined by a cause, and wonder is on account of ignorance of the

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<sup>60</sup> *In Metaph.* 1, l. 3, §55: “Unde primi, qui per modum quemdam fabularem de principiis rerum tractaverunt, dicti sunt poetae theologizantes, sicut fuit Perseus, et quidam alii, qui fuerunt septem sapientes.”

<sup>61</sup> *In Metaph.* 1, l. 3, §55: “Causa autem, quare philosophus comparatur poetae, est ista, quia uterque circa miranda versatur. Nam fabulae, circa quas versantur poetae, ex quibusdam mirabilibus constituuntur. Ipsi etiam philosophi ex admiratione moti sunt ad philosophandum.”

<sup>62</sup> *In Metaph.* 1, l. 3, §52 (cf. ARISTOTLE, *Metaphysica* A.2, 983a11–12): “ostendit [Philosophus] ad quem terminum ista scientia pervenire conetur.” *In Metaph.* 1, l. 3, §66: “Hic ponit terminum, in quem proficit ista scientia; et dicit quod ordo eius consistit vel terminatur ad contrarium eius quod erat in illis qui prius istam scientiam quaerebant. Sicut etiam in generationibus naturalibus et motibus accidit. Nam unusquisque motus terminatur ad contrarium eius a quo motus incipit. Unde, cum inquisitio sit motus quidam ad scientiam, oportet quod terminetur ad contrarium eius a quo incipit.”

<sup>63</sup> *In Metaph.* 1, l. 3, §66 (cf. ARISTOTLE, *Metaphysica* A.2, 983a11–15): “Initiata est autem [ut praedictum est (1)] inquisitio huius scientiae ab admiratione de omnibus: quia primi admirabantur pauciora, posteriores vero occultiora. Quae quidem admiratio erat, si res ita se haberet sicut automata mirabilia, idest quae videntur mirabiliter a casu accidere. Automata enim dicuntur quasi per se accidentia.” All brackets in the original; note (1) refers us to §53 and following (i.e., to end at §55).

<sup>64</sup> *In Metaph.* 1, l. 3, §66: “Admirantur enim homines praecipue quando aliqua a casu eveniunt hoc modo, ac si essent praevisa vel ex aliqua causa determinata. Casualia enim non a causa sunt determinata, et admiratio est propter ignorantiam causae. Et ideo cum homines nondum poterant speculari causas rerum, admirabantur omnia quasi quaedam casualia.”

cause. Hence, since men could not yet speculate (i.e., theorize about) the causes of things, they wondered about all (things) as (though they should be) some (things that happen) by chance.

For example, they wondered about the revolutions of the sun (*conversiones solis*, i.e., the periodical return of the seasons, caused, according to ancient belief, by the revolution of the heavenly bodies), which are the two tropics: of winter (i.e., the tropic of Capricorn), and of summer (i.e., the tropic of Cancer).<sup>65</sup> For in the summer tropic the sun begins to revolve around the south, while it priorly tended towards the north; and in the winter tropic, conversely (i.e., in the northern hemisphere, the apparent position of the sun during the summer is higher than during the winter).

Also, (they wondered) about the diameter of the square not being commensurable with the side.<sup>66</sup> For *not to be measurable* seemed to belong only to the indivisible. Thus, the unit alone (which is altogether indivisible) is that which is not measured by a number: rather, it measures all numbers. Whence, it seems wonderful if something that is not indivisible (i.e., a magnitude) should not be measurable; and that it should not be measurable because there is no minimum (in any magnitude). However, it is evident that the diameter of the square and its side are not indivisible or minimal (magnitudes). Whence, it seems wonderful if they are not commensurate.

Therefore, since the inquiry of philosophy begins from wonder, it must end or move forward (*proficere*) towards the contrary; and to move forward towards that which is more worthy, as the vulgar proverb agrees, which says that one ought always to move forward into (something) better (*semper proficere est in melius* < δεῖ... εἰς... τὸ ἄμεινον ἀποτελευτῆσαι).<sup>67</sup> And what that contrary and worthier (terminus) should be is evident in the aforesaid wonders; for when men have already learned the causes of the aforesaid (wonders), they (no longer) wonder.

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<sup>65</sup> *In Metaph.* 1, l. 3, §66 (cf. ARISTOTLE, *Metaphysica* A.2, 983a15): "Sicut admirantur circa conversiones solis, quae sunt duae; scilicet duos tropicos, hyemalem et aestivalem. Nam in tropico aestivali incipit sol converti versus meridiem, cum prius versus septemtrionem tenderet. In tropico autem hyemali e converso."

<sup>66</sup> *In Metaph.* 1, l. 3, §66 (cf. ARISTOTLE, *Metaphysica* A.2, 983a15–17): "Et etiam circa hoc quod diameter non est commensurabilis lateri quadrati. Cum enim non mensurari videatur esse solius indivisibilis, sicut sola unitas est quae non mensuratur a numero, sed ipsa omnes numeros mensurat, mirum videtur si aliquid quod non est indivisibile non mensuratur; ac per hoc id quod non est minimum non mensuratur. Constat autem, quod diametrum quadrati et latus eius non sunt indivisibilia, sive minima. Unde mirum videtur si non sunt commensurabilia."

<sup>67</sup> *In Metaph.* 1, l. 3, §67 (cf. ARISTOTLE, *Metaphysica* A.2, 983a17–19): "Cum ergo philosophiae inquisitio ab admiratione incipiat, oportet ad contrarium finire vel proficere; et ad id proficere quod est dignius, ut proverbium vulgare concordat, quo dicitur, quod semper proficere est in melius. Quid enim sit illud contrarium et dignius, patet in praedictis mirabilibus; quia quando iam homines discutunt causas praedictorum, non mirantur."



For example, the geometer does not wonder whether the diameter should be incommensurable to the side.<sup>68</sup> For he scientifically knows its cause: to wit, because the proportion (i.e., the ratio) of the square of the diameter to the square of the side is not as the proportion of a square number to a square number, but as the proportion of two to one. Whence, it remains that the proportion of the side to the diameter should not be as the proportion of a number to a number. Wherefrom, it is evident that they cannot be commensurate: for those lines alone are commensurable whose proportion to each other is as the proportion of a number to a number.

Therefore, the end of a science into which we must move forward will be that, knowing the causes, we should not wonder about their effects.<sup>69</sup>

### **50.18. Wisdom-Philosophy is Maximally Free**

ARISTOTLE proves that wisdom-philosophy should be maximally free through the following reason.<sup>70</sup> That man is properly said (to be) *free* who is a cause of himself, and not a cause of another. Thus, servants belong to their masters, and work for the sake of the masters. Whatever they acquire, they acquire for them. Free men, on the other hand, exist for themselves insofar as they acquire and work for themselves. And this science alone exists for its own sake. Therefore, among the sciences, it is free.

It should be noted that this can be understood in two modes:<sup>71</sup>

1. Such that *this (science) alone* should denote—in genus—every speculative science.<sup>72</sup> And then, it is true that this genus of sciences alone should be sought for the sake of itself. Whence, too, only those are said (to be) *liberal arts (artes liberales, i.e., free arts, those that are contained in the trivium and the quadrivium; ► 2.3)* which are ordered to knowing

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<sup>68</sup> *In Metaph.* 1, l. 3, §67 (cf. ARISTOTLE, *Metaphysica* A.2, 983a19–20): “Ut geometer non admiratur si diameter sit incommensurabilis lateri. Scit enim causam huius; quia scilicet proportio quadrati diametri ad quadratum lateris non est sicut proportio numeri quadrati ad numerum quadratum, sed sicut proportio duorum ad unum. Unde relinquitur, quod proportio lateris ad diametrum non sit sicut proportio numeri ad numerum. Et ex hoc patet quod commensurari non possunt. Illae enim solae lineae sunt commensurabiles, quarum proportio ad invicem est sicut proportio numeri ad numerum.”

<sup>69</sup> *In Metaph.* 1, l. 3, §67: “Erit ergo finis huius scientiae in quem proficere debemus, ut causas cognoscentes, non admiremur de earum effectibus.”

<sup>70</sup> *In Metaph.* 1, l. 3, §52 (cf. ARISTOTLE, *Metaphysica* A.2, 982b25–28): “ostendit [Philosophus...] quod ipsa [scientia] est libera maxime.” *In Metaph.* 1, l. 3, §58: “Hic probat secundum, scilicet quod ipsa sit libera; et utitur tali ratione. Ille homo proprie dicitur liber, qui non est alterius causa, sed est causa suiipsius. Servi enim dominorum sunt, et propter dominos operantur, et eis acquirunt quicquid acquirunt. Liberi autem homines sunt suiipsorum, utpote sibi acquirentes et operantes. Sola autem haec scientia est propter seipsam: ergo ipsa sola est libera inter scientias.”

<sup>71</sup> *In Metaph.* 1, l. 3, §59 (cf. ARISTOTLE, *Metaphysica* A.2, 982b25–28): “Et notandum, quod hoc potest dupliciter intelligi.”

<sup>72</sup> *In Metaph.* 1, l. 3, §59: “Uno modo quod hoc quod dicitur haec sola demonstret in genere omnem scientiam speculativam. Et tunc verum est quod solum hoc genus scientiarum propter seipsum quaeritur. Unde et illae solae artes liberales dicuntur, quae ad sciendum ordinantur: illae vero quae ordinantur ad aliquam utilitatem per actionem habendam, dicuntur mechanicae sive serviles.”

scientifically (*ad sciendum ordinantur*), while those that are ordered to have some utility through action are said (to be) *mechanical* or *servile*.

2. Such that, since the final cause, too, is among the highest causes, (*this science alone*) should denote—specially—this philosophy or wisdom, which concerns itself with the highest causes.<sup>73</sup> Whence, this science would have to consider the ultimate and universal end of all (things). And in this way, all the other sciences are ordered into it as into an end. Whence, this (science) alone is maximally for the sake of itself.

### 50.19. Wisdom-Philosophy is Not a Human Science

ARISTOTLE proves that this science is not human.<sup>74</sup> He says that a science that is maximally free cannot be as a possession of the nature of that which is a servant (*ministra vel ancilla* = δούλη) in many modes. And human nature is a servant in many modes. Therefore, the aforesaid science is not a human possession (< οὐκ ἀνθρωπίνη νομίζοιτο αὐτῆς ἢ κτῆσις).

Human nature is said (to be a) *servant* insofar as it underlies the necessities (of life) in multiple modes.<sup>75</sup> Wherefrom, it sometimes omits that which ought to be sought according to itself on account of those (things) that are necessary for life. As ARISTOTLE says in the *Topics*, it is better to philosophize than to become rich, even though to become rich should sometimes be chosen instead: for example, by someone who lacks the (things) necessary (for life).

Wherefrom, it is evident that that wisdom is sought only for the sake of itself, which does not befit man as a possession.<sup>76</sup> For that is had by man as a possession which can be

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<sup>73</sup> *In Metaph.* 1, l. 3, §59: “Alio modo, ut [hoc quod dicitur haec sola] demonstrat specialiter istam philosophiam, sive sapientiam, quae est circa altissimas causas; quia inter causas altissimas etiam est finalis causa, ut supra dictum est. Unde oportet, quod haec scientia consideret ultimum et universalem finem omnium. Et sic omnes aliae scientiae in eam ordinantur sicut in finem; unde sola ista maxime propter se est.”

<sup>74</sup> *In Metaph.* 1, l. 3, §52 (cf. ARISTOTLE, *Metaphysica* A.2, 982b28–30): “ostendit [Philosophus...] Tertio, quod non est [scientia] humana.” Ibid., §60: “Hic probat tertium scilicet *quod non sit humana*. [...] Ostendit autem propositum suum tali ratione. Scientia, quae est maxime libera, non potest esse ut possessio naturae illius, quae multipliciter est ministra vel ancilla: humana autem natura «in multis,» idest quantum ad multa est ministra: ergo praedicta scientia non est humana possessio.”

<sup>75</sup> *In Metaph.* 1, l. 3, §60 (cf. ARISTOTLE, *Topica* Γ.2, 118a6–15): “Dicitur autem humana natura ministra, in quantum multipliciter necessitatibus subditur. Ex quo provenit, quod quandoque praetermittit id quod est secundum se quaerendum, propter ea quae sunt necessaria vitae; sicut dicitur in tertio Topicorum, quod philosophari melius est quam ditari, licet ditari quandoque sit magis eligendum, puta indigenti necessariis.”

<sup>76</sup> *In Metaph.* 1, l. 3, §60: “Ex quo patet, quod illa sapientia tantum propter seipsam quaeritur, quae non competit homini ut possessio. Illud enim habetur ab homine ut possessio, quod ad nutum habere potest, et quo libere potest uti. Ea autem scientia, quae propter se tantum quaeritur, homo non potest libere uti, cum frequenter ab ea impediatur propter vitae necessitatem. Nec etiam ad nutum subest homini, cum ad eam perfecte homo pervenire non possit. Illud tamen modicum quod ex ea habetur, praeponderat omnibus quae per alias scientias cognoscuntur.”

had at will (*ad nutum*) and which can be freely used. And man cannot freely use the science that is sought only for the sake of itself, since he is frequently impeded from it on account of a necessity of life. Nor does (wisdom-philosophy) underly man at will, since man cannot perfectly attain it. However, the little (*modicum*) that he has of it carries more scientific weight than all those (things) that are known through the other sciences.

ARISTOTLE then excludes the error of the poet SIMONIDES, who used to say that having this honor befits only God: that only God should desire that science sought for the sake of itself and not for the sake of another; but man is not worthy of (that science). Man should not seek that science. He should seek the science proportionate to his condition: one ordered to the necessary (things) of life which man lacks.<sup>77</sup>

This error of SIMONIDES came from the error of other poets who used to say that a deity (*res divina*, lit., a divine thing) would envy; and that, out of envy, God did not want those (perfections) that pertain to his worth to be received by all (men).<sup>78</sup> And if God should envy men in other (things), he is more just in this—namely, in the science sought for the sake of itself, which is the worthiest among all. It follows, according to their opinion, that all imperfect (men) are unfortunate; for they used to say that men were fortunate out of the providence of the gods, who communicated their goods to them. Whence, because of the envy of the gods, who did not want to communicate their goods, it follows that men, remaining outside the perfection of this science, should be unfortunate.

The root of this opinion is most false, since it is not befitting for some deity to be envious.<sup>79</sup> This is evident because **envy** is *sadness about the prosperity of someone*. And this can only happen if the good of another is considered by the envious as a diminution of (his) proper good. However, it does not befit God to be sad, since he is not the subject of some

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<sup>77</sup> *In Metaph.* 1, l. 3, §60 (cf. ARISTOTLE, *Metaphysica* A.2, 982b30–32): “Secundo excludit [Philosophus] quorundam errorem.” Ibid., §61: “Hic excludit errorem cuiusdam Simonidis poetae, qui dicebat, quod soli Deo competit hunc honorem habere, quod velit illam scientiam, quae est propter seipsam quaerenda, et non propter aliud. Sed non est dignum viro, quod non quaerat illam scientiam quae est secundum suam conditionem, quae scilicet ordinatur ad necessaria vitae, quibus homo indiget.”

<sup>78</sup> *In Metaph.* 1, l. 3, §62 (cf. ARISTOTLE, *Metaphysica* A.2, 982b32–983a1): “Iste autem error Simonidis proveniebat ex aliquorum poetarum errore, qui dicebant, quod res divina invidet, et ex invidia ea quae ad honorem suum pertinent non vult Deus ab omnibus acceptari. Et si in aliis Deus hominibus invidet, multo magis est iustum in hoc, scilicet in scientia propter se quaesita, quae est honorabilissima inter omnia. Et secundum eorum opinionem, sequitur, quod omnes imperfecti sunt infortunati. Fortunatos enim esse homines dicebant ex providentia deorum, qui eis bona sua communicabant. Unde ex invidia deorum sua bona communicare nolentium, sequitur, quod homines extra perfectionem huius scientiae remanentes sint infortunati.”

<sup>79</sup> *In Metaph.* 1, l. 3, §63 (cf. ARISTOTLE, *Metaphysica* A.2, 983a1–4): “Sed radix huius opinionis est falsissima; quia non est conveniens, quod aliqua res divina invideat. Quod ex hoc patet, quia invidia est tristitia de prosperitate alicuius. Quod quidem accidere non potest, nisi quia bonum alterius aestimatur ab invido ut proprii boni diminutio. Deo autem non convenit esse tristem, cum non sit alicui malo subiectus. Nec etiam per bonum alterius eius bonum diminui potest; quia ex eius bonitate, sicut ex indeficienti fonte, omnia bona effluunt. Unde etiam Plato dixit, quod a Deo est omnis relegata invidia.”

bad (thing). Nor can his good be diminished by the good of another: for all goods flow out from his goodness as from an unfailing spring. Whence, too, PLATO said that God is removed from all envy.

Yet, *the poets deceive not only in this, but in many other (things)*, as the vulgar proverb says.<sup>80</sup>

### 50.20. Wisdom-Philosophy is the Worthiest Science

ARISTOTLE shows that this is the worthiest (*honorabilissima* < τιμιωτέραν) science through the following reason.<sup>81</sup> That science is maximally worthy which is maximally divine, just like God, too, is more worthy than all things; and this science is maximally divine; therefore, it is the worthiest.

The minor (premise) is proven thus.<sup>82</sup> Some science is said to be divine in two modes, and this science alone is said (to be) divine in both: (1) the science that God has; (2) the science that is about divine things. And that this alone should have one and the other is manifest. Since this science is about the first causes and principles, it must be about God, for God is understood by all as being among the causes, and as some principle of things. Also, either God alone has that science, which is about God and about first causes; or, if not alone, he maximally has it. He alone has it according to perfect comprehension; and he maximally has it insofar as it is also had—in its mode—by men, even if it should not be had by them as a possession, but as something obtained from him.

Wherefrom, ARISTOTLE further concludes that all other sciences are more necessary than this (in relation) to some utility of life: for they are sought less for the sake of themselves. But no other (science) can be worthier than this.<sup>83</sup>

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<sup>80</sup> *In Metaph.* 1, l. 3, §63: “Sed poetae non solum in hoc, sed in multis aliis mentiuntur, sicut dicitur in proverbio vulgari.”

<sup>81</sup> *In Metaph.* 1, l. 3, §52 (cf. ARISTOTLE, *Metaphysica* A.2, 983a4–10): “ostendit [Philosophus] qualis sit scientia ista. [...] Quarto, quod est honorabilissima.” Ibid., §64: “Ostendit quartum, scilicet quod haec scientia sit honorabilissima, tali ratione. Illa scientia est maxime honorabilis, quae est maxime divina, sicut etiam Deus honorabilior est rebus omnibus: sed ista scientia est maxime divina: ergo est honorabilissima.”

<sup>82</sup> *In Metaph.* 1, l. 3, §64 (cf. ARISTOTLE, *Metaphysica* A.2, 983a4–10): “Minor sic probatur. Aliqua scientia dicitur esse divina dupliciter; et haec sola scientia utroque modo divina dicitur. Uno modo scientia divina dicitur quam Deus habet. Alio modo, quia est de rebus divinis. — Quod autem haec sola habeat utrumque, est manifestum; quia, cum haec scientia sit de primis causis et principiis, oportet quod sit de Deo; quia Deus hoc modo intelligitur ab omnibus, ut de numero causarum existens, et ut quoddam principium rerum. Item talem scientiam, quae est de Deo et de primis causis, aut solus Deus habet, aut si non solus, ipse tamen maxime habet. Solus quidem habet secundum perfectam comprehensionem. Maxime vero habet, in quantum suo modo etiam ab hominibus habetur, licet ab eis non ut possessio habeatur, sed sicut aliquid ab eo mutuatum.”

<sup>83</sup> *In Metaph.* 1, l. 3, §65 (cf. ARISTOTLE, *Metaphysica* A.2, 983a10–11): “Ex his autem ulterius concludit [Philosophus...], quod omnes aliae scientiae sunt necessariae magis quam ista ad aliquam vitae utilitatem: minus enim sunt propter se quaesitae. Sed nulla aliarum dignior ista potest esse.”

### 50.21. Distinguishing Art, Science, and Wisdom

It is therefore evident—from the aforesaid—what the nature of this science should be.<sup>84</sup> For it is speculative (►50.13), free (►50.18), (and) non-human but divine (►50.19). And (it is also evident) what is its intention (i.e., that which it tends into), by which the inquiry, the whole method, and the whole art must be had. For its intention is about the first and universal causes of things, about which it inquires and determines (the truth). And, for the sake of their cognition, it moves forward towards the aforesaid terminus (►50.17): namely, not to wonder about the known causes.

However, since the names *art*, *wisdom*, and *science* have been used as though indifferently, lest someone should believe that all these names are synonymous, signifying almost the same, ARISTOTLE removes this opinion, referring (us) to (his discussion about) how science, art, wisdom, prudence, and understanding should differ (in the next chapter; ►51).<sup>85</sup>

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<sup>84</sup> *In Metaph.* 1, l. 3, §68 (cf. ARISTOTLE, *Metaphysica* A.2, 983a20–23): “Patet igitur ex praedictis quae sit natura huius scientiae, quia est speculativa, libera, non humana, sed divina: et quae est eius intentio, qua oportet habere quaestionem et totam methodum et totam hanc artem. Intendit enim circa primas et universales rerum causas, de quibus etiam inquirat et determinat. Et propter harum cognitionem ad praedictum terminum pervenit, ut scilicet non admiretur cognitio causis.”

<sup>85</sup> *In Metaph.* 1, l. 1, §17 (cf. ARISTOTLE, *Metaphysica* A.1, 981b25–27): “respondet [Philosophus] cuidam obiectioni.” *Ibid.*, §34 (cf. ARISTOTLE, *Ethica Nicomachea* Z.1–6, 1138b18–1141a8): “Sed quia usus nomine artis fuerat et sapientiae et scientiae quasi indifferenter, ne aliquis putet haec omnia esse nomina synonyma idem penitus significantia *hanc opinionem removet*, et remittit ad librum *Moralium*, idest ad sextum *Ethicorum*, ubi dictum est, in quo differant scientia et ars et sapientia et prudentia et intellectus.”



## 51. The Intellectual Virtues

*To understand what a science is, we aim to distinguish the diverse intellectual virtues.*

### 51.1. Diverse Divisions of Intellectual Habits

1. In his *Nicomachean Ethics*, ARISTOTLE determines (the truth) about intellectual habits insofar as they are intellectual virtues.<sup>1</sup> They are said (to be) *virtues* insofar as they perfect (the intellect) in its operation, for **virtue** is *that which makes whoever has it good, and renders his operation good* (► 22.9). Thus, insofar as (the intellect) is diversely perfected by such speculative habits, it diversifies such virtues. (We follow this division here.)

2. There is, however, another mode in which the speculative part of the soul is perfected by understanding, which is the habit of principles (► 51.21; 51.22); by which (mode) some (principles) come to be known by themselves; and by which (mode) demonstrated conclusions are known from such principles—whether demonstration should proceed from lower causes, as is (the case) in science (► 51.7), or from the highest causes, as (is the case) in wisdom (► 51.24).<sup>2</sup> When the sciences are distinguished (insofar) as they are some habits, they must be distinguished in virtue of (their) objects—that is, in virtue of the things about which there is science. And thus, three parts of *speculative or theoretical philosophy* are distinguished: metaphysics, mathematics, and physics (► 58).

### 51.2. The Intellectual Virtues Summarized

Briefly to state it, wisdom, science, and understanding are about the speculative part of the soul, which ARISTOTLE calls the *scientific* (part) of the soul.<sup>3</sup> They differ, however, because **understanding** is *the habit of the first principles of demonstration*; **science**, in turn, (is *the habit*) of *conclusions from lower causes*, while **wisdom** (is *the habit that*) *considers first causes*—whence, it is said (to be) the summit (*caput*) of the sciences.

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<sup>1</sup> *In De Trin.*, q. 5 a. 1 ad 1, 173–181: “Philosophus in VI Ethicorum determinat de habitibus intellectualibus in quantum sunt uirtutes intellectuales, dicuntur autem uirtutes in quantum perficiuntur in sua operatione: uirtus enim est que bonum facit habentem et opus eius bonum reddit. Et ideo secundum quod diuersimode perficitur per huiusmodi habitus speculatiuos, diuersificat huiusmodi uirtutes.”

<sup>2</sup> *In De Trin.*, q. 5 a. 1 ad 1, 181–192: “Est autem alius modus quo pars anime speculatiua perficitur per intellectum qui est habitus principiorum, quo aliqua ex se ipsis nota fiunt, et quo cognoscuntur conclusiones ex huiusmodi principiis demonstrate, siue demonstratio procedat ex causis inferioribus sicut est in scientia, siue ex causis altissimis ut in sapientia. Cum autem distinguuntur scientie ut sunt habitus quidam, oportet quod penes obiecta distinguantur, id est penes res de quibus sunt scientie; et sic distinguuntur hic et in VI Metaphysice tres partes philosophie speculatiue.” *In Metaph.* 6, l. 1, §1166: “Concludit numerum scientiarum theoricarum; et circa hoc tria facit. Primo concludit ex praemissis, quod tres sunt partes philosophiae theoriae, scilicet mathematica, physica et theologia, quae est philosophia prima.” Cf. ARISTOTLE, *Metaphysica* E.1, 1026a18–19: “ὥστε τρεῖς ἂν εἴεν φιλοσοφίαι θεωρητικαί, μαθηματική, φυσική, θεολογική.”

<sup>3</sup> *In Metaph.* 1, l. 1, §34: “Et ut breuiter dicatur, sapientia et scientia et intellectus sunt circa partem animae speculatiuam, quam ibi scientificum animae appellat [Philosophus]. Differunt autem, quia intellectus est habitus principiorum primorum demonstrationis. Scientia uero est conclusionis ex causis inferioribus. Sapientia uero considerat causas primas. Unde ibidem dicitur caput scientiarum.”

Prudence and art, on the other hand, are about the *practical* part of the soul, which is able to reason about contingent (things) that are operable by us.<sup>4</sup> And (these) differ: for **prudence** (is *the habit that*) *directs (reason) in actions that do not pass over to an external matter*; rather, they are perfections of the agent; whence, it is said there that prudence is *right reason of things that are to be done (recta ratio agibilium)*. On the other hand, **art** (is *the habit that*) *directs (reason) in productions that pass over into external matter*, such as building and cutting; whence, it is said that **art** is *right reason of the things that are to be produced (recta ratio factibilium)*.

### 51.3. Division of the Rational Part of the Soul: Necessary vs. Contingent Objects

As ARISTOTLE says, the intellectual virtues perfect the rational part of the soul.<sup>5</sup> Hence, to distinguish the intellectual virtues, it is necessary to divide that which has reason. Let us therefore suppose that the rational part (of the soul) should be divided into two: the part by which we theorize (about) *necessary beings*, whose principles cannot be otherwise; and another part by which we theorize (about) *contingent (beings, i.e., whose principles can be otherwise)*.

ARISTOTLE proves the aforesaid division through the following reason.<sup>6</sup> It is necessary that diverse parts of the soul be adapted to objects that differ in genus. And it is manifest that the contingent and the necessary differ in genus, as the corruptible and the incorruptible (► 43.25, ¶2; 21.10, ¶1). It therefore remains that there should be a diverse genus of the parts of the rational soul by which it knows necessary and contingent (beings).

ARISTOTLE proves the major proposition (i.e., that diverse parts of the soul should be adapted to objects that differ in genus) through the following reason.<sup>7</sup> Cognition is in the

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<sup>4</sup> *In Metaph.* 1, l. 1, §34: “Prudentia vero et ars est circa animae partem practicam, quae est ratiocinativa de contingentibus operabilibus a nobis. Et differunt: nam prudentia dirigit in actionibus quae non transeunt ad exteriorem materiam, sed sunt perfectiones agentis: unde dicitur ibi quod prudentia est recta ratio agibilium. Ars vero dirigit in factionibus, quae in materiam exteriorem transeunt, sicut aedificare et secare: unde dicitur quod ars est recta ratio factibilium.”

<sup>5</sup> *In Ethic.* 6, l. 1, 101–112 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1139a5–8): “Dicit ergo [Philosophus] primo quod, quia nunc intendimus de virtutibus intellectualibus, quae perficiunt partem animae rationalem, ideo ad distinguendum virtutes intellectuales oportet dividere rationem habens eodem modo quo supra divisimus partes animae, non quasi ex principali intentione, sed secundum quod sufficit ad propositum. Supponatur ergo quod pars rationalis dividatur in duas: una quidem est per quam speculamur illa entia, scilicet necessaria, quorum principia non possunt aliter se habere, alia autem pars <est> per quam speculamur contingentia.”

<sup>6</sup> *In Ethic.* 6, l. 1, 114–121 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1139a8–10): “probat [Philosophus] praemissam divisionem tali ratione. Ad obiecta quae differunt genere necesse est quod diversa genera partium animae adaptentur; manifestum est autem quod contingens et necessarium differunt genere, sicut habetur de corruptibili et incorruptibili in X Metaphysicae; relinquatur ergo quod sit diversum genus partium animae rationalis quo cognoscit necessaria et contingentia.”

<sup>7</sup> *In Ethic.* 6, l. 1, 122–135 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1139a10–11): “Maiorem autem propositionem probat [Philosophus...]. Et hoc tali ratione. Partibus animae inest cognitio secundum quod habent similitudinem quandam ad res cognitatas; non quidem ita quod res cognita sit actu in natura potentiae cognoscentis, sicut Empedocles posuit quod terra terram cognoscimus, igne ignem et sic de



parts of the soul insofar as they have some likeness to the things known. Not indeed such that the thing known should be in act in the nature of the potency of the knower, as EMPEDOCLES posited that we know earth by earth, fire by fire, and so on: rather, insofar as any potency of the soul is proportionate, according to its property, to knowing such (things). For example, sight (is proportionate according to its property) to knowing colors; and hearing, to knowing sounds. Now, the *ratio* of distinction (►40.7) of those (things) that are alike and proportionate to each other is the same. Therefore, just like (things) known by reason differ in genus, so, too, the parts of the rational soul (must differ in genus).

#### 51.4. The Scientific and the Ratiocinating Parts of the Soul

ARISTOTLE imposes names to the aforesaid parts of the rational soul, saying that the one that speculates (about) necessary (things) can be called the **scientific** (*scientificum* < ἐπιστημονικόν) genus of the soul, since science is about necessary (principles); and the other part can be called **ratiocinating** (*ratiocinativa* < λογιστικόν), insofar as *reasoning* and *deliberating* is taken for the same (< τὸ... βουλευέσθαι καὶ λογίζεσθαι ταύτόν).<sup>8</sup> Thus, he calls *deliberation* (*consilium* < βουλευέται)—and also *reasoning* (*ratiocinatio*)—some inquiry (that has) not yet (been) determined; and this indetermination happens, above all, about contingent (beings), of which there is only deliberation: for nothing is deliberated about those (things) that cannot be otherwise. Therefore, it thus follows that the (part) capable of ratiocinating (*ratiocinativum*) should be one part of the soul that has reason.

Here, ARISTOTLE posits *capable of ratiocinating* (*ratiocinativum*) and *capable of opining* (*opinativum*) for the same.<sup>9</sup> Whence, it is evident that it pertains to the second mode (of the reasonable process; ►52.6, ¶2; i.e., from the part of the terminus at which the reasoning process stops, for the last terminus that an inquiry of reason must attain is the understanding of principles). And he attributes doable human (deeds) to *capable of*

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aliis, sed in quantum quaelibet potentia animae secundum suam proprietatem est proportionata ad talia cognoscenda, sicut visus ad cognoscendos colores et auditus ad cognoscendos sonos. Sed eorum quae sunt invicem similia et proportionata est eadem ratio distinctionis. Ergo, sicut cognita per rationem genere differunt, ita et partes animae rationalis.”

<sup>8</sup> *In Ethic.* 6, l. 1, 136–149 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1139a11–15): “imponit [Philosophus] nomina praedictis partibus. Et dicit quod praedictarum partium rationalis animae una quidem, quae speculatur necessaria, potest dici scientificum genus animae, quia scientia de necessariis est; alia autem pars potest dici ratiocinativa, secundum quod ratiocinari et consiliari pro eodem sumitur; nominat enim consilium quandam inquisitionem nondum determinatam, sicut et ratiocinatio, quae quidem indeterminatio maxime accidit circa contingentia, de quibus solis est consilium, nullus enim consiliatur de his quae non contingit aliter se habere; sic ergo sequitur quod ratiocinativum sit una pars animae rationem habentis.”

<sup>9</sup> *In De Trin.*, q. 6 a. 1 qc. 1 ad 4, 214–223: “Philosophus ibi [sc., in *Ethica Nicomachea* Z.2, 1139a6–15] pro eodem ponit ratiocinativum et opinativum; unde patet quod pertinet ad secundum modum assignatum; ratiocinativum autem vel opinativum attribuit Philosophus ibidem agibilia humana, de quibus est scientia moralis, ratione sue contingentie. Vnde potest ex dictis colligi quod primus modus rationabilitatis est maxime proprius scientie rationali, secundus scientie morali, tertius scientie naturali.”

*ratiocinating* and *capable of opining*, about which moral science is, by reason of its contingency. Whence, it can be gathered from this that the first mode (of the reasonable process; ► 52.6, ¶1) is maximally proper of the rational science (i.e., of logic; ► 52.6, ¶2); the second, to moral science; (and) the third (► 52.6, ¶3), to natural science (► 59).

### 51.5. Knowledge of Contingent Beings

As ARISTOTLE says, the cognition of truth is the proper work of both particular intellects: to wit, the *speculative* or *scientific* (which theorizes about necessary beings) and the *practical* or *ratiocinating* (which theorizes about contingent beings).<sup>10</sup>

However, contingent (beings) can be known in two modes:<sup>11</sup>

#### 1. According to **universal ratios**.<sup>12</sup>

The universal *ratios* of contingent (beings) are immutable.<sup>13</sup> And, according to this, demonstrations are given of them, and their cognition pertains to the demonstrative sciences. Thus, natural science is not only about necessary and incorruptible things, but also about contingent and corruptible things. Whence, it is evident that contingent (beings) thus considered pertain to the same part of the intellective soul to which (pertain) also necessary (beings).

#### 2. Insofar as they are in a **particular** (thing).<sup>14</sup>

Contingent (beings), taken insofar as they are in a particular (thing), are variable, and the intellect falls upon them only through sensitive potencies.<sup>15</sup> Whence, too, one potency is posited among the sensitive parts of the soul, which is called **particular reason** (*ratio particularis*) or **cogitative power** (*vis cogitativa*), (and) which is capable of gathering

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<sup>10</sup> *In Ethic.* 6, l. 2, 244–248 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1139b12): “concludit [Philosophus...] quod cognitio veritatis est proprium opus utrarumque particularum intellectus, scilicet practici et speculativi vel scientifici et ratiocinativi.”

<sup>11</sup> *In Ethic.* 6, l. 1, 191–192: “contingentia dupliciter cognosci possunt.”

<sup>12</sup> *In Ethic.* 6, l. 1, 191–214: “uno modo secundum rationes universales.”

<sup>13</sup> *In Ethic.* 6, l. 1, 193–203: “Universales quidem igitur rationes contingentium immutabiles sunt, et secundum hoc de his demonstrationes dantur et ad scientias demonstrativas pertinet eorum cognitio; non enim scientia naturalis est solum de rebus necessariis et incorruptibilibus, sed etiam de rebus corruptibilibus et contingentibus; unde patet quod contingentia sic considerata ad eandem partem animae intellectivae pertinent ad quam et necessaria, quam Philosophus vocat hic scientificum, et sic procedunt rationes inductae.”

<sup>14</sup> *In Ethic.* 6, l. 1, 193: “alio modo secundum quod sunt in particulari.”

<sup>15</sup> *In Ethic.* 6, l. 1, 203–214: “Alio modo possunt accipi contingentia secundum quod sunt in particulari, et sic variabilia sunt nec cadit supra ea intellectus nisi mediantibus potentiis sensitivis; unde et inter partes animae sensitivas ponitur una potentia quae dicitur ratio particularis sive vis cogitativa, quae est collativa intentionum particularium; sic autem accipit hic Philosophus contingentia, ita enim cadunt sub consilio et operatione; et propter hoc ad diversas partes animae rationalis pertinere dicit necessaria et contingentia, sicut universalialia speculabilia et particularia operabilia.”

particular intentions. In this way, contingent (beings) fall under deliberation and operation. Wherefrom, ARISTOTLE says that necessary and contingent (beings) pertain to diverse parts of the rational soul as universals that can be theorized (*universalia speculabilia*) and (as) particulars that can be operated (*particularia operabilia*).

### 51.6. The Intellectual Virtues: Understanding, Science, Wisdom, Prudence, Art

The **intellectual virtues** are *habits by which the soul says (something) true*.<sup>16</sup> ARISTOTLE determines (the truth) concerning the principal intellectual virtues. First, he enumerates them; and then, he determines (the truth) about each of them. Thus, there are five (habits) in number whereby the soul always says (something) true by either affirming or negating: namely, **art, science, prudence, wisdom, and understanding**. Whence, it is evident that these five are the intellectual virtues.

From these, he excludes **suspicion**, which is had through some conjectures from some particular facts; and **opinion**, which is had through probable reasons about some universals.<sup>17</sup> Indeed, although something true is sometimes said through these two, however, it happens that something false is sometimes said through them: which (false assertion) is a bad understanding, just like the true is its good; and it is against the *ratio* of *virtue* that it be a principle of a bad act (► 22.9). Thus, it is evident that suspicion and opinion cannot be said (to be) *intellectual virtues*.

### 51.7. Science

As ARISTOTLE says, it can be (made) manifest what science should be from the (things) that are said (about it), if science must know through certitude and not follow likenesses.<sup>18</sup>

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<sup>16</sup> In *Ethic.* 6, l. 3, 3–20 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b15–18): “incipit [Philosophus] de ipsis intellectualibus virtutibus determinare. Et primo determinat de virtutibus intellectualibus principalibus [...]. Circa primum duo facit: primo enumerat intellectuales virtutes; secundo determinat de singulis earum [...]. Dicit ergo primo quod, ex quo posita est ratio accipiendi virtutes intellectuales, debemus rursus incipere ab eo quod superius determinatum est, ut sic tractemus de ipsis intellectualibus virtutibus. Dictum est enim prius quod virtutes intellectuales sunt habitus quibus anima dicit verum. Sunt autem quinque numero quibus anima semper dicit verum vel affirmando vel negando, scilicet ars, scientia, prudentia, sapientia et intellectus. Unde patet quod ista quinque sunt virtutes intellectuales.”

<sup>17</sup> In *Ethic.* 6, l. 3, 20–30: “Ab horum autem numero excludit suspicionem, quae per aliquas coniecturas habetur de aliquibus particularibus factis, et opinionem, quae per probabiles rationes habetur de aliquibus universalibus; quamvis enim per ista duo quandoque verum dicatur, tamen contingit quod eis quandoque dicitur falsum, quod est malum intellectus, sicut verum est bonum ipsius; est autem contra rationem virtutis ut sit principium mali actus; et sic patet quod suspicio et opinio non possunt dici intellectuales virtutes.”

<sup>18</sup> In *Ethic.* 6, l. 3, 32–63 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b18–23): “determinat [Philosophus] de virtutibus intellectualibus enumeratis. Et primo determinat de singulis earum [...] determinat de virtutibus intellectualibus perficientibus intellectum circa ea quae sunt ex principiis [...] determinat de scientia quae perficit intellectum circa necessaria [...] notificat scientiam ex parte materiae [...]. Dicit ergo primo quod manifestum potest esse quid sit scientia ex his quae dicuntur, si oportet per certitudinem scientiam cognoscere et non sequi similitudines, secundum quas scilicet quandoque similitudinarie dicimus scire etiam sensibilia de quibus certi sumus. Sed certa ratio scientiae hinc accipitur quod omnes suspicamur de eo quod scimus quod non contingit illud aliter se habere, alioquin non esset certitudo scientis, sed dubitatio opinantis. Huiusmodi autem certitudo, quod scilicet non possit aliter esse, non

That is, we sometimes say, according to likeness (*similitudinariae*), that we scientifically know even those sensible (things) about which we are certain. Instead, the certain *ratio* of science is taken here (in such a way) that we all suspect, concerning what we scientifically know, that it cannot be otherwise—else, we would not have the certitude of (one) who scientifically knows, but the doubt of (one) who opines. And such a certitude—namely, that it could not be otherwise—cannot be had about (things) that may be otherwise: for certitude about them can be had alone when they fall under sense; but when they are not being seen or sensed, then it is concealed whether they should be or they should not be, as is evident about (whether) Sortes is sitting.

It is therefore evident that every scientifically knowable (thing) is (how it is) of necessity.<sup>19</sup> Wherefrom, ARISTOTLE concludes that it should be eternal, since all those (things) that are simply of necessity are eternal; and such (things) are neither generated nor (are they) corrupted. Such are, therefore, (the things) about which there is science. However, about generable and corruptible (things) there can be some science: for example, natural (science); not, however, according to particulars that underlie generation and corruption, but according to universal *ratios* that are of necessity and always (►51.5, ¶1).

ARISTOTLE makes science known through (its) cause.<sup>20</sup> He says that every science seems to be of **teachable** (things): that is, it can be taught. Whence, in the *Metaphysics* he says that a sign of the scientific knower is that he can teach: for another is reduced from potency into act through that which is in act; and for the same reason, every (thing that is) scientifically knowable is learnable—to wit, by he who is a scientific knower in potency.

However, every doctrine or discipline must be produced from some foreknown (things; ►57.3); for we can only arrive at the cognition of something unknown through something known.<sup>21</sup> And (the production of) doctrine from foreknown (things) is twofold: **(1) through**

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potest haberi circa contingentia aliter se habere; tunc enim solum potest de eis certitudo haberi cum cadunt sub sensu, sed quando fiunt extra speculari, id est quando desinunt videri vel sentiri, tunc latent utrum sint vel non sint, sicut patet circa hoc quod est Sortem sedere.”

<sup>19</sup> *In Ethic.* 6, l. 3, 63–73 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b23–24): “Sic ergo patet quod omne scibile est ex necessitate. Ex quo concludit [Philosophus] quod sit aeternum, quia omnia quae sunt simpliciter ex necessitate, sunt aeterna; huiusmodi autem neque generantur neque corrumpuntur. Talia ergo sunt de quibus est scientia. Potest autem et de generabilibus et corruptibilibus esse aliqua scientia, puta naturalis; non tamen secundum particularia quae generationi et corruptioni subduntur, sed secundum rationes universales quae sunt ex necessitate et semper.”

<sup>20</sup> *In Ethic.* 6, l. 3, 74–81 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b25–26): “notificat [Philosophus] scientiam per causam. Et dicit quod omnis scientia videtur esse docibilis, id est potens doceri; unde in I *Metaphysicae* dicitur quod signum scientis est posse docere, per id enim quod est actu reducitur alterum de potentia in actum; et eadem ratione omne scibile est discibile, ab eo scilicet qui est potentia sciens.”

<sup>21</sup> *In Ethic.* 6, l. 3, 81–92 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b26–29): “Oportet autem quod omnis doctrina seu disciplina fiat ex aliquibus praecognitis, sicut dictum est in principio *Posteriorum Analeticorum*; non enim possumus devenire in cognitionem alicuius ignoti nisi per aliquod notum. Est autem duplex doctrina ex praecognitis: una quidem per inductionem, alia vero per syllogismum. Inductio

**induction**, which leads to knowing some principle and some universal, at which we arrive through experiences of singulars (►50.6); **(2) through syllogism** (►52.4, ¶1), which proceeds from universal principles foreknown in the aforesaid mode.

Therefore, it is evident that there are some principles from which a syllogism proceeds that are not made known through syllogism—otherwise we would proceed infinitely in the principles of syllogisms, which is impossible.<sup>22</sup> It therefore remains that there should be induction of the principles of syllogism.

However, not any syllogism whatsoever is disciplinary, as making (someone) scientifically know (►52.14). Rather, the demonstrative (syllogism) alone (produces science), which concludes necessary (conclusions) from necessary (principles; ►53).<sup>23</sup> It is therefore manifest that **science** (*demonstrativus* = ἡ ἐπιστήμη) is a *demonstrative habit* (*habitus demonstrativus* = ἕξις ἀποδεικτική): that is, (a habit) caused from demonstration (when) all those (necessary conditions) are observed concerning demonstrative science (►53.6).

Thus, (in order) for someone scientifically to know, the principles from which he scientifically knows must be—through some mode—believed and known even more than the conclusions that are scientifically known (►57).<sup>24</sup> Otherwise, he would have science not by itself but by accident: to wit, insofar as he might happen to know the conclusion itself through some other principles and not through these (principles) that he knows more than the conclusion. Indeed, the cause must be more powerful than the effect; whence, that which is a cause of knowing must be more known.

### 51.8. Science is About Universals

Although universals should not exist by themselves, however, the natures of those (individuals; ►15.2, ¶1) that subsist by themselves is to be considered universally. And,

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autem inducitur ad cognoscendum aliquod principium et aliquod universale, in quod devenimus per experimenta singularium, ut dicitur in principio Metaphysicae; sed ex universalibus principiis praedicto modo praecognitis procedit syllogismus.”

<sup>22</sup> *In Ethic.* 6, l. 3, 92–116 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b29–31): “Sic ergo patet quod sunt quaedam principia ex quibus syllogismus procedit, quae non notificantur per syllogismum, alioquin procederetur in infinitum in principiis syllogismorum, quod est impossibile, ut probatur in I Posteriorum; sic ergo relinquitur quod principiorum syllogismi sit inductio.”

<sup>23</sup> *In Ethic.* 6, l. 3, 98–105 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b31–33): “Non autem quilibet syllogismus est disciplinalis, quasi faciens scire, sed solus demonstrativus, qui ex necessariis necessaria concludit. Sic ergo manifestum est quod scientia est habitus demonstrativus, id est ex demonstratione causatus, observatis omnibus illis quaecumque circa scientiam demonstrativam determinata sunt in Posterioribus Analeticis.”

<sup>24</sup> *In Ethic.* 6, l. 3, 105–115 (cf. ARISTOTLE, *Ethica Nicomachea* Z.3, 1139b33–35): “Oportet enim ad hoc quod aliquis sciat, quod principia ex quibus scit <sint> per aliquem modum credita et cognita etiam magis quam conclusiones quae sciuntur; alioquin non per se, sed per accidens habebit scientiam, in quantum scilicet potest contingere quod istam conclusionem sciat per quaedam alia principia et non per ista quae non magis cognoscit quam conclusionem; oportet enim quod causa sit potior effectu, unde id quod est causa cognoscendi oportet esse magis notum.”

according to this, genera and species—which are said (to be) *second substances* (►15.2, ¶2)—are taken in the category of substance, about which (universals) there is science (i.e., there is no science of individuals).<sup>25</sup>

### 51.9. Induction and Abstraction

The mode of acquiring science is twofold (as already noted; ►51.7): (1) through induction; (2) through demonstration.<sup>26</sup> As ARISTOTLE says, these two differ because demonstration proceeds from universals, while induction proceeds from particulars.

Therefore, if the universals from which a demonstration proceeds could be known without induction, it would follow that a man of those who do not have sense (experience) could receive a science.<sup>27</sup> Yet, it is impossible to theorize (about) universals without induction.

This is more manifest in sensible things because, in them, we take universal knowledge through the experience that we have about sensible singulars (►50.7).<sup>28</sup> Yet, this seems most dubious in those (things) that are said (to be) *according to abstraction*, as in mathematics. Indeed, since experience has its origin in sense, it seems that this should not have place in those (species or forms) that are abstracted from sensible matter.

Hence, to exclude this (error), ARISTOTLE says that also those (known things) that are said (to be) *according to abstraction* (< τὰ ἐξ ἀφαιρέσεως λεγόμενα) come to be known through induction (►49.8).<sup>29</sup> For, in any one genus of abstract (things), there are some particulars that are not separable from sensible matter insofar as any one of them is *this* (►49.9). Thus, although a line is said (to be) according to abstraction, however, *this* line that is in

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<sup>25</sup> *In Metaph.* 11, l. 2, §2189 (cf. ARISTOTLE, *Metaphysica* K.2, 1060b19–23): “Et veritas est quod, licet universalia non per se existant, tamen naturas eorum quae per se subsistunt est considerare universaliter. Et secundum hoc accipiuntur genera et species in praedicamento substantiae, quae dicuntur secundae substantiae, de quibus est scientia.”

<sup>26</sup> *In Post. an.* 1, l. 30, 31–37 (cf. ARISTOTLE, *Analytica Posteriora* A.18, 81a39–b1): “duplex est modus acquirendi scienciam, unus quidem per demonstrationem, alius autem per inductionem, quod etiam in principio huius libri positum est. Differunt autem hii duo modi, quia *demonstratio* procedit ex *uniuersalibus*, *inductio* autem procedit ex particularibus.”

<sup>27</sup> *In Post. an.* 1, l. 30, 37–41 (cf. ARISTOTLE, *Analytica Posteriora* A.18, 81b2): “Si ergo uniuersalia ex quibus procedit demonstratio cognosci possent absque inductione, sequeretur quod homo posset accipere scienciam eorum quorum non habet sensum. Set *impossibile est uniuersalia speculari* absque inductione.”

<sup>28</sup> *In Post. an.* 1, l. 30, 42–51: “Et hoc quidem in rebus sensibilibus est magis manifestum, quia in eis per experientiam quam habemus circa singularia sensibilia accipimus uniuersalem noticiam, sicut manifestatur in principio *Metaphysice*; set maxime hoc uidetur dubium in hiis que dicuntur secundum abstractionem, sicut in mathematicis: cum enim experientia a sensu ortum habeat, ut dicitur in principio *Metaphysice*, uidetur quod hoc locum non habeat in hiis que sunt abstracta a materia sensibili.”

<sup>29</sup> *In Post. an.* 1, l. 30, 52–61 (cf. ARISTOTLE, *Analytica Posteriora* A.18, 81b2–5): “Et ideo ad hoc excludendum dicit [Philosophus] quod etiam ea *que dicuntur* secundum abstractionem, contingit *nota facere per inductionem*, quia *in unoquoque genere* abstractorum sunt *quedam* particularia que *non sunt separabilia* a materia sensibili, *secundum quod unumquodque* eorum est hoc: quamuis enim linea secundum abstractionem dicatur, tamen hec linea que est in materia sensibili, in quantum est indiuiduata, abstrahi non potest, quia indiuiduatio eius est ex hac materia.”

sensible matter cannot be abstracted insofar as it is individuated, since its individuation is (had) from *this* matter.

However, the principles of abstract (things), from which demonstrations proceed in them, are manifested to us only from some particulars that we perceive by sense.<sup>30</sup> For example, because we see some sensible, singular whole, we are led to knowing what *whole*—and *part*—is, and we know that *every whole is greater than its part* by considering this (*ratio*) in multiple (things). Therefore, the universals from which demonstration proceeds come to be known to us only through induction.

### 51.10. The Habits of Contingent Beings: Art and Prudence

ARISTOTLE determines (the truth) concerning the habits that perfect the intellect concerning contingent (beings).<sup>31</sup> He first shows that there are two habits about contingent (things).

He therefore says that *what can be otherwise* is divided into two, since something of it is *producible* (*factibile* = ποιητόν) and something is *doable* (*agibile* = πρακτόν).<sup>32</sup> Which is known through this: that one of them is a *production* (*factio* = ποιήσις) and the other is an *action* (*actio* = πράξις).

And to these we can assent (< πιστεύομεν... περὶ αὐτῶν) through external reasons (< τοῖς ἔξωτερικοῖς λόγοις): that is, by those (truths) that are determined outside of this science.<sup>33</sup> To wit, where the difference between *action* and *production* is shown (►47.11, ¶4): for action is said (to be) an operation that passes into an external matter (in order) to form something from it, as to build, to burn or to cut.

Therefore, since habits are distinguished according to (their) objects (►14.9), it follows that the habit that is active with reason (< ἡ μετὰ λόγου ἔξις πρακτική)—namely,

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<sup>30</sup> *In Post. an.* 1, l. 30, 61–70: “Non autem manifestantur nobis principia abstractorum, ex quibus demonstrationes in eis procedunt, nisi ex particularibus aliquibus que sensu percipimus: puta, ex hoc quod uidemus aliquod totum singulare sensibile, perducimur ad cognoscendum quid est totum et pars et cognoscimus quod omne totum est maius sua parte, considerando hoc in pluribus. Sic igitur uniuersalia ex quibus demonstratio procedit, non fiunt nobis nota nisi per inductionem.”

<sup>31</sup> *In Ethic.* 6, l. 3, 117–123 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4–5, 1140a1–b30): “determinat [Philosophus] de habitibus qui perficiunt intellectum circa contingentia. Et circa hoc tria facit: primo ostendit duos esse habitus circa contingentia; secundo determinat de uno eorum, scilicet de arte [...]; tertio determinat de altero, scilicet de prudentia.”

<sup>32</sup> *In Ethic.* 6, l. 3, 124–128 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a1–2): “Dicit ergo primo quod contingens aliter se habere dividitur in duo, quia aliquid eius est agibile et aliquid est factibile, quod quidem cognoscitur per hoc quod alterum est factio et alterum est actio.”

<sup>33</sup> *In Ethic.* 6, l. 3, 128–136 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a2–3): “Et his possumus assentire per rationes exteriores, id est per ea quae determinata sunt extra istam scientiam, scilicet in IX Metaphysicae; ibi enim ostensa est differentia inter actionem et factionem; nam actio dicitur operatio manens in ipso agente, sicut videre, intelligere et velle, factio autem dicitur operatio transiens in exteriorem materiam ad aliquid formandum ex ea, sicut aedificare, urere et secare.”

**prudence**—should be other than the productive habit that is with reason (< ἕτερόν ἐστι τῆς μετὰ λόγου ποιητικῆς ἕξεως)—which is **art** (►51.11).<sup>34</sup>

And (it also follows) that one of them should not be contained under the other (< διὸ οὐδὲ περιέχεται ὑπ’ ἀλλήλων), just like action and production are not contained under each other: for neither is an action a production nor is a production an action (< οὔτε γὰρ ἡ πρᾶξις ποίησις οὔτε ἡ ποίησις πρᾶξις ἐστίν), since they are distinguished by opposite differences (i.e., *passing to external matter* and *not passing to external matter*).<sup>35</sup>

However, it is to be considered that, since the cognition of contingent (things) cannot have the certitude of truth that repels falsehood, hence, in respect of (that which) pertains to cognition alone, contingent (things) are omitted by the intellect, which is perfected by the cognition of truth.<sup>36</sup> Yet, the cognition of contingent (things) is useful insofar as it is directive of human operation, which is about contingent (things). And hence, ARISTOTLE divides contingent (things), (while) treating of intellectual virtues, only insofar as they underlie human operation. Whence, too, practical sciences alone are about contingent (things) insofar as they are contingent: to wit, in particular. The speculative sciences, in turn, are about contingent (things) only according to universal *ratios* (►51.5, ¶1).

### 51.11. Art

ARISTOTLE determines (the truth) about art, manifesting it through induction.<sup>37</sup> Thus, we see that (the art of) building is some art; and, again, that it is some habit (ordered) to the production of something with reason; and no art is found to which this would not befit: to wit, that it be a productive habit with reason; and no productive habit is found that would not be an art. Whence, it is manifest that **art** (*ars* = τέχνη) is the same as a productive

<sup>34</sup> *In Ethic.* 6, l. 3, 136–139 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a4–5): “Quia ergo habitus distinguuntur secundum obiecta, consequens est quod habitus qui est activus cum ratione, scilicet prudentia, sit alius ab habitu factivo qui est cum ratione, qui est ars.”

<sup>35</sup> *In Ethic.* 6, l. 3, 139–143 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a5–6): “et quod unus eorum non contineatur sub alio, sicut neque actio et factio continentur sub invicem, quia neque actio est factio neque factio est actio; distinguuntur enim oppositis differentiis, ut ex dictis patet.”

<sup>36</sup> *In Ethic.* 6, l. 3, 143–158: “Est autem considerandum quod, quia contingentium cognitio non potest habere certitudinem veritatis repellentem falsitatem, ideo, quantum ad solam cognitionem pertinet, contingentia praetermittuntur ab intellectu, qui perficitur per cognitionem veritatis; est autem utilis contingentium cognitio secundum quod est directiva humanae operationis, quae circa contingentia est. Et ideo contingentia divisit [Philosophus] tractans de intellectualibus virtutibus solum secundum quod subiciuntur humanae operationi. Unde et solae scientiae practicae sunt circa contingentia in quantum contingentia sunt, scilicet in particulari; scientiae autem speculativae non sunt circa contingentia nisi secundum rationes universales, ut supra dictum est.”

<sup>37</sup> *In Ethic.* 6, l. 3, 160–172 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a6–10): “determinat [Philosophus] de arte. Et primo de ipsa arte secundum se; secundo de arte per comparisonem ad oppositum eius [...]. Circa primum duo facit: primo ostendit quid sit ars; secundo quae sit artis materia [...]. Primum manifestat per inductionem. Videmus enim quod aedificativa est ars quaedam et iterum quod est habitus quidam ad faciendum aliquid cum ratione, et nulla ars invenitur cui hoc non conveniat, quod scilicet sit habitus factivus cum ratione, neque invenitur talis, habitus factivus scilicet cum ratione, qui non sit ars; unde manifestum est quod idem est ars et habitus factivus cum vera ratione.”



habit with true reason (*habitus factivus cum vera ratione* = ἔξις μετὰ λόγου ἀληθοῦς ποιητική).

ARISTOTLE also determines (the truth) about art by comparison to its opposite.<sup>38</sup> And he says that, just as art—as has been said—is some productive habit with true reason, so, (too), **lack of art** (*athennia* = ἀτεχνία, *id est inertia*), on the contrary, is a *productive habit with false reason about that which can be otherwise*.

### 51.12. The Matter of Art

ARISTOTLE determines the matter of art.<sup>39</sup> And about the matter of art two (things) are to be considered:

1. The **action** itself of the artificer, which is directed by art. And there is a threefold operation of art: **(a) to consider how** (*considerare qualiter*) something is to be produced; **(b) to operate** (*operari*) about an external matter; **(c) to constitute** (*constituere*) the work itself.

Hence, ARISTOTLE says that every art is about generation (< περὶ γένεσιν): that is, about the constitution (§1c) and completion of a work, which he posits first as the end of the art.<sup>40</sup> And it is also about building (< καὶ τὸ τεχνάζειν): that is, about the operation (§1b) of art, since it disposes matter. And it is also about theorizing (< καὶ θεωρεῖν) how something should be produced through art (§1a).

2. The **work** (*opus*) that is produced by art.

From the part of the work itself, two (things) are to be considered:<sup>41</sup> **(a)** those (works) that are produced through human art can be and not be (< τῶν ἐνδεχομένων καὶ εἶναι καὶ μῆ

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<sup>38</sup> *In Ethic.* 6, I. 3, 224–230 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a20–23): “determinat [Philosophus] de arte per comparisonem ad eius oppositum. Et dicit quod sicut ars, ut praedictum est, est quidam habitus factivus cum vera ratione, ita athennia, id est inertia, e contrario est habitus factivus cum ratione falsa circa contingens aliter se habere.”

<sup>39</sup> *In Ethic.* 6, I. 3, 173–185 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a10–14): “determinat [Philosophus] materiam artis. Et circa hoc tria facit: primo ponit artis materiam; secundo ostendit a quibus differat secundum suam materiam [...]; tertio ostendit cum quo conveniat in materia [...]. Circa materiam autem artis duo est considerare, scilicet ipsam actionem artificis quae per artem dirigitur, <et> opus quod est per artem factum. Est autem triplex operatio artis: prima quidem est considerare qualiter aliquid sit faciendum, secunda autem est operari circa materiam exteriorem, tertia autem est constituere ipsum opus.”

<sup>40</sup> *In Ethic.* 6, I. 3, 185–198 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a10–12): “Et ideo dicit [Philosophus] quod omnis ars est circa generationem, id est circa constitutionem et complementum operis, quod primo ponit tamquam finem artis, et est etiam circa artificiare, id est circa operationem artis qua disponit materiam, et est etiam circa speculari qualiter aliquid fiat per artem.”

<sup>41</sup> *In Ethic.* 6, I. 3, 185–198 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a12–14): “Ex parte vera ipsius operis duo est considerare. Quommodum primum est quod ea quae fiunt per artem humanam sunt contingentia esse et non esse, quod patet ex hoc quod quando fiunt, incipiunt esse de novo. Secundum est quod principium generationis artificialium operum est in solo faciente quasi extrinsecum ab eis, sed non in facto quasi intrinsecum.”

εἶναι), which is evident because, when they are produced, they begin to be anew; **(b)** the principle of generation of artificial works is in the producer alone as extrinsic, (originating) from him (< ἡ ἀρχὴ ἐν τῷ ποιοῦντι), but not in the (thing) produced as intrinsic (< ἀλλὰ μὴ ἐν τῷ ποιουμένῳ).

### 51.13. Art Compared to Fortune (Luck/Chance)

ARISTOTLE shows with what art should agree in matter.<sup>42</sup> And he says that fortune (*fortuna* = ἡ τύχη) and art are about the same according to some mode (< τρόπον τινὰ περὶ τὰ αὐτά ἐστίν). For either is about those (things) that are produced by the intellect; but art (is produced) with reason, (while) fortune (is produced) without reason.

And AGATHON designated this agreement, saying that art esteems (*dilexit*) fortune and fortune (esteems) art: to wit, insofar as they agree in matter.

### 51.14. Art Compared to Science

ARISTOTLE distinguishes between art and science as follows.<sup>43</sup> He says here that if, from experience, some universal should be received about generation—that is, about whatever (thing) that can be produced, e.g., about healing or agriculture, this pertains to art; science, on the other hand, is about necessary (things); and thus, if a universal should be considered about those (things) that are always in the same mode—for example, about numbers or figures—, it pertains to science.

### 51.15. Art Compared to Metaphysics, Mathematics, Physics, and Prudence

ARISTOTLE manifests what has been said, showing the difference of art (in relation) to three (habits):<sup>44</sup>

1. In respect of metaphysics and of mathematics, which are about those (things) that are or come to be from necessity, about which there is no art.<sup>45</sup>

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<sup>42</sup> *In Ethic.* 6, l. 3, 216–223 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a17–20): “ostendit [Philosophus] cum quo conveniat ars in materia. Et dicit quod fortuna et ars sunt circa eadem secundum aliquem modum; utraque enim est circa ea quae fiunt per intellectum, sed ars cum ratione, fortuna sine ratione; et hanc convenientiam Agathon designavit dicens quod ars dilexit fortunam et fortuna artem, in quantum scilicet in materia conveniunt.”

<sup>43</sup> *In Post. an.* 2, l. 20, 196–205 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100a9): “Et distinguit [Philosophus] inter artem et scienciam sicut et in VI Ethicorum, ubi dicitur quod ars est recta ratio factibilium. Et ideo hic dicit quod si <ex> experimento accipiatur aliquod uniuersale *circa generationem*, id est circa quecunque factibilia, puta circa sanationem uel agriculturam, hoc pertinet ad artem; sciencia uero, ut ibidem dicitur, est circa necessaria, et ideo, si uniuersale consideretur circa ea que semper eodem modo sunt, pertinet ad scienciam, puta circa numeros uel figuras.”

<sup>44</sup> *In Ethic.* 6, l. 3, 199–201 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a14–17): “manifestat [Philosophus] quod dictum est, ostendens differentiam artis ad tria.”

<sup>45</sup> *In Ethic.* 6, l. 3, 201–203 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a14–15): “Primo quidem ad scientias divinas et mathematicas, quae sunt de his quae ex necessitate sunt vel fiunt, de quibus non est ars.”

2. In respect of natural science, which is of those (things) that are according to nature, about which there is no art.<sup>46</sup> For those (things) that are according to nature have in themselves the principle of motion, which does not befit works of art.

3. ARISTOTLE also shows the difference of art (in relation) to prudence.<sup>47</sup> And he says that, since action and production are diverse from each other, it is necessary for art to be directive of production and not of action—of which prudence is directive.

### 51.16. Speculative and Practical Parts of a Science

As AVICENNA says, *theoretical* (*theoricum* < *speculativas* = نظرية *nazarīyah*) and *practical* (*practicum* < *activas* = عملية *‘amalīyah*) is distinguished diversely when philosophy is divided into theoretical and practical, when the arts are divided into theoretical and practical, and when medicine (is divided into theoretical and practical).<sup>48</sup>

Thus, when philosophy—or also the arts—are distinguished by theoretical and practical, their distinction must be taken from the end, such that *that which is ordered to the cognition of truth alone* (*illud quod ordinatur ad solam cognitionem veritatis*) should be said (to be) **theoretical**, while *that which is ordered to operation* (*quod ordinatur ad operationem*, should be said to be) **practical**.<sup>49</sup>

However, what is of concern when the whole (of) philosophy is divided—and the arts—is that, in the division of philosophy, a respect is had to the end of happiness, to which the whole human life is ordered.<sup>50</sup> Indeed, as AUGUSTIN says, from the words of VARRO, “man has no cause for philosophizing other than to be happy.” Whence, since a twofold felicity

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<sup>46</sup> *In Ethic.* 6, l. 3, 204–209 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a15–16): “ostendit [Philosophus] differentiam ad scientiam naturalem, quae est de his quae sunt secundum naturam, de quibus non est ars; habent enim ea quae sunt secundum naturam in se ipsis principium motus, ut dicitur in II Physicorum, quod non competit operibus artis, ut dictum est.”

<sup>47</sup> *In Ethic.* 6, l. 3, 210–214 (cf. ARISTOTLE, *Ethica Nicomachea* Z.4, 1140a16–17): “ostendit [Philosophus] differentiam artis ad prudentiam. Et dicit quod, quia actio et factio sunt altera invicem, necesse est quod ars sit factionis directiva et non actionis, cuius est directiva prudentia.”

<sup>48</sup> *In De Trin.*, q. 5 a. 1 ad 4, 251–256: “sicut dicit Avicenna in principio sue Medicine, aliter distinguitur theoricum et practicum cum philosophia diuiditur in theoricam et practicum, aliter cum artes diuiduntur in theoreticas et practicas, aliter cum medicina.” See AVICENNA, *The Metaphysics of The Healing*, 2, 1–8. Cf. AVICENNA, *Liber de philosophia prima*, 1.1, 1.7–2.21.

<sup>49</sup> *In De Trin.*, q. 5 a. 1 ad 4, 256–261: “Cum enim philosophia, uel etiam artes, per theoricum et practicum distinguuntur, oportet accipere distinctionem eorum ex fine, ut theoricum dicatur illud quod ordinatur ad solam cognitionem ueritatis, practicum uero quod ordinatur ad operationem.”

<sup>50</sup> *In De Trin.*, q. 5 a. 1 ad 4, 261–273 (cf. ARISTOTLE, *Ethica Nicomachea* K.7–8, 1177a12–1178b32): “Hoc tamen interest cum in hoc diuiditur philosophia totalis et artes, quod in diuisione philosophie habetur respectus ad finem beatitudinis, ad quem tota humana uita ordinatur: ut enim dicit Augustinus XIX De ciuitate Dei ex uerbis Varonis: «nulla est homini alia causa philosophandi nisi ut beatus sit»; unde cum duplex felicitas a philosophis ponatur, una contemplatiua et alia actiua, ut patet in X Ethicorum, secundum hoc etiam duas partes philosophie distinxerunt, moralem dicentes practicum, naturalem et rationalem dicentes theoricum. Cum uero dicuntur artium quedam esse speculatiue, quedam practice, habetur respectus ad aliquos speciales fines illarum artium, sicut si dicamus agriculturam esse artem practicum, dialecticam uero theoricum.”

is posited by the philosophers—a contemplative one, and another (one) active—, according to this, too, they have distinguished two parts of philosophy, calling the moral (part) *practical*; (and) the natural and rational (parts), *theoretical*. Yet, when some of the arts are said to be speculative (and) some (others are said to be) practical, a respect is had to some special ends of those arts: for example, if we should say that agriculture is a practical art, while dialectic (is) a theoretical (art).

On the other hand, when (the art of) medicine is divided into theoretical and practical, the division is not considered according to the end; for, in this way, the whole of medicine is contained under the practical (part) insofar as it is ordered to operation.<sup>51</sup> Instead, the aforesaid division is considered insofar as those (truths) that are treated (in medicine) are proximate or remote from operation. Thus, that part of medicine is said (to be) *practical* which teaches the mode of operating (in order) to heal: for example, that such remedies are to be employed for such abscesses. And that part (is said to be) *theoretical* which teaches the principles from which man is directed in (his) operation, but not proximately: for example, that there are three virtues; and that the genera of fevers are so many.

Whence, if some part of some active sciences should be said (to be) theoretical, it is not necessary—on account of this—for that part to be posited under speculative philosophy.<sup>52</sup>

### 51.17. Order in Science and in Practical Reason

As ARISTOTLE says, we reckon we know each (science) when we know the first causes (► 11.6; 46), the first principles (► 45), and up to the first elements (► 12.9).<sup>53</sup> Wherefrom, ARISTOTLE manifestly shows that there is an ordered process in the sciences insofar as we proceed from the first causes and principles up to the proximate causes, which are the elements that constitute the essence of a thing.

And this is reasonable, for the process of the sciences is a work of reason, of which it is proper to order.<sup>54</sup> Whence, some order is found in every work of reason, according to

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<sup>51</sup> *In De Trin.*, q. 5 a. 1 ad 4, 273–290: “Cum autem medicina diuiditur in theoreticam et practicam, non attenditur diuisio secundum finem, — sic enim tota medicina sub practica continetur, utpote ad operationem ordinata —, set attenditur predicta diuisio secundum quod ea que in medicina tractantur sunt propinqua uel remota ab operatione: illa enim pars medicine dicitur practica, que docet modum operandi ad sanationem, sicut quod talibus apostematibus sunt talia remedia adhibenda, theoretica uero illa pars que docet principia ex quibus homo dirigitur in operatione set non proxime, sicut quod uirtutes sunt tres, et quod genera februm sunt tot.”

<sup>52</sup> *In De Trin.*, q. 5 a. 1 ad 4, 290–293: “Vnde non oportet ut si alicuius actiue scientie aliqua pars dicatur theoretica, quod propter hoc illa pars sub philosophia speculatiua ponatur.”

<sup>53</sup> *In De caelo* 1, pr. 1: “Sicut Philosophus dicit in I *Physic.*, *tunc opinamur cognoscere unumquodque, cum causas cognoscimus primas, et principia prima, et usque ad elementa.* Ex quo manifeste Philosophus ostendit in scientiis esse processum ordinatum, prout proceditur a primis causis et principiis usque ad proximas causas, quae sunt elementa constituentia essentiam rei.”

<sup>54</sup> *In De caelo* 1, pr. 1: “Et hoc est rationabile: nam processus scientiarum est opus rationis, cuius proprium est ordinare; unde in omni opere rationis ordo aliquis inuenitur, secundum quem proceditur ab

which we proceed from one into another. And this is evident in practical reason—whose consideration is about those that we produce—as much as in speculative reason—whose consideration is about those that are produced from some other (principle).

### 51.18. The Order of Practical Reason

A process from the prior to the posterior is found in the consideration of practical reason according to a fourfold order:<sup>55</sup>

1. According to the order of **apprehension**, insofar as the artificer first apprehends the form of a house absolutely, and thereafter he brings it into matter.<sup>56</sup>
2. According to the order of **intention**, insofar as the artificer intends to complete (*perficere*) the whole house; and on account of this, he does whatever he operates concerning the parts of the house.<sup>57</sup>
3. According to the order of **composition**, insofar as he first shapes the stones, and thereafter joins them into one wall.<sup>58</sup>
4. According to the order of **sustentation of the artifact**, insofar as the artificer lays the foundations first, over which the other parts of the house are sustained.<sup>59</sup>

### 51.19. The Order in Speculative Reason

Likewise, too, there is found a fourfold order in the consideration of speculative reason:<sup>60</sup>

1. Insofar as we proceed **from the more common to the less common**.<sup>61</sup>

This order proportionately responds to the first order (of practical reason), which we called of *apprehension* (► 51.18, ¶1).<sup>62</sup> For universals are considered according to the absolute form, while particulars (are considered) according to the application of form to matter.

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uno in aliud. Et hoc patet tam in ratione practica, cuius consideratio est circa ea quae nos facimus, quam in ratione speculativa, cuius consideratio est circa ea quae sunt aliunde facta.”

<sup>55</sup> *In De caelo* 1, pr. 2: “Invenitur autem processus de priori ad posterius in consideratione practicae rationis secundum quadruplicem ordinem.”

<sup>56</sup> *In De caelo* 1, pr. 2: “primo quidem secundum ordinem *apprehensionis*, prout artifex primo apprehendit formam domus absolute, et postea inducit eam in materiam.”

<sup>57</sup> *In De caelo* 1, pr. 2: “secundo secundum ordinem *intentionis*, secundum quod artifex intendit totam domum perficere, et propter hoc facit quidquid operatur circa partes domus.”

<sup>58</sup> *In De caelo* 1, pr. 2: “tertio secundum ordinem *compositionis*, prout scilicet prius dolat lapides, et postea compingit eos in unum parietem.”

<sup>59</sup> *In De caelo* 1, pr. 2: “quarto secundum ordinem *sustentationis artificii*, prout artifex primo iacit fundamentum, super quod ceterae partes domus sustentantur.”

<sup>60</sup> *In De caelo* 1, pr. 2: “Similiter etiam invenitur quadruplex ordo in consideratione rationis speculativae.”

<sup>61</sup> *In De caelo* 1, pr. 2: “Primus quidem secundum quod proceditur a communibus ad minus communia.”

<sup>62</sup> *In De caelo* 1, pr. 2: “Et hic ordo respondet proportionaliter primo ordini, quem diximus apprehensionis: universalis enim considerantur secundum formam absolutam, particularia vero secundum applicationem formae ad materiam.”

## 2. Insofar as we proceed **from whole to parts**.<sup>63</sup>

This order proportionately responds to the order that we called of *intention* (► 51.18, ¶2): to wit, insofar as, in consideration, the whole is prior than the parts—not any (parts) whatsoever, but the parts that are according to matter, and which are of the individual.<sup>64</sup>

For example, *semicircle*, in whose definition *circle* is posited: for a **semicircle** is a *half part of a circle*.<sup>65</sup> And *acute angle*, in whose definition *right (angle)* is posited: for an **acute angle** is an (*angle*) *lesser than a right (angle)*. However, it is accidental for the circle and for the right (angle) to be so divided; whence, such (parts) are not parts of the species; for such parts (of the species) are prior in consideration than the whole, and are posited in the definition of the whole, as *flesh* and *bones* (are posited) in the definition of *man*.

## 3. Insofar as we proceed **from the simple to the composite**, inasmuch as composite (things) are known by simple (things) as by their principles.<sup>66</sup>

This order is compared to the third order, which we called of *composition* (► 51.18, ¶3).<sup>67</sup>

## 4. Insofar as **main parts** must be considered **priorly**.<sup>68</sup>

For example, the heart and the liver (must be considered before) the arteries and blood.<sup>69</sup>

This is proportionate to the practical order insofar as a foundation is priorly laid (► 51.18, ¶4).<sup>70</sup>

### 51.20. Prudence

ARISTOTLE concludes the definition of prudence from what has been said.<sup>71</sup> And he says that, since prudence is not a science, which is a demonstrative habit about necessary

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<sup>63</sup> *In De caelo* 1, pr. 2: “Secundus ordo est secundum quod proceditur a toto ad partes.”

<sup>64</sup> *In De caelo* 1, pr. 2: “Et hic ordo proportionaliter respondet ordini quem diximus *intentionis*, prout scilicet totum est prius in consideratione quam partes, non qualescumque, sed partes quae sunt secundum materiam et quae sunt individui.”

<sup>65</sup> *In De caelo* 1, pr. 2: “sicut semicirculus, in cuius definitione ponitur circulus (est enim semicirculus *media pars circuli*), et acutus angulus, in cuius definitione ponitur rectus (est enim acutus angulus *minor recto*). Accidit autem circulo et recto angulo sic dividi: unde huiusmodi non sunt partes speciei. Huiusmodi enim partes sunt priores in consideratione quam totum, et ponuntur in definitione totius, sicut carnes et ossa in definitione hominis, ut dicitur in VII *Metaphys.*”

<sup>66</sup> *In De caelo* 1, pr. 2: “Tertius autem ordo est secundum quod proceditur a simplicibus ad composita, in quantum composita cognoscuntur per simplicia, sicut per sua principia.”

<sup>67</sup> *In De caelo* 1, pr. 2: “Et hic ordo comparatur tertio ordini, quem diximus *compositionis*.”

<sup>68</sup> *In De caelo* 1, pr. 2: “Quartus autem ordo est secundum quod principales partes necesse est prius considerare.”

<sup>69</sup> *In De caelo* 1, pr. 2: “sicut cor et hepar quam arterias et sanguinem.”

<sup>70</sup> *In De caelo* 1, pr. 2: “Et hic proportionatur practico ordini, secundum quod fundamentum prius iacitur.”

<sup>71</sup> *In Ethic.* 6, l. 4, 72–79 (cf. ARISTOTLE, *Ethica Nicomachea* Z.5, 1140b4–6): “concludit [Philosophus] ex praemissis diffinitionem prudentiae. Et dicit quod, ex quo prudentia non est scientia, quae est habitus demonstrativus circa necessaria, et non est ars, quae est habitus cum ratione factivus, relinquitur quod

(things); and it is not an art, which is a productive habit with reason; it remains that **prudence** (*prudentia* = φρόνησις) should be *an active habit with true reason (habitus cum vera ratione activus* < ἔξιν ἀληθῆ μετὰ λόγου πρακτικῆν): not indeed about producible (things), which are outside of man, but *about good and bad (deeds) of man itself (circa bona et mala ipsius hominis* < περὶ τὰ ἀνθρώπων ἀγαθὰ καὶ κακά).

(We do not pursue this virtue further, since it is not relevant to our present intention.)

### 51.21. Understanding

Having determined (the truth) concerning the intellectual virtues that perfect the intellect about those (known things) that are from principles (i.e., the virtues of science, art, and prudence), ARISTOTLE determines (the truth) concerning the intellectual virtues that perfect the intellect about the principles themselves.<sup>72</sup> And first, he determines (the truth) concerning (the habit of) understanding, which is about the principles of demonstration. He therefore shows, first, that, apart from the other intellectual virtues, there must be an understanding about the principles of demonstration.

Thus, science is some judgment (*existimatio* = ὑπόληψις) about universals and about those (things) that are of necessity.<sup>73</sup> For particular and contingent (things) cannot attain the certitude of science because they are only known insofar as they fall under sense. And there is a third (requirement) that is to be considered about science: that there must be some principles of those (conclusions) that are demonstrated and of science itself, which is about demonstrable (things). This is evident because science is (produced) with demonstrative reason that proceeds from principles into conclusions.

Therefore, since this is so concerning science (i.e., that it is about universal, necessary things, and that it requires principles), no science, art, or prudence of scientific principles can exist.<sup>74</sup>

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*prudentia sit habitus cum vera ratione activus, non quidem circa factibilia, quae sunt extra hominem, sed circa bona et mala ipsius hominis.*"

<sup>72</sup> *In Ethic.* 6, I. 5, 1–12 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1140b31–1141a8): "Postquam Philosophus determinavit de virtutibus intellectualibus quae perficiunt intellectum circa ea quae sunt ex principiis, hic determinat de virtutibus intellectualibus perficientibus intellectum circa ipsa principia. Et primo quidem determinat de intellectu, qui est circa principia demonstrationis [...]. Ostendit ergo primo quod praeter alias virtutes intellectuales necesse est esse intellectum circa principia demonstrationis."

<sup>73</sup> *In Ethic.* 6, I. 5, 12–22 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1140b31–33): "Est enim scientia quaedam existimatio de universalibus et de his quae sunt ex necessitate (particularia enim et contingentia non possunt attingere ad certitudinem scientiae, quia non sunt nota nisi secundum quod cadunt sub sensu), est autem tertio considerandum circa scientiam quod eorum quae demonstrantur <et> ipsius scientiae, quae est circa demonstrabilia, necesse est esse quaedam principia (quod ex hoc patet quod scientia est cum ratione demonstrativa procedente ex principiis in conclusiones)."

<sup>74</sup> *In Ethic.* 6, I. 5, 22–25 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1140b33–35): "quia ergo ita se habet circa scientiam, necesse est quod principiorum scientiae neque sit scientia neque ars neque prudentia, de quibus iam dictum est."

That there should not be science of them (i.e., of the first principles of demonstration) is evident because that about which science is, is demonstrable; and the first principles of demonstrations are not demonstrable: otherwise we would proceed infinitely (►55.13).<sup>75</sup>

That there should not be art or prudence of those principles is evident because these two virtues (i.e., art and prudence) are about those (things) that can be otherwise; which cannot be said of the principles of demonstration, for they must be more certain than the conclusions, which are (produced) of necessity.<sup>76</sup>

Wherefrom, it is also evident that there can be no wisdom—which is another intellectual virtue (►51.24)—of those principles.<sup>77</sup> For it behooves the wise to have demonstration about some things: to wit, of the first causes of things—and principles are indemonstrable, as has been said.

Therefore, if we say about the intellectual virtues that falsehood does not underlie them, whether they should be about necessary (things), which cannot be otherwise, or about contingent (things); and that there are these habits, i.e., science, prudence, art, wisdom, and understanding; and since none of these three—prudence, wisdom, and science—can be about indemonstrable principles; it remains that there should be understanding of those principles (<λείπεται νοῦν εἶναι τῶν ἀρχῶν).<sup>78</sup>

Here, **understanding** (*intellectus* = νοῦν) is not taken for an intellective potency, but for some habit whereby man knows indemonstrable principles from the virtue of the light of the agent intellect.<sup>79</sup> And the name is fitting enough: for such principles are immediately

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<sup>75</sup> In *Ethic.* 6, l. 5, 25–29 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1140b35): “Quod autem horum non sit scientia, patet, quia id de quo est scientia est demonstrabile, prima autem demonstrationum principia non sunt demonstrabilia, alioquin procederetur in infinitum.”

<sup>76</sup> In *Ethic.* 6, l. 5, 29–34 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1140b35–1141a1): “Quod autem non sit horum principiorum ars vel prudentia, patet per hoc quod hae duae virtutes sunt circa ea quae contingit aliter se habere, quod non potest dici de principiis demonstrationis; oportet enim ea esse certiora conclusionibus, quae sunt ex necessitate.”

<sup>77</sup> In *Ethic.* 6, l. 5, 34–40 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1141a1–3): “Ex hoc etiam patet quod horum principiorum non potest esse sapientia, quae est alia virtus intellectualis de qua post dicetur; quia ad sapientem pertinet quod habeat demonstrationem de aliquibus rebus, id est de primis causis entium, principia autem sunt indemonstrabilia, ut dictum est.”

<sup>78</sup> In *Ethic.* 6, l. 5, 40–50 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1141a1–8): “Si ergo virtutes intellectuales quibus ita verum dicimus quod eis numquam subest mendacium, sive circa necessaria quae non contingit aliter se habere sive circa contingentia, sunt isti habitus, scientia, prudentia sub qua comprehendit artem quae est etiam circa contingentia, et iterum sapientia et intellectus, cum nullum trium quae sunt prudentia, sapientia et scientia possit esse circa principia indemonstrabilia, ut ex praedictis patet, relinquitur quod horum principiorum sit intellectus.”

<sup>79</sup> In *Ethic.* 6, l. 5, 50–57 (cf. ARISTOTLE, *Ethica Nicomachea* Z.6, 1141a7–8): “Accipitur autem hic intellectus non pro ipsa potentia intellectiva, sed pro habitu quodam quo homo ex virtute luminis intellectus agentis naturaliter cognoscit principia indemonstrabilia. Et satis congruit nomen: huiusmodi enim principia statim cognoscuntur cognitis terminis, cognito enim quid est totum et quid pars statim scitur quod omne totum est maius sua parte.”



(*statim*) known (when) the terms (are) known. Thus, (when it is) known what a whole is and what a part (is), it is immediately known that every whole is greater than its part.

And it is called *understanding* (*intellectus*) because it reads (or gathers, brings together, extracts) within (*intus legit*), intuiting the essence of the thing.<sup>80</sup> Whence, ARISTOTLE says that the proper object of understanding is the essence (*quod quid est* < τὸ τί ἦν εἶναι). And thus, the cognition of the principles that come to be known immediately (when) the essence about the terms (is) known, is fittingly called *understanding*.

## 51.22. Understanding, the Habit of First Principles, as a Principle of Science

ARISTOTLE solves the question of whether there should be science or some other habit of first principles.<sup>81</sup> About this, he accepts that the cognition of principles pertains to understanding, to which it belongs to know the universal: for he says that the universal is the principle of science.<sup>82</sup> And concerning understanding, there are two genera of habits that are related equally to (that which is) true: for, clearly, they are always true, while others sometimes receive falsehood, as is evident of opinion and reasoning, which can be of the true and of the false; and there are indeed some habits of the erroneous too, related to the false.

On the other hand, since principles are maximally true, it is manifest that they pertain neither to the habits that are always false nor to the habits that sometimes receive falsity, but alone to the habits that are always of the true.<sup>83</sup> And such are science (*sciencia* = ἐπιστήμη) and understanding (*intellectus* = νοῦς). In the (*Nicomachean*) *Ethics* (which we have been using in this chapter) he adds a third one: namely, wisdom. However, since wisdom—as he says there—comprehends in itself science and understanding—for it is some science and the summit (*caput*) of the sciences—he omits it here.

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<sup>80</sup> *In Ethic.* 6, l. 5, 58–63 (cf. ARISTOTLE, *De anima* Γ.4, 429b10–22): “dicitur autem intellectus ex eo quod intus legit intuendo essentiam rei, unde et in III De anima dicitur quod obiectum proprium intellectus est quod quid est; et sic convenienter cognitio principiorum quae statim innotescunt cognito quod quid est circa terminos intellectus nominatur.”

<sup>81</sup> *In Post. an.* 2, l. 20, 289–291 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b5–17): “soluit [Philosophus] primas duas questiones, utrum scilicet primorum principiorum sit sciencia, uel aliquis alius habitus.”

<sup>82</sup> *In Post. an.* 2, l. 20, 292–301 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b5–7): “Circa quod ex premissis accipit [Philosophus] quod cognitio principiorum pertinet ad intellectum, cuius est cognoscere uniuersale: nam uniuersale dicit esse principium sciencie; circa intellectum autem sunt duo genera habituum habentium se aliquater ad uerum: quidam enim *sunt semper ueri*, alii uero interdum *recipiunt falsitatem*, ut patet de opinione et ratiocinatione, que potest esse et ueri et falsi; sunt etiam et quidam habitus erronei, se habentes ad falsum.”

<sup>83</sup> *In Post. an.* 2, l. 20, 301–311 (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b7–8): “quia uero principia sunt maxime uera, manifestum est quod non pertinent ad habitus qui semper sunt falsi neque etiam ad habitus qui interdum recipiunt falsitatem, set solum ad habitus qui sunt semper ueri; huiusmodi autem sunt *sciencia et intellectus* (additur autem in VI Ethicorum tertium, scilicet sapiencia; set quia sapiencia, ut ibidem dicitur, comprehendit in se scienciam et intellectum, est enim quedam sciencia et caput scienciarum, hic eam pretermittit).”

No genus of cognition other than understanding is more certain than science.<sup>84</sup> It is manifest that the principles of demonstrations are more known than the conclusions demonstrated; and there cannot be science of the principles themselves, since every science is produced from some reasoning: to wit, (from) demonstrative (reasoning), whose principles are those of which we are speaking. Therefore, since nothing can be truer than science and understanding—for wisdom is understood (to be included) in these—, it follows, from a consideration of the aforesaid, that understanding is of principles.

ARISTOTLE proves this also by another reason: to wit, because, of necessity, a demonstration is not a demonstration of a principle; otherwise, we would proceed infinitely in demonstrations.<sup>85</sup> Therefore, since demonstration causes science, it follows that nor could science be a principle of science—to wit, such that the principles of science would be known through science. Therefore, if we have no other genus of cognition apart from science that should always be true, it remains that understanding will be the principle of science: to wit, because the principles of the sciences are known through understanding, such that understanding, which is the principle of science, is cognoscitive of the principle from which science proceeds, while science is a whole that is related to the whole matter—about which science is—as understanding (is related) to the principle of science.

### 51.23. Induction of First Universal Principles from Posterior Things

Since we receive the cognition of universals from singulars, ARISTOTLE therefore concludes that, manifestly, it is necessary to know the first universal principles through induction.<sup>86</sup> By way of induction, sense produces the universal within the soul insofar as all the singulars are considered.

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<sup>84</sup> *In Post. an. 2, l. 20, 311–322* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b8–13): “Hac ergo pretermittitur, *nullum aliud genus cognitionis quam intellectus est certius scientia*; manifestum est autem quod *principia* demonstrationum sunt notiora conclusionibus demonstratis, ut in I habitum est; non autem potest esse scientia ipsorum principiorum, quia omnis scientia fit ex aliqua ratiocinatione, scilicet demonstratiua, cuius sunt principia illa de quibus loquimur; quia igitur *nichil* potest esse *uerius* quam scientia et intellectus (nam sapientia in hiis intelligitur), consequens est ex consideratione premissorum quod *principiorum* proprie sit *intellectus*.”

<sup>85</sup> *In Post. an. 2, l. 20, 323–340* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b13–17): “Probat [Philosophus] hoc etiam alia ratione, *quia* scilicet *demonstratio non* est ex necessitate *demonstrationis principium*, alioquin procederetur in demonstrationibus in infinitum, quod in I inprobatum est; cum igitur demonstratio scientiam causet, sequitur quod *neque scientia* possit esse principium scientie, ita scilicet quod principia scientiarum per scientiam cognoscantur. *Si igitur nullum aliud genus* cognitionis *preter scientiam habemus* quod semper sit *uerum*, relinquitur quod *intellectus erit principium scientie*, quia scilicet per intellectum cognoscuntur principia scientiarum, ita scilicet quod *hoc*, scilicet intellectus, qui est *principium* scientie, est cognoscitius *principii* ex quo procedit scientia, *hoc autem*, scilicet scientia, est *omne*, id est totum, quod *similiter se habet ad omnem rem*, id est ad totam materiam de qua est scientia, sicut scilicet intellectus ad principium scientie.”

<sup>86</sup> *In Post. an. 2, l. 20, 282–287* (cf. ARISTOTLE, *Analytica Posteriora* B.19, 100b3–5): “Quia igitur uniuersalium cognitionem accipimus ex singularibus, concludit [Philosophus] *manifestum* esse quod necesse est *prima* uniuersalia principia cognoscere per inductionem: *sic* enim, scilicet per uiam inductionis, *sensus facit uniuersale intus* in anima, in quantum considerantur omnia singularia.”

First (principles) cannot be made known by some prior (principles); instead, they are made known by posterior (things; e.g., the point is known by the line), as causes (are made known) by (their) proper effects.<sup>87</sup>

In the process of cognition, we find that someone comes into the cognition of principles through (the cognition of) those-that-are-from-the-principles (*per principiata*).<sup>88</sup> However, (when) these (principles are) had, he knows them more (than he knows) those-that-are-from-the-principles; nor does he need those-that-are-from-the-principles for the cognition of the principles that he already knows by themselves; nor does he lose the cognition of those-that-are-from-the-principles, though: rather, that cognition is perfected by the principles.

#### 51.24. Wisdom

ARISTOTLE shows what **wisdom** (*sapientia* = σοφία) should be:<sup>89</sup>

1. Wisdom **particularly** taken.<sup>90</sup> Among the arts, we assign the name of *wisdom* to the most certain arts: to wit, those that know the first causes in some genus of artifact direct other arts that are about the same genus, as the architectonic art directs those who operate manually (► 50.11, ¶1).

According to this, we say (for example) that Phidias was a wise sculptor, and Polycleitus a wise statuary.<sup>91</sup>

Here, we say that **wisdom** is nothing other than *the virtue of art* (*virtus artis* = ἀρετὴ τέχνης).<sup>92</sup> That is, the ultimate and most perfect in art: to wit, when someone attains that which is ultimate and most perfect in an art; for this is the virtue of each thing (► 22.2).

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<sup>87</sup> *In Ethic.* 1, l. 1, 153–155: “Prima autem non possunt notificari per aliqua priora, sed notificantur per posteriora, sicut causae per proprios effectus.”

<sup>88</sup> *In Sent.* 1, d. 1 q. 4 a. 2 ad 1: “invenimus in processu cognitionis, quod in cognitionem principiorum venit quis per principiata, quibus tamen habitis, magis ipsa cognoscit quam principiata; nec indiget principiatis ad cognitionem principiorum quae jam per se cognoscit; neque tamen principiatorum cognitionem amittit; immo illa cognitio per principia perficitur.”

<sup>89</sup> *In Ethic.* 6, l. 5, 64–70 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a9–17): “determinat [Philosophus] de sapientia. Et primo ostendit quid sit sapientia [...]. Circa primum duo facit: primo ostendit quid dicatur sapientia particulariter sumpta et secundo ex hoc quid sit sapientia simpliciter.”

<sup>90</sup> *In Ethic.* 6, l. 5, 71–75 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a9–10): “Dicit ergo [Philosophus] primo quod inter artes nos assignamus nomen sapientiae certissimis artibus, quae scilicet cognoscentes primas causas in genere alicuius artificii dirigunt alias artes quae sunt circa idem genus, sicut architectonica ars dirigit manualiter operantes.”

<sup>91</sup> *In Ethic.* 6, l. 5, 76–79 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a10–11): “et secundum hunc modum dicimus Phydiam fuisse sapientem latomum, id est lapidum incisorem, et Polyclitum sapientem statuificem, id est factorem statuarum.”

<sup>92</sup> *In Ethic.* 6, l. 5, 79–84 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a11–12): “Ubi nihil aliud dicimus sapientiam quam virtutem artis, id est ultimum et perfectissimum in arte, quando scilicet aliquis attingit ad id quod est ultimum et perfectissimum in arte: hoc enim est virtus uniuscuiusque rei, ut dicitur in I De caelo et mundo.”

2. Wisdom **simply** said.<sup>93</sup> Thus, just as we consider some to be wise in some art, so, too, we consider some to be wise totally (*totaliter* = ὅλως): that is, in respect of the whole genus of beings, and not according to some part (*non secundum <aliquam> partem* = οὐ κατὰ μέρος), even if they should not be wise about some other art.

For example, HOMER says (in his *Margites*), about someone, that the gods appointed him (to be) neither digger nor ploughman, nor wise in some art (< τὸν δ' οὔτ' ἄρ σκαπτῆρα θεοὶ θέσαν οὔτ' ἀροτῆρα οὔτ' ἄλλως τι σοφόν), but wise simply.<sup>94</sup>

Whence, it is manifest that, just like he who is wise in some art is most certain in that art, so, (too), that (virtue) that is wisdom simply is the most certain (*certissima* = ἀκριβεστάτη) among all the sciences: to wit, insofar as it reaches the first principles of beings, which are most known according to themselves, even though some of them—namely, the immaterial (principles)—should be less known in respect to us.<sup>95</sup> And there are also (some) most universal principles (that are) more known in respect of us: for example, those that pertain to being insofar as it is being (*ens in quantum est ens*), the cognition of which pertains to wisdom simply said, as ARISTOTLE says (► 59).

ARISTOTLE infers a corollary from what has been said.<sup>96</sup> Since wisdom is most certain, and the principles of demonstrations are more certain than the conclusions, he says that the wise must not only know those (propositions) that are concluded from the principles of demonstrations, concerning those (subjects) about which it considers, but (he must) also say (what is) true about these principles. Not indeed that he should demonstrate them, but insofar as it pertains to the wise to make the common (principles) known: for example, *whole* and *part*, *equal* and *unequal*, and other such (common principles), which, (as soon

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<sup>93</sup> *In Ethic.* 6, l. 5, 85–92 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a12–14): “ostendit [Philosophus] quid sit sapientia simpliciter dicta. Et dicit quod, sicut existimamus quosdam <esse> sapientes in aliquo artificio, ita etiam existimamus quosdam esse sapientes totaliter, id est respectu totius generis entium et non secundum aliquam partem, etiam si non sint sapientes circa aliquod aliud artificium.”

<sup>94</sup> *In Ethic.* 6, l. 5, 92–95 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a14–15): “sicut Homerus dicit de quodam quod dii eum posuerant non fossorem neque aratorem neque aliquod aliud particulare artificium sapientem, sed sapientem simpliciter.”

<sup>95</sup> *In Ethic.* 6, l. 5, 95–106 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a16–17): “Unde manifestum est quod, sicut ille qui est sapiens in aliquo artificio est certissimus in illa arte, ita illa quae est sapientia simpliciter est certissima inter omnes scientias, in quantum scilicet attingit ad prima principia entium, quae secundum se sunt notissima, quamvis aliqua eorum, scilicet immaterialia, sint minus nota quoad nos; universalissima autem principia sunt etiam quoad nos magis nota, sicut ea quae pertinent ad ens in quantum est ens, quorum cognitio pertinet ad sapientiam simpliciter dictam, ut patet in IV Metaphysicae.”

<sup>96</sup> *In Ethic.* 6, l. 5, 107–120 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a17–19): “infert [Philosophus] quoddam correlarium ex dictis. Et dicit quod, quia sapientia est certissima, principia autem demonstrationum sunt certiora conclusionibus, oportet quod sapiens non solum sciat ea quae ex principiis demonstrationum concluduntur circa ea de quibus considerat, sed etiam quod verum dicat circa ipsa principia, non quidem quod demonstret ea, sed in quantum ad sapientem pertinet notificare communia, puta totum et partem, aequale et inaequale et alia huiusmodi, quibus cognitio statim principia demonstrationum innotescunt; unde et ad huiusmodi sapientem pertinet disputare contra negantes principia, ut patet in IV Metaphysicae.”

they are) known, the principles of demonstration are immediately (*statim*) known. Whence, too, it pertains to such a wise (person) to dispute against those who negate the principles.

Therefore, ARISTOTLE thus finally concludes that wisdom, insofar as it says (what is) true, is an understanding (*intellectus* = νοῦς); and insofar as it knows those (propositions) that are concluded from principles it is a science (*scientia* = ἐπιστήμη).<sup>97</sup> However, (wisdom) is distinguished from science commonly taken (*communiter sumpta*) on account of the eminence that it has among the other science: for it is some virtue of all the sciences.

Wherefrom, ARISTOTLE says that wisdom is not just any science, but the science of the worthiest things (*honorabilissimarum* = τιμιωτάτων), as though it should have the *ratio* of head (*caput* = κεφαλή) among all the sciences.<sup>98</sup> For just as the motions and operations of all the other members are directed by the senses that are in the head, so, (too), wisdom directs all the other sciences, while all others suppose their principles from it.

### 51.25. Wisdom Is about Causes

ARISTOTLE shows what he intends from what has been had above: that wisdom should be about causes.<sup>99</sup> Whence, he says that this is (that) for the sake of which the aforesaid reasoning has been made: because that science which is called *wisdom* seems to be about first causes and about first principles. Which is evident from what has been said (► 51.24, ¶2). For anyone is wiser the more he approaches the cause of cognition; which is evident from what has been said, since the experienced is wiser than he who only has sense without experience. And the artificer is wiser than the experienced in anything. And among artificers, the architect is wiser than the manufacturer. And among the arts and

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<sup>97</sup> *In Ethic.* 6, l. 5, 120–126 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a17–19): “Sic ergo ulterius concludit [Philosophus] quod sapientia, in quantum dicit verum circa principia, est intellectus, in quantum autem scit ea quae ex principiis concluduntur, est scientia. Distinguitur tamen a scientia communiter sumpta propter eminentiam quam habet inter alias scientias; est enim virtus quaedam omnium scientiarum.”

<sup>98</sup> *In Ethic.* 6, l. 6, 1–22 (cf. ARISTOTLE, *Ethica Nicomachea* Z.7, 1141a19–20): “Postquam Philosophus determinavit de singulis virtutibus intellectualibus, hic ostendit quae sit praecipua inter eas. Et primo ostendit quae sit praecipua simplici; [...] primo ostendit quod sapientia sit simpliciter praecipua inter omnes [...]. Dicit ergo primo quod sapientia non est qualiscumque scientia, sed scientia rerum honorabilissimarum, id est divinarum, ac si ipsa habeat rationem capitis inter omnes scientias. Sicut enim per sensus qui sunt in capite diriguntur motus et operationes omnium aliorum membrorum, ita sapientia dirigit omnes alias scientias, dum ab ea omnes aliae sua principia supponunt.”

<sup>99</sup> *In Metaph.* 1, l. 1, §35 (cf. ARISTOTLE, *Metaphysica* A.1, 981b27–982a3): “Ostendit [Philosophus] ex praehabitis principale propositum; quod scilicet sapientia sit circa causas. Unde dicit quod hoc est cuius gratia «nunc sermonem facimus,» id est ratiocinationem praedictam: quia scientia illa quae denominatur sapientia, videtur esse circa primas causas, et circa prima principia. Quod quidem patet ex praehabitis. Unusquisque enim tanto sapientior est, quanto magis accedit ad causae cognitionem: quod ex praehabitis patet; quia expertus est sapientior eo qui solum habet sensum sine experimento. Et artifex est sapientior experto quocumque. Et inter artifices architector est sapientior manu artifice. Et inter artes etiam et scientias, speculativae sunt magis scientiae quam activae. Et haec omnia ex praedictis patent. Unde relinquitur quod illa scientia, quae simpliciter est sapientia, est circa causas. Et est similis modus arguendi, sicut si diceremus: illud quod est magis calidum, est magis igneum: unde quod simpliciter est ignis, est calidum simpliciter.”

sciences, too, the speculative are more sciences than the active. And all these (things) are evident from the aforesaid. Whence, it remains that the science that is wisdom simply is about causes. And the mode of arguing is alike if we should say: that which is hotter is more igneous; whence, that which is fire simply is hot simply.

## 52. The Order of Rational Philosophy

*We now turn our attention to principles in the art—and science—of reasoning.*

### 52.1. Logic as the *Art of Reason* and the *Rational Science*

As ARISTOTLE says, the genus of men (< τὸ... τῶν ἀνθρώπων γένος; ► 14.1, footnote 2) lives by art and by reasonings (< καὶ τέχνη καὶ λογισμοῖς [ζῆ]).<sup>1</sup> In which (statement) he seems to touch upon something that is proper to man, in which man differs from the other animals. For the other animals are driven towards their acts (*ad suos actus aguntur*) by some natural instinct, while man is directed in its actions by the judgment of reason. Wherefrom, diverse arts are devoted to carrying out human actions more easily and orderly, for **art** seems to be nothing other than *a certain ordering of reason (certa ordinatio rationis) by which mode, through determinate means, the due end of a human action should be attained (quomodo per determinata media ad debitum finem actus humani perveniant)*.

However, reason can direct not only the lower parts of actions; rather, it is also directive of its (own) acts.<sup>2</sup> Indeed, this is proper of the intellective part: that it should reflect upon itself; for the intellect understands itself. And likewise, reason can reason about its (own) act. Therefore, if the art of building or of carpentry, whereby man can exert such acts more easily and orderly, was discovered because reason reasons about the act of the hand, for the same reason, there is some needed *art that should be directive of the act itself of reason*: to wit, (an art) by which man, in the act itself of reason, should proceed orderly (and) more easily. And this art is **logic (logica)**: that is, *the rational science (rationalis scientia)*, which is rational not only because it is according to reason, which is common to all the arts, but also because it is about *the act itself of reason as about its proper matter*. Hence, it seems to be *the art of arts (ars artium)*, because it directs us in the act of reason, from which all arts proceed.

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<sup>1</sup> *In Post. an. 1, l. 1, 1–12* (cf. ARISTOTLE, *Metaphysica* A.1, 980b27–28): “Sicut dicit Aristotiles in principio Metaphisice, hominum genus arte et rationibus uiuit. In quo uidetur Philosophus tangere quoddam hominis proprium quo a ceteris animalibus differt: alia enim animalia quodam naturali instinctu ad suos actus aguntur, homo autem rationis iudicio in suis actionibus dirigitur; et inde est quod ad actus humanos faciliter et ordinate perficiendos diuerse artes deseruiunt: nichil enim aliud ars esse uidetur quam certa ordinatio rationis, quomodo per determinata media ad debitum finem actus humani perueniatur.”

<sup>2</sup> *In Post. an. 1, l. 1, 12–31*: “Ratio autem non solum dirigere potest inferiorum partium actus, set etiam actus sui directiua est: hoc enim est proprium intellectiue partis ut in seipsam reflectatur, nam intellectus intelligit seipsum et similiter ratio de suo actu ratiocinari potest. Si igitur ex hoc quod ratio de actu manus ratiocinatur adiuuenta est ars edificatoria uel fabrilis per quas homo faciliter et ordinate huiusmodi actus exercere potest, eadem ratione ars quedam necessaria est que sit directiua ipsius actus rationis, per quam scilicet homo in ipso actu rationis ordinate, faciliter et sine errore procedat; et hec ars est logica, id est rationalis, scientia. Que non solum rationalis est ex hoc quod est secundum rationem, quod est omnibus artibus commune, set etiam ex hoc quod est circa ipsum actum rationis sicut circa propriam materiam; et ideo uidetur esse ars artium, quia in actu rationis nos dirigit, a quo omnes artes procedunt.”  
Note that *ars artium* is a Semitism, akin to שִׁיר הַשִּׁירִים.

## 52.2. The Parts of Logic Follow upon the Acts of Reason

(From what has just been said), therefore, the parts of logic must be taken according to the diversity of the acts of reason.<sup>3</sup> Now, as ARISTOTLE says, the operation of the intellect is twofold, to which a third—the operation of reasoning—is added. Hence, there are three acts of reason, of which the first two (¶1, ¶2) are of reason insofar as it is some intellect; and since **logic** is said (to be the) *rational science*, it is necessary for its consideration to revolve (*versetur*) about those (things) that pertain to these three operations of reason:

1. One action or operation of the intellect is the **understanding of indivisibles** (► 19.1, ¶1; 38.13), or of uncomplex (things), by which the intellect apprehends the essence of each thing in itself: (i.e.), conceives *what* the thing is.<sup>4</sup> This operation is called by some (authors) the *information of the intellect* (*informatio intellectus*), or *imagination through the intellect* (*imaginatio per intellectum*).

To this operation of reason is ordered the doctrine that ARISTOTLE consigns in his book *Categories*, where he determines (the truth) about those (things) that pertain to the first operation of the intellect: that is, of those (essences) that are conceived in a simple understanding.<sup>5</sup>

2. The second is the operation of the composing and dividing intellect: the **composition or division** of (essences) understood (► 19.1, ¶2), in which there already is the true and the false.<sup>6</sup>

To this act of reason is devoted the doctrine that ARISTOTLE consigns in his book *On Interpretation*, where he determines (the truth) about those (things) that pertain to the second operation: to wit, about affirmative and negative enunciation.<sup>7</sup>

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<sup>3</sup> *In Post. an.* 1, l. 1, 32–35: “Oportet igitur logice partes accipere secundum diuersitatem actuum rationis. Sunt autem rationis tres actus. Quorum primi duo sunt rationis secundum quod est intellectus quidam.” *In Peri.* 1, l. 1, 1–2 (cf. ARISTOTLE, *De anima* Γ.6, 430a26–28): “Sicut dicit Philosophus in III De anima, duplex est operatio intellectus.” *Ibid.*, 6–7: “additur autem et tertia operatio ratiocinandi.” *Ibid.* 15–17: “Cum autem logica dicatur rationalis sciencia, necesse est quod eius consideratio uersetur circa ea que pertinent ad tres predictas operationes rationis.”

<sup>4</sup> *In Post. an.* 1, l. 1, 35–40: “una enim actio intellectus est intelligencia indiuisibilium, siue incomplexorum, secundum quam concipit quid est res, et hec operatio a quibusdam dicitur informatio intellectus siue ymaginatio per intellectum.” *In Peri.* 1, l. 1, 2–5: “una quidem que dicitur indiuisibilium intelligencia, per quam scilicet intellectus apprehendit essenciam uniuscuiusque rei in se ipsa.”

<sup>5</sup> *In Peri.* 1, l. 1, 18–21: “de hiis igitur que pertinent ad primam operationem intellectus, id est de hiis que simplici intellectui concipiuntur, determinat Aristotiles in libro Predicamentorum.” *In Post. an.* 1, l. 1, 40–42: “et ad hanc operationem rationis ordinatur doctrina quam tradit Aristotiles in libro Predicamentorum.”

<sup>6</sup> *In Post. an.* 1, l. 1, 42–44: “secunda uero operatio intellectus est compositio uel diuisio intellectuum, in qua est iam uerum uel falsum.” *In Peri.* 1, l. 1, 5–6: “alia est autem operatio intellectus componentis et diuidentis.”

<sup>7</sup> *In Post. an.* 1, l. 1, 44–46: “et huic rationis actui deseruit doctrina quam tradit Aristotiles in libro Peryermeneias.” *In Peri.* 1, l. 1, 21–24: “de hiis uero que pertinent ad secundam operationem, scilicet de enunciatione affirmatiua et negatiua, determinat Philosophus in libro Peryermeneias.”



3. The third act of reason, on the other hand, is according to that which is proper of reason (►21.1, ¶2b): to wit, to traverse through (*discurrere*) from one (known thing or *ratio*) into another, such that (reason) should arrive at the inquiry (and) cognition of the unknown through that which is known.<sup>8</sup>

To this act are devoted the remaining books of logic.<sup>9</sup> ARISTOTLE determines (the truth) about those (things) that pertain to the third operation in the book *Prior (Analytics)* and in the consequent (books), in which he treats about the syllogism simply and about the diverse species of syllogisms and argumentations in which reason proceeds from one (known thing or *ratio*) to another.

### 52.3. Order of the Operations of Reason among Themselves

Of these operations (just discussed), the first is ordered to the second, since there can only be composition and division of simple apprehensions.<sup>10</sup>

It is to be considered, however, that the composition of a proposition is not a work of nature, but a work of the intellect and of reason (i.e., insofar as propositions are composed through the motion of reasoning).<sup>11</sup> Whence, ARISTOTLE says that it is the intellect that makes each of the intelligible (essences) one (< τὸ... ἐν ποιοῦν ἕκαστον, τοῦτο ὁ νοῦς) by composing propositions from intelligible (essences). And since true and false consist in composition (►28.12), the true and the false is not in things (*in rebus*), but in the mind (*in mente*).

Thus, judging is not a proper (act) of reason.<sup>12</sup> Whereby, (reason) can be distinguished from the intellect, since the intellect, too, judges *this* to be true, (and) *that* (to be) false. Wherefrom, on the other hand, judgment is attributed to reason and comprehension to the intellect, for judgment is produced in us, as in common (*ut communiter*), by resolution

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<sup>8</sup> *In Post. an.* 1, l. 1, 46–49: “Tercius uero actus rationis est secundum id quod est proprium rationis, scilicet discurrere ab uno in aliud, ut per id quod est notum deueniat in cognitionem ignoti.” *In Peri.* 1, l. 1, 6–8: “tercia operatio ratiocinandi, secundum quod ratio procedit a notis ad inquisitionem ignotorum.”

<sup>9</sup> *In Post. an.* 1, l. 1, 49–50: “et huic actui deseruiunt reliqui libri logice.” *In Peri.* 1, l. 1, 24–29: “de hiis uero que pertinent ad terciam operationem determinat Aristotiles in libro Priorum et in consequentibus, in quibus agitur de sillogismo simpliciter et de diuersis sillogismorum et argumentationum speciebus, quibus ratio de uno procedit ad aliud.”

<sup>10</sup> *In Peri.* 1, l. 1, 8–11: “Harum autem operationum prima ordinatur ad secundam, quia non potest esse compositio et diuisio nisi simplicium apprehensorum.”

<sup>11</sup> *In De anima* 3, c. 5, 81–89 (cf. ARISTOTLE, *De anima* Γ.6, 430b5–6): “Considerandum autem est quod compositio propositionis non est opus nature, set opus rationis et intellectus, et ideo subiungit [Philosophus] quod illud quod facit <unum> unumquodque intelligibilium, componendo ex intelligibilibus propositiones, hoc est intellectus. Et quia uerum et falsum consistit in compositione, ideo dicitur in VI Methaphisice quod uerum et falsum non est in rebus, set in mente.”

<sup>12</sup> *De veritate*, q. 15 a. 1 ad 4: “iudicare non est proprium rationis, per quod ab intellectu distingui possit, quia etiam intellectus iudicat hoc esse uerum, illud falsum. Sed pro tanto rationi iudicium attribuitur, et comprehensio intelligentiae, quia iudicium in nobis ut communiter fit per resolutionem in principia, simplex autem ueritatis comprehensio per intellectum.”

(carried out by reason) into principles; and simple comprehension of truth (is produced in us) by the intellect.

Hence, the second (operation) is ordered to the third: to wit, because it is necessary to proceed from something (that is) known (to be) true—about which the intellect should (give its) assent—to the reception of a certitude about some (hitherto) unknown (conclusions).<sup>13</sup>

Therefore, according to the aforesaid order of three operations, the book *Categories* is ordered to the book *On Interpretation*, which is ordered to the book *Prior (Analytics)* and to the consequent (books).<sup>14</sup>

#### 52.4. Rational Philosophy and the Parts of Logic

It should be considered that the acts of reason are like the acts of nature in respect of something; whence, too, art imitates nature as much as it can.<sup>15</sup> Thus, a threefold diversity is found in the acts of nature; and these three (diverse cases) are also found in the acts of reason, (the first two of which; ¶1, ¶2) pertain to **rational philosophy**, for it befits reason to lead from (knowledge of) one (thing or *ratio*) into (knowledge of) another:

1. In some (cases), nature acts of necessity in such a way that it cannot fail.<sup>16</sup> Likewise, there is some process of reason that leads to necessity, in which it is not possible for there to be a defect in truth. And by such a process of reason, the certitude of science is acquired.

Thus, the part of logic that is devoted to the first process is said (to be) **judicative** (*pars iudicativa*), since judgement is (decided) with the certitude of science.<sup>17</sup> And since certain judgement about effects can only be had *by resolving into first principles*, this part is called **analytical** (*analytica*): that is, **resolutive** (*resolutoria*).

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<sup>13</sup> *In Peri.* 1, l. 1, 11–14: “secunda uero ordinatur ad terciam, quia uidelicet oportet quod ex aliquo uero cognito cui intellectus assenciat procedatur ad certitudinem accipiendam de aliquibus ignotis.”

<sup>14</sup> *In Peri.* 1, l. 1, 29–32: “et ideo secundum predictum ordinem trium operationum, liber Predicamentorum ad librum Peryermeneias ordinatur, qui ordinatur ad librum Priorum et consequentes.”

<sup>15</sup> *In Post. an.* 1, l. 1, 51–55: “Attendendum est autem quod actus rationis similes sunt quantum ad aliquid actibus nature; unde et ars imitatur naturam in quantum potest. In actibus autem nature inuenitur triplex diuersitas.” *Ibid.*, 64–65: “Et hec etiam tria inueniuntur in actibus rationis.” *Ibid.*, 118–120: “Omnia autem hec ad rationalem philosophiam pertinent: inducere enim ex uno in aliud rationis est.” This latter text is placed right before the third process of reason, i.e., sophistic. We therefore assume that St. Thomas does not include sophistic as a proper part of rational philosophy because it always fails to attain its end.

<sup>16</sup> *In Post. an.* 1, l. 1, 55–56: “in quibusdam enim natura ex necessitate agit, ita quod non potest deficere.” *Ibid.*, 65–69: “est enim aliquis rationis processus necessitatem inducens, in quo non est possibile esse ueritatis defectum, et per huiusmodi rationis processum scientie certitudo acquiritur.”

<sup>17</sup> *In Post. an.* 1, l. 1, 75–80: “Pars autem logice que primo deseruit processui pars iudicatiua dicitur, eo quod iudicium est cum certitudine scientie; et, quia iudicium certum de effectibus haberi non potest nisi resoluendo in prima principia, pars hec analetica uocatur, id est resolutoria.” Cf. LIDDELL and SCOTT, *A Greek-English Lexicon*, entries for ἀναλυτικός and ἀναλύω.

Hence, **analytic** is a *demonstrative science that is apt to inquire by resolving to principles known by themselves*.<sup>18</sup> And it is a part of logic, which also contains dialectic under itself.

The certitude of judgement that is had through resolution is either **(a)** from the **form** itself of the syllogism alone; and to this is ordered (ARISTOTLE'S) book *Prior Analytics*, which is about the **sylogism simply**; or **(b)** with this (i.e., from a proper **form** of syllogism and) from **matter**, for propositions (that are) necessary and by-themselves are taken (in science); and to this is ordered (ARISTOTLE'S) book *Posterior Analytics*, which is about the **demonstrative syllogism** (► 53; 52.14).<sup>19</sup>

**2 & 3.** In some (acts of nature), on the other hand, nature operates as more frequently, even though sometimes it could fail from (its) proper act.<sup>20</sup> Whence, in these (cases), there necessarily is a twofold act:

**2.** (There is) one (act of nature) that is as in many (cases): for example, when a perfect animal is generated from the seed.<sup>21</sup> Thus, there is another process of reason in which (something) true is concluded as in many (cases), but not having the necessity (whereby the certitude of science is acquired).

Thus, another part of logic, which is said (to be) **inventive** (*inventiva*, or **inquisitive**, *inquisitiva*), is devoted to the second process of reason, for discovery (*inventio*) is not always (had) with certitude.<sup>22</sup> Whence, judgment (i.e., judicative analysis or resolution, ¶1) is required for there to be certitude concerning those (things) that are discovered.

And just as some degree is considered in those (agents) that act as in most (cases) in natural things—for the stronger the virtue of nature is, the more rarely does it fail from its effect—,<sup>23</sup> so, too, in the process of reason that is not with certitude in every mode (*cum*

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<sup>18</sup> *In Post. an.* 1, l. 35, 17–20: “considerandum est quod analetica, id est demonstratiua scientia que resoluendo ad principia per se nota iudicatiua est, pars logice est, que etiam dyalecticam sub se continet.”

<sup>19</sup> *In Post. an.* 1, l. 1, 80–87: “Certitudo autem iudicii que per resolutionem habetur est uel ex ipsa forma sillogismi tantum, et ad hoc ordinatur liber Priorum analeticorum, qui est de sillogismo simpliciter, uel etiam cum hoc ex materia, quia sumuntur propositiones per se et necessarie, et ad hoc ordinatur liber Posteriorum analeticorum, qui est de sillogismo demonstratiuo.”

<sup>20</sup> *In Post. an.* 1, l. 1, 56–59: “in quibusdam uero natura ut frequentius operatur, licet quandoque et possit deficere a proprio actu, unde in hiis necesse est esse duplicem actum.”

<sup>21</sup> *In Post. an.* 1, l. 1, 59–61: “unum qui sit ut in pluribus, sicut cum ex semine generatur animal perfectum.” Ibid., 69–71: “est autem alius rationis processus in quo ut in pluribus uerum concluditur, non tamen necessitatem habens.”

<sup>22</sup> *In Post. an.* 1, l. 1, 88–92: “Secundo autem processui rationis deseruit alia pars logice que dicitur inuentiua: nam inuentio non semper cum certitudine est, unde de hiis que inuenta sunt iudicium requiritur ad hoc quod certitudo habeatur.”

<sup>23</sup> *In Post. an.* 1, l. 1, 92–98: “Sicut autem in rebus naturalibus in hiis que ut in pluribus agunt gradus quidam attenditur, quia quanto uirtus nature est fortior, tanto rarius deficit a suo effectu, ita et in processu rationis qui non est cum omnimoda certitudine gradus aliquis inuenitur, secundum quod magis et minus ad perfectam certitudinem acceditur.”

*omnimoda certitudine*), some degree is found according to which a more or less perfect certitude is attained. Thus:

**(a)** When reason totally leans into one part of a contradiction—albeit with fearfulness of the other (part)—, even though there should not indeed come to be science through such a process, there nonetheless comes to be **faith** or **opinion** (► 52.11) on account of the probability of the propositions from which it proceeds (► 52.13).<sup>24</sup> And to this (end) is ordered (the part of logic called) **topic** or **dialectic**, for the dialectical syllogism is (had) from more probable (principles). ARISTOTLE treats of this in the book *Topics*.

**(b)** Sometimes, on the other hand, there does not come to be faith or opinion, but some **suspicion**, since (reason) does not totally lean towards one part of a contradiction, although it is inclined more into *this* than into *that*.<sup>25</sup> And **rhetoric** is ordered to this (end).

**(c)** Sometimes, on the other hand, by mere vagary (*sola existimatio*), (reason) leans into some part of a contradiction on account of some representation, in the way in which there comes to be in man a repugnance of some food if it should be represented to him under the likeness of something repugnant.<sup>26</sup> And **poetic** is ordered to this (end), for it behooves the poet to induce towards something virtuous through some appropriate representation.

**3.** Another (act exists) when nature does achieve (*deficit*) what befits it, as when some monster is generated from the seed on account of the corruption of some principle.<sup>27</sup> Thus, there is a third process of reason in which reason fails from the true (i.e., falls short of truth) on account of a defect in some principle that was to be observed in reasoning.

To the third process of reason is devoted the part of logic that is called **sophistic**, of which ARISTOTLE treats in the book *Sophistical Refutations*.<sup>28</sup>

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<sup>24</sup> *In Post. an.* 1, l. 1, 99–106: “Per huiusmodi enim processum quandoque quidem, etsi non fiat scientia, fit tamen fides uel opinio, propter probabilitatem propositionum ex quibus proceditur, quia ratio totaliter declinat in unam partem contradictionis, licet cum formidine alterius; et ad hoc ordinatur topica siue dyaletica, nam sillogismus dyaleticus ex probabilibus est, de quo agit Aristotiles in libro Topicorum.”

<sup>25</sup> *In Post. an.* 1, l. 1, 107–111: “Quandoque uero non fit complete fides uel opinio, set suspicio quedam, quia non totaliter declinat ad unam partem contradictionis, licet magis inclinetur in hanc quam in illam; et ad hoc ordinatur rethorica.”

<sup>26</sup> *In Post. an.* 1, l. 1, 111–118: “Quandoque uero sola existimatio declinat in aliquam partem contradictionis propter aliquam representationem, ad modum quo fit homini abhominatio alicuius cibi si representetur ei sub similitudine alicuius abhominabilis; et ad hoc ordinatur poetica, nam poete est inducere ad aliquod uirtuosum per aliquam decentem representationem.”

<sup>27</sup> *In Post. an.* 1, l. 1, 61–44: “alium uero quando natura deficit ab eo quod est sibi conueniens, sicut cum ex semine generatur aliquod monstrum, propter corruptionem alicuius principii.” At this point, St. Thomas offers an example of the latter two cases: in most instances, a perfect animal is generated from the seed, but sometimes nature fails and something monstrous is generated. Likewise, modern scientists talk about “errors” in DNA replication as being causes of mutation. *Ibid.*, 71–74: “tercius uero rationis processus est in quo ratio a uero deficit, propter alicuius principii defectum quod in ratiocinando erat obseruandum.”

<sup>28</sup> *In Post. an.* 1, l. 1, 121–123: “Tercio autem processui rationis deseruit pars logice que dicitur sophistica, de qua agit Aristotiles in libro Elenchorum.”

## 52.5. Discursive Cognition

*Discourse* (*discursus*) designates (*nominat*) some motion.<sup>29</sup> Now, every motion is from one prior (i.e., the principle) into another posterior (i.e., the terminus). Whence, discursive cognition is considered insofar as, in cognition, we arrive from something priorly known into another (thing) posteriorly known, which was priorly unknown. For the same reason, however, there is no discursive cognition if, contemplated in one (thing, *in uno inspecto*), another (thing) should be simultaneously contemplated (*inspiciatur*), as the image of a thing and the thing (itself) is simultaneously contemplated in a mirror (*in speculo*).

## 52.6. Modes of the Reasonable Process

The process whereby someone proceeds in the sciences is said (to be) **reasonable** (*rationabilis*) in three modes (as detailed below).<sup>30</sup> In the first two (§1, §2), the process is denominated *rational* from the rational science, for logic—which is said (to be the) *rational science*—is used in these modes.

### 1. From the part of the principles from which we proceed.<sup>31</sup>

For example, when someone proceeds to prove something from the works of reason (or of *ratio*, *ex operibus rationis*), such as are *genus*, *species*, *opposite*, and such intentions that logicians consider.<sup>32</sup>

In this mode, some process is said to be reasonable when someone uses in some science the propositions that are consigned (*traduntur*) in logic: to wit, according as we use logic in the other sciences insofar as it **teaches** (*prout est docens*).<sup>33</sup>

This mode of proceeding cannot properly be suited (*competere*) to natural science or to some (other) particular science, in which an error would occur if we should not proceed from proper (principles).<sup>34</sup> However, this may properly and suitably come to be in logic

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<sup>29</sup> *STh* I, q. 58 a. 3 ad 1: “discursus quendam motum nominat. Omnis autem motus est de uno priori in aliud posterius. Unde discursiva cognitio attenditur secundum quod ex aliquo prius noto devenitur in cognitionem alterius posterius noti, quod prius erat ignotum. Si autem in uno inspecto simul aliud inspiciatur, sicut in speculo inspicitur simul imago rei et res; non est propter hoc cognitio discursiva.”

<sup>30</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 120–121: “processus aliquis quo proceditur in scientiis dicitur rationabilis tripliciter.” *Ibid.*, 155–159: “Et his duobus modis [sc., primo et secundo] denominatur processus rationalis a scientia rationali: his enim modis usitatur logica, que rationalis scientia dicitur, in scientiis demonstratiuis, ut dicit Commentator in I Phisicorum.”

<sup>31</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 121–122: “Vno modo ex parte principiorum ex quibus proceditur.”

<sup>32</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 122–126: “ut cum aliquis procedit ad aliquid probandum ex operibus rationis, cuiusmodi sunt genus et species et oppositum, et huiusmodi intentiones quas logici considerant.”

<sup>33</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 126–130: “et sic dicitur aliquis processus esse rationabilis quando aliquis utitur in aliqua scientia propositionibus que traduntur in logica, prout scilicet utimur logica prout est docens in aliis scientiis.”

<sup>34</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 130–136: “Set hic modus procedendi non potest proprie competere alicui particulari scientie, in quibus peccatum accidit nisi ex propriis procedatur: contingit autem hoc

and in metaphysics, since either science is common and—in some mode—about the same subject (►52.6, ¶1; 52.7; 52.8).

Indeed, a judgment must be taken from the proper principles of the thing, while an inquiry is produced also by common (principles).<sup>35</sup> Whence, even in speculative (things), dialectic, which is inquisitive, proceeds from common (principles), while a demonstrative (science), which is judicative, proceeds from proper (principles; ►52.4, ¶2a; ¶1b).

However, logical reasons are those that are taken **(a)** from some common principles; or **(b)** from some more probable and non-necessary (principles; ►52.13).<sup>36</sup> According to this, to proceed *reasonably* is to proceed through the logical way (►52.14). (Therefore, metaphysics is said to proceed reasonably in this mode only insofar as it proceeds from common principles, and not insofar as it proceeds from certain, necessary principles, as will be made evident in the ensuing sections; ►52.7; 52.8.)

## 2. From (the part of) the terminus at which the process stops.<sup>37</sup>

The last terminus that an inquiry of reason must attain is the understanding of principles, in which (process) we judge by resolving (i.e., by analysis; ►52.4, ¶1).<sup>38</sup> And when this indeed comes to be, the process or proof is not said (to be) *reasonable*, but *demonstrative*.

Again, the judgment of each thing is produced through its proper principles.<sup>39</sup> However, an inquiry is not yet through proper principles because, (if) these (should be) had, (then) there would be not inquiry: rather, the thing would already be found; for distinction is not

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proprie et conuenienter fieri in logica et metaphisica, eo quod utraque scientia communis est et circa idem subiectum quodammodo." Ibid., ad 1, 200–204: "ratio illa procedit de processu qui dicitur rationabilis secundum primum modum: sic enim processus rationabilis est proprius rationali scientie et diuine, non autem naturali."

<sup>35</sup> *STh* II-II, q. 51 a. 4 ad 2: "iudicium debet sumi ex propriis principiis rei, inquisitio autem fit etiam per communia. Unde etiam in speculativis dialectica, quae est inquisitiva, procedit ex communibus, demonstrativa autem, quae est iudicativa, procedit ex propriis."

<sup>36</sup> *In De caelo* 1, l. 15, n. 1. (cf. ARISTOTLE, *De caelo* A.7, 275b12–18): "Postquam Philosophus ostendit universaliter non esse corpus infinitum rationibus physicis, idest quae sumuntur ex propriis scientiae naturalis, hic ostendit idem rationibus logicis, idest quae sumuntur ex aliquibus communioribus principiis, vel ex aliquibus probabilibus et non necessariis. Et hoc est quod dicit: *est*, idest contingit, *conari* ad propositum ostendendum *rationabilius*, idest magis per viam logicam, *sic*, idest secundum rationes sequentes. Unde alia littera planior est quae sic habet: *magis autem logice est argumentari et sic*."

<sup>37</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 137–138: "Alio modo dicitur processus rationalis ex termino in quo sistitur procedendo."

<sup>38</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 138–143: "ultimus enim terminus ad quem rationis inquisitio perducere debet, est intellectus principiorum, in que resoluendo iudicamus; quod quidem quando fit, non dicitur processus uel probatio rationabilis, set demonstratiua."

<sup>39</sup> *STh* I-II, q. 57 a. 6 ad 3: "iudicium de unaquaque re fit per propria principia eius. Inquisitio autem nondum est per propria principia, quia his habitis, non esset opus inquisitione, sed iam res esset inventa. [...] distinctio non est in communibus principiis, sed in propriis. Unde et in speculativis una est dialectica inquisitiva de omnibus, scientiae autem demonstrativae, quae sunt iudicativae, sunt diversae de diversis."

(found) in common principles, but in proper (principles). Whence, in speculative (things), there is one dialectic that inquires about all (subjects), while the demonstrative sciences, which are judicative, are diverse (sciences) about diverse (subjects).

Sometimes, however, the inquiry of reason cannot be conducted up to the aforesaid terminus; instead, it stops in the inquiry itself: to wit, when a way to one and to the other (parts of a contradiction) still remains for the inquirer.<sup>40</sup> This happens when we proceed through probable *ratios* (or reasons, *per probabiles rationes*), which are naturally apt to produce opinion or faith—not science. And in this mode, the reasonable process is divided against the demonstrative (process).

In this mode, we can proceed reasonably in any science, such that a way towards the necessary proofs should be furnished from probable (principles).<sup>41</sup> This is another mode in which we use logic in the demonstrative sciences: not indeed as it teaches (*ut est docens*), but insofar as it is **useful** (*ut est utens*, i.e., instrumentally applied; ►46.16).

The use of something conveys (*importat*) the application of that thing to some operation.<sup>42</sup> Whence, the operation to which we apply something is also said (to be) its *use*. For example, (the act of) equitation (*equitare*, i.e., the operation of riding on horseback) is the use of a horse (*usus equi*); and smiting (*percutere*) is the use of a staff (*usus baculi*).

**3. From (the part of) the rational potency:** to wit, insofar as in proceeding we follow the mode of the rational soul (i.e., of the mind) in knowing.<sup>43</sup> In this mode, the reasonable process is proper of natural science (►63.3).

### 52.7. Philosopher, Dialectician, and Sophist Compared

Dialecticians and sophists assume the same guise (*induunt figuram*) as the philosopher, as having some likeness with him.<sup>44</sup> ARISTOTLE shows in what they should have a likeness and in what they should differ.

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<sup>40</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 143–150: “Quandoque autem inquisitio rationis non potest usque ad predictum terminum perducī, set sistitur in ipsa inquisitione, quando scilicet inquirenti adhuc manet uia ad utrumlibet, et hoc contingit quando per probabiles rationes proceditur, que nate sunt facere opinionem uel fidem, non scientiam; et sic rationabilis processus diuiditur contra demonstratiuum.”

<sup>41</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 150–155: “Et hoc modo rationabiliter procedi potest in qualibet scientia, ut ex probabilibus paretur uia ad necessarias probationes; et hic est alius modus quo logica utimur in scientiis demonstratiuis, non quidem ut est docens, set ut est utens.”

<sup>42</sup> *STh I-II*, q. 16 a. 1 co.: “usus rei alicuius importat applicationem rei illius ad aliquam operationem, unde et operatio ad quam applicamus rem aliquam, dicitur usus eius; sicut equitare est usus equi, et percutere est usus baculi.”

<sup>43</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 160–163: “Tertio modo dicitur aliquis processus rationalis a potentia rationali, in quantum scilicet in procedendo sequimur proprium modum anime rationalis in cognoscendo; et sic rationabilis processus est proprius scientie naturalis.”

<sup>44</sup> *In Metaph.* 4, l. 4, §572 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b17–18): “Dialectici et sophistae induunt figuram eamdē philosopho, quasi similitudinem cum eo habentes: sed dialectici et sophistae disputant

They agree in that it behooves the dialectician to consider all (things).<sup>45</sup> And this would not be possible unless (the dialectician) should consider all (things) insofar as they agree in something one: for the subject of one science is one, and the matter of one art is one, about which it operates. Since all things agree only in being (*in ente*), it is therefore manifest that the matter of dialectic is being (*ens*) and those (properties) that belong to being—which the philosopher, too, considers.

Likewise, the sophistic (art), too, has some likeness to philosophy; for the sophistic (art) appears (to be) a wisdom that does not exist.<sup>46</sup> And that which has the appearance of something must have some likeness with that thing.

Hence, the philosopher, the dialectician, and the sophist must consider the same (namely, the same common principles, αὐτὰ οἰκέϊα, and the same subject genus, περὶ... τὸ αὐτὸ γένος).<sup>47</sup>

However, they differ from each other.<sup>48</sup> Thus, the philosopher (differs) from the dialectician according to power (*secundum potestatem* < τῆς δυνάμεως), for the consideration of the philosopher is of greater virtue than the consideration of the dialectician. Indeed, the philosopher proceeds demonstratively concerning the aforesaid common (principles, i.e., being and whatever belongs to being). And hence, it behooves him to have science concerning the aforesaid; and he is capable of knowing (*cognoscitivus*) them through certitude, for certain cognition or science is an effect of demonstration.

The dialectician, on the other hand, proceeds concerning all the aforesaid from probable (principles); whence, he does not produce (*non facit*) science, but some opinion.<sup>49</sup> This is

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de praedictis: ergo et philosophi est ea considerare. Ad manifestationem autem primae ostendit [Philosophus] quomodo dialectica et sophistica cum philosophia habeant similitudinem, et in quo differunt ab ea."

<sup>45</sup> *In Metaph.* 4, l. 4, §573 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b19–22): "Conveniunt autem in hoc, quod dialectici est considerare de omnibus. Hoc autem esse non posset, nisi consideraret omnia secundum quod in aliquo uno conveniunt: quia unius scientiae unum subiectum est, et unius artis una est materia, circa quam operatur. Cum igitur omnes res non conveniant nisi in ente, manifestum est quod dialecticae materia est ens, et ea quae sunt entis, de quibus etiam philosophus considerat."

<sup>46</sup> *In Metaph.* 4, l. 4, §573 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b18–19): "Similiter etiam sophistica habet quamdam similitudinem philosophiae. Nam sophistica est «visa» sive apparens sapientia, non existens. Quod autem habet apparentiam alicuius rei, oportet quod aliquam similitudinem cum illa habeat."

<sup>47</sup> *In Metaph.* 4, l. 4, §573 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b21–23): "Et ideo oportet quod eadem consideret philosophus, dialecticus et sophista."

<sup>48</sup> *In Metaph.* 4, l. 4, §574 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b23–26): "Differunt autem abinvicem. Philosophus quidem a dialectico secundum potestatem. Nam maioris virtutis est consideratio philosophi quam consideratio dialectici. Philosophus enim de praedictis communibus procedit demonstrative. Et ideo eius est habere scientiam de praedictis, et est cognoscitivus eorum per certitudinem. Nam certa cognitio sive scientia est effectus demonstrationis."

<sup>49</sup> *In Metaph.* 4, l. 4, §574: "Dialecticus autem circa omnia praedicta procedit ex probabilibus; unde non facit scientiam, sed quamdam opinionem. Et hoc ideo est, quia ens est duplex: ens scilicet rationis et ens naturae. Ens autem rationis dicitur proprie de illis intentionibus, quas ratio adinvenit in rebus



so because *being* is twofold (► 30.5): to wit, being of *ratio* and being of nature (► 30.5). “Being of *ratio*” is properly said of those intentions that reason discovers in the things considered: for example, the intention of *genus*, of *species*, and (others) like (them), which are certainly not found in the nature of things but follow upon the consideration of reason. The subject of logic is properly of such a mode: to wit, a being of *ratio*. However, such intelligible intentions are likened (*aequiparantur*) to the beings of nature because all beings of nature fall under the consideration of reason. Hence, the subject of logic extends to all (those subjects) of which the being of nature is predicated.

Whence, ARISTOTLE concludes that the subject of logic is likened to the subject of philosophy, which is the being of nature.<sup>50</sup> The philosopher, therefore, proceeds from his principles to prove those (truths) that are to be considered concerning such common accidents of being. The dialectician, on the other hand, proceeds to consider them from the intentions of reason, which are extraneous to the nature of the things. And hence, ARISTOTLE says that dialectic is tentative (*tentativa* = πειραστική, i.e., fitted for trying), for to proceed from extraneous principles is proper of trying (*tentare*).

The philosopher differs from the sophist in the choice of life (*prohaeresi* < τοῦ βίου τῆ προαιρέσει, *idest electione vel voluptate, idest desiderio vitae*).<sup>51</sup> For the philosopher and the sophist order their lives and actions to diverse (things): the philosopher, indeed, to knowing the truth, while the sophist (orders his life) to appear to know (the truth), even if he should not know.

## 52.8. In What Mode the Dialectic and Sophistic Arts are Sciences

The question may be raised as to whether philosophy should consider the accidents by themselves of *being* that follow upon all beings: to wit, *same* and *diverse*, *alike* and *unlike*, *contrariety*, *prior* and *posterior*, and all other such (properties).<sup>52</sup> Indeed, dialecticians, who

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consideratis; sicut intentio generis, speciei et similium, quae quidem non inveniuntur in rerum natura, sed considerationem rationis consequuntur. Et huiusmodi, scilicet ens rationis, est proprie subiectum logicae. Huiusmodi autem intentiones intelligibiles, entibus naturae aequiparantur, eo quod omnia entia naturae sub consideratione rationis cadunt. Et ideo subiectum logicae ad omnia se extendit, de quibus ens naturae praedicatur.”

<sup>50</sup> *In Metaph.* 4, l. 4, §574 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b22–25): “Unde concludit [Philosophus], quod subiectum logicae aequiparatur subiecto philosophiae, quod est ens naturae. Philosophus igitur ex principiis ipsius procedit ad probandum ea quae sunt consideranda circa huiusmodi communia accidentia entis. Dialecticus autem procedit ad ea consideranda ex intentionibus rationis, quae sunt extranea a natura rerum. Et ideo dicitur, quod dialectica est tentativa, quia tentare proprium est ex principiis extraneis procedere.”

<sup>51</sup> *In Metaph.* 4, l. 4, §575 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1004b24–26): “A sophista vero differt philosophus «prohaeresi,» idest electione vel voluptate, idest desiderio vitae. Ad aliud enim ordinat vitam suam et actiones philosophus et sophista. Philosophus quidem ad sciendum veritatem; sophista vero ad hoc quod videatur scire quamvis nesciat.”

<sup>52</sup> *In Metaph.* 3, l. 2, §353 (cf. ARISTOTLE, *Metaphysica* B.1, 995b18–27): “Secunda quaestio est, utrum haec scientia [sc., philosophia] consideret de quibusdam quae videntur esse per se accidentia entis, et

treat of all things, treat of these (properties) from probable rather than necessary (principles). Whence, from one part, it would seem that, since (these properties) are common (to all beings), they should pertain to the first philosopher. However, from the other part, since dialecticians—to whom it behooves to proceed from probable (principles)—consider these (properties of being as such), it would seem that they should not pertain to the consideration of the (first) philosopher—to whom it belongs to demonstrate.

Thus, even though it is said that philosophy is a science, while the dialectic and the sophistic (arts are said) not (to be sciences), however, that the dialectic and the sophistic (arts) should be sciences is not removed by this.<sup>53</sup>

Indeed, dialectic can be considered insofar as it teaches (*secundum quod est docens*; ► 52.6, ¶1) and insofar as it is useful (*secundum quod est utens*; ► 52.6, ¶2).<sup>54</sup>

Insofar as it teaches, it has the consideration of these intentions (i.e., *same* and *diverse*, *alike* and *unlike*, etc.), instituting the mode in which, through them, (someone) can proceed in each of the sciences to (reach) conclusions (that are) shown (to be) probably (true).<sup>55</sup> It does this demonstratively; and, according to this, it is a science.

(Dialectic) is useful, on the other hand, insofar as—in the discovered mode—it is used (in order) to conclude something with probability in each of the sciences; and in this way, it recedes from the mode of science.<sup>56</sup>

Likewise, (the same) is to be said concerning the sophistic (art).<sup>57</sup> For insofar as it teaches, it consigns through necessary and demonstrative reasons the mode of arguing apparently. Insofar as it is used, on the other hand, it departs from the process of true argumentation.

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consequi omnia entia: scilicet de eodem et diverso, simili et dissimili, et de contrarietate, et de priori et posteriori, et omnibus aliis huiusmodi, de quibus dialectici tractant, qui habent considerationem de omnibus. Sed tamen de huiusmodi perscrutantur, non ex necessariis, sed ex probabilibus. Ex una enim parte videtur quod cum sint communia, pertineant ad philosophum primum. Ex alia parte videtur quod ex quo dialectici ista considerant, quorum est ex probabilibus procedere, quod non pertineat ad considerationem ipsius philosophi cuius est demonstrare.”

<sup>53</sup> *In Metaph.* 4, l. 4, §576: “Licet autem dicatur, quod philosophia est scientia, non autem dialectica et sophistica, non tamen per hoc removetur quin dialectica et sophistica sint scientiae.”

<sup>54</sup> *In Metaph.* 4, l. 4, §576: “Dialectica enim potest considerari secundum quod est docens, et secundum quod est utens.”

<sup>55</sup> *In Metaph.* 4, l. 4, §576: “Secundum quidem quod est docens, habet considerationem de istis intentionibus, instituens modum, quo per eas procedi possit ad conclusiones in singulis scientiis probabiliter ostendendas; et hoc demonstrative facit, et secundum hoc est scientia.”

<sup>56</sup> *In Metaph.* 4, l. 4, §576: “Utens vero est secundum quod modo adinvento utitur ad concludendum aliquid probabiliter in singulis scientiis; et sic recedit a modo scientiae.”

<sup>57</sup> *In Metaph.* 4, l. 4, §576: “Et similiter dicendum est de sophistica; quia prout est docens tradit per necessarias et demonstrativas rationes modum arguendi apparenter. Secundum vero quod est utens, deficit a processu verae argumentationis.”

Yet, in the part of logic that is said (to be) *demonstrative*, only doctrine (i.e., teaching) pertains to logic, while use (pertains) to philosophy and to the other particular sciences that are about the things of nature.<sup>58</sup> This is so because the use of the demonstrative (art) consists in using the principles of the things of which the demonstration comes to be; which (principles) pertain to real sciences, not using logical intentions.

Thus, it is apparent that some parts of logic have the science itself, the doctrine, and the use—such as tentative dialectic and the sophistic (art)—, while some (parts of logic have) the doctrine and not the use, such as the demonstrative (art).<sup>59</sup>

### 52.9. Science Compared to Other Cognitive Habits

As already discussed (► 51), ARISTOTLE posits five (habits) that are always related to (that which is) true: namely, *art*, *science*, *prudence*, *wisdom*, and *understanding*, adding two (habits) that are related to the true and the false (► 51.6): namely, *suspicion* and *opinion*.<sup>60</sup>

The first five (i.e., art, prudence, wisdom, science, and understanding) are related only to (that which is) true because they convey (*important*) a rectitude of reason (i.e., right reason).<sup>61</sup> Yet, three of them—wisdom, science, and understanding—convey a rectitude of cognition about necessary (things): **science**, about *conclusions*; **understanding**, about *principles*; **wisdom**, about the *highest causes*.

On the other hand, the other two—namely, art and prudence—convey a rectitude of reason about contingent (things): **prudence**, about *doable* (*deeds*, *agibilia*), that is, about acts that are in whoever operates, such as to love, to hate, to choose, and such, which pertain to moral acts, of which prudence is directive; **art** imports a rectitude of reason about *producible* (artifacts, *factibilia*), that is, about those that are made in an external matter, as to cut, and other such works, in which art directs.<sup>62</sup> Here (in *Posterior Analytics*)

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<sup>58</sup> *In Metaph.* 4, l. 4, §577: “Sed in parte logicae quae dicitur demonstrativa, solum doctrina pertinet ad logicam, usus vero ad philosophiam et ad alias particulares scientias quae sunt de rebus naturae. Et hoc ideo, quia usus demonstrativae consistit in utendo principiis rerum, de quibus fit demonstratio, quae ad scientias reales pertinet, non utendo intentionibus logicis.”

<sup>59</sup> *In Metaph.* 4, l. 4, §577: “Et sic apparet, quod quaedam partes logicae habent ipsam scientiam et doctrinam et usum, sicut dialectica tentativa et sophistica; quaedam autem doctrinam et non usum, sicut demonstrativa.”

<sup>60</sup> *In Post. an.* 1, l. 44, 283–288: “sciendum est quod Aristoteles in VI Ethicorum ponit quinque que semper se habent ad verum, scilicet artem, scientiam, prudentiam, sapientiam et intellectum, subiungens duo que se habent ad verum et falsum, scilicet suspicionem et opinionem.”

<sup>61</sup> *In Post. an.* 1, l. 44, 288–295: “Prima autem quinque se habent solum ad verum, quia inportant rectitudinem rationis; set tria eorum, scilicet sapientia, scientia et intellectus, inportant rectitudinem cognitionis circa necessaria, scientia quidem circa conclusiones, intellectus autem circa principia, sapientia autem circa causas altissimas, que sunt cause diuine.”

<sup>62</sup> *In Post. an.* 1, l. 44, 295–306 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 89b7): “alia uero duo, scilicet ars et prudentia, inportant rectitudinem rationis circa contingencia, prudentia quidem circa agibilia, id est circa actus qui sunt in operante, puta amare, odire, eligere et huiusmodi, que pertinent ad actus morales, quorum est directiua prudentia, ars autem importat rectitudinem rationis circa factibilia, id est

ARISTOTLE adds **reason** (*ratio* = *δianoía*), which pertains to the *deduction of principles into conclusions*.

Thus, ARISTOTLE compares *science* to the habits that are related to (that which is) true.<sup>63</sup> And first to those habits that are about conclusions. He, therefore, says first that (the habits) that pertain to cognition—other than opinion—should in some mode be distinguished into *reason* (*δianoía*), *understanding*, *science*, *art*, *prudence*, and *wisdom*. And in respect of something, they pertain to the consideration of first philosophy or of natural philosophy. However, in respect of something, (they pertain) to the consideration of moral philosophy, which is called *ethics*. Indeed, to determine (the truth) about wisdom—what it should be and in what mode it is had—and about science, understanding, and art, pertains in some way to first philosophy.<sup>64</sup> Prudence, on the other hand, pertains to the consideration of moral (philosophy). Intellect and reason, insofar as they signify some potencies, pertain to the consideration of the natural (philosopher).

Moreover, as ARISTOTLE says, science differs from opinion; and likewise, the scientifically knowable, which is the object of science, differs from the opinable, which is the object of opinion (as discussed next).<sup>65</sup>

## 52.10. Universality and Necessity Pertain to Science

ARISTOTLE posits two (properties) that pertain to science (►51.7):<sup>66</sup>

1. That it be **universal**, for science is not about singulars that fall under sense (►51.8; 51.5, ¶1).<sup>67</sup>

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circa ea que aguntur in exteriorem materiam, sicut est secare et alia huiusmodi opera, in quibus dirigit ars. Hic autem addit rationem, que pertinet ad deductionem principiorum in conclusiones.”

<sup>63</sup> *In Post. an.* 1, l. 44, 269–282 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 89b7–9): “comparat [Philosophus] scienciam ad alios habitus qui se habent ad uerum. Et primo, ad illos habitus qui sunt de conclusionibus; [...]. Dicit ergo primo quod *reliqua* ab opinione ad cognitionem pertinentia, *quomodo* distinguantur *in rationem et intellectum et scienciam et artem et prudentiam et sapienciam*, quantum ad aliquid pertinent ad considerationem philosophie prime, uel etiam philosophie naturalis, quantum autem ad aliquid ad considerationem philosophie moralis, que dicitur *ethica*.”

<sup>64</sup> *In Post. an.* 1, l. 44, 306–313: “Determinare <autem> de sapiencia quid sit et quomodo se habeat, et de sciencia et intellectu et arte, pertinet aliqualiter ad philosophiam primam; prudentia uero pertinet ad considerationem moralem; intellectus et ratio, secundum quod significant potentias quasdam, pertinent ad considerationem naturalem, ut patet in libro De anima.”

<sup>65</sup> *In Post. an.* 1, l. 44, 4–24 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b30–31): “hic <ostendit> [Philosophus] comparationem sciencie ad alia que ad cognitionem pertinent. [...] agit de comparatione sciencie ad opinionem, que est uerorum et falsorum; [...] proponit differenciam esse inter scienciam et opinionem; [...] Dicit ergo primo, quod *sciencia* differt ab *opinione*, et similiter *scibile*, quod est obiectum sciencie, differt ab *opinabili*, quod est obiectum opinionis.”

<sup>66</sup> *In Post. an.* 1, l. 44, 26–27 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b31–32): “<ostendit> [Philosophus] quid pertineat ad scienciam. Et ponit duo ad eam pertinere.”

<sup>67</sup> *In Post. an.* 1, l. 44, 27–30 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b31): “quorum unum est quod sit *uniuersalis* (non enim sciencia est de singularibus sub sensu cadentibus; et hoc supra manifestatum est).”

2. That it is (demonstrated) through (principles) **necessary** by themselves (► 53.4, ¶3).<sup>68</sup> And he explains what should be **necessary** (*necessarium* = ἀναγκαῖον): to wit, that which *cannot be otherwise* (*non contingit aliter se habere* = οὐκ ἐνδέχεται ἄλλως ἔχειν; ► 9.9).

### 52.11. Opinion

As ARISTOTLE says, **opinion** (*opinio* = δόξα) is *an estimation*—that is, a *judgment*—of *some immediate and non-necessary proposition* (*acceptio*, <*id est existimatio, quaedam*> *immediatae propositionis et non necessariae* = ὑπόληψις τῆς ἀμέσου προτάσεως καὶ μὴ ἀναγκαίης).<sup>69</sup>

Any (*proposition*) that *cannot be proven through some mean* is said (to be an) **immediate proposition**, whether it should be necessary (e.g., every whole is greater than its part) or non-necessary.<sup>70</sup> For it is impossible to proceed infinitely in predications (► 55.13), whether in respect of means or in respect of extremities; and this (impossibility applies) not only analytically in demonstrations (► 52.4, ¶1b), but also logically—in common—in respect of all syllogisms (► 52.4, ¶1a).

Therefore, if there should be some mediate (i.e., non-immediate), contingent (i.e., non-necessary) proposition, it would have to be reduced to some immediate (propositions).<sup>71</sup> However, it is not reduced to immediate necessary (propositions), since necessary (propositions) are not the proper principles of contingent (propositions). Nor can a contingent (proposition) be concluded from necessary (propositions). Whence, it remains that there should be some immediate contingent proposition.

For example, “the man does not run” is a mediate (proposition) and can be proven by the mean “the man does not move,” which is also contingent, but immediate.<sup>72</sup> Therefore, the estimation of such contingent propositions is an opinion. Yet, this does not exclude that

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<sup>68</sup> *In Post. an.* 1, l. 44, 30–34 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b31–32): “aliud est quod sciencia est *per necessaria*. Et exponit quid sit necessarium, scilicet illud quod *non contingit aliter se habere* (et hoc etiam est supra manifestatum, quod demonstratio procedat ex necessariis).”

<sup>69</sup> *In Post. an.* 1, l. 44, 89–91 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 89a3–4): “Et ad exponendum quid sit opinio, subiungit [Philosophus] quod opinio *est acceptio*, id est existimatio, quedam *immediate propositionis et non necessarie*.”

<sup>70</sup> *In Post. an.* 1, l. 44, 95–103: “Dicitur enim immediata propositio, quecunque per aliquod medium probari non potest, siue sit necessaria siue non necessaria: ostensum est enim supra quod non proceditur in infinitum in predicationibus neque quantum ad media neque quantum ad extrema. et [sic] hoc non solum analetice in demonstrationibus, set etiam logice communiter quantum ad omnes sillogismos.”

<sup>71</sup> *In Post. an.* 1, l. 44, 103–109: “si igitur sit aliqua propositio contingens mediata, oportet quod reducatur ad aliquas immediatas; non autem reducitur ad immediatas <necessarias>, quia necessaria non sunt propria principia contingencium nec ex necessariis potest concludi contingens; unde relinquitur quod sit aliqua propositio immediata contingens.”

<sup>72</sup> *In Post. an.* 1, l. 44, 109–118: “sicut: «Homo non currit» est mediata, potest enim probari per hoc medium: «Homo non mouetur», que etiam est contingens, sed [sic] immediata. Existimatio ergo talium propositionum contingencium immediatarum est opinio. Set per hoc non excluditur quin etiam acceptio propositionis contingentis mediate sit opinio: sic enim se habet circa contingencia sicut intellectus et sciencia circa necessaria.”

taking this contingent proposition mediately is an opinion too: for (a contingent proposition) is had in this way about contingent (things) as understanding and science (are had) about necessary (things).

Therefore, this (definition of opinion, *a judgment of some immediate and non-necessary proposition*) can be understood in two modes:<sup>73</sup>

1. Such that the immediate proposition be **necessary in itself** but be taken as non-necessary by whoever opines.<sup>74</sup>
2. Such that (the immediate proposition) be **contingent in itself**.<sup>75</sup>

## 52.12. Contingency—Whether Universal or Particular—Pertains to Opinion

ARISTOTLE shows what pertains to opinion: to wit, that it be about (that which) can be otherwise, whether universally or particularly.<sup>76</sup> And he proves this in three (modes):

1. Through the mode of division.<sup>77</sup>

Apart from necessary true (propositions), which cannot be otherwise, there are some true (propositions that are) not necessary, which can be otherwise.<sup>78</sup> And from what has been said (►52.10, ¶2), it is manifest that about such (contingent things) there is no science, for it would follow that contingent (things) could not be otherwise—and science is about such (necessary) things.

Likewise, nor can it be said that there should be understanding (*intellectus* = νοῦς) of them.<sup>79</sup> And we take here *understanding* not insofar as some potency of the soul is called *understanding* (i.e., the intellect), but insofar as it is a principle of science (< λέγω... νοῦν ἀρχὴν ἐπιστήμης): that is, insofar as it is the habit of first principles, from which

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<sup>73</sup> *In Post. an.* 1, l. 44, 91–92: “Quod potest duobus modis intelligi.”

<sup>74</sup> *In Post. an.* 1, l. 44, 92–94: “uno modo sic quod propositio immediata in se quidem sit necessaria, set ab opinante accipiat ut non necessaria.”

<sup>75</sup> *In Post. an.* 1, l. 44, 94–95: “alio modo, ut in se sit contingens.”

<sup>76</sup> *In Post. an.* 1, l. 44, 36–39 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b32–89a10): “ostendit [Philosophus] quid pertineat ad opinionem, scilicet quod sit circa contingencia aliter se habere, siue in uniuersali siue in particulari. Et hoc probat tripliciter.”

<sup>77</sup> *In Post. an.* 1, l. 44, 40 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b32–37): “Primo quidem per modum diuisionis.”

<sup>78</sup> *In Post. an.* 1, l. 44, 41–47 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b32–35): “preter uera necessaria, que non contingunt aliter se habere, sunt *quedam uera* <non> necessaria, que contingit *aliter se habere*. *Manifestum* est autem ex predictis quod *circa* huiusmodi *non est sciencia*, quia sic sequeretur quod contingencia non possent *aliter se habere* (circa talia enim est sciencia, ut iam dictum est).”

<sup>79</sup> *In Post. an.* 1, l. 44, 47–54 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b35–36): “Similiter etiam non potest dici quod eorum <sit> *intellectus*; et accipimus hic intellectum non secundum quod intellectus dicitur *quedam potencia anime*, set secundum quod est *principium sciencie*, id est secundum quod est habitus quidam primorum principiorum, ex quibus procedit demonstratio ad causandam scienciam.”

demonstration proceeds for science to be caused (► 51.22). Wherefrom, to explain what this understanding—which is the principle of science—should be, ARISTOTLE adds, “nor [is there] science of indemonstrable [things],” to wit, (nor) is (there science) of those (things) that can be otherwise, as though he would be saying that understanding should be nothing other than some science of indemonstrable (things).<sup>80</sup>

Thus, just like **science** conveys (*importat*) a certitude of cognition acquired through demonstration, so **understanding** conveys a certitude of cognition without demonstration: not on account of a defect of demonstration, but because that about which the certitude is had is indemonstrable and known by itself; and hence, to explain this, ARISTOTLE adds that an **indemonstrable science** is nothing other than *the immediate judgment of a proposition* (*existimatio immediate propositionis* = ὑπόληψις τῆς ἀμέσου προτάσεως).<sup>81</sup>

That understanding should be an indemonstrable science is evident from what he says: that it is a principle of science.<sup>82</sup> Thus, since science should be of necessary (conclusions), and necessary (conclusions) are only concluded from necessary (► 52.10, ¶2), it is necessary for understanding, which is a principle of science, not to be about contingent (things).

Having therefore shown that neither science nor understanding are of contingent (things), ARISTOTLE posits some division.<sup>83</sup> He says that understanding, science, and opinion can be true. For the true is in the composition and division of the intellect; and in external enunciation too (► 19.1, ¶2), insofar as it signifies the internal truth of opinion, science or understanding. Therefore, if the truth of anyone is either an understanding, science or opinion, and some true contingent (things) exist of which no science nor understanding

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<sup>80</sup> *In Post. an.* 1, l. 44, 54–59 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b36): “Et ideo ad exponendum quid sit iste intellectus qui est principium sciencie, subdit [Philosophus]: *Neque sciencia indemonstrabilis*, scilicet est eorum que contingunt aliter se habere; ac si dicat quod intellectus nichil aliud sit quam quedam sciencia indemonstrabilis.”

<sup>81</sup> *In Post. an.* 1, l. 44, 59–67 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b37): “sicut enim sciencia importat certitudinem cognitionis per demonstrationem acquisitam, ita intellectus importat certitudinem cognitionis absque demonstratione, non propter defectum demonstrationis, set quia id de quo certitudo habetur, est indemonstrabile et per se notum; et ideo ad hoc exponendum subdit quod sciencia indemonstrabilis nichil aliud est quam certa *existimatio immediate propositionis*.”

<sup>82</sup> *In Post. an.* 1, l. 44, 67–73 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b36): “Quod autem intellectus sit sciencia indemonstrabilis patet ex hoc ipso quod dicit quod est «principium sciencie»: cum enim sciencia sit necessariorum et necessaria non concludantur nisi ex necessariis, ut supra probatum est, necesse est quod intellectus, qui est principium sciencie, non sit contingencium.”

<sup>83</sup> *In Post. an.* 1, l. 44, 74–88 (cf. ARISTOTLE, *Analytica Posteriora* A.33, 88b37–89a3): “Ostenso ergo quod neque sciencia neque intellectus sunt contingencium, ponit [Philosophus] quandam diuisionem. Et dicit quod contingit uerum esse et intellectum et scienciam et opinionem, *et quod per hoc dicitur*, id est quod enunciat uoce per intellectum, scienciam et opinionem ueram: est enim uerum et in compositione et diuisione intellectus et in exteriori etiam enunciatione, in quantum significat interiorem ueritatem opinionis, sciencie uel intellectus. Si igitur cuiuslibet ueri uel est intellectus uel sciencia uel opinio, et sunt quedam uera contingencia, quorum non est nec sciencia nec intellectus, *relinquitur* quod circa huiusmodi sit opinio, siue sint actu uera siue sint actu falsa, dummodo possint *aliter se habere*.”

exist, whether they should be actually true or false, so long as they can be otherwise, remaining about such (things) is that opinion should exist.

2. ARISTOTLE proves the same through that which is apparent in common.<sup>84</sup>

He says that what has been said—that opinion is about contingent (things)—is something generally admitted.<sup>85</sup> For opinion seems to sound like something weak and uncertain; and seems to be some such nature that has in itself feebleness and incertitude.

3. ARISTOTLE proves the same through experience.<sup>86</sup> For someone does not claim to opine when he opines that it should be impossible (for something) to be otherwise: instead, he (then) claims scientifically to know. On the other hand, when he opines that (something) is so, but that nothing prevents it from being otherwise, then he claims to opine, as if opinion should be such—that is, of (something) contingent—, while science (should be) of (something) necessary.

### 52.13. Demonstrative vs. Dialectical Proposition

ARISTOTLE posits the difference between *dialectical* and *demonstrative* proposition.<sup>87</sup> He says that, while a proposition takes one or the other part of an enunciation (i.e., either the affirmative or the negative; ► 19.2, ¶2), the dialectical (proposition) indifferently takes either of them. Thus, it has a way to one part of a contradiction and to the other (► 42.5), since it proceeds from more probable (principles). Whence, too, in propositions, it takes one and the other part of a proposition. Whence, too, it proposes by seeking.

On the other hand, the demonstrative proposition determinately takes one part of the two, since the demonstrator has a way only to demonstrating (what is) true.<sup>88</sup> Whence, by

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<sup>84</sup> *In Post. an. 1, l. 44, 119–120* (cf. ARISTOTLE, *Analytica Posteriora* A.33, 89a4–6): “Secundo [...] probat [Philosophus] idem per id quod communiter apparet.”

<sup>85</sup> *In Post. an. 1, l. 44, 121–126* (cf. ARISTOTLE, *Analytica Posteriora* A.33, 89a4–6): “Et dicit [Philosophus] quod id quod dictum est, opinionem esse contingencium, est quoddam *confessum*, id est consentaneum, hiis que apparent: *opinio enim* uidetur sonare aliquid debile et incertum, et uidetur esse aliqua talis *natura*, que habeat in se imbecillitatem et incertitudinem.”

<sup>86</sup> *In Post. an. 1, l. 44, 127–134* (cf. ARISTOTLE, *Analytica Posteriora* A.33, 89a6–10): “Tercio [...] probat [Philosophus] idem per experimentum. Nullus enim quando opinatur quod *impossibile* sit *aliter se habere*, reputat se *opinari*, set tunc reputat se *scire*; quando autem opinatur quod *sic* est, set quod *nichil* prohibeat *aliter* se habere, *tunc* reputat se *opinari*, ac si opinio sit *talís*, id est contingentis, *sciencia autem necessarii*.”

<sup>87</sup> *In Post. an. 1, l. 5, 54–62* (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a9–10): “ponit [Philosophus] differenciam inter dyaleticam propositionem et demonstratiuam, dicens quod, cum propositio accipiat alteram partem enunciationis, dyaletica indifferenter accipit quamcunque earum: habet enim uiam ad utramque partem contradictionis, eo quod ex probabilibus procedit; unde etiam et in propositionibus accipit utramlibet partem propositionis, unde etiam querendo proponit.”

<sup>88</sup> *In Post. an. 1, l. 5, 62–68* (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a10–11): “*Demonstratiua autem* propositio accipit *alteram* partem determinate, quia nunquam habet demonstrator uiam nisi ad *uerum* demonstrandum; unde etiam semper proponendo accipit ueram partem propositionis; propter hoc etiam non interrogat, set sumit, qui demonstrat, quasi notum.”



proposing, he always takes the true part of a proposition. Wherefrom, he does not inquire; rather, whoever demonstrates takes (the true part of a proposition) as known.

Thus, inquiring is not the same in the demonstrative sciences and in dialectic.<sup>89</sup> For in dialectic, not only is the inquiry (*interrogatio*) about the conclusion, but also about the premises. (On the other hand), the demonstrator does not inquire about (the premises): rather, he assumes (them) as known by themselves or as proven through such principles. And he inquires only about the conclusion; yet, when he has demonstrated it, he uses it as a proposition (in order) to demonstrate another conclusion.

#### 52.14. Demonstrative vs. Dialectical Syllogism

Since the dialectical syllogism tends to produce opinion, this alone belongs to the intention of the dialectician: that he should proceed from those (principles) that are maximally apt to be opined.<sup>90</sup> And these are those (principles) that seem (more likely) either to many or to the wisest. Thus, (common principles) are said (to be the) *first logical reasons* not because they should logically proceed from logical terms, but because they proceed in the logical mode: that is, from more common and probable (principles), which is proper of the dialectical syllogism.

Hence, if some proposition should present itself to the dialectician while (he is) syllogizing, which (proposition)—according to the truth of the thing—would have a mean through which it could be proven, and yet it should seem not to have a mean, but due to its probability it should seem to be known by itself, this suffices to the dialectician.<sup>91</sup> He would not seek another mean, even if the proposition should be mediated. And syllogizing from it, the dialectician sufficiently completes (*perficit*) the (dialectical) syllogism.

On the other hand, the demonstrative syllogism is ordered to the truth of science. Hence, it pertains to the demonstrator to produce (a syllogism) from those (principles) that are

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<sup>89</sup> *In Post. an.* 1, l. 21, 32–40 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77a36–41): “Sciendum tamen est quod interrogatio aliter est in scienciis demonstratiuis et aliter est in dyaletica: in dyaletica enim non solum interrogatur de conclusione, set etiam de premissis, de quibus demonstrator non interrogat, set ea sumit quasi per se nota uel per talia principia probata; set interrogat tantum de conclusione; set cum eam demonstraerit, utitur ea ut propositione, ad aliam conclusionem demonstrandam.”

<sup>90</sup> *In Post. an.* 1, l. 31, 59–63 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b18–19): “Quia enim sillogismus dyaleticus ad hoc tendit ut *opinionem* faciat, *hoc solum* est de intentione dyaletici ut procedat ex hiis que sunt *maxime* opinabilia. Et hec sunt ea que uidentur uel pluribus uel maxime sapientibus.” *In Physic.* 3, l. 8, n. 1: “Et primo ostendit [Philosophus] hoc per rationes logicas [...]. Dicuntur autem primae rationes logicae, non quia ex terminis logicis logice procedant, sed quia modo logico procedunt, scilicet ex communibus et probabilibus, quod est proprium syllogismi dialectici.”

<sup>91</sup> *In Post. an.* 1, l. 31, 63–71 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b19–22): “et ideo si dyaletico in sillogizando occurrat aliqua propositio que secundum rei ueritatem habeat medium per quod possit probari, set tamen non uideatur habere medium, set propter sui probabilitatem uideatur esse per se nota, hoc sufficit dyaletico nec inquirer aliud medium, licet propositio sit mediata, et ex ea *sillogizans* sufficienter perficit dyaleticum sillogismum.”

according to the immediate truth of the thing.<sup>92</sup> And, if a mediate proposition should present itself to him, it is necessary for him to prove it through the proper mean until he should arrive at an immediate (proposition). Nor is he satisfied by the probability of a proposition.

Moreover, the demonstrator proceeds from those (predications) that are not predicated by accident, but by themselves.<sup>93</sup> On the other hand, the dialectician does not require this. Hence, the questions that concern predication by itself do not have a place in the dialectical syllogism, but only in the demonstrative syllogism.

Also, the demonstration that causes scientifically to know (*facit scire*) must proceed from (principles that are) prior simply.<sup>94</sup> If demonstration should sometimes proceed from (principles that are) prior simply and sometimes from (principles that are) prior in respect of us, scientifically to know would not only have to be the cause of knowing a thing, but it would be said in two modes: for it would also be some (kind of) knowing through posterior (principles); or it would have to be therefore so said; or it would have to be said that the other demonstration, which comes to be from (principles) more known in respect of us, should not be a demonstration simply.

However, according to the natural progress of cognition, reason must arrive from posterior (*ratios* or things) into prior (*ratios* or things).<sup>95</sup>

It is therefore apparent why the dialectical syllogism can be circular: because it proceeds from more probable (principles); and those are said (to be) *more probable* which are more known either to wiser (people) or to many.<sup>96</sup> And thus, the dialectical syllogism proceeds

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<sup>92</sup> *In Post. an.* 1, l. 31, 71–77 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b22–23): “Set sillogismus demonstratiuus ordinatur ad scienciam ueritatis, et ideo ad demonstratorem pertinet ut procedat *ex hiis que sunt* secundum rei ueritatem in mediata, et, si occurrat ei mediata propositio, necesse est quod probet eam per medium proprium, quousque deueniat ad in mediata, nec est contentus probabilitate propositionis.”

<sup>93</sup> *In Post. an.* 1, l. 31, 103–110 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 81b23–29): “*Sunt autem quedam* que neutro istorum modorum per accidens predicantur, et ista dicuntur *per se*. Et talia sunt ex quibus demonstrator procedit, set hoc dyaleticus non requirit, et ideo questio que infra proponitur de huiusmodi que per se predicantur, non habet locum in sillogismis dyaleticis, set solum in sillogismo demonstratiuo.”

<sup>94</sup> *In Post. an.* 1, l. 8, 41–50 (cf. ARISTOTLE, *Analytica Posteriora* A.3, 72b30–32): “oportet demonstrationem que facit scire ex prioribus *simpliciter* procedere; si autem demonstratio nunc ex prioribus simpliciter nunc ex prioribus quo ad nos procederet, oporteret etiam quod scire non solum esset causam rei cognoscere, set *dupliciter* diceretur, quia esset etiam quoddam scire per posteriora; aut ergo oportebit sic dicere, aut oportebit dicere quod *altera demonstratio, que fit ex nobis notioribus, non sit simpliciter* demonstratio.”

<sup>95</sup> *In De Trin.*, pr. 1, 6–8: “oportet ut secundum naturalis cognitionis progressum ratio a posterioribus in priora deueniat.”

<sup>96</sup> *In Post. an.* 1, l. 8, 51–61 (cf. ARISTOTLE, *Analytica Posteriora* A.3, 72b25–30): “apparet quare dyaeticus sillogismus potest esse circularis: procedit enim ex probabiliibus, probabilia autem dicuntur que sunt magis nota uel sapientibus uel pluribus, et sic dyaeticus sillogismus procedit ex hiis que sunt

from those (principles) that are more known to us. Now, the same (principle) may be more known or less (known) in respect of diverse (people); and thus, nothing prevents the dialectical syllogism from becoming circular. Demonstration, on the other hand, comes to be from (principles that are) more known simply; hence, a demonstration cannot become circular.

### 52.15. Species of Disputation

There are four species of **disputation** (*disputatio*):<sup>97</sup>

#### 1. **Doctrinal** (*doctrinalis*) or **demonstrative** (*demonstrativa*).

Doctrinal or demonstrative (disputation), which is ordered to (the attainment of) science, proceeds from true (principles that are) known by themselves (and) proper of the science about which the disputation is produced.<sup>98</sup> It is engaged in between teacher and learner.

#### 2. **Dialectic** (*dialectica*).

Dialectic disputation proceeds from probable (principles) and tends to (the production of) opinion.<sup>99</sup> (Those principles) are said (to be) *probable* which seem (truthful) to all, to many, or to the wise—and to these all (i.e., to all the wise) or to the chief and more known.

#### 3. **Tentative** (*temptativa*).

Tentative disputation is that (disputation) which is ordered to the acquisition of experience about something (*ordinatur ad experimentum sumendum de aliquo*) through those (principles) that seem (to be true) to the respondent.<sup>100</sup>

#### 4. **Sophistic** (*sophistica*), which by another name is called **litigious** (*litigiosa*).

Sophistic (disputation) tends to (the acquisition of) renown (*ad gloriam*), such that (the person who disputes) would seem to be wise; whence, the sophistic (art) is said (to be)

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<magis> nobis nota; contingit autem idem esse magis et minus notum quo ad diuersos, et ideo nichil prohibet sillogismum dyaleticum fieri circularem. Set demonstratio fit ex notioribus simpliciter, et ideo, ut dictum est, non potest fieri demonstratio circularis.”

<sup>97</sup> *De fallaciis*, c. 1, 20–22: “Disputationis uero quatuor sunt species, scilicet doctrinalis, dyaletica, temptatiua et sophistica, que alio nomine dicitur litigiosa.” Note that this work, *De fallaciis*, is of uncertain authenticity; see the discussion in the critical edition itself: *ibid.*, 386–387.

<sup>98</sup> *De fallaciis*, c. 1, 22–26: “Doctrinalis siue demonstratiua est que ad scientiam ordinatur, procedens ex ueris et per se notis et propriis scientie de qua fit disputatio; et hec uertitur inter docentem et addiscentem.”

<sup>99</sup> *De fallaciis*, c. 1, 26–30: “Dyaletica uero disputatio est ex probabilibus procedens, ad opinionem tendens; probabilia autem dicuntur que uidentur omnibus uel pluribus uel sapientibus, et hiis autem omnibus aut precipuis et magis notis.”

<sup>100</sup> *De fallaciis*, c. 1, 30–32: “Temptatiua uero disputatio est que ordinatur ad experimentum sumendum de aliquo per ea que uidentur respondententi.”

*apparent science*.<sup>101</sup> It proceeds from those (principles) that seem (to be) true or probable and are not; or (from) simply false propositions, assuming those (principles) that seem to be true; or arguing in virtue of false propositions.

Thus, logical argumentations are in virtue of true propositions—to wit, from the maximally (true principles), from which the whole virtue of argumentation depends.<sup>102</sup> For example, the argumentation, “Sortes is a man; therefore, Sortes is an animal,” proceeds in virtue of the proposition, “of whichever [subject] a species should be predicated, also the genus [is predicated of that subject],” which is simply true.

Sophistic (disputation), on the other hand, argues thus: “it is an animal; therefore, it is a man,” as though in virtue of the false proposition, “of whichever [subject] a genus should be predicated, also a species [is predicated of that subject].”<sup>103</sup> (Compare to the sophistic argument used by HEATH to prove that, according to ARISTOTLE, magnitudes are numbers; ►7.3.)

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<sup>101</sup> *De fallaciis*, c. 1, 32–38: “Sophistica uera disputatio est tendens ad gloriam, ut sapiens esse uideatur, unde dicitur sophistica apparens scientia; procedit autem ex hiis que uidentur uera seu probabilia et non sunt, uel simpliciter falsas propositiones assumendo que uidentur esse uera, uel in uirtute falsarum propositionum argumentando.”

<sup>102</sup> *De fallaciis*, c. 1, 38–44: “Logicales enim argumentationes sunt in uirtute uerarum propositionum, scilicet maximarum, ex quibus tota uirtus argumentationis pendet; sicut ista argumentatio ‘Sortes est homo, ergo Sortes est animal’ procedit in uirtute huius propositionis: ‘De quocumque predicatur species, et genus’, que est simpliciter uera.”

<sup>103</sup> *De fallaciis*, c. 1, 44–47: “Sophistica autem sic argumentatur: ‘Est animal, ergo est homo’, quasi in uirtute huius propositionis false: ‘De quocumque predicatur genus, et species’.”

## 53. The Demonstrative Syllogism

We turn our attention to that analytical part of rational philosophy in which the certitude of judgement is had from the form of the syllogism together with some matter (► 52.4, ¶1b). These last three material conditions are detailed further in the ensuing chapters.

### 53.1. Definitions of the Demonstrative Syllogism

In all those (things) that are for the sake of an end (*propter finem*), the definition by final cause is the *ratio* of the definition by the material cause (► 10.10).<sup>1</sup> For example, a house must be built from stone and timber (i.e., its material causes) because it is a cover (*operimentum*) that protects us from cold and heat (i.e., its end or final cause).

ARISTOTLE therefore gives two definitions of *demonstration*: **(1)** one (definition) taken from the **end** of demonstration (► 53.2), which is *scientifically to know* (*scire*); and from this (definition), he concludes **(2)** another (definition) that is taken from the **matter** of demonstration (► 53.6).<sup>2</sup>

### 53.2. Definition by Final Cause

ARISTOTLE defines the demonstrative syllogism by comparison to its end or effect, which is scientifically to know.<sup>3</sup> Concerning this, he does three (things):

1. He posits that *scientifically to know* is the end or effect of the demonstrative syllogism; for **scientifically to know** (*scire*) seems to be nothing other than *to understand the truth of some conclusion through demonstration* (*intelligere <veritatem alicuius conclusionis> per demonstrationem* = δι' ἀποδείξεως εἰδέναι).<sup>4</sup>

2. He defines the **demonstrative syllogism** (*sylogismum demonstrativum*) by such an end, saying that **demonstration** (*demonstratio* < ἀπόδειξις) is a *scientific syllogism* (*sylogismus scientialis* = συλλογισμὸς ἐπιστημονικός): that is, (a syllogism) that makes (someone) scientifically to know.<sup>5</sup>

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<sup>1</sup> *In Post. an.* 1, l. 4, 41–47: “in omnibus que sunt propter finem, diffinitio que <est> per causam finalem est ratio diffinitionis que est per causam materialem et medium probans ipsam: propter hoc enim oportet ut domus fiat ex lapidibus et lignis, quia est operimentum prohibens nos a frigore et estu.”

<sup>2</sup> *In Post. an.* 1, l. 4, 47–51: “sic igitur et Aristoteles hic de demonstratione duas diffinitiones dat, quarum una sumitur a fine demonstrationis qui est scire, et ex hac concluditur altera que sumitur a materia demonstrationis.”

<sup>3</sup> *In Post. an.* 1, l. 4, 138–140 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b17–19): “diffinit [Philosophus] sillogismum demonstrativum per comparisonem ad finem suum, qui est scire. Circa quod tria facit.”

<sup>4</sup> *In Post. an.* 1, l. 4, 140–144 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b17): “Primo, ponit quod scire est finis sillogismi demonstrativi siue effectus eius, cum scire nihil aliud esse uideatur quam *intelligere* ueritatem alicuius conclusionis *per demonstrationem*.”

<sup>5</sup> *In Post. an.* 1, l. 4, 144–147 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b17–18): “Secundo [...], diffinit sillogismum demonstrativum per huiusmodi finem, dicens quod demonstratio est *sillogismus scientialis*, id est faciens scire.”

3. Lest someone understand *scientific syllogism* (to refer to) that (syllogism) which some science would use, he explains what he called *scientific* (*scientialis* = ἐπιστημονικός, i.e., of or for science, *scientific*).<sup>6</sup> Thus, he says that (that) *syllogism* is said (to be) *scientific* according to which we scientifically know insofar as we have it (*secundum quem scimus in quantum ipsum habemus* < καθ' ὃν τῷ ἔχειν αὐτὸν ἐπιστάμεθα, i.e., we scientifically know something insofar as we possess such a syllogism as a habit).

### 53.3. Scientifically to Know Something: Simply vs. According to Something

(It is to be considered that) ARISTOTLE intends (further) to define *scientifically to know* (*scire*) simply (►53.4), and not according to accident, for this (accidental) mode of knowing is sophistic.<sup>7</sup> Sophists use such a mode in arguing: “I know Coriscus; [and] Coriscus is coming; therefore, I know the one who comes.”

Thus, we are said **scientifically to know** (*scire*) something (in two modes):<sup>8</sup>

#### 1. **Simply** (*simpliciter*), when we know it **in itself** (*in seipso*).<sup>9</sup>

Scientifically to know something is to know it **perfectly**—and this is to perfectly apprehend its truth, for the principles of a thing’s being (*principia esse rei*) and its truth are the same, as ARISTOTLE says (< ἕκαστον ὡς ἔχει τοῦ εἶναι, οὕτω καὶ τῆς ἀληθείας; ►8.3; 27.4).<sup>10</sup>

Therefore, if the scientific knower (*sciens*) is to know (something) perfectly, he must know the **cause** of the scientifically-known thing.<sup>11</sup> However, if he should know only the cause, he would not yet know the effect in act—which is to know simply—but only virtually—which is to know according to something (*secundum quid*) and, as it were, by accident (*per accidens*; ¶2). Hence, the scientific knower must know simply also the **(actual)** application of the cause to the effect.

<sup>6</sup> *In Post. an.* 1, l. 4, 147–153 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b18–19): “Tercio exponit hoc quod dixerat *scientialem* [...], dicens quod *scientialis* sillogismus dicitur *secundum quem scimus in quantum ipsum habemus*, ne forte aliquis sillogismum *scientialem* intelligeret quo aliqua *scientia* uteretur.”

<sup>7</sup> *In Post. an.* 1, l. 4, 73–78: “Intendit igitur Philosophus diffinire *scire simpliciter*, non autem *scire secundum accidens*, hic enim *modus sciendi* est *sophisticus*. Vtuntur enim Sophiste tali modo arguendi: «Cognosco Coriscum; Coriscus est ueniens; ergo cognosco ueniens».” Ibid., 60–61: “determinat [Philosophus] cuiusmodi *scire* sit, quod diffinire intendit.”

<sup>8</sup> *In Post. an.* 1, l. 4, 61–62: “*sciendum est quod aliquid dicimur scire* [...]”

<sup>9</sup> *In Post. an.* 1, l. 4, 62–63: “*aliquid dicimur scire simpliciter, quando scimus illud in seipso*.”

<sup>10</sup> *In Post. an.* 1, l. 4, 81–85 (cf. ARISTOTLE, *Metaphysica* α.1, 993b23–31): “*considerandum est quod scire aliquid est perfecte cognoscere ipsum, hoc autem est perfecte apprehendere ueritatem ipsius: eadem enim sunt principia esse rei et ueritatis ipsius, ut patet ex II Metaphysice*.”

<sup>11</sup> *In Post. an.* 1, l. 4, 86–92 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b10–12): “*oportet igitur scientem, si est perfecte cognoscens, quod cognoscat causam rei scite; si autem cognosceret causam tantum, nondum cognosceret effectum in actu, quod est scire simpliciter, set uirtute tantum, quod est scire secundum quid et quasi per accidens, et ideo oportet scientem simpliciter cognoscere etiam applicationem cause ad effectum*.”

On the other hand, since **science** (*scientia*) is also *the certain cognition of a thing* (*certa cognitio rei*), and someone cannot know **through certitude** that which can be otherwise, hence, that which is scientifically known must not be capable of being otherwise (► 9.9).<sup>12</sup>

**2. According to something** (*secundum quid*), when we know it **in another** (*in alio*).<sup>13</sup> And this is to know (it) **by accident** (*per accidens = secundum accidens*, according to accident): to wit, for (when) something (is) known by itself (¶1), we are said to know what happens (*accidit*) to it in whatever mode. Now, something is *in another* either:

**(a)** As a **part** in a whole.<sup>14</sup> For example, if knowing the house, we should be said to know the wall.

**(b)** As an **accident** in a subject.<sup>15</sup> For example, if knowing Coriscus, we should be said to know the one who comes.

**(c)** As an **effect** in a cause.<sup>16</sup> For example, we foreknow the conclusion in the principles (of a syllogism).

**(d)** In whatever similar mode (► 29.1; e.g., as we know the placed thing in the place).<sup>17</sup>

#### 53.4. Scientifically to know Something Simply

ARISTOTLE posits the definition of **scientifically to know** (*scire = ἐπίστασθαι*) **simply** (*simpliciter = ἀπλῶς*):<sup>18</sup>

<sup>12</sup> *In Post. an.* 1, l. 4, 93–97 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b12): “quia uero scientia etiam est certa cognitio rei, quod autem contingit aliter se habere non potest aliquis per certitudinem cognoscere, ideo ulterius oportet quod id quod scitur non possit aliter se habere.”

<sup>13</sup> *In Post. an.* 1, l. 4, 63–65: “dicimur scire aliquid secundum quid quando scimus illud in alio in quo est [...]” Ibid., 71–73: “et hoc est scire per accidens, quia scilicet scito aliquo per se, dicimur scire illud quod accidit ei quocunque modo.”

<sup>14</sup> *In Post. an.* 1, l. 4, 65–66: “uel sicut pars in toto, sicut si scientes domum diceremur scire parietem.”

<sup>15</sup> *In Post. an.* 1, l. 4, 66–68: “uel sicut accidens in subiecto, sicut si scientes Coriscum diceremur <scire> uenientem.”

<sup>16</sup> *In Post. an.* 1, l. 4, 68–70: “uel sicut effectus in causa, sicut dictum est supra quod conclusionem prescimus in principiis.”

<sup>17</sup> *In Post. an.* 1, l. 4, 70–71: “uel quocunque simili modo.”

<sup>18</sup> *In Post. an.* 1, l. 4, 81–82 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b9–12): “ponit [Philosophus] diffinitionem ipsius scire simpliciter.” St. Thomas observes that, if someone should rightly consider (the given definition), (what) is shown by this notification is what the name should signify, rather than something being signified directly: for it does not make *science* (*scientia*) known—about which (*science*) the definition could be properly assigned, since it is a species of some genus (i.e., science is a species of some genus of knowledge); instead, it makes *scientifically to know* (*scire*) itself known. Whence, in the beginning ARISTOTLE said, “we think we scientifically know,” and it does not say, “scientifically to know is such or such.” Ibid., 116–123 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b9): “Si quis etiam recte consideret, hac notificatione magis ostenditur quid significet nomen quam directe aliquid significetur: non enim notificat scientiam, de qua proprie posset diffinitio assignari, cum sit species alicuius generis, set notificat ipsum scire. Vnde et a principio dixit: «scire opinamur», et non dicit: «scire est aliquid tale uel tale».” Also, as St. Thomas explains, ARISTOTLE manifests the definition posited (here) by (the fact) that scientific knowers—as much as non-knowers who consider themselves scientifically to know—take *scientifically to know* in this (posited) mode: the non-knowers, because they think that they know,

1. Since science is a **perfect** cognition, he therefore says (that we suppose ourselves scientifically to know) *when we think that we know the cause* (*cum causam arbitramur cognoscere* = ὅταν τὴν... αἰτίαν οἰώμεθα γινώσκειν, i.e., when we think that we know the cause *on account of which the thing is*, *propter quam res est* = δι' ἣν τὸ πράγμα ἐστίν).<sup>19</sup>
2. Since it is an **actual** cognition by which we know simply, he adds, *and (seeing) that it is its cause* (*et quoniam illius est causa* < ὅτι ἐκείνου αἰτία ἐστί).<sup>20</sup>
3. Since it is a **certain** cognition, he adds, *and (that) it cannot be otherwise* (*et non est contingere aliter se habere* = καὶ μὴ ἐνδέχασθαι τοῦτ' ἄλλως ἔχειν).<sup>21</sup>

### 53.5. Scientifically to know by Effects Instead of Causes

ARISTOTLE responds to a tacit question: namely, whether there should be some mode of scientifically knowing other than the aforesaid; which (answer) he promises to say later (►57.5, ¶2); for there is also a (way of) scientifically knowing through an effect.<sup>22</sup> Moreover, we say that we scientifically know in some mode the indemonstrable principles themselves, of which a cause cannot be taken (►57.8).<sup>23</sup>

Nevertheless, the proper and perfect mode of scientifically knowing is the aforesaid.<sup>24</sup>

### 53.6. Definition from the Material Conditions of Demonstration

As ARISTOTLE says, even though a syllogism (formally speaking only; ►52.4, ¶1a) should not require (any conditions taken from matter) in the propositions from which it proceeds,

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consider themselves to be thus related in knowing as has been said, while scientific knowers truly are thus related. Ibid., 103–109 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b12–15): “manifestat [Philosophus] positam diffinitionem per hoc quod tam *scientes*, quam *non scientes* estimantes tamen se scire, hoc modo accipiunt scire sicut dictum est: *non scientes* enim qui estimant se scire *opinantur sic se habere* in cognoscendo sicut dictum est, *scientes autem* uere sic se *habent*.” St. Thomas adds that this is the right manifestation of a definition: for a definition is the *ratio* that the name signifies, as ARISTOTLE says in his *Metaphysics*; and the signification of a name ought to be taken from that which those who commonly speak through that name intend to signify; whence, too, ARISTOTLE says in his *Topics*, that names ought to be used as many (i.e., most people) use (them). Ibid., 110–116 (cf. ARISTOTLE, *Metaphysica* Γ.7, 1012a23–24; *Topica* B.2, 110a14–22): “Est autem hec recta manifestatio diffinitionis: diffinitio enim est ratio quam significat nomen, ut dicitur in IV Metaphysice; significatio autem nominis accipienda est ab eo quod intendunt communiter loquentes per illud nomen significare, unde et in II Topicorum dicitur quod nominibus utendum est ut plures utuntur.”

<sup>19</sup> *In Post. an.* 1, l. 4, 97–98 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b11–12): “Quia ergo sciencia est perfecta cognitio, dicit [Philosophus]: *cum causam arbitramur cognoscere*.”

<sup>20</sup> *In Post. an.* 1, l. 4, 98–100 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b11–12): “quia uero est actualis cognitio per quam scimus simpliciter, addit: *et quoniam illius est causa*.”

<sup>21</sup> *In Post. an.* 1, l. 4, 100–102 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b12): “quia uero est certa cognitio, subdit: *et non est contingere aliter se habere*.”

<sup>22</sup> *In Post. an.* 1, l. 4, 129–133 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b16–17): “respondet [Philosophus] tacite questioni, utrum scilicet sit aliquis alius modus sciendi a predicto. Quod promittit se in consequentibus dicturum. Est enim scire etiam per effectum, ut infra patebit.”

<sup>23</sup> *In Post. an.* 1, l. 4, 133–135: “dicimur etiam aliquo modo scire ipsa principia indemonstrabilia, quorum non est accipere causam.”

<sup>24</sup> *In Post. an.* 1, l. 4, 135–136: “set proprius et perfectus modus sciendi est qui predictus est.”



demonstration nonetheless requires them (materially speaking; ►52.4, ¶1b): otherwise, it would not produce science.<sup>25</sup> He therefore manifests the definition (of the demonstrative syllogism) and the aforesaid conditions, without which it could not produce science.

Hence, he concludes from the aforesaid (►53.4) a definition of the demonstrative syllogism taken from matter.<sup>26</sup> Thus, if *scientifically to know* (*scire*) signifies this—i.e., to know the (actual) cause of a thing (through certitude)—it is necessary for a demonstrative science—that is, (a science) that is acquired through demonstration—to proceed from propositions (that are all of the following):

1. **True** (*ex <propositionibus> veris* = ἐξ ἀληθῶν; ►4).
2. Both **first** and **immediate** (*et primis et immediatis* = καὶ πρώτων καὶ ἀμέσων; ►53.8).

They are said (to be) *first* in order to other propositions that are proven through them. They are said (to be) *immediate* insofar as they lack a demonstrating mean: that is, they are not demonstrated through some mean: instead, they are manifest by themselves.

3. (They must) also (be) **causes of the conclusions** (*et causis conclusionis* < καὶ αἰτίων τοῦ συμπεράσματος; ►53.9).

ARISTOTLE excuses himself from adding another particule that—it would seem—ought to be added: namely, that a demonstration should proceed from **proper** principles (►56.5).<sup>27</sup> Yet, he says that this is understood by what has been said (¶3): for if the propositions of a demonstration are the causes of the conclusion, it is necessary that they be their proper principles (< οὕτω γὰρ ἔσονται καὶ αἱ ἀρχαὶ οἰκεῖαι τοῦ δεικνυμένου). Indeed, causes must be proportionate to effects (and vice-versa; ►11.13).

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<sup>25</sup> *In Post. an.* 1, l. 4, 183–188 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b23–25): “manifestat [Philosophus] premissae consequentiae necessitatem, dicens quod, licet syllogismus non requirat premissas condiciones in propositionibus ex quibus procedit, requirit tamen eas demonstratio: aliter enim non faceret scientiam.” Ibid., 189–193 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b25–72a5): “manifestat [Philosophus] positam definitionem, manifestans etiam quod immediate dixerat, scilicet quod nisi premissae condiciones demonstrationi adessent, scientiam facere non posset.”

<sup>26</sup> *In Post. an.* 1, l. 4, 154–156 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b19–22): “concludit [Philosophus] ex predictis definitionem demonstratiui syllogismi ex materia sumptam.” Ibid., 161–173: “ponit [Philosophus] consequentiam, qua demonstrationis materialis definitio concluditur ex premissis, dicens quod, si scire hoc significat quod diximus, causam rei cognoscere etc., *necesse est* quod demonstratiua scientia, id est que per demonstrationem acquiritur, procedat ex propositionibus *ueris et primis et immediatis*, id est que non per aliquod medium demonstrantur, set per seipsas sunt manifeste (que quidem immediate dicuntur in quantum carent medio demonstrante, prime autem in ordine ad alias propositiones que per eas probantur); *et iterum ex notioribus et prioribus, et causis conclusionis.*”

<sup>27</sup> *In Post. an.* 1, l. 4, 175–182 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b22–23): “excusat se [Philosophus] ab additione alterius particule que uidebatur apponenda, quod scilicet demonstratio ex propriis principiis procederet. Set ipse dicit quod hoc intelligitur per ea que dicta sunt: nam si propositiones demonstrationis sunt cause conclusionis, necesse est quod sint *propria principia eius*: oportet enim causas esse proportionatas effectibus.”

4. **More known and prior** (*notioribus et prioribus* = καὶ γνωριμωτέρων καὶ προτέρων; ►53.10; note: we have inverted the order used by ARISTOTLE in the last two conditions).

### 53.7. Demonstration Is from True Propositions

ARISTOTLE shows that (demonstration) always proceeds from **true** (propositions) in order to produce science. For *that which is not, cannot be known* (*quod non est, non est scire* = οὐκ ἔστι τὸ μὴ ὄν ἐπίστασθαι).<sup>28</sup>

Indeed, what is not true is not: for *to be* and *to be true* are convertible.<sup>29</sup> Therefore, that which is scientifically known must be true. Thus, the conclusion of the demonstration that makes (someone) scientifically to know must be true. And consequently, its propositions (must also be true): for a true (conclusion) cannot be known from false (propositions), even if it were possible to conclude (something) from them.

For example, the diameter is not commensurable to the side of the square.<sup>30</sup> For (those) **quantities** are said (to be) **incommensurable** of which some common measure cannot be taken (►5.5). And such quantities do not have a proportion (i.e., a ratio) to each other as (the ratio) of a number to a number. This (incommensurability) happens of necessity concerning the diameter of the square and its side, as is evident in Book 10 of EUCLID's *Elements*.

### 53.8. Demonstration Is from First, Immediate-Indemonstrable Propositions

ARISTOTLE shows that demonstration should be from (propositions that are) **first** and **immediate** or **indemonstrable** (*ex primis et immediatis <sive> indemonstrabilibus* < ἔκ πρώτων... ἀναποδείκτων).<sup>31</sup> (Explained further, next; ►54.) For someone happens to

<sup>28</sup> *In Post. an.* 1, l. 4, 194–196 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b25–26): “ostendit [Philosophus] quod semper procedit ex ueris ad hoc quod scienciam faciat, quia *quod non est, non est scire*.”

<sup>29</sup> *In Post. an.* 1, l. 4, 204–210: “Quod autem non est uerum, non est: nam esse et esse uerum conuertuntur. Oportet ergo id quod scitur *esse uerum*. Et sic conclusionem demonstrationis que facit scire oportet esse ueram, et per consequens eius propositiones: non enim contingit uerum sciri ex falsis, etsi concludi possit ex eis.”

<sup>30</sup> *In Post. an.* 1, l. 4, 196–204 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b26): “sicut dyametrum esse symetrum, id est commensurabilem <lateri> quadrati: dicuntur enim quantitates incommensurabiles quarum non potest accipi aliqua mensura communis, et huiusmodi quantitates sunt quarum non est proportio ad inuicem sicut numeri ad numerum, quod de necessitate contingit de dyametro quadrati et eius latere, ut patet ex X Euclidis.” See EUCLID, *Opera Omnia*, vol. 3, 2.2–4: “Σύμμετρα μεγέθη λέγεται τὰ τῷ αὐτῷ μέτρῳ μετρούμενα, ἀσύμμετρα δέ, ὧν μηδὲν ἐνδέχεται κοινὸν μέτρον γενέσθαι.” HEIBERG's version (*ibid.*, 3): “Magnitudines commensurabiles uocantur, quas eadem mensura metiri licet, incommensurabiles autem, quarum communis mensura inueniri nequit.” *Ibid.*, 16.11–12: “Τὰ σύμμετρα μεγέθη πρὸς ἄλληλα λόγον ἔχει, ὃν ἀριθμὸς πρὸς ἀριθμὸν.” HEIBERG's version (*ibid.*, 17): “Magnitudines commensurabiles inter se rationem habent, quam numerus ad numerum.” That this happens of necessity concerning the diameter of the square and its side is not in EUCLID's *Elements*, but it can be found in CAMPANUS's Commentary, who refers us back to ARISTOTLE; see BUSARD, *Campanus of Novara and Euclid's Elements*, Book 10, Proposition 5.

<sup>31</sup> *In Post. an.* 1, l. 4, 211–220 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b26–29): “ostendit [Philosophus] quod demonstratio sit *ex primis et immediatis* siue *indemonstrabilibus*: non enim contingit

have science only if he should have a demonstration of those (conclusions) of which there can be demonstration; and this, by itself and not by accident (< μὴ κατὰ συμβεβηκός).

He therefore says this because it would be possible scientifically to know some conclusion not having a demonstration of the premises, even if they should be indemonstrable.<sup>32</sup> For he would have scientifically known it through other principles: and this would be according to accident.

Let it therefore be given that some demonstrator should syllogize from demonstrable or mediate (propositions).<sup>33</sup> Therefore, he either has or does not have a demonstration of them. If he does not have (a demonstration of the demonstrable or mediate propositions), he therefore does not scientifically know the premises either; and thus, nor (does he scientifically know) the conclusion on account of the premises. On the other hand, if he has (a demonstration of the demonstrable or mediate propositions), in the end (*tandem*) he must arrive at some immediate and indemonstrable (propositions), for it is impossible to proceed infinitely in demonstrations (►55.13); and thus, the demonstration must proceed from immediate (propositions): either immediately or through some means.

Whence, too, ARISTOTLE says in the *Topics* that demonstration is from first and true (propositions), or from those that have received faith through them (i.e., from propositions that have been made credible through first and true propositions).<sup>34</sup>

### 53.9. The Propositions of a Demonstration Are the Causes of the Conclusion

ARISTOTLE proves that the propositions of a demonstration should be the **causes** of the conclusion, for *we know scientifically when we know the causes* (*tunc scimus cum causas cognoscimus* < τότε ἐπιστάμεθα ὅταν τὴν αἰτίαν εἰδῶμεν).<sup>35</sup> And since a demonstration should be (produced) from first (principles, *ex primis* = ἐκ πρώτων), we have that it should

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aliquem habere scienciam nisi habeat *demonstrationem* eorum *quorum* potest esse *demonstratio*, et hoc dico per se et *non per accidens*." According to the critical apparatus, *inmediatis* is a gloss.

<sup>32</sup> *In Post. an.* 1, l. 4, 211–220 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b27): "et hoc ideo dicit quia possibile esset scire aliquam conclusionem *non habens demonstrationem* premissorum, etiam si essent demonstrabilia, quia sciret eam per alia principia; et hoc esset secundum accidens."

<sup>33</sup> *In Post. an.* 1, l. 4, 220–230: "Detur ergo quod aliquis demonstrator syllogizet ex demonstrabilibus siue mediatis; aut ergo habet illorum demonstrationem, aut non habet; si non habet, ergo nec scit premissa, et ita nec conclusionem propter premissa; si autem habet, cum in demonstrationibus non sit abire in infinitum, ut infra ostendet, tandem erit deuenire ad aliqua inmediate et indemonstrabilia; et sic oportet quod demonstratio ex immediatis procedat, uel statim uel per aliqua media."

<sup>34</sup> *In Post. an.* 1, l. 4, 230–232: "Vnde et in primo libro Topicorum dicitur quod demonstratio est ex primis et ueris, aut ex hiis que per ea fidem sumpserunt." See ARISTOTLE, *Topica* A.1, 100a27–29: "ἀπόδειξις μὲν οὖν ἐστίν, ὅταν ἐξ ἀληθῶν καὶ πρώτων ὁ συλλογισμὸς ᾗ, ἢ ἐκ τοιούτων ἃ διὰ τινῶν πρώτων καὶ ἀληθῶν τῆς περὶ αὐτὰ γνώσεως τὴν ἀρχὴν εἴληφεν."

<sup>35</sup> *In Post. an.* 1, l. 4, 233–236 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b29–31): "probat [Philosophus] quod demonstrationis propositiones sint cause conclusionis, quia *tunc scimus cum causas cognoscimus*."

be from proper principles (*ex propriis principiis* = ἐξ ἀρχῶν οἰκείων).<sup>36</sup> Indeed, *first* and *principle* seem to be the same, for the first and maximum in any genus is the cause of those that are after (it in the genus; ► 8.3; 27.4). (Note that this twofold material condition is explained in greater detail in two ensuing chapters; ► 55; 56.)

### 53.10. The Propositions of a Demonstration Are Prior and More Known

Wherefrom, ARISTOTLE further concludes that (the propositions of a demonstration) should be **prior** and **more known**, since every cause is naturally prior and more known than its effect; and the cause of a demonstrative conclusion must be more known not only in respect of knowing *what it is*, but also in respect of knowing *that it is*.<sup>37</sup>

Thus, to demonstrate that there is a solar eclipse, it is not sufficient scientifically to know that (an eclipse) is an interposition of the Moon (i.e., *what it is*): it is also necessary scientifically to know that the Moon is interposed between the Sun and the Earth (i.e., *that it is* the case that this happens).<sup>38</sup>

(Note that this material condition is explained in greater detail in an ensuing chapter; ► 57.)

### 53.11. Of All, by Itself, Universal

It pertains to logic in common (*communiter*) to consider predication universally, insofar as it contains under itself the predication that is by itself and that which is not by itself.<sup>39</sup> However, predication by itself (*praedicatio per se*) is proper of demonstrative science.

Hence, as ARISTOTLE says, before we determine from which and of what (kind of principles) a demonstration should be (produced), we ought first to determine what is understood when we say *of all* (*de omni* = κατὰ παντός), *by itself* (*per se* = καθ' αὐτό), and *universal* (*universale* = καθόλου; not to be confused with our prior use of this term).<sup>40</sup>

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<sup>36</sup> *In Post. an.* 1, l. 4, 313–322 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a5–7): “Quia uero in hac manifestatione hoc etiam omiserat [Philosophus] manifestare quod demonstratio esset ex propriis principiis, consequenter subdit quod hoc habetur etiam ex premissis: per hoc enim quod dicitur quod demonstratio est *ex primis*, habetur quod sit *ex propriis principiis*, sicut et superius dictum est; *idem enim* uidetur esse *primum et principium*, nam primum in unoquoque genere et maximum, est causa omnium eorum que sunt post, ut dicitur in II Methaphisice.”

<sup>37</sup> *In Post. an.* 1, l. 4, 236–241 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b31–33): “Et ex hoc concludit ulterius quod sint *priores et notiores*, quia omnis causa est naturaliter et prior et notior suo effectui; oportet autem quod causa conclusionis demonstratiue sit notior non solum quantum ad cognitionem ‘quid est’, set etiam quantum ad cognitionem ‘quia est’.”

<sup>38</sup> *In Post. an.* 1, l. 4, 242–245: “non enim ad demonstrandum quod eclipsis solis erit, sufficit scire quod est lune interpositio, set oportet etiam scire quod luna interponitur inter solem et terram.”

<sup>39</sup> *In Post. an.* 1, l. 35, 20–25: “ad logicam autem communiter pertinet considerare predicationem uniuersaliter, secundum quod continet sub se predicationem que est per se et que non est per se, set demonstratiue scientie propria est predicatio per se.”

<sup>40</sup> *In Post. an.* 1, l. 9, 35–39 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a25–27): “dicit [Philosophus...] quod, ante quam determinetur in speciali ex quibus et qualibus sit demonstratio, primo determinandum est quid intelligatur cum *dicimus ‘de omni’, et ‘per se’, et ‘uniuersale’*.”

Indeed, (in order) to know from what (principles) a demonstration should be (produced), it is necessary to know these, since these must be observed in (all) demonstrations.<sup>41</sup> For in the propositions of a demonstration, something must be predicated *universally* (►19), which is what **of all** signifies; (it must) also (be predicated) **by itself** (►17.8); and (it must) also (be predicated) *first*, which (is what) **universal** signifies (►53.12).

These three are had from addition (*ex additione*; ►18.5, ¶1), for everything that is predicated *by itself* is also predicated (*of all* or) *universally*, but not conversely; likewise, everything that is predicated *first* (or *universal*) is also predicated *by itself*, but this is not convertible (i.e., the order of dependence, ►47.2, is thus: [1] *de omni* = κατὰ παντός, *of all* or *universally*; [2] *per se* = καθ' αὐτό, *by itself*; [3] *universale* = καθόλου, *universal* or *first*).<sup>42</sup> Whence, too, their *ratio* of order is apparent.

The difference and number of these three is apparent because:<sup>43</sup>

1. Something is said to be predicated **of all** or **universally** *by comparison to those that are contained under the subject*.<sup>44</sup> Thus, we say something *of all*, when nothing can be taken under the subject of which the predicate would not be said (►19).
2. Something is said to be predicated **by itself** *by comparison to the subject itself*, for it is posited in its definition—or conversely (►17.8).<sup>45</sup>
3. Something is said to be predicated of another **first** *by comparison to those that are prior to the subject and contain it* (i.e., contain that which is posterior).<sup>46</sup> For example, *to have three (internal) angles (that are equal to 180°)* is not predicated *first* of the isosceles (triangle), since it is priorly predicated of (something) prior: to wit, of the triangle.

<sup>41</sup> *In Post. an.* 1, l. 9, 40–46 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a25–27): “Cognoscere enim ista est necessarium ad sciendum ex quibus sit demonstratio: hec enim obseruari in demonstrationibus oportet. Oportet enim in propositionibus demonstrationis aliquid uniuersaliter predicari, quod significat ‘dici de omni’, et ‘per se’, et etiam primo, quod significat ‘uniuersale’.”

<sup>42</sup> *In Post. an.* 1, l. 9, 46–51 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a25–27): “Hec autem tria se habent ex additione ad inuicem: nam omne quod per se predicatur, etiam uniuersaliter predicatur, set non e conuerso; similiter omne quod primo predicatur, predicatur per se, set non conuertitur; unde etiam apparet ratio ordinis istorum.”

<sup>43</sup> *In Post. an.* 1, l. 9, 51–52 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a25–27): “Diferencia etiam et numerus istorum trium apparet ex hoc quod [...]”

<sup>44</sup> *In Post. an.* 1, l. 9, 53–58 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a26): “aliquid predicari dicitur de omni siue uniuersaliter per comparationem ad ea que continentur sub subiecto: tunc enim dicitur aliquid de omni, ut habetur in libro Priorum, quando nichil est sumere sub subiecto de quo predicatum non dicatur.”

<sup>45</sup> *In Post. an.* 1, l. 9, 58–60 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a26): “per se autem dicitur aliquid predicari per comparationem ad ipsum subiectum, quia ponitur in eius diffinitione uel e conuerso.”

<sup>46</sup> *In Post. an.* 1, l. 9, 61–66 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73a27): “primo uero dicitur aliquid predicari de altero per comparationem ad ea que sunt priora subiecto et continencia ipsum: nam habere tres angulos etc., non predicatur primo de ysochele, quia prius predicatur de priori, scilicet de triangulo.”

### 53.12. Universal

ARISTOTLE shows that **universal** contains in itself both *to be said of all* and *by itself*.<sup>47</sup>

And to make evident what is said here, it is to be known that *universal* is not taken here in the mode in which everything that is predicated of many is said (to be) *universal*—as PORPHYRY (in his *Isagoge*) determines (the truth) concerning the five universals (i.e., γένος = the *predicable* genus, διαφορά = difference, εἶδος = species, ἴδιον = proper, and συμβεβηκός = accident).<sup>48</sup> Rather, *universal* is said here according to some adequation of the predicate to the subject: to wit, when neither the predicate is found outside the subject nor would the subject be without the predicate.

As ARISTOTLE says, **universal** (*universale* = καθόλου) is *that predicate which is of all*—that is, predicated of the subject universally—, *is in it by itself, and agrees with the subject insofar as it is itself the subject* (< ὃ ἂν κατὰ παντός τε ὑπάρχη καὶ καθ' αὐτὸ καὶ ἢ αὐτό).<sup>49</sup>

Thus, many (predicates) are universally predicated of some (subject) which do not agree with it *by themselves* and *insofar as itself*.<sup>50</sup> For example, every stone is colored; however, (it is not colored) insofar as (it is itself) a stone but insofar as it has a surface.

Lest someone believe that the *by itself* that ARISTOTLE said in the definition of *universal* should be (something) other than *insofar as itself*, he says that *by itself* and *insofar as itself* is the same.<sup>51</sup> For example, (the predicate) *point* is *by itself* in (the subject) *line* in the first mode (► 17.8, ¶1; i.e., because the point is a consubstantial terminus of the line); and (the predicate) *straightness* (is in the subject *line*) in the second mode (► 17.8, ¶2; i.e., because straightness is in a straight line as its property): for one (i.e., the point) and the other (i.e., straightness) is in it (i.e., in the line) *insofar as it is a line*. And conversely,

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<sup>47</sup> *In Post. an. 1, l. 11, 12–14* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b26–27): “ostendit [Philosophus] quod uniuersale continet in se et ‘dici de omni’ et ‘per se’.”

<sup>48</sup> *In Post. an. 1, l. 11, 16–24* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b26–27): “Ad euidentiam autem eorum que hic dicuntur, sciendum est quod uniuersale non hoc modo hic accipitur prout omne quod predicatur de pluribus uniuersale dicitur, secundum quod Porphirius determinat de quinque uniuersalibus; set dicitur hic uniuersale secundum quandam adequationem predicati ad subiectum, cum scilicet neque predicatum inuenitur extra subiectum neque sit subiectum sine predicato.” Cf. PORPHYRY, *Isagoge*, 1.4–5: “τί γένος καὶ τί διαφορά τί τε εἶδος καὶ τί ἴδιον καὶ τί συμβεβηκός.”

<sup>49</sup> *In Post. an. 1, l. 11, 27–31* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b26–27): “dicit [Philosophus] quod *uniuersale*, scilicet predicatum, est quod et *de omni* est, id est uniuersaliter predicatur de subiecto, et etiam *per se*, scilicet inest ei, et conuenit subiecto *secundum quod ipsum* subiectum est.”

<sup>50</sup> *In Post. an. 1, l. 11, 31–35*: “Multa enim uniuersaliter de aliquibus predicantur, que non conueniunt ei per se et secundum quod ipsum, sicut omnis lapis coloratus est, non tamen secundum quod lapis, set secundum quod est superficiem habens.”

<sup>51</sup> *In Post. an. 1, l. 11, 43–51* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b28–32): “ne aliquis crederet aliud esse quod in diffinitione uniuersalis dixerat ‘per se’ et ‘secundum quod ipsum’, dicit [Philosophus] quod ‘per se’ et ‘secundum quod ipsum’ idem est, sicut *linee per se inest punctum*, primo modo, et *rectitudo*, secundo modo: nam utrumque inest ei *secundum quod linea est*, et e conuerso triangulo *secundum quod triangulus est* insunt *duo recti*, id est quod ualet duos rectos, quia per se triangulo inest.”

(three angles) that are worth two right (angles, i.e., 180°) are in the triangle insofar as it is a triangle, for (this property) is in the triangle by itself.

(Using this very example), ARISTOTLE shows that *according to itself* is found in *universal*.<sup>52</sup> Thus, to have three (internal) angles equal to two right (angles) does not befit *isosceles* insofar as it is *isosceles*, but insofar as it is a *triangle*. Hence, whoever knows that some triangle—namely, the *isosceles*—has three (internal angles equal to 180°), has less cognition of that which is by itself than if he should know that (it is) the triangle (universally) that has three (internal angles equal to 180°). And this is to be said universally: that if something should not be in a triangle insofar as it is a triangle, and it should be demonstrated of it, whatsoever that should be, it will not be a true demonstration. On the other hand, if it should be in it insofar as it is a triangle, he has a more perfect cognition who knows (that this is) universally (true) concerning the triangle as such.

Wherefrom, ARISTOTLE concludes some conditional (*ratio of universal*), in the antecedent of which three (conditions) are posited; and these three (conditions being) supposed, it follows that to have three (internal angles equal to 180°) does not befit the triangle insofar as it is *isosceles*, but conversely:<sup>53</sup>

1. That *triangle* should be in more (things) than *isosceles*.<sup>54</sup>
2. That *triangle* is predicated of *isosceles* and of others according to the same *ratio* and not equivocally.<sup>55</sup>

He adds the first two (conditions) in the antecedent because, if *triangle* should not be in more (things than in *triangle* itself) or if it should be predicated equivocally of many, it would not be compared to *isosceles* as universal to particular.<sup>56</sup>

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<sup>52</sup> *In Post. an. 1, l. 37, 128–142* (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85b5–9): “manifestat [Philosophus] quod in uniuersali inueniatur secundum se: habere enim tres angulos equales *duobus rectis* non conuenit ysocheli secundum se, id est *secundum quod ysocheles* est, sed [sic] *secundum quod* est *triangulus*, et ideo qui cognoscit quendam triangulum habere tres, scilicet ysochelem, *minus* habet cognitionem de eo quod est per se *quam* si cognoscat quod *triangulus* habet tres. Et hoc est uniuersaliter dicendum quod, <si> aliquid non insit triangulo *secundum quod* est *triangulus* et demonstratur de eo, quicquid sit illud, *non erit* uera *demonstratio*. *Si autem* insit ei secundum quod est triangulus, *cognoscens* in uniuersali de triangulo secundum quod huiusmodi perfectiorem cognitionem habet.”

<sup>53</sup> *In Post. an. 1, l. 37, 142–144* (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85b9–13): “Ex hiis igitur concludit [Philosophus] quamdam condicionalem, in cuius antecedenti tria ponuntur.” *Ibid.*, 149–152 (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85b11–13): “et, hiis tribus suppositis, consequens est quod habere tres non conueniat triangulo *in quantum* est *ysocheles*, set e conuerso.”

<sup>54</sup> *In Post. an. 1, l. 37, 144–145* (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85b9–10): “quorum unum est quod *triangulus* sit *in plus* quam *ysocheles*.”

<sup>55</sup> *In Post. an. 1, l. 37, 145–147* (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85b10): “secundum est quod *triangulus* predicatur de ysochele et aliis secundum eandem rationem et non equiuoce.”

<sup>56</sup> *In Post. an. 1, l. 37, 153–156*: “Apposuit autem prima duo in antecedente, quia, si triangulus non esset in plus uel si equiuoce predicaretur de pluribus, non compararetur ad ysochelem sicut uniuersale ad particulare.”

3. That to have three (internal) angles equal to two right (angles) is in every triangle.<sup>57</sup>

He adds the third (condition) because, if to have three (internal angles equal to  $180^\circ$ ) should not befit every triangle, it would not befit it insofar as it is a triangle but insofar as it is some triangle—just like *having three (internal angles equal to  $180^\circ$ )*, since it does not befit any figure, does not befit *figure* insofar as it is a figure, but insofar as it is some figure that is a triangle.<sup>58</sup>

### 53.13. *Universal Adds First*

ARISTOTLE shows what *universal* should add over *said of all* and (over) *by itself*.<sup>59</sup> Thus, he says that a universal is predicated when it is demonstrated to be not only in whatever (subject) of which it is predicated but is also predicated **first** in it.

He manifests (this) through (the same) example.<sup>60</sup> Thus, he says that *to have three (internal) angles equal to two right (angles, i.e., equal to  $180^\circ$ )* is not in whatsoever figure universally, even though it should be demonstrated of a figure (as just stated). For (this property is demonstrated) of the triangle, which is a figure, but it is not in whatsoever figure. Nor does the demonstrator use in his demonstration any figure: for the quadrangle is some figure but does not have three (internal angles) equal to two right (angles).

On the other hand, the isosceles—that is, a triangle of two equal sides—indeed universally has three (internal) angles equal to two right (angles).<sup>61</sup> Yet, (this property) does not befit the isosceles *first*: rather, (it befits) *triangle* priorly, for it befits *isosceles* insofar as it is a *triangle*. Therefore, that which is demonstrated to *first* have (a property such as *three angles equal to two right (angles)*, or whatever other such (property), in that (very same subject), such as the triangle, is the universal predicated *first*.

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<sup>57</sup> *In Post. an. 1, l. 37, 148–149* (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85b10–11): “tercium est quod habere tres angulos equales *duobus* rectis insit *omni* triangulo.”

<sup>58</sup> *In Post. an. 1, l. 37, 156–163*: “Tercium autem addit quia, si habere tres non conueniret *omni* triangulo, non conueniret ei in quantum triangulus, set in quantum aliquis triangulus, sicut hoc ipsum quod est habere tres, quia non conuenit *omni* figure, non conuenit figure in quantum est figura, set in quantum est figura quedam que est triangulus.”

<sup>59</sup> *In Post. an. 1, l. 11, 53–57* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b32–33): “ostendit [Philosophus] quid addat uniuersale supra ‘dici de omni’ et ‘per se’. [...] dicit quod *tunc est uniuersale* predicatum, *cum* non solum *in quolibet*, set *et primo demonstratur* inesse ei de quo predicatur.”

<sup>60</sup> *In Post. an. 1, l. 11, 58–65* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b33–37): “manifestat [Philosophus] per exemplum, dicens quod *habere* tres angulos equales *duobus* rectis non *inest cuilibet figure uniuersaliter*, licet hoc *de figura* demonstretur, quia de triangulo, qui est figura, set tamen *non cuilibet figure inest*, neque demonstrator in sua demonstratione *utitur qualibet figura: quadrangulus enim figura quedam est, set non habet tres duobus rectis equales*.”

<sup>61</sup> *In Post. an. 1, l. 11, 65–72* (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b38–74a1): “Ysocheles autem, id est triangulus duorum equalium laterum, *habet quidem uniuersaliter tres angulos equales duobus rectis, set non conuenit primo ysocheli, set prius triangulo*, quia isocheli conuenit in quantum est triangulus. *Quod igitur primo demonstratur habere duos rectos, aut quodcunque aliud huiusmodi, huic primo inest predicatum uniuersale*, sicut triangulo.”



### 53.14. Errors in the Acceptation of the Universal

As ARISTOTLE says, to prevent an error from happening in a demonstration, it is necessary not to conceal that oftentimes it seems that a universal is demonstrated and it is not demonstrated.<sup>62</sup> He enumerates three modes in which someone may be deceived concerning the acceptation of a universal:<sup>63</sup>

1. When there should be nothing else to be taken—under something common, to which the universal befits first—(other) than *this singular* (*singulare* < τὸ καθ' ἕκαστον ἢ τὰ καθ' ἕκαστα), to which it is inadequately (*inconvenienter*) assigned.<sup>64</sup> For example, if *sensible*—which is first and by itself in *animal*—should be assigned first to *man* as universal, (if) no other (species of) animal (should) exist.

Whence, it is to be noted that *singular* is here taken largely for whatever lower (species), as if a species should be said (to be a) *singular* contained under a genus (► 49.5, ¶1).<sup>65</sup>

Or (alternatively), it can be said that it is impossible to find some genus of which there should be only one species.<sup>66</sup> For a genus is divided into species by opposite difference; and if one of the contraries should be found in nature, also the remaining (species) must be found. One species is divided into diverse individuals through the division of matter. However, the whole matter (that is) proportionate to some species may be comprehended under one individual. And then, there is but one individual under one species. Whence, too, ARISTOTLE clearly (*signanter*) mentions, the *singular*.

2. When many lower (species) can indeed be taken under something common, but that (something) common, which is found in things that differ in species, is **unnamed** (*innominatum* = ἀνώνομον). For example, if there should not be a posited name for *animal*;

<sup>62</sup> *In Post. an.* 1, l. 12, 10–13 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a4–6): “Dicit ergo [Philosophus] primo quod, ad hoc quod non accidat in demonstratione peccatum, oportet non latere quod multociens uidetur demonstrari uniuersale, non autem demonstratur.”

<sup>63</sup> *In Post. an.* 1, l. 12, 17–19 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a6–13): “enumerat [Philosophus] ipsos modos, dicens quod tripliciter contingit decipi circa acceptionem uniuersalis.”

<sup>64</sup> *In Post. an.* 1, l. 12, 20–25 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a7–8): “Primo quidem, cum nichil aliud sit accipere sub aliquo communi, cui primo competit uniuersale, quam hoc singulare, cui inconuenienter assignatur. Sicut si sensibile, quod primo et per se inest animali, assignaretur ut uniuersale primum homini, nullo alio animali existente.”

<sup>65</sup> *In Post. an.* 1, l. 12, 26–28 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a7–8): “Vnde notandum quod ‘singulare’ hic large accipitur pro quolibet inferiori, sicut si species dicatur ‘singulare’ sub genere contentum.”

<sup>66</sup> *In Post. an.* 1, l. 12, 29–41 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a7–8): “Vel potest dici quod non est possibile inuenire aliquod genus cuius una tantum sit species: genus enim diuiditur in species per oppositas diferencias, oportet autem, si unum contrariorum inuenitur in natura, et reliquum inueniri, ut patet per Philosophum in II Celi et mundi, et ideo, si una species inuenitur, inuenitur et alia. Vna autem species diuiditur in diuersa indiuidua per diuisionem materie; contingit autem totam materiam alicui speciei diuisionatam sub uno indiuiduo comprehendi, et tunc non est nisi unum indiuiduum sub una specie. Vnde et signanter de ‘singulari’ mentionem facit [Philosophus].”

and *sensible*, which is proper of *animal*, should be assigned as the first universal to those (species) that are contained under *animal*, whether separately or conjoined.<sup>67</sup>

3. When that of which something is demonstrated as the first universal is related to that which is demonstrated of it **as whole to part** (*sicut totum ad partem* < ὡς ἐν μέρει ὅλον).<sup>68</sup> For example, if *to be able to see* should be assigned to *animal* as the first universal, for not every animal is able to see. Thus, (this property) is in those (subjects) that are in a part: that is, that particularly—and not universally—befit some subject that could be demonstrated; and there will be some demonstration of all, but not in respect of those of which it is demonstrated. Thus, *to be able to see* is indeed demonstrated of something universally, but not universally of *animal*, as (it should be demonstrated) of that in which it is first. And ARISTOTLE explains what should be (that) first (subject) according to which the demonstration is produced, which is the first universal (< λέγω δὲ τούτου πρώτου, ἧ τοῦτο, ἀπόδειξιν, ὅταν ἧ πρώτου καθόλου).

### 53.15. Division of Demonstration

As ARISTOTLE says, demonstration (*demonstratio* = ἀπόδειξις) is divided in three modes:<sup>69</sup>

1. Into **universal** (*universalis* = καθόλου) and **particular** (*particularis* = κατὰ μέρος).<sup>70</sup>
2. Into **categorical** or **affirmative** (*categorica* = κατηγορική, *id est affirmativa*) and **privative** or **negative** (*privativa* = στερητική, *id est negativa*).<sup>71</sup>
3. Into that (demonstration) which demonstrates **ostensibly** (*quae demonstrat ostensive* < ἀποδεικνύειν, i.e., direct demonstration) and that which leads **to the impossible** (*ad impossibile* = εἰς τὸ ἀδύνατον, i.e., *reductio ad impossibile* or *ad absurdum*).<sup>72</sup>

<sup>67</sup> *In Post. an.* 1, l. 12, 42–49 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a8–9): “Secundus modus est quando est quidem accipere sub aliquo communi multa inferiora, set tamen illud commune *innominatum* est, quod inuenitur *in rebus differentibus specie*. Sicut si animali non esset nomen positum, et sensible, quod est proprium animalis, assignaretur ut uniuersale primum hiis que sub animali continentur, uel diuisim uel coniunctim.”

<sup>68</sup> *In Post. an.* 1, l. 12, 50–64 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a9–13): “Tercius modus est quando illud, de quo demonstratur aliquid ut uniuersale primum, se habet ad id quod demonstratur de eo *sicut totum ad partem*. Sicut si ‘posse uidere’ assignaretur animali ut uniuersale primum: non enim omne animal potest uidere. *Inest enim hiis que sunt in parte*, id est que particulariter et non uniuersaliter alicui subiecto conueniunt, *demonstratio*, id est quod demonstrari possint, *et erit* quidem demonstratio *de omni, non tamen* respectu *huius* de quo demonstratur. Posse enim uidere demonstratur quidem de aliquo uniuersaliter, non tamen uniuersaliter de animali sicut de eo cui primo insit. Et exponit [Philosophus] quid sit primum *secundum quod demonstratio* fertur, quod est uniuersale primum.”

<sup>69</sup> *In Post. an.* 1, l. 37, 15–16 (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85a13–17): “Dicit ergo [Philosophus] primo quod demonstratio tripliciter diuiditur.”

<sup>70</sup> *In Post. an.* 1, l. 37, 16–17 (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85a13–14): “uno enim modo diuiditur in uniuersalem et particularem.”

<sup>71</sup> *In Post. an.* 1, l. 37, 17–19 (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85a14): “alio autem modo diuiditur in categoricam et priuatiam, id est affirmatiuam et negatiuam.”

<sup>72</sup> *In Post. an.* 1, l. 37, 19–21 (cf. ARISTOTLE, *Analytica Posteriora* A.24, 85a15–17): “tertio modo diuiditur in eam que demonstrat ostensiuē et in eam que ducit *ad impossibile*.”

## 54. The First and Immediate Proposition

*We turn our attention to the second material condition of demonstration.*

### 54.1. The Proposition in Immediate Proposition

ARISTOTLE defines simply the **proposition** (*propositio* = πρότασις) that is posited in the definition of *immediate proposition* (►54.4), saying that it is *one or the other part of an enunciation in which one is predicated of one* (*altera pars enunciationis, <in qua predicatur> unum de uno* = ἀποφάνσεως τὸ ἕτερον μόριον, ἐν καθ' ἐνός).<sup>1</sup>

Indeed, an enunciation has two parts: namely, affirmation and negation (►19.2, ¶2).<sup>2</sup> And everyone who syllogizes must propose either of them, but not both; for this is proper of he who moves a question from a principle (*a principio*). Wherefrom, *proposition* is separated from *problem*.

Thus, just like only one (conclusion) is concluded in one syllogism, so, (too), a proposition that is a principle of a syllogism must be one.<sup>3</sup> And (a proposition that is) one is (a proposition) in which one (predicate is predicated) of one (subject). Whence, by “one [predicate] of one [subject],” (this) proposition is separated from the enunciation that is said (to be) *many* (*plures*), in which many (predicates are predicated) of one (subject) or one (predicate) is predicated of many (subjects).

### 54.2. The Immediate Proposition as the Principle and Measure of Demonstration

ARISTOTLE shows in what mode the immediate proposition is related to demonstration.<sup>4</sup>

(And to understand this), it is to be considered that, in any genus, there must be one first (principle) that is most simple in that genus and (that is) the measure of all those (things) that are in that genus (►27).<sup>5</sup> Since a measure is homogeneous to the (thing) measured

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<sup>1</sup> *In Post. an. 1, l. 5, 39–41* (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a8–9): “ostendit [Philosophus] quid sit propositio que ponitur in diffinitione immediate propositionis. [...] diffinit propositionem simpliciter, dicens quod *propositio est altera pars enunciationis*, in qua predicatur *unum de uno*.”

<sup>2</sup> *In Post. an. 1, l. 5, 41–47*: “Habet enim enunciatio duas partes, scilicet affirmationem et negationem; oportet autem quod omnis sillogizans alteram earum proponat, non autem utramque: hoc enim est proprium eius qui a principio questionem mouet; unde per hoc separatur propositio a problemate.”

<sup>3</sup> *In Post. an. 1, l. 5, 47–53*: “Sicut etiam in uno sillogismo non concluditur nisi unum, ita oportet quod propositio que est sillogismi principium sit una; una autem est in qua est unum de uno. Vnde per hoc quod dicit: «unum de uno», separatur propositio ab enunciatione que dicitur plures, in qua plura de uno uel unum de pluribus predicatur.”

<sup>4</sup> *In Post. an. 1, l. 36, 229–230* (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b37–85a1): “ostendit [Philosophus] quomodo se habeat propositio immediata ad demonstrationem.”

<sup>5</sup> *In Post. an. 1, l. 36, 230–238* (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b37–39): “Vbi considerandum est quod, sicut habetur in X Metaphisice, in quolibet genere oportet esse unum primum quod est simplicissimum in genere illo et mensura omnium que sunt illius generis; et, quia mensura est homogenea mensurato, secundum diuersitatem generum oportet esse huiusmodi prima indiuisibilia diuersa, unde *hoc non est idem* in omnibus.”

(►28.6), such first indivisible (principles) must be diverse according to the diversity of genera; wherefrom, this (measure) is not the same in all (things).

Now, the principles of a syllogism are propositions.<sup>6</sup> Whence, the simplest proposition, which is the immediate (proposition), must be the *one* that is the measure of syllogisms. And *demonstration* adds over *syllogism* that it *produces science* (►53.2).

Moreover, understanding (►51.21) is compared to science (►51.7) as the one and indivisible (is compared) to the many: for science is (produced) through a descent (*per decursum*) from principles to conclusions, while an understanding is an absolute and simple reception of principles known by themselves.<sup>7</sup>

Whence, understanding responds to the immediate proposition, while science (responds) to the conclusion, which is mediated by a proposition.<sup>8</sup> Therefore, the indivisible *one* of a demonstration—insofar as it is a syllogism—is an immediate proposition. And from the part of the science that (demonstration) causes, its (indivisible) *one* is an understanding.

### 54.3. How an Immediate Proposition is One and Indivisible

ARISTOTLE shows how first and immediate propositions must be taken in demonstrations.<sup>9</sup>

Thus, he says that, when some affirmative conclusion must be demonstrated, for example, “every B is an A,” it is necessary to take some (predicate) that **(1)** should be predicated of B before A (is predicated of B); and **(2)** of which (predicate) A should also be predicated. Let that (predicate of B and subject of A) be C.<sup>10</sup>

(For example, let A = *mortal*; B = *man*. Thus, if we want to demonstrate that *every man is mortal*, it is necessary to take some predicate, e.g., C = *animal*, such that: **[1]** *animal* should be predicated of *man*—i.e., *every man is an animal*—before *mortal* is predicated of *man*; and **[2]** *mortal* should also be predicated of *animal*—i.e., *every animal is mortal*.)

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<sup>6</sup> *In Post. an.* 1, l. 36, 248–252 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b39–85a1): “Syllogismi autem principia sunt propositiones, unde oportet quod *propositio* simplicissima, que est *inmediata*, sit *unum* quod est mensura syllogismorum; demonstratio autem addit supra syllogismum quod facit scienciam.”

<sup>7</sup> *In Post. an.* 1, l. 36, 252–257: “comparatur autem intellectus ad scienciam sicut unum et indiuisibile ad multa; nam sciencia est per decursum a principiis ad conclusiones, intellectus autem est absoluta et simplex acceptio principii per se noti.”

<sup>8</sup> *In Post. an.* 1, l. 36, 257–262 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b39–85a1): “unde intellectus respondet immediate propositioni, sciencia autem conclusioni, que est propositio mediata; sic igitur demonstrationis, in quantum est syllogismus, unum indiuisibile est *propositio inmediate*, ex parte autem sciencie, quam causat, unum eius est *intellectus*.”

<sup>9</sup> *In Post. an.* 1, l. 36, 189–191 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b31–37): “ostendit [Philosophus] qualiter oporteat sumere propositiones primas et immediatas in demonstrationibus.”

<sup>10</sup> *In Post. an.* 1, l. 36, 196–200 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b31–33): “Dicit ergo [Philosophus] primo quod, quando oportet *demonstrare* aliquam conclusionem affirmatiuam, puta: «Omne B est A», necesse est accipere aliquid quod primo predicetur de B quam A et de quo A etiam predicetur, et sit illud C.”

And, again, if there should be some (subject) of which A would be predicated priorly than (A is predicated) of C, always proceeding thus in demonstrating, neither a proposition nor a terminus that signifies some being would be taken outside of A itself.<sup>11</sup> For A would have to be predicated of it by itself; and (A would have to be predicated of it) in such a way that (the subject) would be contained under it (i.e., A) and it would not be extrinsic to it: rather, (we) would always have to condense (*condensare* = πυκνοῦται) the means.

(Thus, let there be some subject of which *mortal* should be predicated before *mortal* is predicated of *animal*: for example, *living organism*. Indeed, *mortal* is predicated of *living organism* before it is predicated of *animal*; for *animal* is contained under *living organism*. And if we always proceed in this way, it is impossible to take anything that would be outside of *mortal* itself. Instead, we would always have to “condense” or “pack” more and more means between *mortal* and *man*, all of which would be contained under *mortal*.)

ARISTOTLE speaks (here) in the likeness of men who, sitting in some bench, seem to be condensed (i.e., pressed close together) when no one can cut through a mean between the sitting (men).<sup>12</sup> So, too, the means in a demonstration are said (to be) *pressed together* (*densata*) when nothing can fall (as a) mean between the terms taken.

And this is what he says.<sup>13</sup> That the mean is pressed together until (we) arrive at this: that the spaces should become indivisible (< τὸ μέσον πυκνοῦται, ἕως ἀδιαίρετα γένηται); that is, the distances between two terms would be such that they could not be divided into multiple such distances; instead, there would be one (< ἓν) space only. And this happens when the proposition is immediate. For a proposition is truly one when it is immediate (< ἔστι... ἐν ὅταν ἄμεσον γένηται, καὶ μία πρότασις ἀπλῶς ἢ ἄμεσος) not only in act but also in potency.

Indeed, if it should be mediate (i.e., as opposed to immediate), even though it would be one in act because one (predicate) is predicated of one (subject), it is nonetheless many

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<sup>11</sup> *In Post. an.* 1, l. 36, 200–207 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b33–35): “Et, si iterum sit aliquid de quo A per prius predicetur quam de C, sic semper procedendo nec *propositio* nec terminus significans aliquod ens accipietur *in demonstrando extra ipsum* A, quia oportebit quod A predicetur de eo per se et ita quod contineatur sub eo et non sit ab eo extrinsecum, set oportebit *semper* condensare media.”

<sup>12</sup> *In Post. an.* 1, l. 36, 207–212 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b35): “et loquitur ad similitudinem hominum qui videntur esse condensati sedentes in aliqua sede quando inter sedentes nullus potest interciderere medius: ita et media in demonstratione dicuntur densata quando inter terminos acceptos nichil cadit medium.”

<sup>13</sup> *In Post. an.* 1, l. 36, 212–220 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b35–37): “Et hoc est quod dicit [Philosophus] quod *medium densatur quousque* perueniatur ad hoc quod spatia *fiant indivisibilia*, id est distancie inter duos terminos sint tales quod non possint diuidi in plures huiusmodi distantias, set sit *unum* spatium tantum. Et hoc contingit quando propositio est immediata; tunc enim est uere *una propositio* non solum actu, set etiam potencia, quando est *immediata*.”

in potency. For (if) a mean (is) taken, two propositions are formed—just like a line, which is one in act insofar as it is continuous, is nonetheless many in potency insofar as it is divisible by a mean point.<sup>14</sup>

Thus, ARISTOTLE says that the immediate proposition is one as simple and indivisible.<sup>15</sup>

#### 54.4. Definition of *Immediate Proposition*

As has been said, the principle of demonstration (*principium demonstrationis* = ἀρχή... ἀποδείξεως) is the immediate proposition.<sup>16</sup> ARISTOTLE defines **immediate proposition** (*propositio immediata* = πρότασις ἄμεσος), saying that it is *that (proposition) to which no other is prior (qua non est altera prior* = ἧς μὴ ἔστιν ἄλλη προτέρα).<sup>17</sup>

The *ratio* of its notification is apparent from the aforesaid.<sup>18</sup> For it has been said (► 53.10) that a demonstration is (produced) from prior (knowledge; more on this, below; ► 57). Therefore, whenever some proposition is mediate—that is, having a mean by which the predicate would be demonstrated of the subject—, there must be propositions prior to it from which it should be demonstrated. Indeed, the predicate of the conclusion is in the mean before it is in the subject (*per prius inest medio quam subiecto*), in which, too, the mean is before the predicate (*cui etiam per prius inest medium quam predicatum*). It therefore remains that that proposition should be immediate to which no other is prior.

#### 54.5. Division into Proper vs. Common Principles

ARISTOTLE divides principles (into) *proper* and *common*.<sup>19</sup> He says that, of the principles that we use in the demonstrative sciences, some are **proper** (*propria* = ἴδια) to each science, while others are **common** (*communia* = κοινά).

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<sup>14</sup> *In Post. an.* 1, l. 36, 220–226: “Si enim sit mediata, quamvis sit una in actu, quia unum predicatur de uno, tamen est multa in potencia, quia accepto medio formantur due propositiones, sicut etiam linea que est una in actu in quantum est continua, est tamen multa in potencia in quantum est diuisibilis per punctum medium.”

<sup>15</sup> *In Post. an.* 1, l. 36, 226–227 (cf. ARISTOTLE, *Analytica Posteriora* A.23, 84b35–37): “et ideo dicit [Philosophus] quod propositio immediata est una sicut simplex indiuisibilis.”

<sup>16</sup> *In Post. an.* 1, l. 5, 16–19 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a7): “resumit [Philosophus] quod supra dictum erat, scilicet quod *principium demonstrationis* sit *propositio immediata*: nam et supra dixerat quod demonstratio est ex primis et immediatis.”

<sup>17</sup> *In Post. an.* 1, l. 5, 20–23 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a7–8): “diffinit [Philosophus] immediatam propositionem. Et dicit quod *immediata* propositio *est qua non est altera prior*.”

<sup>18</sup> *In Post. an.* 1, l. 5, 23–34: “Cuius quidem notificationis ratio ex predictis apparet: dictum est enim supra quod demonstratio est ex prioribus; quandocumque igitur aliqua propositio est mediata, id est habens medium per quod demonstratur predicatum de subiecto, oportet quod priores ea sint propositiones ex quibus demonstratur; nam predicatum conclusionis per prius inest medio quam subiecto, cui etiam per prius inest medium quam predicatum; relinquatur ergo quod illa propositio qua non est altera prior sit immediata.”

<sup>19</sup> *In Post. an.* 1, l. 18, 64–71 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a37–38): “diuidit [Philosophus] principia propria et communia [...], dicens quod principiorum *quibus utimur in demonstratiuis scienciis, alia sunt propria uniuscuiusque sciencie, alia uero communia*.”

The common conceptions of the soul have something (in) common with the other (i.e., with the particular) principles of demonstration and something proper (to them):<sup>20</sup>

1. The (something in) common (that) they have (is) indeed that it is necessary for them—as much as for the others—to be true (i.e., the first material condition; ► 53.6, ¶1).<sup>21</sup>
2. And (what) is proper to these (common) principles (is) that not only is it necessary for them to be true by themselves, but it must also be apparent that they should by themselves be true: for no contraries of them can be opined.<sup>22</sup>

#### **54.6. Division of the Immediate Principle of the Syllogism into *Position* and *Axiom***

To understand this division (of the immediate principle of the syllogism into *position* and *axiom*), it is to be known that any proposition whose predicate is in the *ratio* of the subject (► 17.8, ¶1) is immediate and known by itself in respect of itself (*quantum est in se*).<sup>23</sup>

However, the termini of some propositions are such that they are known to all: for example, *being* (*ens*), *one*, and others that belong to *being* as such (*in quantum ens*); for *being* is the first conception of the intellect (► 49.7, ¶1).<sup>24</sup> Whence, such propositions must be held as known by themselves not only in (respect of) themselves, but also in respect of all (intellects). For example, that it is impossible (simultaneously) to be and not to be; that a whole should be greater than its part; and (other evident propositions) like (these). Whence, too, all sciences take such principles from metaphysics, to which it belongs to consider *being* simply, and those (properties) that belong to *being*.

On the other hand, there are some immediate propositions whose terms are not known to all.<sup>25</sup> Whence, although the predicate should belong to the *ratio* of the subject, however,

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<sup>20</sup> *In Post. an.* 1, l. 19, 18–21: “communes animi conceptiones aliquid habent commune cum aliis principiis demonstrationis et aliquid proprium.”

<sup>21</sup> *In Post. an.* 1, l. 19, 21–22: “commune quidem habent, quia necesse est tam ista quam alia principia per se esse uera.”

<sup>22</sup> *In Post. an.* 1, l. 19, 23–26: “proprium autem est horum principiorum quod non solum necesse est ea per se uera esse, set etiam necesse est uideri quod per se sint uera: nullus enim potest opinari contraria eorum.”

<sup>23</sup> *In Post. an.* 1, l. 5, 116–119 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a14–18): “Ad huius autem diuisionis intellectum, sciendum est quod quelibet propositio cuius predicatum est in ratione subiecti est immediata et per se nota, quantum est in se.”

<sup>24</sup> *In Post. an.* 1, l. 5, 120–130 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a14–18): “Set quarundam propositionum termini sunt tales quod sunt in notitia omnium, sicut ens et unum et alia que sunt entis in quantum ens: nam ens est prima conceptio intellectus. Vnde oportet quod tales propositiones non solum in se, set etiam quo ad omnes quasi per se note habeantur; sicut quod non contingit idem esse et non esse, et quod totum sit maius sua parte, et similia. Vnde et huiusmodi principia omnes scientie accipiunt a metaphisica, cuius est considerare ens simpliciter et ea que sunt entis.”

<sup>25</sup> *In Post. an.* 1, l. 5, 131–143 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a14–18): “Quedam uero propositiones sunt immediate quarum termini non sunt apud omnes noti. Vnde, licet predicatum sit de ratione subiecti, tamen quia diffinitio subiecti non est omnibus nota, non est necessarium quod tales propositiones ab omnibus concedantur; sicut hec propositio: «Omnes recti anguli sunt equales», est,

since the definition of the subject is not known to all, it is not necessary for such propositions to be conceded by all.

For example, the proposition “all right angles are equal” is, in respect of itself, known by itself or immediate, because *equality* falls in the definition of *right angle*. Indeed, a **right angle** is (that angle) *which produces a straight line over another straight line that falls in such a way that the angles should be rendered equal on one part and on the other*. And thus, such principles are received with some position.

Thus, as ARISTOTLE says, the **immediate principle of the syllogism** is twofold:<sup>26</sup>

1. The **position** (*positio* = θέσις), which: **(a)** is not demonstrable; wherefrom it is said (to be) *immediate*; and, for someone who must be instructed in a demonstrative science, **(b)** it is not necessary to conceive (such a position) in the mind or to assent to it.<sup>27</sup>

2. The **axiom** (*dignitas* = ἀξίωμα, i.e., common notion) or **maximal proposition** (*maxima propositio*), which is necessary—for anyone who must be instructed—to have in mind and to assent to it.<sup>28</sup>

In such (principles), we use the aforesaid name—to wit, (that) of *axiom* or of *maximal* (*maxime* = μάλιστα) *proposition*—on account of the certitude of such a principle (in order) to manifest other (things).

It is manifest that some principles are such. For example, ARISTOTLE proves, concerning the principle that *affirmation and negation are not simultaneously true*, that no mind can believe its contrary, even if (someone) should utter (it) orally.<sup>29</sup>

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quantum est in se, per se nota siue immediata, quia equalitas cadit in diffinitione anguli recti: angulus enim rectus est quem facit linea recta super aliam rectam cadens ita quod ex utraque parte anguli reddantur equales. Et ideo cum quadam positione recipiuntur huiusmodi principia.” See EUCLID, *Opera Omnia*, vol. 1, 2.16–4.2: “Ὅταν δὲ εὐθεῖα ἐπ’ εὐθεῖαν σταθεῖσα τὰς ἐφεξῆς γωνίας ἴσας ἀλλήλαις ποιῆ, ὀρθὴ ἑκατέρα τῶν ἴσων γωνιῶν ἐστὶ.” HEIBERG’s version (ibid., 3–5): “Ubi uero recta super rectam lineam erecta angulos deinceps positos inter se aequales efficit, rectus est uterque angulus aequalis.”

<sup>26</sup> *In Post. an.* 1, l. 5, 98–99 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a14–18): “Dicit ergo [Philosophus] primo quod immediatum principium sillogismi duplex est.”

<sup>27</sup> *In Post. an.* 1, l. 5, 99–104 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a15–16): “Vnum est quod dicitur positio, quam neque contingit demonstrare, et ex hoc immediatum dicitur, neque tamen *aliquem docendum*, id est qui doceri debet, in demonstratiua scientia, *necesse est habere*, id est mente concipere siue ei assentire.”

<sup>28</sup> *In Post. an.* 1, l. 5, 104–107 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a16–17): “Aliud uero est quod dicitur dignitas uel maxima propositio, *quam necesse est habere* in mente et ei assentire *quemlibet* qui doceri debet.” See LIDDELL and SCOTT, *A Greek-English Lexicon*, entry for ἀξίωμα. *In Post. an.* 1, l. 5, 112–115 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a17–18): “in talibus utimur nomine predicto, scilicet dignitatis uel ‘maxime’ propositionis, propter huiusmodi principiorum certitudinem ad manifestandum alia.”

<sup>29</sup> *In Post. an.* 1, l. 5, 107–111 (cf. ARISTOTLE, *Metaphysica* Γ.3, 1005b25–26): “et manifestum est quod quedam principia talia sunt, ut probatur in IV Metaphisice de hoc principio quod affirmatio et negatio non sunt simul uera, cuius contrarium nullus mente credere potest, etsi ore proferat.”



#### 54.7. Division of *Position* into *Supposition* and *Definition*

In the subdivision (of *position* into *supposition* and *definition*), ARISTOTLE does not again take up the *immediate proposition*, but the *immediate principle*, to subdivide it: for not only a proposition can be said (to be) the principle of a syllogism, but also a definition.<sup>30</sup>

Or (explained alternatively), it can be said that, although a definition in itself should not be a proposition *in act*, it nonetheless is a proposition *virtually*, for (when) a definition (is) known, it becomes apparent that the definition is truly predicated of a subject.<sup>31</sup> (In this way, all of EUCLID's definitions are first formulated and then supposed; ► 1.3, *in fine*.)

Thus, ARISTOTLE subdivides **position** (*positio* = θέσις) into:<sup>32</sup>

**1. Supposition** (*suppositio* = υπόθεσις), a position that takes some part—to wit, affirmation or negation (► 19.2, ¶2)—of an enunciation (< ἢ... ὅποτερονοῦν τῶν μορίων τῆς ἀντιφάσεως λαμβάνουσα [θέσις]).<sup>33</sup> It is called *supposition* because it is supposed as having truth. This is what he signifies when he says, “as (when) I say that something is or that it is not” (< οἷον λέγω τὸ εἶναι τι ἢ τὸ μὴ εἶναι τι).

**2. Definition** (*definitio* = ὁρισμός), a position that does not signify being (*esse*) or non-being.<sup>34</sup>

Thus, the definition of *unit* is posited by the arithmetician as some principle: to wit, that the **unit** (*unitas* = μονάς) is *the indivisible* (simply) according to quantity (*indivisible secundum quantitatem* = τὸ ἀδιαίρετον... κατὰ τὸ ποσόν).<sup>35</sup>

Nonetheless, a definition is not said (to be a) *supposition*.<sup>36</sup> For that properly is supposed which signifies the true or the false. Hence, ARISTOTLE adds, *what the unit is* (*quod quid*

<sup>30</sup> *In Post. an.* 1, l. 5, 175–178: “in subdiviisione non resumit [Philosophus] immediatam propositionem ad subdividendum, set immediatum principium; principium autem sillogismi dici potest non solum propositio, set etiam diffinitio.”

<sup>31</sup> *In Post. an.* 1, l. 5, 179–182: “Vel potest dici quod, licet diffinitio in se non sit propositio in actu, est tamen in uirtute propositio, quia, cognita diffinitione, apparet diffinitionem de subiecto uere predicari.”

<sup>32</sup> *In Post. an.* 1, l. 5, 153–155 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a18–20): “subdiuidit [Philosophus] alterum membrum prime diuisionis, scilicet positionem.”

<sup>33</sup> *In Post. an.* 1, l. 5, 155–157 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a18–20): “quedam positio est que accipit aliquam partem *enunciationis*, scilicet affirmationem uel negationem, quod significat [Philosophus] cum dicit: *ut dico aliquid esse aut non esse*.” Ibid., 158–160: “hec positio suppositio dicitur, quia tanquam ueritatem habens supponitur.”

<sup>34</sup> *In Post. an.* 1, l. 5, 160–162 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a20–21): “Alia autem positio est que non significat esse uel non esse, sicut *diffinitio*, que *positio* dicitur.”

<sup>35</sup> *In Post. an.* 1, l. 5, 162–165 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a21–23): “ponitur enim ab arismetico diffinitio unitatis tanquam quoddam principium, scilicet quod unitas est *indivisible secundum quantitatem*.”

<sup>36</sup> *In Post. an.* 1, l. 5, 162–165 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 72a23–24): “set tamen diffinitio *non* dicitur *suppositio*: illud enim proprie supponitur quod uerum uel falsum significat. Et ideo subdit

*est unitas* = τὸ... τί ἔστι μονὰς), which signifies neither true nor false, *is not the same as that the unit is* (*esse unitatem* = τὸ εἶναι μονάδα), which signifies (something) true or false.

#### 54.8. Supposition vs. Relative Supposition, Petition, and Question

ARISTOTLE distinguishes **suppositions** and **petitions** from each other.<sup>37</sup> And it is to be known that they have something common and they differ in something.

They have in common that, even though they are demonstrable (*demonstrabilia* = δεικτά), however, the demonstrator accepts them without demonstrating (*accipit <ea> non demonstrans* = λαμβάνει αὐτὸς μὴ δείξας).<sup>38</sup>

Above all, (the demonstrator accepts them without demonstrating) because they are not demonstrable by that science, but by another (►56.7; 63).<sup>39</sup> Whence, too, they are reckoned among the immediate principles, since the demonstrator uses them without a mean because they do not have a mean in that science.

However, (supposition and petition) differ from each other because:<sup>40</sup>

1. If such a proposition should be probable to the learner by whom the demonstration is produced (< ἔαν... δοκοῦντα λαμβάνη τῷ μανθάνοντι), it is said (to be a) **supposition** (*suppositio* = ὑπόθεσις, i.e., a hypothesis); and in this way, *supposition* is said *non-simply* (*non simpliciter* = οὐχ ἀπλῶς; i.e., not as defined above), but (only, μόνον) **in respect of someone** (*ad aliquem* < πρὸς ἐκεῖνον).<sup>41</sup>

2. If, on the other hand, that (person) should be neither of the same opinion nor of the contrary, the demonstrator must petition (*petat*) this from that (person), (and) then it is said (to be a) **petition** (*petitio* < αἰτεῖται).<sup>42</sup>

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[Philosophus] quod *non idem est quod quid est unitas*, quod neque uerum neque falsum significat, et *esse unitatem*, quod significat uerum uel falsum.”

<sup>37</sup> *In Post. an.* 1, l. 19, 55–57 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b27–34): “distinguit [Philosophus] suppositiones et petitiones ad inuicem. Sciendum tamen quod aliquid commune habent et in aliquo differunt.”

<sup>38</sup> *In Post. an.* 1, l. 19, 57–59 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b27–28): “Hoc quidem commune est eis quod, cum sint *demonstrabilia*, tamen demonstrator *accipit ea non demonstrans*.” Ibid., 72–74 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b33–34): “Hoc tamen omnibus commune est quod unoquoque eorum utitur demonstrator *non demonstrans, cum sit demonstrabile*.”

<sup>39</sup> *In Post. an.* 1, l. 19, 59–64: “et precipue quia non sunt demonstrabilia per hanc scienciam, set per aliam, ut supra dictum est; unde et inter immediata principia computantur, quia demonstrator utitur eis absque medio, eo quod non habent medium in illa sciencia.”

<sup>40</sup> *In Post. an.* 1, l. 19, 64–65: “Differunt autem ad inuicem, quia [...]”

<sup>41</sup> *In Post. an.* 1, l. 19, 65–68 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b28–30): “*si quidem* talis propositio sit probabilis addiscenti cui fit demonstratio, dicitur suppositio, et sic suppositio dicitur *non simpliciter, set ad aliquem*.”

<sup>42</sup> *In Post. an.* 1, l. 19, 68–70 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b30–31): “*si uero ille neque sit eiusdem opinionis neque contrarie*, oportet quod demonstrator hoc ab eo petat, et tunc dicitur petitio.”

3. And if he should be of the contrary opinion, then it will be a **question** (*questio* = αἵτημα), about which it is necessary to dispute between them.<sup>43</sup>

#### 54.9. The Supposition-Postulate

There is also another mode in which some propositions are said (to be) **suppositions** (*suppositiones*, i.e., what EUCLID calls **postulates**, *postulata* = αἰτήματα).<sup>44</sup> For there are some propositions that can only be proven through the principles of another science; and hence, they must be supposed in the (former) science, even if they should be proven through the principles of the other science. (Note that the supposition-postulate differs from the question of the same Greek name [αἵτημα], in which opinions are confronted.)

For example, the geometer supposes that a straight line is (i.e., can be) drawn from (any) point to (any) point (i.e., EUCLID's First Postulate); and the natural (philosopher) proves (it), showing that between whichever two points there should be a mean line.<sup>45</sup>

#### 54.10. Definitions vs. Suppositions or Petitions

ARISTOTLE distinguishes definitions from suppositions through two arguments.<sup>46</sup>

1. Every supposition or petition says *that something is* or *that it is not*.<sup>47</sup> On the other hand, terms, definitions (*termini* = ὅροι, *id est diffinitiones*) do not say *that something is* or *that it is not*.

Therefore, taken by themselves, terms are neither suppositions nor petitions.<sup>48</sup> On the other hand, taken in propositions, they are suppositions: for example, when it is said, "man is a rational, mortal animal." Nevertheless, taken by themselves, *termini*—that is, definitions—must be understood; and *to understand* is not *to suppose*, just as *to hear* (is

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<sup>43</sup> *In Post. an.* 1, l. 19, 70–72 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b31–33): "Si autem sit contrarie opinionis, tunc erit *questio*, de qua oportet disputari inter eos."

<sup>44</sup> *In Post. an.* 1, l. 5, 144–149: "Est et alius modus, quo aliquae propositiones suppositiones dicuntur. Sunt enim quaedam propositiones quae non possunt probari nisi per principia alterius scientie, et ideo oportet quod in illa scientia supponantur, licet probentur per principia alterius scientie."

<sup>45</sup> *In Post. an.* 1, l. 5, 149–152: "sicut a puncto ad punctum rectam lineam ducere supponit geometra et probat naturalis, ostendens quod inter quelibet duo puncta sit linea media." See EUCLID, *Opera Omnia*, vol. 1, 8.7–8: "Ἡτήσθω ἀπὸ παντὸς σημείου ἐπὶ πᾶν σημείον εὐθείαν γραμμὴν ἀγαγεῖν." HEIBERG's version (*ibid.*, 9): "Postuletur, ut a quouis puncto ad quouis punctum recta linea ducatur."

<sup>46</sup> *In Post. an.* 1, l. 19, 75–76 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b35–77a4): "distinguit [Philosophus] diffinitiones a suppositionibus per duas rationes."

<sup>47</sup> *In Post. an.* 1, l. 19, 79–82 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b35–36): "Primo ponit rationem, quae talis est. Omnis suppositio uel petitio dicit aliquid esse uel non esse; *termini* autem, id est diffinitiones, non *dicunt* aliquid esse uel *non esse*."

<sup>48</sup> *In Post. an.* 1, l. 19, 82–91 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b36–39): "*termini* ergo *non sunt suppositiones* neque *petitiones*, per se sumpti. *Set in propositionibus* assumpti, *sunt suppositiones*, ut cum dicitur: «Homo est animal rationale mortale». *Set terminos* per se sumptos *oportet solum intelligere*; *intelligere autem non est supponere*, sicut nec *audire*. *Set illa supponuntur quorumcunque existentium*, id est ex quibuscunque existentibus, *fit conclusio in eo quod illa sunt*, id est propter premissa."

not to assent to what is heard). On the other hand, those are (said to be) supposed of which a conclusion is produced because they have been premised.

2. Every supposition or petition is in whole or in part (< ἢ ὡς ὅλον ἢ ὡς ἐν μέρει): that is, it is a universal or a particular proposition.<sup>49</sup> Definitions, on the other hand, are neither, since nothing is predicated in them—neither universally nor particularly.

#### 54.11. Manifesting the Essence of a Thing through Definition

As ARISTOTLE says, to manifest (through a *ratio* or definition) the essence (of a thing), such (terms of the *ratio*) are to be taken (*accipienda sunt* < ληπτέον) that are always (in the thing) and in more (things), but not outside the genus, up to (*usque ad* = μέχρι) such a term that:<sup>50</sup>

1. First (*primo* < πρώτον), any one (of the terms, *unumquodque* = ἕκαστον) that is taken should be in more (things, *sit in plus* = ἐπὶ πλέον ὑπάρξει).<sup>51</sup>

2. Nevertheless, all (of the terms taken together, *omnia* = ἅπαντα) should not be in more (things, *non sint in plus* = μὴ ἐπὶ πλέον [ὑπάρξει]).<sup>52</sup> Rather, (all of the terms of the *ratio* or definition taken together) should be convertible with the thing whose essence is sought. Indeed, it is necessary for such a *ratio* to signify the essence of the thing (*huiusmodi enim rationem necesse est significare 'quod quid est' rei* < ταύτην γὰρ ἀνάγκη οὐσίαν εἶναι τοῦ πράγματος).

#### 54.12. Immediate Contraries in a Definition

Someone might believe that whoever uses division (in order) to define would need to petition (*indigeat petere*) that the divided whole be contained under the members of the division.<sup>53</sup> However, ARISTOTLE excludes this error, saying that this is not necessary if the

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<sup>49</sup> *In Post. an.* 1, l. 19, 106–112 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 77a3–4): “ponit [Philosophus] secundam rationem, que talis est. *Omnis petitio uel suppositio est in toto uel in parte*, id est est propositio uniuersalis uel particularis; set diffinitiones *neutrum horum* sunt, quia in eis nichil predicatur neque uniuersaliter neque particulariter; ergo et cetera.”

<sup>50</sup> *In Post. an.* 2, l. 13, 59–62 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96a32–33): “Dicit ergo [Philosophus] primo quod, ad manifestandum ‘quod quid est’, *accipienda sunt* talia que quidem sunt semper et in plus, non tamen extra genus, *usque ad* talem terminum, ut [...]”

<sup>51</sup> *In Post. an.* 2, l. 13, 62–63 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96a33): “primo quidem *unumquodque* quod accipitur *sit in plus*.”

<sup>52</sup> *In Post. an.* 2, l. 13, 63–66 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96a34–35): “*omnia autem non sint in plus*, set conuertantur cum re cuius queritur ‘quod quid est’; huiusmodi enim rationem *necesse est significare* ‘quod quid est’ *rei*.”

<sup>53</sup> *In Post. an.* 2, l. 15, 73–82 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 97a19–22): “excludit [Philosophus] secundum errorem. Posset enim aliquis credere quod quicumque utitur diuisione ad definiendum, indigeat petere quod totum diuisum contineatur sub membris diuisionis. Set ipse dicit quod hoc non est necessarium, *si opposita*, per que fit diuisio, sunt immediata, quia secundum hoc necessarium est quod totum diuisum sub *altero* oppositorum contineatur, dum tamen accipiantur prime difference alicuius generis.”

opposites whereby the division is produced are immediate. For, according to this, it is necessary for the divided whole to be contained under the other of the (two) opposites—provided, however, that the first differences of some genus be taken. (Note that the *ratio* of one immediate opposite can be known from the *ratio* of the other, as in *odd* and *even*.)

#### 54.13. Diversity of Definitions

It is to be known that diverse definitions—taken from diverse causes—can be given of the same thing.<sup>54</sup> And causes have an order (in relation) to each other, for the *ratio* of one is taken from another (► 10.1). Therefore, the definition that is taken from the end must be the *ratio* and proving cause of the other definitions that are taken from other causes.

Let us, therefore, posit two definitions of *house*, of which one should be taken from the material cause, which would be such: “A house is a covering constituted from stones, cement, and wood”; (and) the other (definition of *house*) should be taken from the final cause, which would be such: “A house is a covering that protects us from rain, cold, and heat.” Therefore, the first definition can be demonstrated from the second (definition) in this mode: “Every covering that protects us from rain, cold, and heat must be constituted from stones, cement, and wood; a house is such [a covering]; therefore, etc.”<sup>55</sup>

It is therefore evident that the definition that is taken from the end is the principle of demonstration.<sup>56</sup> On the other hand, the (definition) that is taken from matter is the conclusion of the demonstration. However, one and the other can be conjoined, such that there should be one definition, in this mode: “A house is a covering constituted from the aforesaid [i.e., stones, cement, and wood], that protects [us] from rain, cold, and heat.”

Such a definition contains everything that is in the demonstration: to wit, the mean and the conclusion.<sup>57</sup> And hence, such a definition is a demonstration that differs in position, for it differs from a demonstration only in that it is not ordered in mode and in figure.

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<sup>54</sup> *In Post. an.* 1, l. 16, 62–65: “sciendum est quod contingit diffinitiones diuersas dari eiusdem rei, sumptas ex diuersis causis. Cause autem ad inuicem ordinem habent, nam ex una sumitur ratio alterius.” *Ibid.*, 72–74: “Oportet ergo quod diffinitio que sumitur a fine sit ratio et causa probatiua aliarum diffinitionum que sumuntur ex aliis causis.”

<sup>55</sup> *In Post. an.* 1, l. 16, 74–85: “Ponamus ergo duas diffinitiones domus, quarum una sumatur a causa materiali, que sit talis: «Domus est cooperimentum constitutum ex lapidibus, cemento et lignis»; alia sumatur ex causa finali, que sit talis: «Domus est cooperimentum prohibens nos a pluuiis, frigore et calore». Potest ergo prima diffinitio demonstrari ex secunda, hoc modo: «Omne cooperimentum prohibens nos a frigore, pluuiis et calore, oportet quod sit constitutum ex lapidibus, cemento et lignis; domus est huiusmodi; ergo etc.»”

<sup>56</sup> *In Post. an.* 1, l. 16, 85–91: “Patet ergo quod diffinitio que sumitur a fine est principium demonstrationis, illa autem que sumitur a materia, est demonstrationis conclusio. Potest tamen utraque coniungi, ut sit una diffinitio, hoc modo: «Domus est cooperimentum constitutum ex dictis, defendens a frigore, pluuiis et calore.»”

<sup>57</sup> *In Post. an.* 1, l. 16, 91–96 (cf. ARISTOTLE, *Analytica Posteriora* A.8, 75b30–32): “talis autem diffinitio continet totum quod est in demonstratione, scilicet medium et conclusionem, et ideo talis diffinitio est

#### 54.14. Genera of Definitions in Comparison to Demonstration

A definition is either the principle of a demonstration or the conclusion or a demonstration that differs in position.<sup>58</sup>

Therefore, as ARISTOTLE says, the genus of definition is threefold in comparison to demonstration:<sup>59</sup>

1. There is a definition that is the indemonstrable *ratio* of a thing's essence (< λόγος τοῦ τί ἐστὶν ἀναπόδεικτος).<sup>60</sup> And this is the (definition) that belongs to immediate (principles).
2. There is a definition that is as some demonstrative syllogism of its essence (< συλλογισμὸς τοῦ τί ἐστὶ) and differs from demonstration only according to a diverse acceptation and position of the dictions.<sup>61</sup> For example, when one says, "thunder is a sound of fire extinguished in the clouds" (i.e., a definition that contains all the causes).
3. There is a definition that is significative only of *what is* and is the conclusion of a demonstration (< τῆς τοῦ τί ἐστὶν ἀποδείξεως συμπέρασμα).<sup>62</sup>

#### 54.15. No Definition through Metaphors

ARISTOTLE excludes some mode of proceeding in definitions.<sup>63</sup> He says that, just as we ought not to dispute through metaphors, so, too, we ought not to define through metaphors: for example, if we should say that "man is an inverted tree." Nor ought we assume in definitions any (things that are) metaphorically said. Indeed, definitions are the main and most efficacious means in disputations; therefore, if definitions were given

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demonstratio positione differens, quia in hoc solo differt a demonstratione, quia non est ordinata in modo et figura."

<sup>58</sup> *In Post. an.* 1, l. 26, 42–44: "diffinitio aut est principium demonstrationis aut conclusio aut demonstratio positione differens."

<sup>59</sup> *In Post. an.* 2, l. 8, 179–181 (cf. ARISTOTLE, *Analytica Posteriora* B.10, 94a11–14): "Ex hoc ergo concludit quod triplex est genus diffinitionis per comparisonem ad demonstrationem."

<sup>60</sup> *In Post. an.* 2, l. 8, 181–183 (cf. ARISTOTLE, *Analytica Posteriora* B.10, 94a11–12): "quedam enim est diffinitio, que est *indemonstrabilis ratio* eius 'quod *quid est*', et hec est illa, quam dixerat esse immediatorum."

<sup>61</sup> *In Post. an.* 2, l. 8, 183–189 (cf. ARISTOTLE, *Analytica Posteriora* B.10, 94a12): "alia *uero* est diffinitio que est quasi quidam *sillogismus* demonstratiuus eius 'quod *quid est*', et non differt a *demonstratione* nisi *casu*, id est secundum diuersam acceptionem et positionem dictionum, ut cum dicitur: «Tonitruum est sonus extincti ignis in nubibus»."

<sup>62</sup> *In Post. an.* 2, l. 8, 189–191 (cf. ARISTOTLE, *Analytica Posteriora* B.10, 94a12–14): "*tercia* autem est diffinitio que est solum significatiua *ipsius* 'quod *quid est*' et est *conclusio demonstrationis*."

<sup>63</sup> *In Post. an.* 2, l. 16, 140–153 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 97b37–39): "excludit [Philosophus] quendam modum procedendi in diffinitionibus. Et dicit quod sicut non *oportet disputare* per metaphoras, ita etiam non *oportet diffinire* per metaphoras, utpote si dicamus quod «Homo est arbor inuersa», *neque* etiam *oportet* in diffinitionibus assumere *quecunque* metaphorice *dicuntur*: cum enim diffinitiones sint precipua et efficacissima media in disputationibus, si diffinitiones darentur per metaphoras, sequeretur quod *oporteret* ex *metaphoris disputare*. Hoc autem fieri non debet, quia metaphora accipitur secundum aliquid simile, non autem *oportet* ut id quod est simile secundum unum, sit simile quantum ad omnia."

through metaphors, it would follow that we should dispute from metaphors. However, this must not be done; for metaphors are taken according to some likeness, and that which is alike according to one (mode) need not be alike in respect of all (modes).





## 55. The Causes of the Conclusion

Here, we turn our attention to another material condition of demonstration: the intrinsic and extrinsic causes of the conclusion.

### 55.1. The Conclusion

It is to be known that, since science properly is of conclusions, while understanding (is) of principles, (what is) properly said to be *scientifically knowable* (*scibilia*) are the conclusions of demonstration.<sup>1</sup> In these (conclusions), affections (*passiones*, i.e., properties or necessary accidents; ► 15.17) are predicated of (their) proper subjects. And the proper subjects are not only posited in the definition of (their) accidents but are also their causes.

### 55.2. Modes of Predicating a Proper Accident of a Subject in a Conclusion

As ARISTOTLE says, those (predicates) that are predicated in the conclusions of demonstrations are by themselves (► 17.8) when the subjects are in the definition of the accidents that are predicated of them; or when the predicates are in the subject on account of the subject itself, which is the cause of the predicate.<sup>2</sup>

Wherefrom, ARISTOTLE shows that such scientifically knowable (conclusions, *scibilia*) are necessary; for it is impossible (*non contingit* = οὐ... ἐνδέχεται) for a proper accident not to be predicated of (its) subject.<sup>3</sup>

However, this (i.e., that a proper accident should necessarily be predicated of its subject) is of two modes (< ἢ ἀπλῶς ἢ τὰ ἀντικείμενα):<sup>4</sup>

1. Sometimes, **simply** (*simpliciter* = ἀπλῶς), when the accident is convertible with the subject.<sup>5</sup> For example, *to have three (internal angles equal to two right angles or 180° is convertible) with triangle*; and *risible* (i.e., capable of laughing, is convertible) with *man*.

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<sup>1</sup> *In Post. an.* 1, l. 10, 138–144: “notandum est quod cum sciencia proprie sit conclusionum, intellectus autem principiorum, proprie scibilia dicuntur conclusiones demonstrationis, in quibus passiones predicantur de propriis subiectis; propria autem subiecta non solum ponuntur in diffinitione accidentium, set etiam sunt cause eorum.”

<sup>2</sup> *In Post. an.* 1, l. 10, 147–154 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b16–18): “dicit [Philosophus] quod illa que predicantur in simpliciter scibilibus, hoc est in conclusionibus demonstrationum, sic sunt per se, sicut inesse predicantibus, scilicet sicut quando subiecta insunt in diffinitione accidentium que de eis predicantur, aut inesse propter ipsa, id est quando predicata insunt subiecto propter ipsum subiectum, quod est causa predicati.”

<sup>3</sup> *In Post. an.* 1, l. 10, 155–157 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b18–19): “Et consequenter ostendit [Philosophus] quod huiusmodi scibilia sunt necessaria, quia non contingit quin proprium accidens predicetur de subiecto.”

<sup>4</sup> *In Post. an.* 1, l. 10, 157–158 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b19–24): “set hoc est duobus modis.”

<sup>5</sup> *In Post. an.* 1, l. 10, 158–161 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b19): “quandoque quidem simpliciter, sicut cum unum accidens conuertitur cum subiecto, ut habere tres cum triangulo et risibile cum homine.”

Although a proper (affection) and a definition are convertible, the difference (between them) is that a definition is an essential predicate; and, on account of this, (the definition) is naturally prior to the proper (affection), which is an accidental predicate.<sup>6</sup> Wherefrom, a definition is used in demonstrative (syllogisms) as a mean (in order) to demonstrate the proper affection of a subject (► 55.7).

2. Sometimes, two **opposites** (*opposita* = ἀντικείμενα), taken under disjunction, are of necessity in a subject.<sup>7</sup> For example, in *line*, either *straight* or *curved*; in *number*, (either) *even* or *odd*.

ARISTOTLE shows the reason of this, (which is) that *the contrary, the privation, and the contradiction are in the same genus* (ἔστι γὰρ τὸ ἐναντίον ἢ στέρησις ἢ ἀντίφασις ἐν τῷ αὐτῷ γένει), for privation is nothing other than a negation in a determinate subject.<sup>8</sup> Thus, sometimes the contrary is likened (*equiparatur*) to a negation in some genus: for example, in numbers, *odd* is the same as *non-even* according to the consequence.

Therefore, just like it is necessary to (either) affirm or negate (some predicate of a determined subject), so is it necessary for one or the other of those (contraries) that are by themselves in (a subject) to be in (their) proper subject (e.g., a line is necessarily either straight or curved; and a number is necessarily either even or odd).

### 55.3. Modes of Predication by Itself in the Premises and in the Conclusion

Since, in a demonstration, an affection is proven of a subject through a mean that is a definition, necessarily:<sup>9</sup>

1. The **first** (i.e., the major) **proposition**, whose predicate is the affection and (whose) subject (is) the definition that contains the principles of the affection, is *by itself* in the **fourth mode** (i.e., insofar as *by itself* pertains to an **extrinsic cause**; ► 17.7).<sup>10</sup>

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<sup>6</sup> *In Post. an.* 1, l. 31, 243–249 (cf. ARISTOTLE, *Analytica Posteriora* A.19, 82a15–20) : “Et hec est differentia proprii et diffinitionis, quorum utrumque est conuertibile, et tamen diffinitio est predicatum essenciale et propter hoc est prius naturaliter proprio, quod est predicatum accidentale; et inde est quod in demonstratiuis utuntur diffinitione quasi medio ad demonstrandum propriam passionem de subiecto.”

<sup>7</sup> *In Post. an.* 1, l. 10, 161–172 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b19–21): “quandoque autem duo *opposita* sub disiunctione accepta ex necessitate subiecto insunt, *ut lineae aut rectum aut obliquum, et numero par aut impar.*”

<sup>8</sup> *In Post. an.* 1, l. 10, 161–172 (cf. ARISTOTLE, *Analytica Posteriora* A.4, 73b21–24): “Cuius rationem ostendit [Philosophus], quia *contrarium, priuatio et contradictio sunt in eodem genere* (nam priuatio nichil aliud est quam negatio in subiecto determinato), quandoque etiam contrarium equiparatur negationi in aliquo genere, sicut *in numeris idem est impar et non par* secundum consequenciam. Sicut ergo *necesse est affirmare uel negare*, ita *necesse est alterum eorum que per se insunt, proprio inesse subiecto.*”

<sup>9</sup> *In Post. an.* 1, l. 13, 60–62: “Sciendum autem est quod, cum in demonstratione probetur passio de subiecto per medium quod est diffinitio, oportet quod [...]”

<sup>10</sup> *In Post. an.* 1, l. 13, 62–65: “prima propositio, cuius predicatum est passio et subiectum diffinitio que continet principia passionis, sit per se in quarto modo.”

2. The **second** (i.e., the minor) **proposition**, whose subject is the subject itself and (whose) predicate is the definition itself, is (by itself) in the **first mode** (i.e., insofar as by itself pertains to the **form**; ► 17.4).<sup>11</sup>

3. The **conclusion**, in which the affection is predicated of the subject, is by itself in the **second mode** (i.e., insofar as *by itself* pertains to **matter**, which is here the proper subject of the affection; ► 17.5).<sup>12</sup>

(However, since a proper accident should necessarily be predicated of its subject either simply or according to opposites; ► 55.2), the conclusions of demonstrations include a twofold mode of being said *by itself*:

(a) **(Simply)**, the **second mode** (i.e., when *by itself* pertains to **matter**, which is the proper subject, as just stated; ► 17.5).

(b) **(According to opposites)**, the **fourth mode** (i.e., when *by itself* pertains to the subject as an **extrinsic cause** of its accidents, since the subject does not properly belong to the essence of an accident; ► 17.7).<sup>13</sup>

#### 55.4. The Four Questions

As ARISTOTLE says, the number of questions (► 54.8, ¶3) and (the number) of those (conclusions) that are scientifically known are the same (< τὰ ζητούμενά ἐστὶν ἴσα τὸν ἀριθμὸν ὅσων ἐπιστάμεθα).<sup>14</sup> The reason for this is that science is a cognition acquired through demonstration. Now, those (things) that were unknown before (are) the (very things) whose cognition must be acquired through demonstration; and we pose questions concerning those (things) that we ignore. Whence, it follows that those (questions) that are asked are equal in number to those (conclusions) that are scientifically known.

Now, four are (the questions) that are inquired:<sup>15</sup>

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<sup>11</sup> *In Post. an.* 1, l. 13, 65–67: “secunda autem, cuius subiectum est ipsum subiectum et predicatum ipsa definitio, <in> primo modo.”

<sup>12</sup> *In Post. an.* 1, l. 13, 67–69: “conclusio uero, in qua predicatur passio de subiecto, est per se in secundo modo.”

<sup>13</sup> *In Post. an.* 1, l. 10, 144–146: “unde conclusiones demonstrationum includunt duplicem modum dicendi per se, scilicet secundum et quartum.”

<sup>14</sup> *In Post. an.* 2, l. 1, 35–42 (cf. ARISTOTLE, *Analytica Posteriora* B.1, 89b23–25): “Dicit ergo [Philosophus] primo quod equalis est numerus questionum et eorum que sciuntur; cuius ratio est quia sciencia est cognitio per demonstrationem acquisita; eorum autem oportet per demonstrationem cognitionem acquirere que ante fuerint ignota, et de hiis questiones facimus que ignoramus; unde sequitur quod ea que queruntur sint equalia numero hiis que sciuntur.”

<sup>15</sup> *In Post. an.* 2, l. 1, 42–45 (cf. ARISTOTLE, *Analytica Posteriora* B.1, 89b23–25): “Quatuor autem sunt que queruntur, scilicet ‘quia’, ‘propter quid’, ‘si est’ et ‘quid est’, ad que quatuor reduci potest quicquid est queribile uel scibile.” As St. Thomas explains, this division is not the same as that into which dialectical disputations are divided, for such questions or problems are comprehended under the question *quia* (ARISTOTLE therein posits a division based on what is predicable): *ibid.*, 45–50 (cf. ARISTOTLE, *Topica* A.4,

1. (Whether it is the case) **that** (something is so, *quia* = τὸ ὅτι).
2. **On account of what** (something is so, *propter quid* = τὸ διότι).
3. **Whether** (something) **is** (or exists, *si est* = εἰ ἔστι).
4. **What** (something) **is** (*quid est* = τί ἐστίν).

### 55.5. Relation between the Four Questions

As ARISTOTLE says, it is the same to know *what* (something) *is* (*quid est*; ► 55.4, ¶4) and to know the cause of the question *whether it is* (*an est*; ► 55.4, ¶3), just like it is the same to know *on account of what* (something is so, *propter quid*; ► 55.4, ¶2) and to know the cause of the question (whether it is the case) *that it is* (so, *quia est*; ► 55.4, ¶1).<sup>16</sup>

The reason for this—namely, that it should be the same to know *what* (something) *is* and to know the cause of its question *whether it is*—is that there must be some cause of that which is for the thing to be (*esse*): indeed, something is said (to be) *caused* because it has a cause of its being (*esse*).<sup>17</sup>

The cause of being (*causa essendi*) is either the same as its essence or it is other (than the thing's essence).<sup>18</sup> (The cause of being is) the same (as the thing's essence), indeed, as form and matter, which are parts of the essence. On the other hand, (the cause of being is) other (than the thing's essence) as an efficient (cause) and (as) an end, which two (extrinsic) causes are in some mode the causes of form and of matter, for the agent operates for the sake of the end, and unites form to matter (► 10.5).

If we should take the cause that is other than the essence of the thing, sometimes there is indeed a cause such that the demonstration can be produced through it; but sometimes (there is) not (such a cause; ► 9.9, ¶2).<sup>19</sup> For an effect does not follow of necessity from

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101b13–25): “Diuidit autem [Philosophus] in I Topicorum questiones siue problemata aliter in quatuor, que omnia comprehenduntur sub una harum questionum, que dicitur questio ‘quia’: non enim ibi intendit nisi de questionibus ad quas dyaletice disputatur.”

<sup>16</sup> *In Post. an. 2*, l. 7, 28–31 (cf. ARISTOTLE, *Analytica Posteriora* B.8, 93a3–4): “*idem est scire quid est et scire causam* questionis ‘an est’, sicut idem est scire ‘propter quid’, et scire causam questionis ‘quia est’.” This is first explained in *ibid.*, l. 1, 111–336 (cf. ARISTOTLE, *Analytica Posteriora* B.2, 89b37–90a36).

<sup>17</sup> *In Post. an. 2*, l. 7, 31–35 (cf. ARISTOTLE, *Analytica Posteriora* B.8, 93a5): “*Ratio autem huius*, scilicet quod idem sit scire ‘quid est’ et scire causam ipsius ‘si est’, ista est quod oportet quod eius quod est rem esse, sit *aliqua causa* (per hoc enim dicitur aliquid causatum, quod habet causam sui esse).”

<sup>18</sup> *In Post. an. 2*, l. 7, 35–41 (cf. ARISTOTLE, *Analytica Posteriora* B.8, 93a5–6): “*hec autem causa essendi aut est eadem*, scilicet cum essentia ipsius rei, aut *alia* (eadem quidem, sicut forma et materia, que sunt partes essentie, alia uero, sicut efficiens et finis, que quidem due cause sunt quodam modo cause forme et materie, nam agens operatur propter finem et unit formam materie).”

<sup>19</sup> *In Post. an. 2*, l. 7, 42–48 (cf. ARISTOTLE, *Analytica Posteriora* B.8, 93a6): “et, si accipiamus causam que est alia ab essentia rei, quandoque quidem est causa talis per quam possit fieri demonstratio, quandoque autem non: non enim ex omni causa agente sequitur ex necessitate effectus, ex suppositione autem finis sequitur quod sit id quod est ad finem, ut probatur in II Phisicorum.”

every agent cause (►9.11). However, from the supposition of an end, it follows that there should be that which is (related) to the end (►9.10).

### 55.6. Principles and Non-Principles Compared

ARISTOTLE shows the difference and the agreement between principles and non-principles:<sup>20</sup>

1. Principles agree with non-principles in that, of the former and of the latter, *what* they signify (*quid significant* = τί... σημαίνει) must be accepted (< λαμβάνεται) as by supposition (*quasi supponendo*).<sup>21</sup> To wit, (we must suppose *what* it is of) both: **(a)** *the first* (*et prima* = καὶ τὰ πρῶτα), that is, *the principles*; and (we must suppose *what* it is of) **(b)** *those that are* (i.e., *proceed*) *from them* (*et quae sunt ex hiis* = καὶ τὰ ἐκ τούτων), that is, those that are taken (or received, accepted, *sumuntur*) from the principles (►45.1), since essence (*quod quid est*, i.e., the *what* that something is) properly pertains to the science that is about substance: namely, to first philosophy, from which all other (sciences) take this.
2. On the other hand, principles differ from those that are from principles (*quae sunt ex principiis*) in that, concerning principles, *that they are* (*quod sint* = ὅτι... ἔστι) must be accepted by supposition, while concerning the others—i.e., those which are (i.e., proceed) from principles—, *that they are* must be demonstrated.<sup>22</sup>

### 55.7. The Mean as a Cause

It is manifest that the mean is a cause in the demonstration that produces science, for scientifically to know (*scire*) is to know the cause of a thing (*causam rei cognoscere*); and a cause is what is sought in all the aforesaid questions (►55.4).<sup>23</sup>

However, there are four genera of causes (►9.2, ¶1): **(1)** the **formal** cause or essence (*quod quid erat esse* = τὸ τί ἦν εἶναι, *id est causa formalis*), which is what completes the

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<sup>20</sup> *In Post. an.* 1, l. 18, 37–39 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a32–36): “ostendit [Philosophus] differenciam inter principia et non principia, et conuenienciam.”

<sup>21</sup> *In Post. an.* 1, l. 18, 40–47 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a32–33): “Conueniunt enim principia cum non principiis in hoc quod de utrisque oportet accipere quasi supponendo *quid significant*, scilicet *et prima*, id est principia, *et quae sunt ex hiis*, id est quae ex principiis sumuntur (quia quod quid est proprie pertinet ad scienciam quae est de substantia, scilicet ad philosophiam primam, a qua omnes alie hoc accipiunt).”

<sup>22</sup> *In Post. an.* 1, l. 18, 47–51 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a32–34): “Set in hoc differunt principia et quae sunt ex principiis, quod de principiis oportet accipere supponendo *quod sint*, de aliis autem, quae sunt ex principiis, oportet demonstrare quia sunt.”

<sup>23</sup> *In Post. an.* 2, l. 1, 185–189 (cf. ARISTOTLE, *Analytica Posteriora* B.2, 90a6–7): “manifestum est enim quod *causa* est *medium* in demonstratione quae facit scire, quia scire est *causam rei cognoscere*; *causa* autem est quod *queritur in omnibus* questionibus predictis.” *Ibid.*, l. 9, 13–17 (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a20): “Dicit ergo [Philosophus] primo quod, quia *scire opinamur cum sciamus causam*, ut in I habitum est, demonstratio autem est sillogismus faciens scire, ita consequens est quod *medium demonstrationis sit causa*.”

essence of a thing; **(2)** the **material** cause, which (if) posited, it is necessary for the (thing) caused to be posited (< τὸ τίνων ὄντων ἀνάγκη τοῦτ' εἶναι), since those (effects) that follow of the necessity of matter are absolutely necessary (► 9.9, ¶1); **(3)** the **efficient** cause, the principle of motion (< ἡ τί πρῶτον ἐκίνησε); **(4)** the **final** cause, the cause for the sake of which (< τὸ τίνος ἕνεκα) something comes to be (or is produced, *fit*).<sup>24</sup>

And thus, it is evident that all these causes are manifested through the mean of a demonstration, for any of these causes can be taken as the mean of a demonstration.<sup>25</sup>

### 55.8. The Mode in Which Causes Are Assumed

ARISTOTLE proposes the mode in which a material cause is assumed in a demonstration, which also befits the other causes.<sup>26</sup> He then posits an example.

He therefore says first that the material cause cannot be taken such that something should follow of necessity if only one proposition were taken.<sup>27</sup> Rather, (we) must take at least two propositions so related that they should communicate in (i.e., have in common) one mean. Therefore, if one mean—that is a material cause—should be taken in two propositions, the conclusion follows of necessity.

For example, if we should say, “every composite from contraries is corruptible; a stone is such [a thing composed from contraries]; therefore, [a stone is corruptible].”<sup>28</sup> And (we) must take two propositions not only on account of the requirement of the syllogistic form, but also because not all (things) that are (constituted) from matter have (their) necessity from matter. Hence, apart from the proposition in which *this* is taken to have *such* a matter,

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<sup>24</sup> *In Post. an. 2, l. 9, 17–28* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a21–23): “*sunt autem quatuor genera causarum, ut in II Phisicorum et in V Metaphisice plenius manifestatur; quarum una est ‘quod quid erat esse’, id est causa formalis, que est completiua essencie rei; alia autem est causa qua posita necesse est causatum poni, et hec est causa materialis, quia ea que sequuntur ex necessitate materie sunt necessaria absolute, ut habetur in II Phisicorum; tertia autem causa est que est principium motus, id est causa efficiens; quarta autem causa est cuius gratia fit aliquid, scilicet causa finalis.*”

<sup>25</sup> *In Post. an. 2, l. 9, 28–31* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a23–24): “*et ita patet quod per medium demonstrationis omnes hee cause manifestantur, quia quelibet harum causarum potest accipi ut medium demonstrationis.*”

<sup>26</sup> *In Post. an. 2, l. 9, 46–49* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a24–35): “*Circa primum duo facit [Philosophus]: primo proponit modum quo causa materialis assumitur in demonstratione, qui etiam competit aliis causis; secundo, ponit exemplum.*”

<sup>27</sup> *In Post. an. 2, l. 9, 50–58* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a24–27): “*Dicit ergo [Philosophus] primo quod illud quo existente necesse est aliud esse, scilicet causa materialis, non contingit accipi sic ut ex necessitate aliquid sequatur si accipiatur una sola propositio, set oportet accipere ad minus duas hoc modo se habentes quod communicent in uno medio. Si ergo accipiatur in duabus propositionibus unum medium, quod est causa materialis, ex necessitate sequitur conclusio.*”

<sup>28</sup> *In Post. an. 2, l. 9, 58–68*: “*Puti si dicamus: «Omne compositum ex contrariis est corruptibile; lapis est huiusmodi; ergo etc.». Oportet autem accipere duas propositiones non solum propter exigentiam forme sillogistice, set etiam quia non omnia que sunt ex materia, habent ex materia necessitatem, ut probatur in II Phisicorum; et ideo, preter propositionem in qua sumitur hoc habere talem materiam, oportet quod sumatur alia propositio que declaret quod ex tali materia aliquid ex necessitate sequatur.*”

another proposition must be taken that declares that from *such* matter something follows of necessity.

### 55.9. Cause and Effect in Equivocal, Univocal, and Analogical Predication

As ARISTOTLE says, both *that which is the cause* (*et id quod est causa* = καὶ ὃ αἴτιον) and *that of which the cause is* (*id cuius est causa* = καὶ οὗ αἴτιον) can be considered according to accident.<sup>29</sup> For example, a musical (i.e., a musician) is by accident a cause of a house, of which the cause by itself is the builder, who, in turn, is a cause by accident of a shelter of thieves—if this should happen to come to be in the house. Indeed, also problems themselves seem to be by accident.

On the other hand, if cause and caused should not be taken by accident, the mean, which is taken for the cause, would have to be likewise related with the effect whose demonstration is sought:<sup>30</sup>

1. If some (things) should be **equivocal** (*equivoca* = ὁμώνυμα), the common mean that is taken will also be equivocal.<sup>31</sup>
2. If they should not be equivocal but would (**univocally**) agree as in a genus (*quasi in genere* = ὡς ἐν γένει), also the mean will be common according to genus.<sup>32</sup>
3. Of those that agree **according to analogy**, ARISTOTLE says that in these, too, there must be one mean according to analogy, just like the rainbow—as much as the echo—is some reflection (*repercussio*).<sup>33</sup>

### 55.10. Problems that Agree in the Mean

ARISTOTLE shows in what mode many problems agree in *on account of what* (something is so) in respect of the unity of the mean.<sup>34</sup> He therefore says that some problems are the

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<sup>29</sup> *In Post. an. 2, l. 19, 47–53* (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a4–6): “dicit [Philosophus] quod contingit *et id quod est causa et id cuius est causa, considerare secundum accidens* (sicut musicus per accidens est causa domus, cuius per se est causa edificator, qui tamen est causa receptaculi latronum per accidens, si contingat hoc in domo fieri); *quinimmo etiam ipsa problemata uidentur esse per accidens.*”

<sup>30</sup> *In Post. an. 2, l. 19, 53–57* (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a6): “*Si uero non accipiantur per accidens causa et causatum, oportet quod medium, quod accipitur pro causa, similiter se habeat cum effectu cuius demonstratio queritur.*”

<sup>31</sup> *In Post. an. 2, l. 19, 57–58* (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a7): “*Vtpote si aliqua sint equiuoca, et medium commune quod accipitur erit equiuocum.*”

<sup>32</sup> *In Post. an. 2, l. 19, 58–60* (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a7–8): “*autem non sint equiuoca, set conueniant quasi in genere, etiam medium erit commune secundum genus.*”

<sup>33</sup> *In Post. an. 2, l. 19, 80–84* (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a15–16): “*Tercio autem dicit [Philosophus] de hiis que conueniunt secundum analogiam, quod in hiis etiam oportet esse medium unum secundum analogiam; sicut supra dictum est quod tam yris quam echo est quedam repercussio.*”

<sup>34</sup> *In Post. an. 2, l. 17, 108–122* (cf. ARISTOTLE, *Analytica Posteriora* B.15, 98a24–27): “*ostendit [Philosophus] quomodo multa problemata conueniunt in eo quod est ‘propter quid’.* Et primo quantum ad

same insofar as they agree, in one mode, in *on account of what* (something is so) because they have the same mean. Thus, many (things) are demonstrated through the mean *reflection* (*antiperistasis* = ἀντιπερίστασις, *id est contra resistencia vel repercussio*). And there are some means that are not the same simply but (the same) in (predicable) genus, which are nonetheless diversified by some differences that are taken either:

1. From a diversity of **subjects**.
2. From a diversity of the **mode of being produced**.

Thus, (the mean would be *one according to analogy*; ►55.9, ¶3) if we should seek *on account of what* an echo should be produced; or on account of what something appears in a mirror; or on account of what the rainbow is generated.<sup>35</sup> Indeed, all these are caused from reflection (which is the same in predicable genus); but the reflections differ in species (because they are produced in diverse modes; ¶2). For an echo is produced by the reflection of air moved by a sounding body at some concave body; the image (*apparitio*) of a thing in a mirror is produced on account of a mutation in the mean that is reflected at the mirror; and a rainbow is produced on account of solar rays being reflected at humid vapors. (That is, even though all of these reflections should be in the same predicable genus, *reflection*, they are analogous according to subject genus because they cannot be reduced to the same subject or, consequently, to the same mode of production; ►14.3).

### 55.11. Problems that Differ in the Mean

ARISTOTLE shows in what mode problems should agree in an *on account of what* according to the ordering of the means.<sup>36</sup> He says that there are some other problems that differ from each other because they have diverse means of which one is under another (*eo quod habent diuersa media quorum unum est sub altero* < τῷ τὸ μέσον ὑπὸ τὸ ἕτερον μέσον εἶναι).

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unitatem medii [...]. Dicit ergo primo quod quedam *problemata sunt eadem*, in quantum scilicet conueniunt in eo quod <est> 'propter quid', uno quidem <modo> propter hoc quod habent *idem medium*, sicut per hoc medium quod est *antiperistasis*, id est contra resistencia uel repercussio, multa demonstrantur. Sunt autem *quedam media <eadem>* non simpliciter, set *genere*, que tamen quibusdam differentiis diuersificantur, que sumuntur uel ex diuersitate subiectorum, uel ex diuersitate modi fiendi."

<sup>35</sup> *In Post. an. 2*, l. 17, 122–134 (cf. ARISTOTLE, *Analytica Posteriora* B.15, 98a27–29): "sicut si queratur *propter quid* fit echon, aut *propter quid apparet*, scilicet aliquid in speculo, uel *propter quid* generatur *yris*: *omnia enim ista sunt idem problema* quantum ad medium 'propter quid', quod est *idem genere*: *omnia enim causantur ex repercussione*; set *repercussiones differunt specie*: nam echon fit per repercussionem eris moti a corpore sonante ad aliquod corpus concauum, apparitio autem rei in speculo fit propter hoc quod inmutatio medii repercutitur ad speculum, iris autem fit propter hoc quod radii solares repercutiuntur ad uapores humidos."

<sup>36</sup> *In Post. an. 2*, l. 17, 136–141 (cf. ARISTOTLE, *Analytica Posteriora* B.15, 98a29–31): "ostendit [Philosophus] quomodo *problemata conueniunt* in 'propter quid' secundum ordinationem mediorum. Et dicit quod quedam *alia problemata sunt* que *differunt* ad inuicem ex eo quod habent diuersa media quorum unum est *sub altero*."



He posits an example.<sup>37</sup> If we should inquire on account of what the Nile overflows at the end of the lunar months, the reason is that it rains more at the end of the month. And why this should be so is taken through another mean: to wit, on account of the moon—which has power over liquids—being wanting; and thus, (if) its light (is) wanting, vapors in the air are condensed more; wherefrom, rain is caused. And thus, it is evident that these two means (i.e., there being more rain at the end of the month, and the waning of the moon) are related to each other such that one of them is under the other (►63).

#### 55.12. The Definition as a Cause

It would seem that ARISTOTLE says that the definition of the affection should be the mean in a demonstration.<sup>38</sup> However, it is to be considered that the definition of the affection cannot be perfected (*perfici*, i.e. completed) without the definition of the subject. Indeed, it is manifest that the principles that the definition of the subject contains are the principles of the affection.

Therefore, a demonstration resolves into a first cause only if the definition of the subject is taken as the mean of the demonstration.<sup>39</sup> Hence, it is necessary to conclude an affection about the subject through the definition of the affection; and (it is) furthermore (necessary) to conclude the definition of the affection about the subject through the definition of the subject. Whence, ARISTOTLE says (►57.8, ¶2, ¶3) that it is necessary to foreknow *what it is* (*quid est*) not only of the affection, but also of the subject, which is necessary only because the demonstrator uses the definition of the subject in (the act of) demonstrating.

This is evident through an example.<sup>40</sup> If we wanted to demonstrate about a triangle that it has three angles equal to two right (angles), we would first take as a mean a figure having

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<sup>37</sup> *In Post. an. 2, l. 17, 141–151* (cf. ARISTOTLE, *Analytica Posteriora* B.15, 98a31–34): “Et ponit [Philosophus] exemplum, utpote si queratur *propter quid Nilus* in fine mensis, scilicet lunaris, *magis* inundat; huius enim ratio est quia finis mensis est magis pluuiialis. Quare autem hoc sit, accipitur per aliud medium, scilicet propter hoc scilicet quod tunc *deficit luna*, que habet dominium super humores, et ideo, deficiente lumine eius, magis commouentur uapores in aere, ex quo causatur pluuiia. Et sic patet quod ista duo media *sic se habent ad inuicem* quod unum eorum est sub alio.”

<sup>38</sup> *In Post. an. 2, l. 1, 250–255* (cf. ARISTOTLE, *Analytica Posteriora* B.2, 90a21–23): “Videtur hic Aristoteles dicere quod diffinitio passionis sit medium in demonstratione. Set considerandum est quod diffinitio <passionis> *perfici* non potest sine diffinitione subiecti: manifestum est enim quod principia que continet diffinitio subiecti sunt principia passionis.”

<sup>39</sup> *In Post. an. 2, l. 1, 255–266*: “Non ergo demonstratio resoluet in primam causam, nisi accipiatur ut medium demonstrationis diffinitio subiecti. Sic igitur oportet passionem concludere de subiecto per diffinitionem passionis, et ulterius diffinitionem passionis concludere de subiecto per diffinitionem subiecti. Vnde et in principio libri dictum est quod oportet precognoscere quid est non solum de passione, set etiam de subiecto, quod non oporteret nisi demonstrator diffinitione subiecti <uteretur> in demonstrando.”

<sup>40</sup> *In Post. an. 2, l. 1, 267–276*: “Et hoc patet per exemplum: si uelimus de triangulo demonstrare quod habet tres angulos equales duobus rectis, accipiamus primo pro medio quod est figura habens angulum extrinsecum equalem duobus intrinsecis sibi oppositis, quod est quasi diffinitio passionis: quod iterum

an external angle equal to two internal angles opposite to it, which is as the definition of the affection; which, again, must be demonstrated through the definition of the subject, as if we should say, “every figure contained by three straight lines has an external angle equal to the two internal [angles] opposite to it.”

The same is evident if we wanted to demonstrate that a high- and a low-pitch voice should be consonant.<sup>41</sup> Let us take the definition of the affection as is said here: to wit, that they have a numerical proportion. Yet, again, in order to demonstrate this, it is necessary to take the definition of low-pitch and high-pitch: for a **low-pitch voice** is *that (voice) which is naturally apt to move sense in a long time* (i.e., it has a long period), while a **high-pitch** (voice is that voice) *which (is naturally apt to move sense) in a short time* (i.e., it has a short period). Therefore, there is a numerical proportion of a high- and a low-pitch (voice). And it makes no difference if high- and a low-pitch should be defined otherwise: something that pertains to quantity must be posited in their definition (e.g., high and low frequency, instead of short and long period, respectively); and thus, it will be necessary to conclude (that there is) in them a numerical proportion.

### 55.13. No Infinite Demonstration

ARISTOTLE proves logically that universally (speaking) in any genus of predication, there is no infinite process (this demonstration is not included here).<sup>42</sup> But he moreover proves this analytically in (respect of) those (predicates) that are predicated by themselves, for we only use such a mode of predication in demonstrations.

Thus, ARISTOTLE says that neither mode of predicating *by itself* can proceed infinitely.<sup>43</sup>

1. In the **first mode** of predicating by itself (i.e., when the predicate is posited in the definition of the subject; ►17.8, ¶1): He says that those that are predicated in the

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demonstrare oportet per diffinitionem subiecti, ut dicamus: «Omnis figura tribus rectis lineis contenta habet angulum exteriorem equalem duobus interioribus sibi oppositis».

<sup>41</sup> *In Post. an. 2*, l. 1, 277–290 (cf. ARISTOTLE, *Analytica Posteriora* B.2, 90a21–23): “Et idem patet si uelimus demonstrare quod uox acuta et grauis consonant: accipiemus diffinitionem passionis, ut hic dicitur, scilicet quod habent proportionem numeralem; set rursus ad hoc demonstrandum oportet accipere diffinitionem grauis et acuti: nam grauis uox <est> que in multo tempore nata est mouere sensum, acuta autem que in modico tempore; modici autem ad multum est proportio numeralis; ergo uocis acute et grauis est proportio numeralis. Nec refert si aliter diffiniatur acutum et graue: oportet enim in eorum diffinitione ponere aliquid ad quantitatem pertinens, et sic necesse erit concludere in eis proportionem numeralem.”

<sup>42</sup> *In Post. an. 1*, l. 35, 25–32 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a8–11): “et ideo supra logice probauit [Philosophus] propositum, quia ostendit uniuersaliter in omni genere predicationis non esse processum in infinitum, hic autem intendit ostendere analetice, quia hoc probat solum in hiis que predicantur per se. Et hec est uia expeditior; et ideo sufficit ad propositum, quia in demonstrationibus non utimur nisi tali modo predicationis.” The proof omitted here is in ARISTOTLE, *Analytica Posteriora* A.21–22, 82b35–84a7 (cf. *In Post. an. 1*, l. 34; l. 35).

<sup>43</sup> *In Post. an. 1*, l. 35, 79–81 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a17–29): “premittens [Philosophus] propositum, quod in neutro modo dicendi per se *contingit* in infinitum procedere.”

essence—that is, as posited in the definition of the subject—cannot be infinite, for it would be impossible to define. Wherefrom, he concludes that, if all (those predicates) that are predicated in demonstrations should be predicated by themselves, and it is impossible to proceed infinitely upwards in predicates by themselves, it is necessary that predicates in demonstrations should stop upwards. Wherefrom, they will also stop downwards, since from whichever part an infinite should be posited, science and definition would be taken away.<sup>44</sup>

2. In the **second mode** (i.e., when the subject is posited in the definition of the predicate; ► 17.8, ¶2), for example, when *odd* is predicated of a number.<sup>45</sup> Thus, if we were to proceed further, (such) that something else should be predicated by itself of *odd* according to this mode of predicating by itself, it would follow that *odd* would be in its definition. However, number is posited in the definition of *odd*. Whence, it would follow that also number would be posited in the definition of this third (affection) that is by itself in *odd*. But this cannot proceed infinitely: to wit, such that infinite (affections) should be in the definition of something. It therefore remains that such predications by themselves may not proceed infinite upwards—that is, from the part of the predicate.

As ARISTOTLE says, howsoever much one should proceed in such predications by themselves of the second mode, all the predicates taken in order would have to be in a first subject—for example, in number—as predicated of it: to wit, because, if *odd* is predicated by itself of *number*, whatever should be predicated by itself of *odd* must also be predicated by itself of *number*.<sup>46</sup> And, again, *number* must be in all of these: for, if

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<sup>44</sup> *In Post. an.* 1, l. 35, 116–128 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a25–29): “probat [Philosophus] propositum in primo modo dicendi per se. Et dicit quod illa que predicantur *in eo quod quid est*, id est quasi posita in diffinitione subiecti, non possunt esse *infinita*, quia non contingeret *diffinire*, ut supra probatum est. Ex hoc ergo concludit quod, *si omnia* que predicantur in demonstrationibus, per se predicantur, et in predicatis per se non est procedere in infinitum in sursum, necesse est quod predicata in demonstrationibus stent *in sursum*. Et ex hoc etiam sequitur quod stent *in deorsum*, quia ex quacunque parte ponatur infinitum, tollitur sciencia et diffinitio, ut ex supra dictis patet.”

<sup>45</sup> *In Post. an.* 1, l. 35, 79–81 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a17–22): “probat [Philosophus] hoc in secundo modo, puta cum inpar predicatur de numero: si enim procedatur ulterius quod aliquid aliud predicetur per se de inpari secundum istum modum dicendi per se, sequetur quod inpar insit in diffinitione <illius>; numerus autem ponitur in diffinitione inparis; unde sequeretur quod etiam numerus ponetur in diffinitione illius tercii, quod per se inest inpari. Set hic *non contingit* abire in infinitum, ut scilicet infinita insint in diffinitione alicuius, sicut ante probatum est. Relinquitur ergo quod in talibus per se predicationibus non contingit procedere in infinitum *in sursum*, id est ex parte predicati.”

<sup>46</sup> *In Post. an.* 1, l. 35, 97–114 (cf. ARISTOTLE, *Analytica Posteriora* A.22, 84a22–25): “et dicit [Philosophus] quod, quantumcunque procedatur in huiusmodi per se predicationibus secundi modi, oportebit quod *omnia* predicata per ordinem accepta insint *primo* subiecto, *puta numero*, quasi predicata de eo, quia scilicet, si inpar per se predicatur de numero, oportet quod quicquid per se predicatur de inpari, etiam per se predicetur de numero, et iterum oportet quod numerus omnibus *illis* insit, quia, si numerus ponitur in diffinitione inparis, oportet quod ponatur in diffinitione omnium eorum que diffiniuntur per inpar, et ita sequetur quod mutuo sibi inuicem insint; ergo *erunt conuertibilia*, et *non se inuicem excedentia*. Sic enim proprie passionibus se habent ad sua subiecta. Vnde, si etiam sint infinita per se predicata secundum hunc modum, non erit ad propositum quo aliquis intendit ponere infinita in predicatis esse uel in sursum uel in deorsum.”

*number* is posited in the definition of *odd*, it must be posited in the definition of all those that are defined by *odd*. And thus, it follows that they should mutually be in each other. Therefore, they will be convertible; and one would not exceed the other, for proper affections are thus related to their subjects. Whence, if there should also be infinite predicates by themselves according to this mode, it will not serve the purpose of someone who intends to posit that there are infinite predicates, whether upwards or downwards.

#### 55.14. When There Is No Cause: The Need for a Subject Genus

As ARISTOTLE shows, it is not always possible to receive an essence (*quod quid est* = τὸ τί ἔστιν) through demonstration.<sup>47</sup> And to show this, he presupposes that, of some (things), there is another cause; but of other (things, there is) not (another cause). Indeed, since an essence is received through a demonstration whose mean is a cause, it is manifest that there are some (things) whose essence must be taken as some immediate principle, such that, of such a thing, it is necessary to suppose (*supponere* < ὑποθέσθαι) both *that it is* and *what it is* (*et esse et quid est* = καὶ εἶναι καὶ τί ἔστιν); or to manifest (it) in some other mode than (through) demonstration: for example, through an effect, through a simile, or in some such mode.<sup>48</sup>

However, it is to be considered that what ARISTOTLE says—that of some (things) there is not another cause—can be understood in three modes:<sup>49</sup>

1. That simply and absolutely (a thing) does not have a cause of its being (*esse*).<sup>50</sup> And this befits only the first principle (simply; ►45.2, ¶1), which is the cause of being and of truth in all things. Thus, nothing prevents those (things) that are of necessity to have some cause of (their) necessity too (►46.2).

However, since ARISTOTLE uses the plural, what he says here—that there should be some (things) that do not have a cause of their being—is not to be understood in this way.<sup>51</sup>

<sup>47</sup> *In Post. an. 2, l. 8, 1–7* (cf. ARISTOTLE, *Analytica Posteriora* B.9, 93b21): “Postquam Philosophus ostendit quod in quibusdam per demonstrationem accipitur ‘quod quid est’, hic ostendit quod hoc non est possibile in omnibus. Et ad hoc ostendendum presupponit quod *quorundam est quedam altera causa, quorundam autem non.*”

<sup>48</sup> *In Post. an. 2, l. 8, 7–14* (cf. ARISTOTLE, *Analytica Posteriora* B.9, 93b21–24): “Quia igitur ‘quod quid est’ accipitur per demonstrationem cuius medium est causa, manifestum est quod sunt quedam quorum ‘quod quid est’ oportet accipere sicut quoddam immediatum principium, ita quod oportet supponere de tali re *et esse et quid est*, uel manifestare aliquo *alio modo* quam per demonstrationem, puta per effectum uel per simile uel aliquo tali modo.”

<sup>49</sup> *In Post. an. 2, l. 8, 15–17* (cf. ARISTOTLE, *Analytica Posteriora* B.9, 93b21): “Est autem considerandum quod hoc quod dicit [Philosophus], quorundam non esse aliam causam, potest intelligi tripliciter.”

<sup>50</sup> *In Post. an. 2, l. 8, 18–23*: “Vno modo, quod simpliciter et absolute causam non habet sui esse, et hoc competit soli primo Principio, quod est causa esse et ueritatis in omnibus rebus. Nichil enim prohibet etiam eorum que ex necessitate sunt, esse aliquam causam necessitatis, ut patet in V Metaphisice.”

<sup>51</sup> *In Post. an. 2, l. 8, 23–26*: “Et ideo, cum hic Philosophus pluraliter loquatur, non sic est intelligendum quod hic dicitur, quod aliqua sint que nullam habent causam sui esse.”

2. It can be understood according to the order of the causes of the same thing; for it is manifest that, in things that have four causes, one cause is in some mode a cause of another (►10.3).<sup>52</sup> And in each of the genera of causes, it is possible to proceed from the posterior (cause) to the prior (►11.3).

However, definitions must be given through proximate causes.<sup>53</sup> And, according to this sense, “in some books, it is inserted that *definitions produced according to species* [i.e., according to the formal cause] *have no mean whereby they would be demonstrated; but definitions produced according to matter can have a mean.*”<sup>54</sup> (This is so), to wit, because the definitions that are given according to a material cause can be demonstrated through the definitions that are given according to a formal cause.<sup>55</sup>

However, a definition that is given according to a formal cause cannot be further demonstrated through some principle (that is) intrinsic to the thing, which properly pertains to the essence (*quod quid est*): namely, entering the essence of the thing.<sup>56</sup>

On the other hand, even if it should be demonstrated through an efficient and a final cause, it is to be said that, always, the higher cause is related as a formal (cause) in respect of the lower (cause).<sup>57</sup>

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<sup>52</sup> *In Post. an. 2*, l. 8, 27–30: “Alio modo potest intelligi secundum ordinem causarum eiusdem rei. Manifestum est enim in rebus habentibus quatuor causas, quod una causa est quodam modo causa alterius.” Ibid., 43–44: “Potest tamen in singulis causarum generibus a posterioribus ad priora <procedi>.”

<sup>53</sup> *In Post. an. 2*, l. 8, 45: “set diffinitiones debent dari per causas proximas.”

<sup>54</sup> *In Post. an. 2*, l. 8, 46–50: “Et secundum hunc sensum «in quibusdam libris interponitur quod Diffinitiones secundum speciem facte nullum habent medium quo demonstrantur; diffinitiones autem secundum materiam facte possunt habere medium.»” (Smaller font in the original.) St. Thomas subsequently rejects this quote in a note probably written by MOERBEKE, arguing that it is not present in the Greek text; *ibid.*, 61–64: “«Predicta tamen uerba non habentur in libris Grecis; unde magis uidetur esse glossa que per errorem scriptorum introducta est loco textus.»” Whence, René-A. GAUTHIER interestingly remarks in his chapter 6, on the sources of the commentary *In De anima*, L<sup>45,1</sup>, 204\*–205\*: “Le découverte de[...]s notes critiques de Guillaume de Moerbeke jette un jour nouveau sur une remarque critique de saint Thomas qui avait déjà par sa justesse fait l’admiration des éditeurs Léonins (*In Post. anal.*, II 8, n. 3 ; éd. Léon., t. I, p. 356b, avec la note γ). [...] La phrase condamnée par saint Thomas se lit à peu près littéralement dans la traduction des *Seconds analytiques* par Jacques de Venise (A.L., IV 1–4, p. 83, 6–8) : « Diffinitiones quidem secundum speciem facte nullum habent medium quo demonstrantur (-tentur *multi codd*), sed diffinitiones secundum materiam facte possunt habere medium. » Mais cette phrase n’a pas son équivalent dans les mss grecs à 93b21 : les éditeurs de l’*Aristoteles Latinus*, L. Minio-Paluello et B. G. Dodd, ont conjecturé que Jacques de Venise avait traduit une glose de son ms. grec. Cette addition est omise par la « *Translatio Ioannis* » (p. 167, 6) et par la *Recensio Guillelmi* (p. 329, 12). Or, L. Minio-Paluello a montré que saint Thomas a connu et utilisé la *Recensio Guillelmi* (cf. L. Minio-Paluello, *Opuscula. The Latin Aristotle*, Amsterdam 1972, p. 163). Il semble donc sûr que saint Thomas a recopié plus ou moins fidèlement une note critique de Guillaume de Moerbeke.”

<sup>55</sup> *In Post. an. 2*, l. 8, 51–53: “quia scilicet diffinitiones que dantur secundum causam materialem possunt demonstrari per diffinitiones que dantur secundum causam formalem.”

<sup>56</sup> *In Post. an. 2*, l. 8, 54–58: “diffinitio autem que datur secundum causam formalem non potest ulterius demonstrari per aliquod principium intrinsecum rei, quod proprie pertinet ad ‘quod quid est’, utpote intrans essenciam rei.”

<sup>57</sup> *In Post. an. 2*, l. 8, 58–61: “set etsi demonstretur per causam efficientem et finalem, dicendum erit quod semper causa superior se habet ut formalis respectu inferioris.”

3. It can be understood insofar there are some (things) that do not have a cause in the **subject genus** of some science (discussed in the next chapter; ►56). For example, in the genus of *number*, about which arithmetic is, (we) must arrive (in analysis or resolution) at the unit, of which another principle cannot be taken in this genus (►57.8, ¶2).<sup>58</sup>

And this sense harmonizes with (*concordat*) the example that ARISTOTLE adds, saying that the arithmetician supposes *what the unit is*, and *that the unit is* (< ὅπερ ὁ ἀριθμητικὸς ποιεῖ· καὶ γὰρ τί ἐστὶ τὴν μονάδα ὑποτίθεται, καὶ ὅτι ἐστίν).<sup>59</sup>

Thus, just as an essence (*quod quid est*) can be manifested (of) those (things) of which there is not another cause, so, too, (something similar has to be said about) those (things) that can have a mean and of which there is another cause: but not such that the essence itself would be demonstrated; rather, the mean of the demonstration would be taken as the essence.<sup>60</sup>

As ARISTOTLE summarizes, of those that do not have a cause, the definitions are to be taken as some immediate principles. Hence, he says here that the definition of immediate (things), that is, of things that do not have causes, is as some indemonstrable position of its essence (< ὁ... τῶν ἀμέσων ὁρισμὸς θέσις ἐστὶ τοῦ τί ἐστίν ἀναπόδεικτος).<sup>61</sup>

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<sup>58</sup> *In Post. an. 2*, l. 8, 65–69: “Tercio modo potest intelligi in quantum aliqua sunt que non habent causam in genere subiecto alicuius scientie, sicut in genere numeri, de quo est arismetica, est deuenire ad unitatem, cuius in hoc genere non est accipere aliud principium.”

<sup>59</sup> *In Post. an. 2*, l. 8, 70–72 (cf. ARISTOTLE, *Analytica Posteriora* B.9, 93b24–25): “Et hic sensus concordat exemplo quod Philosophus subiungit, dicens quod *arismeticus* <supponit> *quid est unitas, et quia est.*”

<sup>60</sup> *In Post. an. 2*, l. 8, 72–77 (cf. ARISTOTLE, *Analytica Posteriora* B.9, 93b25–28): “Et, sicut illa quorum non est alia causa, ita etiam illa que possunt habere *medium, et quorum est altera causa*, potest manifestari ‘quod quid est’, ita tamen quod *non* demonstratur ipsum ‘quod quid est’, set magis medium demonstrationis ut ‘quod quid est’ accipiatur.”

<sup>61</sup> *In Post. an. 2*, l. 8, 173–179 (cf. ARISTOTLE, *Analytica Posteriora* B.10, 94a9–10): “resumit [Philosophus] quoddam quod supra dixerat, quod eorum que non habent causam, diffinitiones sunt accipiende sicut quedam immediata principia. Et ideo dicit hic quod diffinitio *immediatorum*, id est rerum non habentium causas, est sicut quedam *indemonstrabilis positio* eius ‘quod quid est.’”

## 56. The Subject Genus

If the propositions of a demonstration are causes of the conclusion, it is necessary that they be their proper principles (► 53.6, ¶3). We examine here what these principles are.

### 56.1. Three Things Necessary for Demonstration

As ARISTOTLE says, there are three necessary (things) for a demonstration (to be produced).<sup>1</sup> And he shows which of them can be common to diverse sciences and which (of them can) not:

1. *That which is demonstrated (quod demonstratur = τὸ ἀποδεικνύμενον)*: namely, the **conclusion** (*conclusio* = τὸ συμπέρασμα), which contains in itself *that which is by itself in some genus (quod per se inest alicui generi = τὸ ὑπάρχον γένει τινὶ καθ' αὐτό)*.<sup>2</sup> Indeed, through demonstration, a proper affection is concluded of a proper subject.

The subject is the cause of the proper affections.<sup>3</sup> Hence, if we should want to investigate the cause of the affections of something—on account of which they should be in some lower things—, we would have to take in common that which is the proper subject, by whose definition the cause of that affection is taken.

The relation of subject to proper affections is similar to (the relation) of genus to species: to wit, such that *substance* should be divided (as a genus) in this mode into (the species) *immaterial* and *corporeal*—and body (should be divided) into (the species) *incorruptible* and *elementary*—, just like number (should be divided) into even and odd, or animal into healthy and sick.<sup>4</sup> Of which, *number* is the subject of *even* and *odd* as of (its) proper affections; and *animal* (is the subject) of *healthy* and *sick* (as of its proper affections). Both subject and affections (are) predicated of all the species (► 14.1, ¶1).

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<sup>1</sup> *In Post. an.* 1, l. 15, 34–36 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75a39–40): “premittit [Philosophus] que sint necessaria ad demonstrationem, dicens quod *in demonstrationibus tria sunt*.” Ibid., 45–65 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b2–8): “ostendit [Philosophus] quid predictorum trium possit esse commune diuersis scienciis et quid non.”

<sup>2</sup> *In Post. an.* 1, l. 15, 36–39 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75a40–41): “Vnum est quod demonstratur, scilicet *conclusio*, que quidem continet in se id *quod per se inest alicui generi*; per demonstrationem enim concluditur propria passio de proprio subiecto.”

<sup>3</sup> *In Post. an.* 2, l. 17, 56–62 (cf. ARISTOTLE, *Analytica Posteriora* B.14, 98a9–12): “subiectum est causa proprie passionis, et ideo, si uolumus inuestigare causam alicuius passionis, propter quam insit quibusdam rebus inferioribus, oportet accipere commune quod est proprium subiectum, per cuius diffinitionem accipitur causa illius passionis.”

<sup>4</sup> *De sub. sep.*, c. 6, 48–57: “est similis habitudo generis ad differentias, sicut subiecti ad proprias passiones; ut scilicet substantia hoc modo dividatur per spiritualem et corporalem, et corpus per caeleste et elementare, sicut numerus per par et impar, aut animal per sanum et aegrum: quorum numerus est subiectum paris et imparis sicut propriarum passionum, et animal sani et aegri, tam subiecto quam passionibus de speciebus omnibus praedicatis.” Rendering *spiritualem* as *immaterial* and *caeleste* as *incorruptible* for greater clarity: it is irrelevant for the purpose at hand whether celestial bodies are corruptible or whether immaterial substances are necessarily spiritual.

2. The **axioms** (*dignitates* = τὰ ἐξιώματα) from which (*ex quibus* = ἐξ ὧν) the demonstration proceeds.<sup>5</sup>

The axioms from which the demonstration proceeds can be the same in diverse demonstrations and also in diverse sciences.<sup>6</sup>

3. The **subject genus** (*genus subiectum* = τὸ γένος τὸ ὑποκείμενον), whose proper affections—and accidents by themselves—the demonstration shows (*cuius <proprias> passiones et per se accidentia demonstratio ostendit* = οὐ τὰ πάθη καὶ τὰ καθ' αὐτὰ συμβεβηκότα δηλοῖ ἢ ἀπόδειξις).<sup>7</sup>

### 56.2. Demonstration is in One Subject Genus

A demonstration is (produced) from those (principles) that are by themselves.<sup>8</sup> Therefore, as ARISTOTLE says, it is manifest that it is impossible to demonstrate descending or proceeding from one genus into another genus (< οὐκ ἄρα ἔστιν ἐξ ἄλλου γένους μεταβάντα δεῖξαι).

In a demonstration, the means (*media* = τὰ μέσα) and the extremities (*extrema* = τὰ ἄκρα) must be of the same genus.<sup>9</sup> Indeed, the extremities are contained in the conclusion: for, in the conclusion, the greater extremity is the predicate, while the lesser extremity is the subject. And the mean is contained in the premises. Therefore, principles and conclusions must be taken about the same genus. And since diverse sciences are about diverse subject genera, it follows of necessity that, from the principles of one science, something would not be concluded in another science that should not be posited under it.

It is evident that, if the subject of the conclusion and the mean should thoroughly be of another genus, the affection either could not altogether be in the mean, or it would not be by itself in the subject. Thus, it would have to be by accident in one or in the other of them.

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<sup>5</sup> *In Post. an. 1, l. 15, 39–40* (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75a41–42): “*Aliud autem sunt dignitates, ex quibus demonstratio procedit.*”

<sup>6</sup> *In Post. an. 1, l. 15, 46–49* (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b2–3): “*horum autem trium unum, scilicet dignitates, ex quibus demonstratio procedit, contingit esse idem in diuersis demonstrationibus et etiam in diuersis scienciis.*”

<sup>7</sup> *In Post. an. 1, l. 15, 40–42* (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75a42–b2): “*Tercium autem est genus subiectum, cuius proprias passiones et per se accidentia demonstratio ostendit.*”

<sup>8</sup> *In Post. an. 1, l. 15, 25–28* (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75a38): “*Dicit ergo [Philosophus] primo: ex quo demonstratio est ex hiis que sunt ‘per se’, ergo manifestum est quod non contingit demonstrare descendentem uel procedentem ex alio genere in aliud genus.*”

<sup>9</sup> *In Post. an. 1, l. 15, 103–114* (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b10–11): “*ostendit [Philosophus] propositum hoc modo: Oportet in demonstratione eiusdem generis esse media et extrema; extrema autem in conclusione continentur, nam maior extremitas in conclusione est predicatum, minor uero extremitas subiectum; medium autem in premissis continentur; oportet igitur principia et conclusiones circa idem genus sumi. Cum autem huic coniunxerimus quod diuersae sciencie sunt circa diuersa genera subiecta, ex necessitate sequetur quod ex principiis unius sciencie non concludatur aliquid in alia sciencia que non sit sub ea posita.*”



And if it should be in the mean by accident, it will be by accident in the premise; if, on the other hand, (it should be by accident) in the subject, it will be in the conclusion—and this, from the part of the affection. Either way, it would nonetheless have to be by accident in the premises, insofar as the subject is taken under the mean: for example, if *triangle* should be taken under *brazen*, or conversely. However, it has been shown that, in demonstrations, the conclusion as much as the premises are by themselves and not by accident. Therefore, means and extremities must be of the same genus.<sup>10</sup>

ARISTOTLE infers two conclusions from the (above) premises:<sup>11</sup>

1. No science demonstrates something about the subject of another science, whether it should be of a more common science or of another, separate science.<sup>12</sup>

Likewise, one science does not have to prove that which belongs to another science—unless, perhaps, one science should be under the other, as perspective is related to geometry, and (as) harmonic (science) or music (is related) to arithmetic.<sup>13</sup>

2. A science does not prove any which accident about its own subject, but the accident that is of its genus.<sup>14</sup>

### 56.3. The Same Genus: Simply vs. According to Something

It would be impossible for some conclusion to be demonstrated from some principles unless the genus should be the same either *simply* (*simpliciter*) or *according to something* (*secundum quid*).<sup>15</sup> Thus, it is manifest that **the genus** about which the principles and conclusions are taken **is necessarily either**:

<sup>10</sup> *In Post. an.* 1, l. 15, 124–139 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b11–12): “Vnde patet quod oportet omnino, si subiectum conclusionis et medium sint penitus alterius generis, quod passio uel non per se insit medio uel non per se insit subiecto; et ita oportet quod alteri eorum insit per accidens. Et, si quidem medio insit per accidens, erit per accidens in premissis; si autem subiecto, erit in conclusione, et hoc ex parte passionis; set utroque modo oportebit per accidens esse in premissis, quantum ad hoc quod subiectum accipitur sub medio, sicut si triangulus accipiatur sub eneo aut e conuerso. Ostensum est autem quod in demonstrationibus tam conclusio quam premissae sunt per se et non per accidens. Oportet ergo in demonstrationibus medium et extrema eiusdem generis esse.”

<sup>11</sup> *In Post. an.* 1, l. 15, 141 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b12–20): “infert [Philosophus] duas conclusiones ex premissis.”

<sup>12</sup> *In Post. an.* 1, l. 15, 142–145 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b12–17): “Quarum prima est quod nulla sciencia demonstrat aliquid de subiecto alterius sciencie, siue sit sciencie communioris siue alterius sciencie dispertite.”

<sup>13</sup> *In Post. an.* 1, l. 15, 148–167 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b12–17): “Et similiter, quod est unius sciencie non habet probare alia sciencia, nisi forte una sciencia sit sub altera, sicut se habet *perspectiua ad geometriam et consonantia* (uel harmonica, id est musica) *ad arismetiam*.”

<sup>14</sup> *In Post. an.* 1, l. 15, 168–171 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b17–20): “Secunda conclusio ponitur [...]. Et est quod sciencia etiam de proprio subiecto non probat quodlibet accidens, set accidens quod est sui generis.”

<sup>15</sup> *In Post. an.* 1, l. 15, 72–80 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b8–10): “manifestum est quod *necesse est aut esse simpliciter idem genus*, circa quod sumuntur principia et conclusiones [...]; *aut* [...]

1. **The same simply** (*simpliciter* = ἀπλῶς).<sup>16</sup> In this way, there is no descent or transit from a genus into (another) genus.

A genus *simply the same* is taken when some determining difference that should be extraneous to the nature of that genus is not taken from the part of the subject.<sup>17</sup>

For example, if someone should proceed—from (some) principles (that have been) verified about the triangle—to demonstrate something about the isosceles or some other species of triangle, (then the genus taken—i.e., *triangle*—would be simply the same).<sup>18</sup>

2. The same **according to something** (*secundum quid*) or *in some mode* (*sic* = πῆ, <*id est quodam modo*>), if the demonstration should descend (< εἰ μέλλει ἢ ἀπόδειξις μεταβαίνειν, i.e., pass) from one genus into another.<sup>19</sup>

A genus is *one according to something* (*secundum quid... unum*) when some difference (which is) extraneous to the nature of that genus is assumed about the subject.<sup>20</sup>

For example, *visual* (*visuale*) is extraneous to the genus of line; and *sounding* (*sōnus*), to the genus of number.<sup>21</sup> Therefore, *number simply*, which is the subject genus of arithmetic, and *sonorous number*, which is the subject genus of music (i.e., of harmonic acoustics), are not *one genus* simply. Nor, likewise, (are the same genus simply) *line* simply, which the geometer considers, and *visual line*, which the perspective scientist (*perspectivus*) studies. Whence, it is evident that, when those that of *line* simply are applied to *visual line*, there comes to be some mode of descent into another genus—not (so), however, when those (determining differences) that belong to (the subject genus) *triangle* are applied to (the subject genus) *isosceles*.

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oportet esse unum genus *sic*, id est quodam modo. *Aliter* enim *impossibile* est quod demonstraretur aliqua conclusio ex aliquibus principiis, nisi sit idem genus uel simpliciter uel secundum quid."

<sup>16</sup> *In Post. an.* 1, l. 15, 72–75 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b8–9): "*necesse est aut esse simpliciter idem genus, circa quod sumuntur principia et conclusiones, et sic non est descensus neque transitus a genere in genus.*"

<sup>17</sup> *In Post. an.* 1, l. 15, 81–84: "*simpliciter idem genus accipitur quando ex parte subiecti non sumitur aliqua differentia determinans que sit extranea a natura illius generis.*"

<sup>18</sup> *In Post. an.* 1, l. 15, 84–87: "*sicut si quis per principia uerificata de triangulo procedat ad demonstrandum aliquid circa ysochelem uel aliquam aliam speciem trianguli.*"

<sup>19</sup> *In Post. an.* 1, l. 15, 75–77 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b9): "*aut, si debet demonstratio descendere de uno genere in aliud, oportet esse unum genus sic, id est quodam modo.*"

<sup>20</sup> *In Post. an.* 1, l. 15, 87–90: "*Secundum quid autem est unum genus quando assumitur circa subiectum aliqua differentia extranea a natura illius generis.*"

<sup>21</sup> *In Post. an.* 1, l. 15, 90–101: "*sicut uisuale est extraneum a genere linee et sonus est extraneus a genere numeri; numerus ergo simpliciter, qui est genus subiectum arismetice, et numerus sonorus, qui est genus subiectum musice, non sunt unum genus simpliciter; similiter autem nec linea simpliciter, quam considerat geometra, et linea uisualis, quam considerat perspectiuus. Vnde patet quod quando ea que sunt linee simpliciter applicantur ad lineam uisualis, fit quodam modo descensus in aliud genus, non autem quando ea que sunt trianguli applicantur ad ysochelem.*"

#### 56.4. Demonstration in Sciences Whose Subject Genus is Diverse

In those sciences whose subject genus is diverse, it is impossible for a demonstration that proceeds from the principles of one science to agree in respect of the accidents of the subject of another science—unless perhaps the subject of one science should be contained under the subject of the other.<sup>22</sup>

Thus, the demonstration of geometry precedes the lower sciences, as are the mechanical arts, which use measures; or the optical (sciences), as are the sciences that treat of vision, such as perspective, the science that treats of mirrors, and such.<sup>23</sup> (The same is the case) likewise, of arithmetic in comparison to harmonics or music.

How this should happen—to wit, that the subject of one science should be contained under the subject of another—will be said later (► 63).<sup>24</sup>

#### 56.5. Demonstration is from Proper—Not Common—Principles

As ARISTOTLE says, it is evident that not any (conclusion) can be demonstrated through any (principles).<sup>25</sup> Instead, a demonstration must be produced from the principles of each (subject genus) in a mode (such) that the principles of the demonstration be by themselves in that which is demonstrated. And if this is so, for something to be scientifically known, it is not sufficient that (the conclusion) should be demonstrated from true and immediate (principles): it must, moreover, be demonstrated from proper principles.

Whence, it is evident that whoever knows through such *ratios* (i.e., the ratios of common principles) does not know insofar as *that which is*—that is, *by itself*—but only by accident.<sup>26</sup>

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<sup>22</sup> *In Post. an.* 1, l. 15, 49–57 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b3–6): “in illis scienciis quarum est diuersum *genus* subiectum [...] non contingit quod demonstratio que procedit ex principiis unius sciencie [...] *conuenire* quantum ad *accidencia* subiectis alterius sciencie [...] *nisi* forte subiectum unius sciencie contineatur sub subiecto alterius.”

<sup>23</sup> *In Post. an.* 1, l. 17, 138–147 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a22–25): “redit [Philosophus] ad principalem conclusionem. Et dicit quod demonstratio non procedit in aliud genus, nisi sicut dictum est quod demonstratio geometrie procedit ad scientias inferiores sicut sunt artes mechanice, que utuntur mensuris, aut speculatiue, sicut sciencie que sunt de uisu, ut perspectiue, et sciencie que sunt de speculis et huiusmodi; et similiter est de arismetica in comparatione ad armonicam, id est musicam.”

<sup>24</sup> *In Post. an.* 1, l. 15, 58–60 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b6): “quod quidem qualiter contingat, scilicet subiectum unius sciencie contineri sub subiecto alterius, *posterius dicetur*.”

<sup>25</sup> *In Post. an.* 1, l. 17, 9–18 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 75b37–40): “proponit [Philosophus] intentum, dicens quod, quia *manifestum est quod non* contingit *unumquodque* per unumquodque *demonstrare*, set oportet quod demonstratio fiat *ex unoquoque principiorum*, hoc modo quod *id quod demonstratur sit secundum quod est illud*, id est oportet quod principia demonstrationis insint per se ei quod demonstratur, si, inquam, ita est, non sufficit ad hoc quod aliquid sciatur quod demonstretur *ex ueris et immediatis*, set oportet ulterius quod demonstretur ex principiis propriis.”

<sup>26</sup> *In Post. an.* 1, l. 17, 40–52 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 75b42–76a9): “Vnde patet quod qui scit per huiusmodi rationes, *non scit secundum quod illud est*, id est per se, set per *accidens* tantum; si enim esset secundum se, *non conueniret demonstratio in aliud genus*. *Vnumquodque enim scimus secundum accidens, cum non cognoscimus illud secundum quod est ex principiis illius*, id est secundum quod est ex principiis per se, sicut *habere tres angulos equales duobus rectis* inest per se triangulo

Indeed, if (an affection) should be (in a subject) according to itself, the demonstration would not pass into another genus. Thus, we know any one (thing) according to accident when we do not know it insofar as it is from its principles—that is, insofar as it is from principles by themselves. For example, *to have three (internal) angles equal to two right (angles)* is by itself in *triangle* insofar as it is from its principles; which (affection) would be proximate according to the genus of the conclusion if a mean by itself of the conclusion should be taken.

As ARISTOTLE shows, the **principles in any one genus** (*principia in unoquoque genere* = ἀρχὰς ἐν ἐκάστω γένει) are *those (principles) that, because they are true, cannot be demonstrated* (*illa que, cum sint <vera>, tamen non contingit ea demonstrare* = ταύτας ἄς ὅτι ἔστι μὴ ἐνδέχεται δεῖξαι), either simply—if they should be first principles—or at least in that science in which they are taken as principles. He says, “because they are” (*cum sint* = ὅτι ἔστι) to differentiate (these principles) from the false (principles) that are not demonstrated in some science.<sup>27</sup>

Therefore, as ARISTOTLE says, it is evident that it is impossible to demonstrate in whatever mode, but (only) insofar as (a conclusion) is demonstrated from the proper principles of each (subject genus).<sup>28</sup> Yet, also the proper principles of the singular sciences have something common prior to them.

## 56.6. How Sciences Use Common and Proper Principles

ARISTOTLE shows in what mode the aforesaid (i.e., common and proper) principles of science are demonstratively used:<sup>29</sup>

1. Concerning **common principles**, he says that it is sufficient to take any one of them inasmuch as they pertain to that genus about which the science is.<sup>30</sup>

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secundum quod est *ex principiis illius*. Quare si per se esset medium acceptum conclusioni, *necesse esset in eadem proximitate esse, id est proximum esse secundum genus conclusioni.*”

<sup>27</sup> *In Post. an. 1, l. 18, 29–36* (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a31–32): “ostendit [Philosophus] que sint principia, dicens quod *principia in unoquoque genere* sunt *illa que, cum sint uera, tamen non contingit ea demonstrare*, uel simpliciter si sint principia prima, uel ad minus non est demonstrare in illa sciencia in qua sumuntur ut principia. Dicit autem: «cum sint», ad differentiam falsorum, que non demonstrantur in aliqua sciencia.”

<sup>28</sup> *In Post. an. 1, l. 17, 82–89* (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a13–16): “Remota autem dubitatione, ulterius conclusionem intentam principaliter inducit [Philosophus], dicens quod ex predictis patet *quod non est demonstrare unumquodque simpliciter*, id est quocumque modo, *set <secundum> hoc quod demonstratur ex propriis principiis uniuscuiusque*. *Set et principia propria singularum scienciarum habent aliquod commune prius eis.*”

<sup>29</sup> *In Post. an. 1, l. 18, 91–92* (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a43–b11): “ostendit [Philosophus] quomodo premissis principiis sciencie demonstratiue utantur.”

<sup>30</sup> *In Post. an. 1, l. 18, 93–96* (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a43): “Et primo quidem de communibus dicit quod *sufficiens est accipere unumquodque istorum communium quantum pertinet ad genus illud de quo est sciencia.*”

Since this could seem contrary to what has been shown above—that the demonstrative sciences do not proceed from common (principles)—, he adds that common principles are taken in any one demonstrative science according to analogy (*secundum analogiam* = κατ' ἀναλογίαν): that is, insofar as they are proportionate to that science.<sup>31</sup>

Thus, he explains that it is useful (*utile* = χρήσιμον) to take such principles in the sciences in as much as they pertain to the subject genus that is contained under that science (< ἐν τῷ ὑπὸ τὴν ἐπιστήμην γένει).<sup>32</sup>

Indeed, to appropriate is nothing other than to draw the common to the proper.<sup>33</sup>

## 2. ARISTOTLE shows how the demonstrative sciences should use **proper principles**:<sup>34</sup>

(a) In these sciences, it is supposed *that* the **subjects** (*subiecta*) are (*supponuntur esse* < λαμβάνεται εἶναι): to wit, the subjects that are the proper (*propria* = ἴδια) principles about which a science theorizes (*speculatur* = θεωρεῖ) those (affections) that are by themselves in them (*ea que per se insunt eis* = τὰ ὑπάρχοντα καθ' αὐτά).<sup>35</sup>

(b) On the other hand, concerning the **affections** [by themselves of a subject] (< τὰ... τούτων πάθη καθ' αὐτά), the aforesaid sciences suppose (only) *what each of them should signify* (*supponunt... quid significet unaqueque* < τί... σημαίνει ἕκαστον, λαμβάνουσιν).<sup>36</sup>

### 56.7. No Science Demonstrates Its Proper Principles

ARISTOTLE concludes saying that, if demonstrations in the singular sciences are not produced from common principles; and, also, the principles of the sciences have something prior to them that is common; it is (therefore) manifest that it does not behoove any one science to demonstrate its proper principles.<sup>37</sup>

<sup>31</sup> *In Post. an.* 1, l. 18, 72–77 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a38–39): “Et quia hoc posset uideri contrarium ei quod supra ostensum est, quod sciencie demonstratiue non procedunt ex communibus, ideo subiungit [Philosophus] quod *communia* principia accipiuntur in unaquaque sciencia demonstratiua *secundum analogiam*, id est secundum quod sunt proportionata illi sciencie.”

<sup>32</sup> *In Post. an.* 1, l. 18, 78–81 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a39–40): “Et hoc est quod subdit [Philosophus], exponens quod *utile est* accipere huiusmodi principia in scienciis quantum pertinet ad genus subiectum quod continetur sub illa sciencia.”

<sup>33</sup> *De veritate*, q. 7 a. 3 co., 32–34: “appropriare nihil est aliud, quam commune trahere ad proprium.”

<sup>34</sup> *In Post. an.* 1, l. 18, 106–107 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b3–11): “ostendit [Philosophus] qualiter demonstratiue sciencie utantur propriis principiis.”

<sup>35</sup> *In Post. an.* 1, l. 18, 107–109 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b3–4): “*propria* principia sunt que supponuntur esse in scienciis, scilicet subiecta *circa que sciencia speculatur ea que per se insunt eis*.”

<sup>36</sup> *In Post. an.* 1, l. 18, 113–114 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b6–7): “Set de passionibus supponunt predictae sciencie *quid significet unaqueque*.”

<sup>37</sup> *In Post. an.* 1, l. 17, 94–100 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a16–17): “inducit conclusionem [Philosophus], dicens quod, *si hoc* uerum est, scilicet quod demonstrationes in singulis scienciis non fiunt ex principiis communibus, et iterum quod principia scienciarum habent aliquid prius se quod est commune, *manifestum est quod non est uniuscuiusque sciencie demonstrare principia sua propria*.”

Indeed, those prior principles, through which the proper principles of the singular sciences can be proven, are the common principles of all (sciences).<sup>38</sup> And that science that considers such common principles is related to those (principles) that are common to all (sciences) as the other particular sciences are related to those (principles) that are proper (to them).

Thus, just like the subject of arithmetic is *number*, and hence, arithmetic considers those (affections) that are proper to number, likewise first philosophy, which considers common principles, has for (its) subject *being*, which is common to all (things).<sup>39</sup> Hence, (first philosophy) considers those (affections) that are proper of *being*, which are common to all (beings), as proper to itself.

ARISTOTLE shows the preeminence of that science that considers the common principles—namely, first philosophy—in relation to the other (sciences).<sup>40</sup> For that through which something is proven must be more scientifically known (*scitum*) or (at least) known (*notum*). Thus, whosoever knows something from higher causes must understand those causes more, since he will scientifically know from prior (causes) simply; for he would not know from caused causes. When, on the other hand, someone knows from caused causes, then he does not understand from prior and more scientifically known (causes) simply, but from (what is) more known and prior in respect of us.

Thus, since the principles of lower sciences are proven from the principles of the higher (sciences), the process is not from (things) caused into causes, but conversely.<sup>41</sup> Whence, such a process must be from the prior and more known simply. Therefore, that which

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<sup>38</sup> *In Post. an. 1, l. 17, 100–107* (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a17–18): “*illa enim principia priora, per que possent probari singularum scienciarum propria principia, sunt communia principia omnium, et illa sciencia, que considerat huiusmodi principia communia, est propria omnibus, id est ita se habet ad ea que sunt communia omnibus sicut se habent alie sciencie particulares ad ea que sunt propria.*”

<sup>39</sup> *In Post. an. 1, l. 17, 107–114*: “*Sicut enim subiectum arismetice est numerus et ideo arismetica considerat ea que sunt propria numeri, similiter prima philosophia, que considerat communia principia, habet pro subiecto ens, quod est commune ad omnia, et ideo considerat ea, que sunt propria entis, que sunt omnibus communia, tanquam propria sibi.*”

<sup>40</sup> *In Post. an. 1, l. 17, 116–126* (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a18–20): “*ostendit [Philosophus] preminentiam huius sciencie que considerat principia communia, scilicet philosophie prime, ad alias. Semper enim oportet illud per quod aliquid probatur esse magis scitum uel notum: qui enim scit aliquid ex superioribus causis, oportet quod sit magis intelligens illas causas, quia sciuit ex prioribus simpliciter, cum non sciuit ex causatis causis; quando enim aliquis scit ex causatis causis, tunc non intelligit ex prioribus et ex magis notis simpliciter, set ex magis notis et prioribus quo ad nos.*”

<sup>41</sup> *In Post. an. 1, l. 17, 126–137* (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a20–22): “*Cum autem principia inferioris sciencie probantur ex principiis superioris, non proceditur ex causatis in causas, set e conuerso; unde oportet quod talis processus sit ex prioribus et ex magis notis simpliciter. Oportet ergo magis esse scitum quod est superioris sciencie ex quo probatur id quod est inferioris, et maxime esse scitum id quo omnia alia probantur et ipsum non probatur ex alio priori, et per consequens sciencia superior erit magis sciencia quam inferior, et sciencia suprema, scilicet philosophia prima, erit maxime sciencia.*”

belongs to a higher science—from which is proven what belongs to the lower (sciences)—must be more scientifically known; and that must be maximally by which all other (conclusions) are proven, and it itself is not proven from something prior. Consequently, the higher science will be a science more than the lower; and the highest science—namely, first philosophy—will maximally be a science.

### 56.8. No Demonstration from Probable Principles

Since it is manifest that a demonstration must conclude from necessary (propositions), those are fools (*stulti* = εὐήθεις) who have opined that the principles of a demonstration are well taken if the proposition taken should only be probable or true, as do sophists, who appear to be scientific knowers but are not.<sup>42</sup> For scientifically to know is only for science to be had—to wit, through demonstration. And that something should be first or non-first is not had from its being probable or improbable; yet, that about which demonstration comes to be must be **first in some genus**, and (must) be **true**. And the demonstrator does not take (just) any first, but the first (that is) **proper** to that genus about which he demonstrates.

For example, the arithmetician does not take (to be) first that which is about magnitudes, but (that which is) about number.<sup>43</sup>

It should be noted, however, that *sophists* are not taken here as (they are) in (ARISTOTLE's) book *Sophistical Refutations*, who (therein) proceed from those (principles) that seem probable and are not; or seem to syllogize and do not syllogize.<sup>44</sup> For just as such (people) are said (to be) *sophists*—that is, apparent and not true knowers—insofar as they lack in dialectical argumentation, so, (too), dialectical argumentations, if they should appear to prove demonstratively and would not prove, are *sophistical* insofar as they seem, by their argumentation, (to be) scientific, when they are not.

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<sup>42</sup> *In Post. an.* 1, l. 13, 106–114 (cf. ARISTOTLE, *Analytica Posteriora* A.6, 74b21–26): “manifestum est, ex hoc quod oportet demonstrationem ex necessariis concludere, quod *stulti sunt* illi qui *opinati sunt bene se principia demonstrationis accipere, si solum propositio accepta sit probabilis uel uera, ut Sophiste faciunt*, id est illi qui apparent scientes et non sunt. Nam *scire* non est nisi per hoc quod scientia habetur, scilicet ex demonstratione; ex hoc autem quod aliquid *est probabile* uel improbabile, non habetur quod sit primum uel non primum; set tamen oportet illud circa quod fit demonstratio esse *primum in genere* aliquo *et esse uerum*; non tamen *omne* primum accipit demonstrator, set primum *proprium* illi generi *circa quod demonstrat*.”

<sup>43</sup> *In Post. an.* 1, l. 13, 114–116: “sicut arithmeticus non accipit primum quod est circa magnitudines, set circa numerum.”

<sup>44</sup> *In Post. an.* 1, l. 13, 117–127 (cf. ARISTOTLE, *Analytica Posteriora* A.6, 74b23): “Attendendum autem est quod Sophiste non sumuntur hic sicut in libro Elenchorum, qui procedunt ex his que uidentur probabilia, non sunt autem, uel uidentur sillogizare et non sillogizant; sicut enim tales Sophiste dicuntur, id est apparentes <sapientes> et non existentes, in quantum deficiunt a dyaletica argumentatione, ita dyaletice argumentationes, si appareant demonstratiue probare et non probent, sophisticæ sunt, in quantum uidentur sua argumentatione scientes, cum non sint.”





## 57. Cognitive Conditions of Demonstration

We turn our attention to one last material condition of demonstration: that it proceed from prior and more known principles (► 53.6, ¶4).

### 57.1. Induction vs. Demonstration

Induction produces the known (*facit notum*) in a mode other than demonstration, for demonstration proceeds from the prior simply, while induction (proceeds) from the prior in respect of us (*quoad nos*).<sup>1</sup>

### 57.2. The End and Necessity of the Demonstrative Syllogism

The necessity of anything that is ordered to an end is taken from its end.<sup>2</sup> And the end of the demonstrative syllogism is the acquisition of science (► 53.2). Whence, if science could not be acquired through a syllogism or argument, there would be no need for the demonstrative syllogism.

Now, as ARISTOTLE says, natural forms are reduced into act from forms that are in matter: to wit, from the forms of natural agents.<sup>3</sup> Likewise, he posits that science is produced (*fit*) in us in act through some knowledge that preexists in us: and this is for science to be produced in us through whatever syllogism or argument, for in arguing we proceed from one (known thing or *ratio*) into another.

### 57.3. Every Doctrine and Every Discipline is Produced from Pre-Existent Cognition

To show the necessity of (there being) a demonstrative syllogism, ARISTOTLE says first that, in us, knowledge (*cognitio*) is acquired from some pre-existent knowledge.<sup>4</sup>

ARISTOTLE introduces a universal proposition that contains (his) premise: namely, that, in us, the reception of (reasoned) cognition is produced from some pre-existent cognition (< πᾶσα διδασκαλία καὶ πᾶσα μάθησις διανοητικὴ ἐκ προϋπαρχούσης γίνεται γνῶσεως).<sup>5</sup>

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<sup>1</sup> *In Post. an.* 1, l. 8, 32–35 (cf. ARISTOTLE, *Analytica Posteriora* A.3, 72b25–30): “*inductio facit notum, scilicet altero modo a demonstratione: nam demonstratio procedit ex prioribus simpliciter, inductio autem ex prioribus quo ad nos.*”

<sup>2</sup> *In Post. an.* 1, l. 1, 133–138: “*Necessitas autem cuiuslibet rei ordinate ad finem ex suo fine sumitur; finis autem demonstratiui sillogismi est acquisitio sciencie: unde, si sciencia acquiri non posset per sillogismum uel argumentum, nulla esset necessitas demonstratiui sillogismi.*”

<sup>3</sup> *In Post. an.* 1, l. 1, 153–160: “*ponit enim [Philosophus] quod forme naturales reducuntur in actum a formis que sunt in materia, scilicet a formis naturalium agentium, et similiter ponit quod sciencia fit in nobis actu per aliquam scienciam in nobis preexistentem, et hoc est fieri in nobis scienciam per sillogismum aut argumentum quodcunque: nam ex uno in aliud argumentando procedimus.*”

<sup>4</sup> *In Post. an.* 1, l. 1, 161–164 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a1–2): “*Ad ostendendum igitur necessitatem demonstratiui sillogismi, premitit Aristotiles quod cognitio in nobis acquiritur ex aliqua cognitione preexistenti.*”

<sup>5</sup> *In Post. an.* 1, l. 1, 168–175 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a1–2): “*inducit [Philosophus] uniuersalem propositionem propositum continentem, scilicet quod acceptio cognitionis in nobis fit ex aliqua preexistenti cognitione. Et ideo dicit: Omnis doctrina et omnis disciplina, non autem: «omnis*

Hence, he says, “every doctrine and every discipline,” and not “every cognition,” because not every cognition depends on prior cognition—otherwise one would go on infinitely. Rather, the reception of every discipline comes to be from pre-existent cognition.

However, *doctrine* and *discipline* are not taken here only insofar as they are related to the acquisition of the sciences, but to the acquisition of any knowledge.<sup>6</sup> This is evident because ARISTOTLE manifests this proposition also in (the case of) disputative and rhetorical disputations (►57.4, ¶2, ¶3), by which science is not acquired. Whereby, too, he does not say, “from pre-existent science,” or “[from pre-existent] understanding,” but universally, “[from pre-existent, ἐκ προϋπαρχούσης] knowledge [γνώσεως].”

ARISTOTLE adds *intellective* (*intellectiva* = διανοητική, i.e., the third operation; ►52.2, ¶3) to exclude the acceptance of sensitive or imaginative cognition, for it belongs to reason alone to proceed from one into another.<sup>7</sup>

#### 57.4. Inductive Proof That Doctrine and Discipline Are from Pre-Existent Cognition

ARISTOTLE manifests the premised proposition through induction.<sup>8</sup> (Thus, it is evident that every intellective doctrine or discipline is produced from pre-existent knowledge):

1. In demonstrative (argumentations), in which science is acquired.<sup>9</sup> And among these, the most principal are the mathematical sciences on account of the most certain mode of demonstration (►1.1). All the other arts follow, because in all (of them) there is something of the mode of demonstration—otherwise they would not be sciences.

2. In disputative or dialectical statements, which use syllogism and induction.<sup>10</sup> In one and in the other of these, we proceed from something foreknown: for in a syllogism, the

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cognitio», quia non omnis cognitio ex priori cognitione dependet (esset enim in infinitum abire), omnis autem discipline acceptio ex preexistenti cognitione fit.”

<sup>6</sup> *In Post. an. 1, l. 1, 179–187* (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a1–2): “Non autem accipitur hic doctrina et disciplina secundum quod se habent ad acquisitionem sciencie tantum, set ad acquisitionem cognitionis cuiuscunque; quod patet, quia manifestat [Philosophus] hanc propositionem etiam in disputatiuis et rethoricis disputationibus, per quas non acquiritur sciencia; propter quod etiam non dicit: ex preexistenti «sciencia» uel «intellectu», set uniuersaliter *cognitione*.”

<sup>7</sup> *In Post. an. 1, l. 1, 187–190* (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a1–2): “Addit autem [Philosophus]: *intellectiua*, ad excludendum acceptionem cognitionis sensitue uel ymaginatie: nam procedere ex uno in aliud rationis est solum.”

<sup>8</sup> *In Post. an. 1, l. 1, 192–193* (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a2–11): “manifestat [Philosophus] propositionem premissam per inductionem.”

<sup>9</sup> *In Post. an. 1, l. 1, 194–199* (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a2–4): “Et primo, in demonstratiuis in quibus acquiritur sciencia; in hiis autem principales sunt mathematice sciencie, propter certissimum modum demonstrationis, consequenter autem sunt et omnes alie artes, quia in omnibus est aliquis modus demonstrationis, alias non essent sciencie.”

<sup>10</sup> *In Post. an. 1, l. 1, 200–207* (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a5–9): “manifestat [Philosophus] idem in orationibus disputatiuis siue dyaleticis, que utuntur sillogismo et inductione, in quorum utroque proceditur ex aliquo precognito: nam in sillogismo accipitur cognitio alicuius uniuersalis

cognition of some concluded universal is taken from other known universals, while in an induction, a universal is concluded from singulars that are manifest (►57.1).

3. In the rhetorical (arts).<sup>11</sup> In these, persuasion comes to be through an enthymeme (i.e., a syllogism in which one of the premises is implicit) or through an example, and not through a complete syllogism or induction, on account of the incertitude of the matter about which it revolves: namely, about the singular acts of men, in which universal propositions cannot be truly taken. Hence, some enthymeme is used in the place of a syllogism. Likewise, in the place of an induction, in which a universal is concluded, some example, in which we proceed from a singular not to a universal but to a singular. Whence, it is evident that, just like an enthymeme is some mutilated syllogism, so an example is some imperfect induction. Therefore, if in a syllogism and in an induction, we proceed from some fore-known, the same must be understood (to be the case) in an enthymeme and in an example.

### 57.5. Demonstration Is from Things That Are More Known Simply

Since *prior* and *more known* is said in two modes—namely, in respect of us and according to nature (►49.2)—, ARISTOTLE says that those (known things) from which demonstration proceeds are prior and more known simply and according to nature—not in respect of us. Simply prior and more known are those—like universals—that are more remote from sense, while prior and more known in respect of us are proximate to sense—namely, singulars, which are opposed to universals either according to the opposition of the prior and the posterior, or according to the opposition of the proximate and the remote.<sup>12</sup>

This seems to be contrary to what ARISTOTLE says in the *Physics* (►49.5, ¶1): that universals are prior in respect of us and posterior according to nature.<sup>13</sup> However, it is to

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conclusi ab aliis uniuersalibus *notis*, in inductione autem concluditur *uniuersale* ex singularibus que sunt manifesta.”

<sup>11</sup> *In Post. an.* 1, l. 1, 209–224 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a9–11): “manifestat [Philosophus] idem in rethoricis, in quibus persuasio fit per entimema aut per exemplum, non autem per sillogismum uel inductionem completam, propter incertitudinem materie circa quam uersatur, scilicet circa actus singulares hominum, in quibus uniuersales propositiones non possent assumi uere; et ideo utitur, loco sillogismi in quo necesse est esse aliquam uniuersalem, aliquo entimemate, et similiter, loco inductionis in qua uniuersale concluditur, aliquo exemplo, in quo proceditur a singulari non ad uniuersale set ad singulare; unde patet quod, sicut entimema est quidam *sillogismus* decurtatus, ita exemplum est quedam *inductio* imperfecta; si ergo in sillogismo et inductione proceditur ex aliquo precognito, oportet idem intelligi in entimemate et exemplo.”

<sup>12</sup> *In Post. an.* 1, l. 4, 245–255 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b33–72a5): “Et quia prius et notius dicitur *dupliciter*, scilicet quo ad nos et secundum naturam, dicit [Philosophus] consequenter quod ea ex quibus procedit demonstratio sunt *priora et notiora* simpliciter et secundum naturam, non quoad nos. — Et ad huius expositionem dicit quod *priora et notiora* simpliciter sunt illa que sunt remota a sensu, ut *uniuersalia*, *priora* autem *et notiora* quo ad nos sunt *proxima sensui*, scilicet *singularia*, que *opponuntur* uniuersalibus siue oppositione prioris et posterioris, siue oppositione propinqui et remoti.”

<sup>13</sup> *In Post. an.* 1, l. 4, 256–267 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b29–72a5; *Physica* A.1, 184a16–24): “Videtur autem contrarium huius haberi in I Phisicorum, ubi dicitur quod uniuersalia sunt

be said that here (in the *Posterior Analytics*) he speaks of the order of the singular to the universal simply, whose order must be taken according to the order of sensitive and intellectual cognition in us—and sensitive cognition is prior to intellectual (cognition) in us, since intellectual cognition, in us, proceeds from sense. Whence, the singular is both prior and more known than the universal in respect of us.

In the *Physics*, on the other hand, the order of the universal to the singular is not posited simply; rather, (what is posited there is the order) of the more universal to the less universal: for example, (the order) of *animal* to *man*; and thus, the more universal must be prior and more known in respect of us.<sup>14</sup> Indeed, in every generation, that which is in potency is prior in time and posterior in nature, while that which is complete in act is prior in nature and posterior in time (► 46.29; 48.32). Now, the cognition of a genus is as potential in comparison to the cognition of a species, in which all the essential (principles) of the thing are known. Whence, in the generation of our science, knowing the more common is prior to knowing the less common.

(It can) also (be argued that), in the *Physics*, ARISTOTLE says that the way from the more known to us is innate to us (► 49.5, ¶1).<sup>15</sup> Therefore, (it would seem that) a demonstration is not produced from those (cognitions) that are prior simply, but in respect of us. However, it is to be said that here (in the *Posterior Analytics*) he speaks insofar as that which is in sense is more known, in respect of us, than that which is in the intellect. There, on the other hand, (he speaks) insofar as that which is more known in respect of us is also in the intellect. And there are no demonstrations from singulars, which are in sense, but only from universals, which are in the intellect.

Or (explaining alternatively), it is to be said that in every demonstration we must proceed from those (things) that are more known in respect of us: not from singulars, however, but

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priora quo ad nos et posteriora secundum naturam. Set dicendum quod hic loquitur de ordine singularis ad uniuersale simpliciter, quorum ordinem oportet accipere secundum ordinem cognitionis sensitivae et intellectivae in nobis; cognitio autem sensitiva est in nobis prior intellectiva, quia intellectualis cognitio ex sensu procedit in nobis; unde et singulare est prius et notius quo ad nos quam uniuersale.”

<sup>14</sup> *In Post. an.* 1, l. 4, 267–280 (cf. ARISTOTLE, *Physica* A.1, 184a16–24): “In I autem Phisicorum, non ponitur ordo uniuersalis ad singulare simpliciter, set magis uniuersalis ad minus uniuersale, ut puta animalis ad hominem, et sic oportet quod quo ad nos uniuersalius sit prius et magis notum: in omni enim generatione, quod est in potencia est prius tempore et posterius natura, quod autem est completum in actu est prius natura et posterius tempore; cognitio autem generis est quasi potencialis in comparatione ad cognitionem speciei, in qua actu sciuntur omnia essentialia rei; unde in generatione sciencie nostre prius est cognoscere magis commune quam minus commune.”

<sup>15</sup> *In Post. an.* 1, l. 4, 281–291 (cf. ARISTOTLE, *Analytica Posteriora* A.2, 71b29–72a5; *Physica* A.1, 184a16–24): “Item, in libro Phisicorum dicitur quod innata est nobis uia ex nobis notioribus; non ergo demonstratio fit ex hiis que sunt priora simpliciter, set quo ad nos. Set dicendum quod hic loquitur secundum quod id quod est in sensu est notius quoad nos eo quod est in intellectu; ibi autem secundum quod <id quod> est notius quo ad nos est etiam in intellectu; ex singularibus autem, que sunt in sensu, non sunt demonstrationes, set ex uniuersalibus tantum, que sunt in intellectu.”

from universals.<sup>16</sup> Thus, it is to be known that, since we must arrive at the cognition of unknown (things) from more known (things), and (in) every demonstration a cause must be drawn to make something known, it is necessary for every demonstration to proceed from the (things that are) more known in respect of us, by which (things) something comes to be known through demonstration. However,

1. Sometimes, that which is more known in respect of us is also more known according to nature and simply, as happens mathematical (things), in which, due to abstraction from (sensible) matter, demonstrations are produced only from formal principles.<sup>17</sup> And in these (things), demonstration proceeds from the more known simply and more known according to nature: to wit, from causes into effects. Whence, this is said (to be) a **demonstration on account of what** (a thing is so, *demonstratio propter quid*).

2. Sometimes, on the other hand, that which is more known in respect of us is not more known simply, as happens in natural (things), in which the essences and virtues of things are concealed because they are in matter, but come to be known to us through those (effects) that are externally apparent about them.<sup>18</sup> Whence, in such (things), demonstrations are produced as *in most* (cases, *ut plurimum*), by the effects, which are more known in respect of us, and not simply. Indeed, if the effects should be more known in respect of us, it can be demonstrated—from any (such) effect—that there is a proper cause: since effects depend upon a cause, (if) the effect (is) posited, it is necessary for a

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<sup>16</sup> *In Post. an.* 1, l. 4, 292–296: “Vel dicendum quod in omni demonstratione oportet quod procedatur ex hiis que sunt notiora quo ad nos, non tamen singularibus, set uniuersalibus: non enim aliquid potest nobis notum fieri nisi per id quod est magis notum nobis.” *In De anima* 2, c. 3, 10–15: “sciendum est quod, cum ex notis oporteat in cognitionem ignotorum deuenire, omnis autem demonstratio adducitur causa notificandi aliquid, necesse est quod omnis demonstratio procedat ex notioribus quo ad nos, quibus per demonstrationem fit aliquid notum.”

<sup>17</sup> *In Post. an.* 1, l. 4, 297–303: “quandoque autem id quod est magis notum quo ad nos est etiam magis notum secundum naturam et simpliciter, sicut accidit in mathematicis in quibus propter abstractionem a materia non fiunt demonstrationes nisi ex principiis formalibus, et in talibus fiunt demonstrationes ex hiis que sunt notiora simpliciter.” *In De anima* 2, c. 3, 15–21: “In quibusdam autem sunt eadem notiora quo ad nos et secundum naturam, sicut in mathematicis, que sunt a materia abstracta; et in hiis demonstratio procedit ex notioribus simpliciter et notioribus secundum naturam, scilicet ex causis in effectus; unde et dicitur demonstratio propter quid.” *STh* I, q. 2 a. 2 co.: “duplex est demonstratio. Una quae est per causam, et dicitur propter quid, et haec est per priora simpliciter.”

<sup>18</sup> *In Post. an.* 1, l. 4, 303–310: “quandoque uero id quod est notius quo ad nos non est notius simpliciter, sicut accidit in naturalibus, in quibus essencie et uirtutes rerum propter hoc quod in materia <sunt>, sunt occulte, set innotescunt nobis per ea que exterius de ipsis apparent; unde in talibus fiunt demonstrationes ut plurimum per effectus, qui sunt notiores quo ad nos, et non simpliciter.” *In De anima* 2, c. 3, 21–28: “In quibusdam uero non sunt eadem magis nota simpliciter et quo ad nos, scilicet in naturalibus, in quibus plerumque effectus sensibiles sunt magis noti suis causis; et ideo in naturalibus ut in pluribus proceditur ab hiis que sunt minus nota secundum naturam, magis autem nota quo ad nos, ut dicitur in I Phisicorum.” *STh* I, q. 2 a. 2 co.: “duplex est demonstratio. [...] Alia est per effectum, et dicitur demonstratio quia, et haec est per ea quae sunt priora quoad nos, cum enim effectus aliquis nobis est manifestior quam sua causa, per effectum procedimus ad cognitionem causae. Ex quolibet autem effectu potest demonstrari propriam causam eius esse (si tamen eius effectus sint magis noti quoad nos), quia, cum effectus dependeant a causa, posito effectu necesse est causam praeesistere.”

cause to preexist. And this is said (to be) a **demonstration that** (i.e., that a thing is so, *demonstratio quia*).

However, we are not speaking now about the second mode of demonstrations (§2), but about the first (§1).<sup>19</sup>

### 57.6. Cognition by Proximate vs. Remote Causes

As ARISTOTLE shows, not only must we assign all the causes (of a thing), but we must also tell the proximate causes, such that we may arrive at the proximate causes from the first causes.<sup>20</sup> For the cognition of a thing through first causes is had only generally (*in universali*) and imperfectly. On the other hand, through proximate causes, the cognition of the thing is had, and a perfect (cognition). For example, if someone should inquire the material cause of man, he must not assign as a cause the elements, which are the common matter of all generable and corruptible things; instead, he must assign the proper matter, such as flesh and bones, and such (material causes).

### 57.7. Foreknowledge by Signs

In natural (things), whose effects are more known to us than the causes, the sign should be that which is posterior in nature.<sup>21</sup> However, it does not belong to the *ratio* of *sign*, properly taken, that it should be either prior or posterior in nature, but only that it be foreknown to us. Whence, sometimes we take effects as signs of causes, as (we take) the pulse (as) a sign of health; but sometimes (we take) causes (as) signs of the effects, as (we take) the dispositions of celestial bodies (as) signs of (cloud) cover and rains.

### 57.8. Cognition of the Principles of Demonstration

The principle of the demonstrative syllogism is twofold: **(1)** its mean (►55.7); and **(2)** the first, indemonstrable propositions (►54).<sup>22</sup> Every doctrine—and every discipline—is

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<sup>19</sup> *In Post. an.* 1, l. 4, 311–312: “Nunc autem non loquitur de hoc modo demonstrationum, set de primo.”

<sup>20</sup> *In Metaph.* 8, l. 4, §1738 (cf. ARISTOTLE, *Metaphysica* H.4, 1044b1–3): “Ostendit [Philosophus] quod non solum oportet assignare omnes causas, sed oportet etiam dicere causas proximas, ut incipiendo a causis primis perveniamus ad causas proximas. Per causas enim primas habetur cognitio de re aliqua solum in universali et imperfecte. Per causas autem proximas habetur cognitio rei et perfecta. Sicut si quis quaerat causam materialem hominis, non debet assignari pro causa, ignis aut terra quae sunt materia communis omnium generabilium et corruptibilium; sed debet assignari propria materia, ut et caro, et os, et huiusmodi.”

<sup>21</sup> *De veritate*, q. 9 a. 4 ad 5: “quamvis in naturalibus, quorum effectus sunt nobis magis noti quam causae, signum sit id quod est posterius in natura, tamen de ratione signi proprie accepti non est quod sit vel prius vel posterius in natura, sed solummodo quod sit nobis praecognitum: unde quandoque accipimus effectus ut signa causarum, sicut pulsum signum sanitatis; quandoque vero causas signa effectuum, sicut dispositiones corporum caelestium signa imbrum et pluviarum.”

<sup>22</sup> *In Post. an.* 2, l. 1, 5–17: “Est autem duplex principium demonstratiui sillogismi, scilicet medium eius et prime propositiones indemonstrabiles. [...] omnis doctrina et omnis disciplina fit ex preexistenti cognitione; in demonstrationibus autem cognitio conclusionis acquiritur per aliquod medium et per primas propositiones indemonstrabiles; residuum erat inuestigare qualiter ista innotescant.”

produced from preexistent knowledge (►57.3); and in demonstrations, cognition of the conclusion is acquired by some mean and through the first, indemonstrable propositions. It remained for ARISTOTLE to investigate how these should come to be known.

That whose science is sought through demonstration is some conclusion in which a proper affection is predicated of a subject.<sup>23</sup> This conclusion is inferred from some principles.

Since the cognition of simple (things) precedes the cognition of composite (things), it is necessary for subject and affection to be known in some mode before the cognition of the conclusion is had (i.e., because the conclusion is composed of subject and affection).<sup>24</sup> Likewise, the principle from which the conclusion is inferred must be foreknown, since the conclusion comes to be known from the cognition of a principle.

Of these three—namely, of the principle, of the subject, and of the affection—the mode of pre-cognition is twofold, since two are (the things) that are foreknown: namely, *that it is* (*quia est* = ὅτι ἔστι), and *what it is* (*quid est* = τί ἐστι), as ARISTOTLE says.<sup>25</sup>

1. Since a **principle** is some enunciation, it cannot be foreknown—concerning it—*what it is*, but only *that it is true*. Indeed, complex (things, i.e., things accidentally composed) are not defined (►18.2). For example, there is no definition—much less an enunciation—of *white man*.<sup>26</sup>

Thus, as ARISTOTLE says, there are (some things)—as (are) principles—of which it is necessary to priorly know *that they are*.<sup>27</sup> And he posits as an example the first of all the (common) principles: to wit, that (*either*) *the affirmation or the negation of any which (proposition) is true* (*de unoquoque est affirmatio vel negatio vera* < ἅπαν ἢ φῆσαι ἢ ἀποφῆσαι ἀληθές).

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<sup>23</sup> *In Post. an.* 1, l. 2, 17–21: “id cuius sciencia per demonstrationem queritur est conclusio aliqua in qua propria passio de subiecto aliquo predicatur, que quidem conclusio ex aliquibus principiis infertur.”

<sup>24</sup> *In Post. an.* 1, l. 2, 21–27: “et, quia cognitio simplicium precedit cognitionem compositorum, necesse est quod, antequam habeatur cognitio conclusionis, cognoscatur aliquo modo subiectum et passio; et similiter oportet quod precognoscatur principium ex quo conclusio infertur, cum ex cognitione principii conclusio innotescat.”

<sup>25</sup> *In Post. an.* 1, l. 2, 27–30: “Horum autem trium, scilicet, principii, subiecti et passionis est duplex modus precognitionis, <quia duo sunt que precognoscuntur>, scilicet, quia est et quid est.” *Ibid.*, 50–54 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a11–13): “Propter hoc ergo dicit Philosophus quod *dupliciter necessarium est precognoscere*, quia duo sunt que precognoscuntur de hiis quorum precognitionem habemus, scilicet quia est et quid est.”

<sup>26</sup> *In Post. an.* 1, l. 2, 31–36: “Ostensum est autem <in> VII Metaphisice quod complexa non diffiniuntur: hominis enim albi non est aliqua diffinitio, et multo minus enunciationis alicuius; unde, cum principium sit enunciatio quedam, non potest de ipso precognosci quid est, set solum quia uerum est.”

<sup>27</sup> *In Post. an.* 1, l. 2, 54–58 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a11–14): “et [dicit Philosophus] quod *alia* sunt de quibus *necesse est prius cognoscere quia sunt*, sicut principia de quibus postea exemplificat, ponens in exemplo primum omnium principiorum, scilicet quod de unoquoque est affirmatio uel negatio uera.”

2. The **subject**, in turn, both has a definition and its being does not depend upon the affection: instead, its proper being is understood before the being of the affection (is understood) in it.<sup>28</sup> Hence, concerning the subject, both *what it is* and *that it is* must be foreknown—above all, because the mean (*medium*) of the demonstration is taken from the definition of the subject and (from the definition) of the affection (►55.7; 55.12).

Thus, as ARISTOTLE says, there are some (things) of which we must foreknow one and the other: namely, *what it is* and *that it is*.<sup>29</sup> He exemplifies (this) concerning the unit, which is a *principle* in every genus of quantity: for even if it should in some mode be an *accident* in respect of substance, however, in the mathematical sciences, which are about quantity, (the unit) cannot be taken as an affection, but only as a **subject**, since it should have nothing prior in this genus.

3. Concerning the (**proper**) **affection**, it can indeed be known *what it is*, since accidents have a definition in some mode (►18.10; 18.11).<sup>30</sup> However, the *being* (*esse*) of a (proper) affection—and of whatever accident—is a *being in* (*inesse*) a subject, which is clearly what is concluded in a demonstration. Therefore, concerning the affection, it is not foreknown *that it is*, but only *what it is*.

Thus, as ARISTOTLE says, there are some (things)—namely, the (proper) affections—about which it is necessary to foreknow *what is it that is said* (*quid est quod dicitur* = τί τὸ λεγόμενόν ἐστι): i.e., what is signified by the name (< τί σημαίνει).<sup>31</sup>

And he does not say “what it is” simply, but “what is it that is said,”<sup>32</sup> because, before it is known concerning something *whether* it is, it cannot properly be known concerning it *what*

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<sup>28</sup> *In Post. an.* 1, l. 2, 43–49: “Subiectum autem et diffinitionem habet et eius esse a passione non dependet, set suum esse proprium preintelligitur ipsi esse passionis in eo; et ideo de subiecto oportet precognoscere et quid est et quia est, presertim cum ex diffinitione subiecti et passionis sumatur medium demonstrationis.”

<sup>29</sup> *In Post. an.* 1, l. 2, 113–120 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a15–16): “Dicit etiam [Philosophus] quod *quedam* sunt de quibus oportet prescire *utraque*, scilicet quid est et quia est. Et exemplificat de unitate que est principium in omni genere quantitatis: etsi enim aliquo modo sit accidens respectu substantie, tamen in scienciis mathematicis, que sunt de quantitate, non potest accipi ut passio, set ut subiectum tantum, cum in hoc genere nichil habeat prius.”

<sup>30</sup> *In Post. an.* 1, l. 2, 37–43: “De passione autem potest quidem sciri quid est, quia, ut in eodem libro ostenditur, accidentia quodam modo diffinitionem habent; passionis autem esse, et cuiuslibet accidentis, est inesse subiecto, quod quidem demonstratione concluditur; non ergo de passione precognoscitur quia est, set quid est solum.”

<sup>31</sup> *In Post. an.* 1, l. 2, 58–61 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a11–13): “[dicit Philosophus quod] *alia uero* sunt de quibus oportet preintelligere *quid est quod dicitur*, id est quid significatur per nomen, scilicet de passionibus.”

<sup>32</sup> *In Post. an.* 1, l. 2, 62–67 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a13): “Et non dicit: «quid est» simpliciter, set «quid est quod dicitur», quia antequam sciatur de aliquo an sit, non potest proprie sciri de eo quid est (non entium enim non sunt diffinitiones), unde questio «an est» precedit questionem «quid est».”



it is, for non-beings do not have definitions. Whence, the question “is it?” precedes the question “what is it?”

On the other hand, it cannot be shown—concerning something—whether it is unless we should first understand what is signified by the name.<sup>33</sup> Whereby, in a disputation against those who deny principles, ARISTOTLE teaches (us) to begin from the signification of names. And he exemplifies (this) concerning the triangle, about which it is necessary to foreknow that it signifies that which is contained in its definition (< τὸ... τρίγωνον, ὅτι τοῦ σημαίνει).

### 57.9. How Principles, Subject and Affection Are Known

ARISTOTLE shows the reason of such a diversity (in foreknowledge; ►57.8): the mode of manifestation of the principle, of the subject, and of the affection is not alike.<sup>34</sup>

Indeed, the *ratio* of cognition in them is not the same.<sup>35</sup> Whence, since they are not known in the same mode, it is not surprising if their pre-cognition should be diverse, for:

1. **Principles** are known through *the act (of the intellect) that composes and divides* (►19.1, ¶2; 52.2, ¶2).<sup>36</sup>

2. The **subject** and the **affection**, on the other hand, (are known) through *the act (of the intellect) that apprehends the essence* (►19.1, ¶1; 52.2, ¶1).<sup>37</sup> This clearly does not befit the subject and the affection likewise, for:

(a) The **subject** should be defined absolutely, since in its definition is not posited something that should be outside its essence (►16.4).<sup>38</sup>

(b) The **affection**, on the other hand, is defined with dependence (in relation) to the subject, which is posited in its definition (►18.10).<sup>39</sup>

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<sup>33</sup> *In Post. an.* 1, l. 2, 67–74 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a14–15): “set non potest ostendi de aliquo an sit nisi prius intelligatur quid significatur per nomen; propter quod etiam Philosophus in IV Metaphisice, in disputatione contra negantes principia, docet incipere a significatione nominum. Exemplificat autem de triangulo, de quo oportet prescire *quoniam* nomen eius *hoc significat*, quod scilicet in sua diffinitione continetur.”

<sup>34</sup> *In Post. an.* 1, l. 2, 121–124 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a16–17): “Rationem autem huiusmodi diuersitatis ostendit [Philosophus], quia non est similis modus manifestationis predictorum, scilicet principii, passionis et subiecti.”

<sup>35</sup> *In Post. an.* 1, l. 2, 124–125: “non enim est eadem ratio cognitionis in ipsis.” Ibid., 133–135: “unde, ex quo non eodem modo cognoscuntur, non est mirum si eorum diuersa precognitio sit.”

<sup>36</sup> *In Post. an.* 1, l. 2, 125–126: “nam principia cognoscuntur per actum componentis et diuidentis.”

<sup>37</sup> *In Post. an.* 1, l. 2, 126–129: “subiectum autem et passio [cognoscuntur] per actum apprehendentis quod quid est; quod quidem non similiter competit subiecto et passioni.”

<sup>38</sup> *In Post. an.* 1, l. 2, 129–131: “cum subiectum diffiniatur absolute, quia in diffinitione eius non ponitur aliquid, quod sit extra essentiam ipsius.”

<sup>39</sup> *In Post. an.* 1, l. 2, 131–133: “passio autem definitur cum dependencia ad subiectum quod in eius diffinitione ponitur.”

### 57.10. Foreknowledge of Principles vs. Conclusion

The principles must be known before the conclusion.<sup>40</sup> In demonstrative (syllogisms), the principles are related to the conclusions as active causes (are related) to their effects in natural (things). Whence, ARISTOTLE posits the propositions of a syllogism in the genus of efficient cause (►9.7).

The effect, on the other hand, before it should be produced in act, certainly preexists in the virtue of the active cause—not, however, in act, which is to be simply (*simpliciter esse*).<sup>41</sup> Likewise, before a conclusion should be deduced from demonstrative principles, in the foreknown principles themselves the conclusion is foreknown virtually but not in act, for it thus preexists in them (i.e., only virtually). And thus, it is evident that (the conclusion) is not foreknown simply (*simpliciter*), but according to something (*secundum quid*).

### 57.11. Knowledge of Immediate Principles

The cognition of the conclusions, of which there properly is science, is derived from the cognition of the principles.<sup>42</sup> However, the immediate principles themselves are not known through some extrinsic mean, but through the cognition of the proper terms. Thus, (once it is) known what a whole is and what a part is, it is known that every whole is greater than its part, for in such propositions the predicate belongs to the *ratio* of the subject, as has been said (►54.6). Hence, the cognition of those principles reasonably is a cause of cognition of the conclusions, since always, what is by itself is the cause of that which is by another (►26.11).

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<sup>40</sup> *In Post. an.* 1, l. 3, 22–27 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a24–26): “oportet principia conclusioni precognoscere; principia autem se habent ad conclusiones in demonstratiuis sicut cause actiue in naturalibus ad suos effectus (unde in II Phisicorum propositiones sillogismi ponuntur in genere cause efficientis).”

<sup>41</sup> *In Post. an.* 1, l. 3, 27–35 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a24–26): “effectus autem, antequam producat in actu, preexistit quidem in causis actiuis uirtute, non autem actu, quod est simpliciter esse; et similiter antequam ex principiis demonstratiuis deducatur conclusio, in ipsis quidem principiis precognitis precognoscitur conclusio uirtute quidem, non autem actu: sic enim in eis preexistit. Et sic patet quod non precognoscitur simpliciter, set secundum quid.”

<sup>42</sup> *In Post. an.* 1, l. 7, 86–97 (cf. ARISTOTLE, *Analytica Posteriora* A.3, 72b23–25): “ex cognitione principiorum deriuatur cognitio conclusionum, quarum proprie est sciencia; ipsa autem principia immediata non per aliquod medium extrinsecum cognoscuntur, set per cognitionem propriorum terminorum: scito enim quid est totum et quid est pars, cognoscitur quod omne totum est maius sua parte, quia in talibus propositionibus, ut supra dictum est, predicatum est de ratione subiecti. Et ideo rationabiliter cognitio horum principiorum est causa cognitionis conclusionum, quia semper, quod est per se, est causa eius, quod est per aliud.”

## 58. The Order of Natural Philosophy

By *naturalis philosophia*, St. Thomas does not mean in this context only the science that studies beings subjected to change: he comprehends under it also mathematics and metaphysics, as explained at the beginning of this part (► 8.13, ¶1).

Briefly to restate it, the consideration of reason is perfected by the habit of science; hence, there are diverse sciences according to the diverse orders that reason properly considers. Furthermore, when sciences are distinguished insofar as they are habits, they must be distinguished in virtue of their objects—that is, in virtue of the things about which there is science (► 51.1, ¶2). Wherefrom, three parts of speculative or theoretical philosophy are to be distinguished: metaphysics, mathematics, and physics.

### 58.1. Unity of a Potency and of a Habit

The unity of a potency and of a habit is to be considered according to the object: not indeed materially, but according to the formal *ratio* of the object (► 14.9).<sup>1</sup> Thus, *man*, *ass*, and *stone* agree (*conveniunt*) in one formal *ratio* of *colored*, which is the object of sight.

That is properly assigned (to be) the object of some potency or habit under whose *ratio* all (things) are referred to the potency or habit.<sup>2</sup> For example, *man* and *stone* are referred to (the potency of) sight insofar as they are colored; whence, *colored* is the proper object of sight.

### 58.2. Diversity of Potencies

Not just any diversity of genus requires a diversity of potencies—otherwise, we would not see plants and animals by the same seeing potency.<sup>3</sup> Instead, (for there to be a diversity of potencies), only that diversity (of genus is required) which considers (*respicit*) the formal *ratio* of the object (► 22.11; 22.12). For example, there would have to be diverse seeing potencies if there should be a diverse genus of color or of light.

The proper object of the intellect (i.e., of the potency of understanding) is the essence (*quod quid est*), which is common to all (beings), both substances and accidents, although

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<sup>1</sup> *STh I*, q. 1 a. 3 co.: “Est enim unitas potentiae et habitus considerata secundum obiectum, non quidem materialiter, sed secundum rationem formalem obiecti, puta homo, asinus et lapis conveniunt in una formali ratione colorati, quod est obiectum visus.”

<sup>2</sup> *STh I*, q. 1 a. 7 co.: “Sic enim se habet subiectum ad scientiam, sicut obiectum ad potentiam vel habitum. Proprie autem illud assignatur obiectum alicuius potentiae vel habitus, sub cuius ratione omnia referuntur ad potentiam vel habitum, sicut homo et lapis referuntur ad visum in quantum sunt colorata, unde coloratum est proprium obiectum visus.”

<sup>3</sup> *In Ethic.* 6, l. 1, 176–183: “Non enim quaelibet diversitas generis in obiectis requirit diversas potentias, alioquin non eadem potentia visiva videremus plantas et animalia, sed sola illa diversitas quae respicit formalem rationem obiecti, puta, si esset diversum genus coloris vel luminis, oporteret esse diversas potentias visivas.”

not in the same mode. Whence, too, we know substances and accidents by the same intellectual potency. Therefore, for the same reason, the diversity of genus of necessary and contingent (beings) does not require diverse intellectual potencies.<sup>4</sup>

### 58.3. Specification of Potencies and of Habits Compared

Since any one (thing) that is determined to an end should be determined according to the exigency of the end, potencies and habits, which are ordered to an act as to a last perfection, must be distinguished according to diverse acts, just like the potencies of matters, too, are distinguished by the relation to diverse forms.<sup>5</sup>

However, not just any diversity of acts produces (*facit*) a difference of potencies and of habits (►22.12): rather, only that (difference) which is (had) from the diversity of objects, from which the acts are diversified as motion (is diversified) from the terminus (►48.21).<sup>6</sup> However, only that difference of termini produces a diverse species of motion which is considered according to that *ratio* according to which the motion terminates (►48.22, ¶1).

Whence, (for example), that (the motion of) *descent* should be terminated at one element or another does not produce a diverse species of local motion, since local motion was not towards elements as such: instead, (a diverse species of motion is produced) insofar as (local motions) are downwards.<sup>7</sup> On the other hand, (those) generations (of elements) differ according to species which are terminated at the forms of elements.

Likewise, diverse objects diversify the acts according to species only if there should be a diversity according to that *ratio* according to which there is an object.<sup>8</sup> Thus, *to see white*

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<sup>4</sup> *In Ethic.* 6, l. 1, 183–189: “Obiectum autem intellectus proprium est quod quid est, quod est commune omnibus et substantiis et accidentibus, licet non eodem modo. Unde et eadem intellectiva potentia cognoscimus substantias et accidentia. Pari ergo ratione diversitas generis necessariorum et contingentium non requirit diversas potentias intellectivas.”

<sup>5</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “cum unumquodque quod est ad finem, determinetur secundum exigentiam finis; potentiae et habitus, qui ordinantur ad actus sicut ad ultimam perfectionem, oportet quod secundum actus diversos distinguantur: sicut etiam potentiae materiae distinguuntur per relationem ad diversas formas.”

<sup>6</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Non autem quaelibet diversitas actuum facit differentiam potentiarum et habituum; sed illa tantum quae est ex diversitate objectorum, a quibus actus specificantur, sicut motus a terminis. Solum autem illa differentia terminorum facit diversam speciem motus quae attenditur secundum illam rationem secundum quam terminat motum.”

<sup>7</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Unde quod descensus terminetur ad aquam vel ad terram, non facit diversam speciem motus localis; quia motus localis non erat ad terram vel aquam in quantum huiusmodi, sed in quantum deorsum sunt. Generationes autem differunt secundum speciem quae terminantur ad formas aquae et terrae.” Replacing *water* and *earth* with *elements*. The point is that motion upwards is not specified by the element that moves in that direction, but by the terminus of that motion. Likewise, motion downwards is not specified by earth, even if it should be heavier than water. On the other hand, if a motion should be terminated at some element, it would take its species from that terminus.

<sup>8</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “et similiter objecta diversa non diversificant actus secundum speciem, nisi sit diversitas secundum illam rationem secundum quam est objectum. Videre enim album et nigrum non sunt diversi actus secundum speciem: quia utrumque est objectum visus secundum unam rationem, in quantum scilicet sunt colorata visibilia actu per lucem.”

and (*to see*) *black* are not diverse acts according to species, since one and the other is an object of sight under one *ratio*: namely, insofar as they are colored (things, made) visible in act by light.

Hence, it happens that the more the habits or potencies are immaterial, the more they are universal and the less they are distinguished, since they consider a more universal *ratio* of object.<sup>9</sup> For example, to the five proper senses (i.e., touch, sight, hearing, smell and taste) correspond (only) one common sense and one imagination.

#### **58.4. Diversity of the Habits of the Speculative and Operative Sciences**

Sometimes, multiple habits are in one potency.<sup>10</sup> Hence, some diversity suffices to distinguish habits that does not suffice to distinguish a potency, since a potency is compared to (its) act in a mode other than a habit (is compared to act; i.e., because habit is a mean between potency and act). Whence, too, the object responds to one and to the other (i.e., to potency and to habit) according to a diverse *ratio*.

Indeed, a potency is a principle of acting absolutely, while a habit is a principle of acting promptly and easily.<sup>11</sup> Hence, the object, according to that *ratio* whereby it is related to the act simply, responds to the potency; but it responds to the habit insofar as it is related to the easiness of the act. Hence, the diversity of the matter or object in order to those (things) that produce easiness in the act, produces a diversity of habit and not of potency.

Wherefrom, in the speculative (sciences), a diversity of matter—according to which (such matter) is determinable by diverse means and principles from which there is easiness of consideration—produces diverse sciences.<sup>12</sup> For example, natural (science), which demonstrates from effects and (from) those (means) that appear in sense (perception), differs from mathematics, which cannot proceed (to draw demonstrative conclusions) about its matter from the same principles and means.

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<sup>9</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Et inde contingit quod quanto aliqui habitus vel potentiae sunt immaterialiores, tanto sunt universaliores, et minus distinguuntur, quia attendunt universaliorem rationem objecti; sicut quinque sensibus propriis correspondet unus sensus communis, et una imaginatio.”

<sup>10</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Sciendum tamen, quod cum plures habitus quandoque sint in una potentia, aliqua diversitas sufficit ad distinguendum habitus quae non sufficit ad distinguendum potentiam: quia potentia alio modo comparatur ad actum quam habitus; unde et secundum alteram rationem objectum utrique respondet.”

<sup>11</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Potentia enim est principium agendi absolute; sed habitus est principium agendi prompte et faciliter; et ideo objectum secundum illam rationem qua se habet ad actum simpliciter, respondet potentiae; sed secundum quod se habet ad facilitatem actus respondet habitui. Et ideo diversitas materiae vel objecti in ordine ad ea quae faciunt facilitatem in actu, facit diversitatem habitus, et non potentiae.”

<sup>12</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Et inde est quod in speculativis diversitas materiae, secundum quod est determinabilis per diversa media et principia, ex quibus est facilitas considerationis, facit diversas scientias; sicut naturalis, quae ex effectibus et his quae apparent in sensu demonstrat, a mathematica differt, quae circa suam materiam ex eisdem principiis et mediis procedere non potest.”

And just like in the speculative (sciences) there is a principle and a mean, so are there ends in operative (sciences).<sup>13</sup> Thus, we proceed from their intention (as from a principle) into those (means) that are towards the end as from axioms (*ex dignitatibus*) into conclusions. And hence, (in the ethical order), all moral habits are distinguished according to the relation to the end, from which the first difference taken is that (between) good and bad (as contraries), since *good* conveys (*importat*) an end, while *bad* (conveys) a deviation (*deordinationem*) from the end. According to this, (moral) virtues are distinguished from vices; and in the virtues where there is found a diverse *ratio* of *good*, there are diverse virtues according to species. The good towards which human virtues are proximately ordered is the good of reason, against which there is the bad of man. And since the *ratio* of *good* is not found in the same mode in all moral matters, as is evident, there must be diverse moral virtues that differ in species.

### 58.5. What Is a Demonstrative Science About?

As ARISTOTLE says, every demonstrative science is about three (things):<sup>14</sup>

1. The **subject genus** (*genus subiectum* = τὸ γένος [τὸ ὑποκείμενον], which is that which is posited to exist, ὅσα... εἶναι τίθεται), whose affections by themselves are sought (*cuius per se passiones scrutantur* < οὗ τῶν καθ' αὐτὰ παθημάτων ἐστὶ θεωρητικῆ; ► 58.6).<sup>15</sup>
2. The **common axioms** (*communes dignitates* < τὰ κοινὰ λεγόμενα ἀξιώματα), from which—as first (principles)—it demonstrates (*ex quibus sicut primis demonstrat* < ἐξ ὧν πρώτων ἀποδείκνυσι; ► 58.10).<sup>16</sup>
3. The **affections** (*passiones* < τὰ πάθη), about which each science accepts *what* they should signify (*de quibus unaqueque scientia accipit quid significant* < ὧν τί σημαίνει ἕκαστον λαμβάνει; ► 58.22).<sup>17</sup>

<sup>13</sup> *In Sent.* 3, d. 33 q. 1 a. 1 qc. 1 co.: “Sicut autem in speculativis est principium demonstrationis et medium; ita fines sunt in operativis, ut dicitur in 7 Ethic. Ex eorum enim intentione procedimus in ea quae sunt ad finem, sicut ex dignitatibus in conclusiones; et ideo secundum relationem ad finem omnes morales habitus distinguuntur, ex quo prima sumpta est differentia boni et mali: quia bonum importat finem, ut dicitur in 10 Metaph., malum autem deordinationem a fine: et secundum hoc virtutes a vitiis distinguuntur: et in virtutibus ubi invenitur diversa ratio boni, sunt diversae virtutes secundum speciem. Bonum autem ad quod humanae virtutes proxime ordinantur, est bonum rationis, contra quam esse est malum hominis, ut dicit Dionysius in Lib. de Divin. Nom. Et quia non in omnibus materiis moralibus eodem modo invenitur rationis bonum, ut patet; ideo oportet diversas virtutes morales esse specie differentes.”

<sup>14</sup> *In Post. an.* 1, l. 18, 128–129 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b11–12): “Omnis enim demonstratiua scientia circa tria est.”

<sup>15</sup> *In Post. an.* 1, l. 18, 129–130 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b12–13): “quorum unum est genus subiectum cuius per se passiones scrutantur.”

<sup>16</sup> *In Post. an.* 1, l. 18, 131–132 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b14–15): “et aliud est communes dignitates, ex quibus sicut primis demonstrat.”

<sup>17</sup> *In Post. an.* 1, l. 18, 132–133 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b15–16): “tercium autem est passiones, de quibus unaqueque scientia accipit quid significant.”

## 58.6. A Science Is One Because Its Subject Genus Is One

ARISTOTLE compares the sciences to each other in respect of their unity and diversity according to (their) subject and (their) principles.<sup>18</sup> He proposes that the unity of a science is considered from the unity of the subject genus. He says, therefore, that a science is said (to be) *one* because it is of one genus (< μία... ἐπιστήμη ἐστὶν ἡ ἐνὸς γένους).

The reason for this is that the process of any science is as some motion of reason.<sup>19</sup> And the unity of any motion is mainly considered from (its) terminus (► 48.21). Hence, he holds that the unity of a science is considered from the end or from the terminus of the science.

Indeed, *subject is related to science as object (is related) to potency or habit.*<sup>20</sup>

Now, the end or terminus of any science is the genus about which the science is; for in the speculative sciences nothing is sought but the cognition of the subject genus, while in the practical sciences (what) is intended as an end (is) the construction of the subject itself (► 58.16).<sup>21</sup>

For example, in geometry, (what) is intended as an end (is) the cognition of magnitude, which is the subject of geometry.<sup>22</sup> On the other hand, in the building science, (what) is intended as an end (is) the construction of a house, which is the subject of such an art. And whatsoever virtue underlies the production of some genus, it is necessary that to that same virtue pertain also the production of the proper differences of that genus.<sup>23</sup> For example, if it should pertain to someone to constitute a triangle (through construction; ► 1.5), it would pertain to him to constitute an equilateral or an isosceles triangle.

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<sup>18</sup> *In Post. an.* 1, l. 41, 108–130 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a38): “comparat [Philosophus] sciencias ad inuicem secundum unitatem et diuersitatem. [...] ostendit unitatem et diuersitatem esse in scienciis secundum subiectum et principia; [...] ostendit quid faciat ad unitatem uel diuersitatem sciencie; [...] ostendit quid faciat unitatem sciencie; [...] proponit quod unitas sciencie consideratur ex unitate generis subiecti; [...] Dicit ergo primo quod *sciencia* dicitur *una* ex hoc quod est *unius generis*.”

<sup>19</sup> *In Post. an.* 1, l. 41, 131–136: “Cuius ratio est quia processus sciencie cuiuslibet est quasi quidam motus rationis; cuiuslibet autem motus unitas ex termino principaliter consideratur, ut patet in V Physicorum, et ideo tenet [Philosophus] quod unitas sciencie consideretur ex fine siue ex termino sciencie.”

<sup>20</sup> *STh* I, q. 1 a. 7 co.: “Sic enim se habet subiectum ad scientiam, sicut obiectum ad potentiam vel habitum.”

<sup>21</sup> *In Post. an.* 1, l. 41, 136–141: “est autem cuiuslibet sciencie finis siue terminus genus circa quod est sciencia, quia in speculatiuis scienciis nichil aliud queritur quam cognitio generis subiecti, in practicis autem scienciis intenditur quasi finis constructio ipsius subiecti.”

<sup>22</sup> *In Post. an.* 1, l. 41, 141–145: “sicut in geometria intenditur quasi finis cognitio magnitudinis, que est subiectum geometrie, in sciencia autem edificatiua intenditur quasi finis constructio domus, que est huiusmodi artis subiectum.”

<sup>23</sup> *De substantiis separatis*, c. 16, 127–133: “Necesse est autem ut cuiuscumque virtuti subiicitur productio generis alicuius, ad illius etiam virtutem pertineat producere illius generis differentias proprias; sicut si ad aliquem pertineat constituere triangulum, ad eum etiam pertinet constituere triangulum equilaterum vel isoscelem.”

Whence, it remains that the unity of any science is to be considered according to the unity of the subject (genus).<sup>24</sup>

On the other hand, since the unity of one subject genus is more common than (the unity) of another (subject genus), so, too, one science is more common than another.<sup>25</sup> For example, (the unity) of (the subject genus; ►27.1, ¶2) *being* or of (the subject genus) *substance* (is more common) than (the unity) of (the subject genus) *mobile body*. Whence, metaphysics, which is the science of being or of substance, is more common than physics, which is (the science) of mobile body.

### 58.7. Conditions of the Subject Genus

ARISTOTLE shows what those genera—about which there can be science—are, positing two conditions:<sup>26</sup>

1. Those (things) of which one science is of one genus are any which (things) that are composed from first [principles] (*quaecunq̄ue ex primis componuntur* = ὅσα ἐκ τῶν πρώτων σύγκειται).<sup>27</sup>

To make this evident, it is to be considered that the progress of a science, as has been said (►58.6), consists in some motion of reason that traverses from one (known thing or *ratio*) into another.<sup>28</sup> And every motion proceeds from some principle and terminates at something. Whence, in the progress of a science, reason must proceed from some first principles.

Therefore, if there is a thing that does not have prior principles from whose *ratio* could proceed (a demonstration), of those (things) there cannot be a science—according as *science* is taken here insofar as it is the effect of demonstration (►53.2, ¶1).<sup>29</sup>

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<sup>24</sup> *In Post. an.* 1, l. 41, 145–147: “Vnde relinquitur quod cuiuslibet sciencie unitas secundum unitatem subiecti est attendenda.”

<sup>25</sup> *In Post. an.* 1, l. 41, 147–153: “Set, sicut unius generis subiecti unitas est communior quam alterius, ut puta entis siue substancie quam corporis mobilis, ita etiam una sciencia communior est quam alia, sicut metaphisica, que est de ente siue de substancia, communior est quam phisica, que est de corpore mobili.”

<sup>26</sup> *In Post. an.* 1, l. 41, 155–157 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a38–b1): “ostendit [Philosophus] qualia sunt illa genera, de quibus possunt esse sciencie. Et ponit duas condiciones.”

<sup>27</sup> *In Post. an.* 1, l. 41, 158–160 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a38–39): “Quarum unam ponit [Philosophus] dicens: *Quaecunq̄ue ex primis componuntur*, ista scilicet sunt quorum unius generis una est sciencia.”

<sup>28</sup> *In Post. an.* 1, l. 41, 161–167 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a38–39): “Ad cuius euidenciam considerandum est quod, sicut iam dictum est, progressus sciencie consistit in quodam motu rationis discurrentis ab uno in aliud; omnis autem motus a principio quodam procedit et ad aliquid terminatur; unde oportet quod in progressu sciencie ratio procedat ex aliquibus principiis primis.”

<sup>29</sup> *In Post. an.* 1, l. 41, 168–172: “Si qua ergo res est que non habeat principia priora ex quibus ratio procedere possit, horum non potest esse sciencia, secundum quod hic sciencia accipitur prout est demonstrationis effectus.”



Whence, the speculative sciences are not about the essences themselves of separated substances, for we cannot scientifically know their essences through demonstrative sciences, since the essences themselves of those substances are intelligible by themselves by an intellect proportionate to this; yet, knowledge of them—whereby their essence is known—is not gathered through some prior (principles).<sup>30</sup>

On the other hand, through the speculative sciences, it can be known about them (i.e., about separated substances) whether they are, what they are not, and something (more) according to the likeness that is found in lower things.<sup>31</sup> Then, we use posterior (effects) as prior (causes) to know them, since those that are posterior according to nature are prior and more known in respect of us (► 57.5, ¶2).

Thus, it is evident that those (things) about which science is had through those (principles) that are prior simply are composed according to themselves from something prior.<sup>32</sup> On the other hand, whatever (things) are known through posterior (effects), which are first according to us even if they should be simple in themselves, are nonetheless composed from something prior in respect of us insofar as they are received in our cognition.

2. And their parts or affections (i.e., the parts or affections of those things of which one science is of one genus) are by themselves (*et partes sunt aut passionēs eorum per se = καὶ μέρη ἐστὶν ἢ πάθη τούτων καθ' αὐτά*).<sup>33</sup>

It is to be considered that the **parts of the subject** of some science can be twofold: to wit, **(a) the parts from which** it is composed as from first (principles), as has been said, i.e., the principles themselves of the subject; and **(b) the subjective parts** (► 13.6).<sup>34</sup> Although what is said here could be understood of either parts, however, it seems that it is to be understood, rather, of the first genus of parts (i.e., parts *from which*).

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<sup>30</sup> *In Post. an.* 1, l. 41, 172–179: “Vnde sciencie speculatiue non sunt de ipsis essentiis substanciarum separatarum: non enim per sciencias demonstratiuas possumus scire quod quid est in eis, quia ipse essencie harum substanciarum sunt intelligibiles per seipsas ab intellectu ad hoc proportionato, non autem congregatur earum notitia, qua cognoscitur quod quid est ipsarum, per aliqua priora.”

<sup>31</sup> *In Post. an.* 1, l. 41, 179–185: “set per sciencias speculatiuas potest sciri de eis an sint et quid non sunt et aliquid secundum similitudinem in rebus inferioribus inuentam; et tunc utimur posterioribus ut prioribus ad earum cognitionem, quia que sunt posteriora secundum naturam sunt priora et notiora quo ad nos.”

<sup>32</sup> *In Post. an.* 1, l. 41, 186–190: “Et sic patet quod illa de quibus habetur sciencia per ea que sunt priora simpliciter, sunt composita secundum se ex aliquibus prioribus; quecunque uero cognoscuntur per posteriora, que sunt prima quo ad nos, etsi in seipsis sint simplicia, secundum tamen quod in nostra cognitione accipiuntur, componuntur ex aliquibus primis quo ad nos.”

<sup>33</sup> *In Post. an.* 1, l. 41, 193–194 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a39): “Secundam conditionem ponit [Philosophus] cum dicit: *et partes sunt aut passionēs eorum per se*.”

<sup>34</sup> *In Post. an.* 1, l. 41, 195–202: “Vbi considerandum est quod subiectum alicuius sciencie duplices partes habere potest, scilicet partes ex quibus componitur sicut ex primis, ut dictum est, id est ipsa principia subiecti, et partes subiectiuas. Et, quamuis de utrisque partibus possit intelligi quod hic dicitur, tamen magis uidetur esse intelligendum de primo genere partium.”

Indeed, in whatever science, there are some principles of the subject about which the first consideration is.<sup>35</sup> For example, in the natural science, (the first consideration is) about matter and form; and in grammar, (the first consideration is) about letters (or phonemes).

Also, there is in any science something last at which the consideration of the science is terminated—to wit, so that the affections of the subject should be manifested.<sup>36</sup>

Yet, one and the other of these—namely, both the first parts and the affections—can be attributed to something both by themselves and not by themselves.<sup>37</sup> Thus, those that are the principles and the affections of *triangle* are not by themselves the principles and the affections of *isosceles* insofar as it is isosceles, but insofar as it is a triangle. Nor are they the principles and affections themselves of bronze and of (something) white, even though some bronze—or something white—should happen to be triangular.

Whence, if there should be a science that would manifest the affections of the triangle from the principles of the triangle, the subject of that science would not be *isosceles*, *white* or *bronze*, but *triangle*; of which the subjective parts are, namely, *isosceles*, *equilateral*, and *scalene*.<sup>38</sup>

Wherefrom, these parts here at present are not befittingly taken in this way, since an example (of) how a science should be related to such subjective parts can be taken because it is somehow related to the whole genus, rather than conversely.<sup>39</sup>

### 58.8. Consideration of the Principles of the Subject Genus

Any science that considers some subject genus must consider the principles of that (subject) genus, since a science is perfected only through the cognition of (its) principles.<sup>40</sup>

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<sup>35</sup> *In Post. an.* 1, l. 41, 202–205: “In qualibet enim sciencia sunt quedam principia subiecti, de quibus est prima consideratio, sicut in sciencia naturali de materia et forma, et in gramatica de literis.”

<sup>36</sup> *In Post. an.* 1, l. 41, 205–208: “est etiam in qualibet sciencia aliquid ultimum ad quod terminatur consideratio sciencie, ut scilicet passiones subiecti manifestentur.”

<sup>37</sup> *In Post. an.* 1, l. 41, 208–216: “Set utrumque horum, scilicet et prime partes et passiones, possunt alicui attribui et per se et non per se: nam ea que sunt principia et passiones trianguli non sunt per se principia et passiones ysochelis in quantum ysocheles est, set in quantum triangulus; neque etiam sunt per se principia et passiones eris et albi, quamuis contingat aliquod <es> esse triangulatum, uel aliquod album.”

<sup>38</sup> *In Post. an.* 1, l. 41, 216–221: “Vnde, si qua sciencia esset que ex principiis trianguli manifestaret passiones trianguli, huius sciencie subiectum non esset ysocheles neque album aut es, set triangulus. Cuius etiam per se subiectiue partes sunt, scilicet ysocheles, equilaterus et gradatus.”

<sup>39</sup> *In Post. an.* 1, l. 41, 221–226 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a39): “set pro tanto dixi de hiis partibus hic ad presens non ita conuenienter accipi, quia magis accipere possumus documentum qualiter sciencia se habeat ad huiusmodi partes subiectiuas ex eo quod se habet aliquid ad totum genus, quam e conuerso.”

<sup>40</sup> *In De Trin.*, q. 5 a. 4 co., 82–87: “Sciendum siquidem est quod quecumque scientia considerat aliquod genus subiectum, oportet quod consideret principia illius generis, cum scientia non perficiatur nisi per cognitionem principiorum, ut patet per Philosophum in principio Phisicorum.”

Indeed, as ARISTOTLE shows, we must begin from the consideration of principles.<sup>41</sup> And he posits the following reason: in all sciences, which have principles, causes or elements, understanding and science proceeds from the cognition of the principles, causes, and elements. Thus, the science that is about nature has principles, elements, and causes; therefore, we must begin in it from the determination of principles.

When he says, “understanding” (*intelligere* = τὸ εἰδέναι), he refers to definitions; and when he says, “scientifically knowing” (*scire* = τὸ ἐπίστασθαι), (he refers) to demonstrations.<sup>42</sup> For just as demonstrations are (had) from causes, so, too, definitions (are had from causes), since a complete definition should be a demonstration that differs only in position (► 54.14, ¶2; 54.13).

However, he does not intend to signify the same (thing) when he says, “principles, causes or elements” (*principia aut causas aut elementa* = ἀρχαὶ ἢ αἴτια ἢ στοιχεῖα).<sup>43</sup> For *cause* is in more (things) than *element*. Indeed, an element is that from which a thing is composed first and is in it (► 12.9): for example, letters (i.e., specifically different phonemes), and not syllables, are the elements of speech. Causes, in turn, are said (to be those principles) on which others depend according to their being or coming-to-be; whence, also those (principles) that are outside the thing, or those that are in the thing (but) from which the thing is not first composed, can be said (to be) *causes*, but not *elements*. *Principle*, on the other hand, conveys (*importat*) some order of some process; whence, something can be a principle which is not a cause. For example, that whence motion begins is a principle of motion, but not a cause; and the point is a principle of the line, but not a cause.

Therefore, by *principles* ARISTOTLE seems to understand mover causes and agents, in which the order of some process is maximally considered; by *causes*, he seems to understand formal and final causes, on which things maximally depend according to their

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<sup>41</sup> *In Physic.* 1, l. 1, n. 5 (cf. ARISTOTLE, *Physica* A.1, 184a10–12): “Huic autem libro praemittit Philosophus prooemium, in quo ostendit ordinem procedendi in scientia naturali. Unde [...] primo ostendit quod oportet incipere a consideratione principiorum [...]. Primo ergo ponit talem rationem. In omnibus scientiis quarum sunt principia aut causae aut elementa, intellectus et scientia procedit ex cognitione principiorum, causarum et elementorum; sed scientia quae est de natura, habet principia, elementa et causas; ergo in ea oportet incipere a determinatione principiorum.”

<sup>42</sup> *In Physic.* 1, l. 1, n. 5 (cf. ARISTOTLE, *Physica* A.1, 184a10): “Quod autem dicit [Philosophus] *intelligere*, refertur ad definitiones; quod vero dicit *scire*, ad demonstrationes. Nam sicut demonstrationes sunt ex causis, ita et definitiones; cum completa definitio sit demonstratio sola positione differens, ut dicitur in I *Poster.*”

<sup>43</sup> *In Physic.* 1, l. 1, n. 5 (cf. ARISTOTLE, *Physica* A.1, 184a11): “Per hoc autem quod dicit [Philosophus] *principia* aut *causas* aut *elementa*, non intendit idem significare. Nam causa est in plus quam elementum; elementum enim est ex quo componitur res primo et est in eo, ut dicitur in V *Metaphys.*, sicut litterae sunt elementa locutionis, non autem syllabae: causae autem dicuntur ex quibus aliqua dependent secundum suum esse vel fieri; unde etiam quae sunt extra rem, vel quae sunt in re ex quibus non componitur res primo, possunt dici causae, non tamen elementa. Principium vero importat quendam ordinem alicuius processus; unde aliquid potest esse principium, quod non est causa: sicut id unde incipit motus est principium motus, non tamen causa; et punctum est principium lineae, non tamen causa.”

being and coming-to-be; by *element*, on the other hand, (he seems) properly (to understand) the first material causes.<sup>44</sup>

And he uses these names disjunctively (i.e., separated by *or*) and not coupled (i.e., joined by *and*) to designate that not all sciences demonstrate through all the causes.<sup>45</sup> For mathematics demonstrates only through the formal cause; metaphysics demonstrates chiefly through the formal and the final (causes), and also (through) the agent (cause); and natural (science demonstrates) through all the causes.

ARISTOTLE proves from common opinion (► 53.4, and its footnote 18) the first proposition of the argument that he brought up.<sup>46</sup> For someone deems that he knows something when he knows its causes, from the first to the last (< τότε γὰρ οἴομεθα γινώσκειν ἕκαστον, ὅταν τὰ αἴτια γνωρίσωμεν τὰ πρῶτα καὶ τὰς ἀρχὰς τὰς πρώτας); and we must not take here “causes, elements, and principles” otherwise than above, as AVERROES would, but in the same mode. Now, ARISTOTLE says, “up to the elements” (< μέχρι τῶν στοιχείων), because that which is last in cognition is matter: for matter is on account of (*propter*) form; and form is from the agent for the sake of (*propter*) the end—unless it itself should be the end. For example, we say that a saw has teeth in order to (*propter*) cut; and that (the teeth) must be (made of) iron such that they be apt to cut.

### 58.9. Sciences Are Diverse Because Their Principles Are Diverse

It is to be considered that, while ARISTOTLE took the *ratio of unity of a science* from the unity of the subject genus (► 58.6), he does not take the *ratio of diversity of sciences* from the diversity of subjects, but from the diversity of principles.<sup>47</sup> Thus, he shows the reason

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<sup>44</sup> *In Physic.* 1, l. 1, n. 5 (cf. ARISTOTLE, *Physica* A.1, 184a11): “Sic igitur per *principia* videtur intelligere causas moventes et agentes, in quibus maxime attenditur ordo processus cuiusdam; per *causas* autem videtur intelligere causas formales et finales, a quibus maxime dependent res secundum suum esse et fieri; per *elementa* vero proprie primas causas materiales.”

<sup>45</sup> *In Physic.* 1, l. 1, n. 5 (cf. ARISTOTLE, *Physica* A.1, 184a11): “Utitur autem istis nominibus disiunctim et non copulatim ad designandum quod non omnis scientia per omnes causas demonstrat. Nam mathematica non demonstrat nisi per causam formalem; metaphysica demonstrat per causam formalem et finalem praecipue, et etiam agentem; naturalis autem per omnes causas.”

<sup>46</sup> *In Physic.* 1, l. 1, n. 5 (cf. ARISTOTLE, *Physica* A.1, 184a12–14): “Primam autem propositionem rationis inductae probat [Philosophus] ex communi opinione, sicut et in libro *Poster.*: quia tunc quilibet opinatur se cognoscere aliquid, cum scit omnes causas eius a primis usque ad ultimas. Nec oportet ut aliter accipiamus hic causas et elementa et principia quam supra, ut Commentator vult, sed eodem modo. Dicit autem usque ad elementa, quia id quod est ultimum in cognitione est materia. Nam materia est propter formam; forma autem est ab agente propter finem, nisi ipsa sit finis: ut puta dicimus quod propter secare serra habet dentes, et ferreos oportet eos esse ut sint apti ad secandum.”

<sup>47</sup> *In Post. an.* 1, l. 41, 228–229 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87a39–b1): “ostendit [Philosophus] rationem diuersitatis scienciarum. Et primo, ponit hanc rationem.” *Ibid.*, 231–241: “Est autem considerandum circa primum quod, cum rationem unitatis sciencie acceperit ex unitate generis subiecti, rationem diuersitatis scienciarum non accipit ex diuersitate subiecti, set ex diuersitate principiorum: dicit enim quod una *sciencia est altera ab alia*, quarum *principia* sunt diuersa, ita quod nec ambarum scienciarum principia procedant ab aliquibus principiis prioribus, neque principia unius sciencie procedant ex principiis alterius, quia, siue procederent *ex eisdem* principiis siue alia ex aliis, non esset diuersa sciencia.”

of the diversity of the sciences positing first the following *ratio*: **one science is diverse from another** (*una scientia est altera ab alia* < ἑτέρα... ἐπιστήμη ἐστὶν ἑτέρας) of which the principles are diverse, such that neither the principles of both sciences proceed from some prior principles, nor do the principles of one science proceed from the principles of the other (< ὅσων αἱ ἀρχαὶ μήτ' ἐκ τῶν αὐτῶν μήθ' ἕτεραι ἐκ τῶν ἑτέρων). Indeed, there would not be a diverse science (if) they should proceed from the same principles or (if) the principles of one (should proceed) from the principles of the other (*alia ex aliis*).

Therefore, to make this evident, it is to be known that the material diversity of an object does not diversify a habit: rather, only the formal (diversity of an object diversifies a habit; ►58.4).<sup>48</sup> Therefore, since *the scientifically knowable (scibile)* is the proper object of science (►58.19), sciences will not be diversified according to the material diversity of the scientifically knowable (things), but according to their formal diversity. Just like the formal *ratio* of *visible* is taken from light, by which color is seen, so the formal *ratio* of *scientifically knowable* is taken according to the principles from which something is scientifically known.

Hence, regardless of how diverse some scientifically knowable (objects) should be according to their nature (►58.21), they pertain to one science so long as they are scientifically known through the same principles, since they will not yet be diverse insofar as they are scientifically knowable: for they are scientifically knowable through their principles.<sup>49</sup> Thus, (for example), it is evident that human voices differ greatly according to their nature from the sounds of inanimate bodies; yet, since consonance is considered according to the same principles in human voices and in the sounds of inanimate bodies, it is the same science of harmonics (*musica*) that considers one and the other.

On the other hand, if some (scientifically knowable things) should be the same according to (their) nature, and yet they would be considered through diverse principles, it is manifest that they pertain to diverse sciences.<sup>50</sup> For example, the mathematical body is not

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<sup>48</sup> *In Post. an.* 1, l. 41, 242–251: “Ad huius ergo euidetiam sciendum est quod materialis diuersitas obiecti non diuersificat habitum, set solum formalis. Cum ergo scibile sit proprium obiectum sciencie, non diuersificabuntur sciencie secundum diuersitatem materialem scibilium, set secundum diuersitatem eorum formalem; sicut autem formalis ratio uisibilis sumitur ex lumine, per quod color uidetur, ita formalis ratio scibilis accipitur secundum principia ex quibus aliquid scitur.”

<sup>49</sup> *In Post. an.* 1, l. 41, 251–262: “Et ideo, quantumcunque sint aliqua diuersa scibilia secundum suam naturam, dummodo per eadem principia sciantur, pertinent ad unam scienciam, quia non erunt iam diuersa in quantum sunt scibilia: sunt enim per sua principia scibilia; sicut patet quod uoces humane multum differunt secundum suam naturam a sonis inanimatorum corporum, set tamen, quia secundum eadem principia attenditur consonancia in uocibus humanis et sonis inanimatorum corporum, eadem est sciencia musice, que de utrisque considerat.”

<sup>50</sup> *In Post. an.* 1, l. 41, 262–270: “Si uero aliqua sint eadem secundum naturam et tamen per diuersa principia considerentur, manifestum est quod ad diuersas sciencias pertinent; sicut corpus mathematicum non est separatum subiecto a corpore naturali, quia tamen corpus mathematicum cognoscitur per principia quantitatis, corpus autem naturale per principia motus, non est eadem sciencia geometria et naturalis.”

separated in subject from the natural body; however, since the mathematical body is known (*cognoscitur*) through the principles of quantity, while the natural body (is known) through the principles of motion, geometry and natural (science) are not the same science.

It is therefore evident that the diversity of principles is sufficient for the diversification of the sciences, which is accompanied by the diversity of the scientifically knowable genus; but for a science to be **one simply**, one and the other is required: **both** the unity of the **subject and** the unity of the **principles**.<sup>51</sup> Hence, ARISTOTLE mentioned the unity of the subject when he said, “[that science is one] which is of one genus” (< μία... ἐπιστήμη ἐστὶν ἡ ἐνὸς γένους; ►58.6); and (he mentioned the unity of) the principles when he said, “which [are composed] from first [principles whose parts or affections are by themselves]” (< ὅσα ἐκ τῶν πρώτων σύγκειται καὶ μέρη ἐστὶν ἡ πάθη τούτων καθ’ αὐτά; ►58.7, ¶1 & ¶2).

On the other hand, it is further to be considered that second principles take (their) virtue from first (principles; ►45.3); whence, a diversity of **first principles** is required for the diversity of the sciences.<sup>52</sup> This will indeed not be (the case) if either: **(a)** the principles of diverse (things) flow from the same principles, as the principles of *triangle* and of *square* (flow) from the principles of *figure*; or **(b)** the principles of one (thing) are derived from the principles of another, as the principles of *isosceles* depend on the principles of *triangle*.

Nor should we understand (by this) that a unity of first principles simply should suffice for the unity of the sciences, but the unity of **proper principles** in some (subject) genus of a scientifically knowable (object).<sup>53</sup> And the genera of scientifically knowable (objects) are distinguished according to a diverse mode of knowing (*secundum diversum modum cognoscendi*), just like those (things) that are defined with matter and those that are defined without matter are known in a diverse mode (►58.20). Whence, *natural body* and *mathematical body* are diverse genera of scientifically knowable (objects). Whence, the

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<sup>51</sup> *In Post. an.* 1, l. 41, 270–278: “Patet ergo quod ad diuersificandum sciencias sufficit diuersitas principiorum, quam concomitatur diuersitas generis scibilis, ad hoc autem quod sit una sciencia simpliciter utrumque requiritur, et unitas subiecti et unitas principiorum (et ideo de unitate subiecti supra fecit [Philosophus] mentionem cum dixit: «que est unius generis»; de principiis autem, cum dixit: «quecunque ex primis» etc.).”

<sup>52</sup> *In Post. an.* 1, l. 41, 279–287: “Set ulterius considerandum est quod secunda principia uirtutem sortiuntur a primis; unde requiritur diuersitas primorum principiorum ad diuersitatem scienciarum; quod quidem non erit si uel diuersorum principia ex eisdem principiis fluunt, sicut principia trianguli et quadrati deriuantur ex principiis figure; uel principia unius deriuantur ex principiis alterius, sicut principia ysochelis dependent a principiis trianguli.”

<sup>53</sup> *In Post. an.* 1, l. 41, 287–300: “Nec tamen intelligendum est quod sufficiat ad unitatem sciencie unitas principiorum primorum simpliciter, set unitas principiorum primorum in aliquo genere scibilis. Distinguuntur autem genera scibilium secundum diuersum modum cognoscendi, sicut alio modo cognoscuntur ea que definiuntur cum materia et ea que definiuntur sine materia; unde aliud genus scibilium est corpus naturale et corpus mathematicum, unde sunt diuersa prima principia utriusque generis, et per consequens diuersae sciencie, et utrumque horum generum distinguitur in diuersas species scibilium, secundum diuersos modos et rationes cognoscibilitatis.”

first principles of one and of the other genus are diverse; and consequently, the sciences (are) diverse. One and the other of these genera is distinguished into diverse species of scientifically knowable (objects) according to diverse modes and *ratios* of cognoscibility.

ARISTOTLE manifests the posited *ratio*.<sup>54</sup> He says that a sign of this is that sciences should be diverse according to principles when we arrive, by analysis or resolution (*resolvendo*), at first principles that are indemonstrable, which must be of the same genus with those (found in the conclusions) that are demonstrated; for, as has been shown above (► 56.2), it is impossible to demonstrate proceeding from another genus.

For indemonstrable principles to be of one genus, it is taken as a sign that those (conclusions) that are demonstrated through them should be in the same genus and connatural (*congenea* = συγγενῆ, *id est connaturalia*) or proximate to it according to the same genus: for (things that are) such have the same principles.<sup>55</sup>

Thus, it is evident that the unity of a scientifically knowable genus—insofar as it is scientifically knowable—, from which the unity of a science should be taken, and the unity of principles, according to which the diversity of sciences should be taken, correspond to each other.<sup>56</sup>

#### 58.10. The Common Axioms

As ARISTOTLE says, there cannot be some common principles from which—alone—all (scientific conclusions) would be syllogized.<sup>57</sup> For example, this is a common principle: “of any [proposition], there is [either] affirmation or negation,” which is true, in common, in every genus. And it is indeed impossible for all (scientific conclusions) to be syllogized from some such common (principles) alone, since the genera of beings are diverse, and

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<sup>54</sup> *In Post. an.* 1, l. 41, 302–309 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87b1–3): “manifestat [Philosophus] positam rationem. Et dicit quod *signum huius est*, quod sciencie sint altere secundum principia, *cum* perueniatur resoluendo ad principia prima, que sunt *indemonstrabilia*, que *oportet esse* eiusdem generis cum *hiis que* demonstrantur, quia, sicut supra ostensum est, non contingit ex alio genere procedentem demonstrare.”

<sup>55</sup> *In Post. an.* 1, l. 41, 309–314 (cf. ARISTOTLE, *Analytica Posteriora* A.28, 87b3–4): “Ad hoc autem quod principia *indemonstrabilia* sint unius generis, accipitur ut *signum*, *cum ea que demonstrantur per ipsa sint in eodem genere et congenea*, id est connaturalia, uel *proxima* secundum genus sibi ipsis: huiusmodi enim habent eadem principia.” As the apparatus of the critical edition explains, St. Thomas incorporates here two different renderings of συγγενῆ: *proxima* (James of VENICE) and *congenea* (MOERBEKE).

<sup>56</sup> *In Post. an.* 1, l. 41, 314–318: “Et sic patet quod unitas generis scibilis, in quantum est scibile, ex quo accipiebatur unitas sciencie, et unitas principiorum, secundum que accipiebatur sciencie diuersitas, sibi mutuo correspondent.”

<sup>57</sup> *In Post. an.* 1, l. 43, 124–135 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88a36–b3): “dicit [Philosophus] quod non *possunt esse aliqua* principia communia, *ex quibus* solum *omnia* sillogizentur, sicut hoc est principium commune: «De quolibet est affirmatio uel negatio», quod quidem communiter est uerum in omni genere, non tamen est possibile quod ex solis aliquibus taliter communibus possint omnia sillogizari, quia *genera* entium sunt diuersa, et diuersa sunt principia que sunt solum quantitatum principia ab hiis que *sunt solum* principia qualitatum, que oportet coassumere principiis communibus ad concludendum in qualibet materia.”

the principles that are the principles of quantities alone are diverse from those (principles) that are the principles of quality alone, which must be co-assumed with common principles (in order) to conclude in any matter.

If, for example, from the aforesaid principle we must syllogize in (the genus of continuous) quantities, it is necessary to accept that, since this (principle) should be false: “a point is a line,” this (other principle) must be true: “a point is not a line.”<sup>58</sup> Likewise, in (the matter of) qualities, something (that is) proper of quality must be co-assumed. Whence, it remains that it would be impossible for the principles of all (demonstrative) syllogisms to be the same.

Every science has its principles.<sup>59</sup> Yet, that the principles of one science should be the same as those that are (the principles) of another—which would have to be (the case) if the principles of all scientific syllogisms should be the same—is impossible and ludicrous (*derisibile* < γελοῖον). For, according to this, it would follow that all those (things) that are in the sciences would be the same; and thus, all sciences would be one science; for those (things) that are the same as the same (third thing) are the same to each other (< αὐτὰ αὐταῖς αἰ αὐτὰί). Yet, the principles of any which science are in some mode the same as the conclusions, since they are of one genus: for it is not (possible) to demonstrate from one genus into another, as has been said (► 56.2). Therefore, if the principles are the same, it would follow that all those (things) that are in the sciences would be the same.

As ARISTOTLE says, if someone should say that the first immediate propositions are those principles from which all (conclusions) are demonstrated, he must consider that, in any one genus, there must nonetheless be one principle or one immediate proposition in that genus—not first simply.<sup>60</sup> And (he must consider also) that it would be necessary to

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<sup>58</sup> *In Post. an.* 1, l. 43, 135–142: “Putā, si in quantitativis oporteat ex dicto principio etiam sillogizare, oportet accipere quod, cum hec sit falsa: «Punctus est linea», oportet hanc esse ueram: «Punctus non est linea»; et similiter in qualitativis oportet coassumere aliquid proprium qualitati. Vnde relinquitur quod impossibile sit esse eadem principia omnium sillogismorum.”

<sup>59</sup> *In Post. an.* 1, l. 43, 210–223 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88b10–15): “quelibet sciencia habet sua principia. Set quod sint eadem principia unius sciencie que sunt alterius (quod oporteret si eadem essent principia omnium sillogismorum sciencialium), est impossibile et derisibile, quia secundum hoc sequeretur quod omnia que sunt in scienciis *essent eadem*, et ita omnes sciencie essent una sciencia: que enim eisdem sunt eadem, sibi inuicem sunt eadem. Set principia cuiuslibet sciencie sunt quodam modo eadem conclusionibus, quia sunt unius generis: non enim est ex uno in aliud genus demonstrare, ut supra dictum est. Si igitur principia sunt eadem, sequeretur quod *omnia* que sunt in scienciis, *essent eadem*.”

<sup>60</sup> *In Post. an.* 1, l. 43, 268–280 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88b20–21): “dicit [Philosophus] quod, *si aliquis dicat primas immediatas propositiones has esse illa principia ex quibus omnia demonstrantur*, considerare debet quod nichilominus *in unoquoque genere oportet esse unum principium* uel unam propositionem immediatam primam in illo genere, non primam simpliciter, et quod ex illa que est prima simpliciter, coassumpto isto principio proprio huius generis, oportebit in hoc genere demonstrari; et ita non ex solis communibus principiis possunt omnia demonstrari, set oportet coaccipere propria, que sunt diuersa diuersorum.”



demonstrate in this genus from that (proposition) that is first simply, (having also) co-assumed this principle proper to that genus. In this way, not all (scientific conclusions) can be demonstrated from common principles alone: rather, it is necessary to co-accept proper (principles), which (proper principles) are diverse of diverse (sciences).

As ARISTOTLE says, it is manifest, in another mode, that it is impossible for the principles of all sciences to be the same.<sup>61</sup> For diverse genera have principles (that are) diverse in genus (e.g., the unit vs. the point; ►60). Whence, since diverse sciences are about diverse genera, it follows that diverse sciences should have diverse principles.

### 58.11. Principles: *From Which vs. About Which*

Since the common principles that all sciences use are the same in some mode, ARISTOTLE consequently distinguishes the principles.<sup>62</sup> Thus, he says that principles are twofold: some (principles) **from which** (*ex quibus* = ἐξ ὧν) we demonstrate first, as the first axioms, such as “it is impossible for the same [thing] to be and not to be”; and, again, there are some principles **about which** (*circa quae* = περὶ ὅ) the sciences are: to wit, the subjects of the sciences, since we use the definitions of the subject as principles in demonstrations.

Therefore, those first (principles) *from which* we demonstrate are common to all the sciences; but the principles *about which* the sciences are, are proper to any which science.<sup>63</sup> For example, number (is proper) to arithmetic; and magnitude (is proper) to geometry. Common principles must be applied to these proper (principles) for there to be a demonstration.

And, since (a conclusion) is not demonstrated from common principles alone, it cannot be said that the principles of all demonstrative syllogisms are the same, which is what ARISTOTLE intends to prove (►58.10).<sup>64</sup>

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<sup>61</sup> *In Post. an.* 1, l. 43, 299–305 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88b25–27): “dicit [Philosophus] quod *manifestum* est alio modo *quod non contingit hoc*, scilicet quod eadem sint principia omnium scienciarum, quia *ostensum est* supra quod diuersorum generum sunt *principia* diuersa *genere*; unde, cum diuersae sciencie sint de diuersis generibus, sequitur quod diuersa principia sint diuersarum scienciarum.”

<sup>62</sup> *In Post. an.* 1, l. 43, 305–314 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88b27–29): “Set quia quodam modo eadem principia communia sunt quibus omnes sciencie utuntur, ideo consequenter distinguit [Philosophus] de principiis. Et dicit quod *duplicia sunt principia*: quedam ex quibus primo demonstratur, sicut prime dignitates, ut quod: «Non contingit idem esse et non esse»; et iterum sunt quedam principia circa que sunt sciencie, scilicet subiecta scienciarum, quia diffinitionibus subiecti utimur ut principiis in demonstrationibus.”

<sup>63</sup> *In Post. an.* 1, l. 43, 314–320 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88b27–29): “illa ergo prima *ex quibus* demonstratur *sunt communia* omnibus scienciis, set principia *circa* que sunt sciencie *sunt propria* cuilibet sciencie, sicut *numerus* arismetice et *magnitudo* geometrie; principia autem communia oportet ad hec propria applicari ad hoc quod demonstratur.”

<sup>64</sup> *In Post. an.* 1, l. 43, 320–323: “Et, quia non ex solis communibus principiis demonstratur, non potest dici eadem esse principia omnium sillogismorum demonstratiuorum, quod intendit [Philosophus] probare.”

## 58.12. Intellectual Cognition of the First Principles of the Speculative Sciences

In the speculative sciences—in the demonstrations of propositions as much as in the discovery of definitions—we always proceed from something priorly known (►53.6, ¶4; 53.10; 57).<sup>65</sup> Thus, just like someone arrives at the cognition of a conclusion from foreknown propositions (*ex propositionibus precognitis*), so, (too), does he arrive at the cognition of a species from the conception of the genus, the difference, and the causes of something. However, it is impossible to proceed infinitely (in) this, since every science would then perish—both in respect of demonstrations and in respect of definitions, for it is impossible to pass through infinite (demonstrations or definitions; ►55.13).

Whence, every consideration of the speculative sciences is reduced into some first (principles), which man has no need to learn or to discover—lest he should proceed infinitely.<sup>66</sup> Instead, he naturally has knowledge of them. The indemonstrable principles of demonstrations are such: for example, “every whole is greater than its part,” and (other) like (first propositions), into which all the demonstrations of the sciences are reduced. And (such are) the first conceptions of the intellect too: for example, (the conception) of *being*, *one*, and such (indivisible understandings), into which all the definitions of the aforesaid sciences must be reduced. Wherefrom, it is evident that nothing can be scientifically known in the speculative sciences—neither by way of demonstration nor by way of definition—except those alone to which the aforesaid naturally known (principles, *naturaliter cognita*) extend.

Such naturally known (principles, *naturaliter cognita*) are manifested to man from the light itself of the agent intellect (►58.13; 50.3), which is natural to man.<sup>67</sup> Something is manifested to us by this light only insofar as, by it, images are made intelligible in act: for this is the act of the agent intellect.

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<sup>65</sup> *In De Trin.*, q. 6 a. 4 co., 96–107: “in scientiis speculatiuis semper ex aliquo prius noto proceditur, tam in demonstrationibus propositionum, quam etiam in inuentionibus diffinitionum: sicut enim ex propositionibus precognitis aliquis deuenit in cognitionem conclusionis, ita ex conceptione generis et differentie et causarum rei aliquis deuenit in cognitionem speciei. Hic autem non est possibile in infinitum procedere, quia sic omnis scientia periret, et quantum ad demonstrationes, et quantum ad diffinitiones, cum infinita non sit pertransire.”

<sup>66</sup> *In De Trin.*, q. 6 a. 4 co., 107–122: “unde omnis consideratio scientiarum speculatiuarum reducitur in aliqua prima, que quidem homo non habet necesse addiscere aut inuenire, ne oporteat in infinitum procedere, set eorum notitiam naturaliter habet. Et huiusmodi sunt principia demonstrationum indemonstrabilia, ut ‘omne totum est maius sua parte’, et similia, in que omnes demonstrationes scientiarum reducuntur, et etiam prime conceptiones intellectus, ut entis, et unius, et huiusmodi, in que oportet reducere omnes diffinitiones scientiarum predictarum. Ex quo patet quod nichil potest sciri in scientiis speculatiuis neque per uiam demonstrationis, neque per uiam diffinitionis, nisi ea tantummodo ad que predicta naturaliter cognita se extendunt.”

<sup>67</sup> *In De Trin.*, q. 6 a. 4 co., 122–129: “Huiusmodi autem naturaliter cognita homini manifestantur ex ipso lumine intellectus agentis, quod est homini naturale; quo quidem lumine nichil manifestatur nobis nisi in quantum per ipsum phantasmata fiunt intelligibilia in actu: hic enim est actus intellectus agentis, ut dicitur in III De anima.”

### 58.13. The Light of the Agent Intellect

As ARISTOTLE shows, apart from the possible intellect (in which intelligible species are received), there is an agent intellect.<sup>68</sup> For in every nature that is sometimes in potency and sometimes in act, it is necessary to posit: **(a)** something that is as matter in each genus: to wit, which is in potency to all those that are in that genus; and **(b)** another (thing) that is as the agent and productive cause (*causa <agens> et factivum* = τὸ αἴτιον καὶ ποιητικόν), which is related, in producing everything [in that genus] (*in faciendo omnia* = τῷ ποιεῖν πάντα), as art (is related) to matter (*ars ad materiam* = ἡ τέχνη πρὸς τὴν ὕλην).

The soul, according to (its) intellectual part, is sometimes in potency (of understanding) and sometimes in act.<sup>69</sup> Therefore, it is necessary for these differences to be in the intellectual soul: to wit, such that **(a)** there should be *an intellect in which* (*intellectus in quo* = νοῦς τῷ) all intelligible (species) can be produced, which is the possible intellect; and **(b)** there should be another intellect that can make all intelligible (species be) in act, which is called *agent intellect* and is like some habit (*sicut habitus quidam* = ὡς ἕξις τις)—insofar as *habitus* (i.e., possession; ► 42.13, ¶2) is a form and a nature, and is distinguished against privation and potency, so that (the agent intellect) is distinguished from the possible agent, which is in potency.

Whence, ARISTOTLE says that (the agent intellect) is a habit like light (*ut lumen* = οἶον τὸ φῶς), which in some mode makes the colors that exist in potency to be colors in act (*facit colores existentes in potencia esse actu colores* = τὸ φῶς ποιεῖ τὰ δυνάμει ὄντα χρώματα ἐνεργεῖα χρώματα).<sup>70</sup> And he says, “in some mode” (*quodam modo* = τρόπον... τινα), because color is visible according to itself; and light makes this (color) to be a color in act only insofar as it makes the transparent (mean) to be in act such that it can be moved by

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<sup>68</sup> *In De anima* 3, c. 4, 4–15 (cf. ARISTOTLE, *De anima* Γ.5, 430a10–13): “ostendit [Philosophus] esse intellectum agentem preter intellectum possibilem, et ratione et exemplo [...]. Ponit ergo circa primum talem rationem: *in omni natura* que est quandoque in potencia et quandoque in actu oportet ponere *aliquid* quod est sicut materia *in unoquoque genere* (quod scilicet est in *potencia* ad *omnia* que sunt illius generis), et aliud quod est sicut *causa* agens et *factivum*, quod ita se habet *in faciendo omnia* sicut *ars ad materiam*.”

<sup>69</sup> *In De anima* 3, c. 4, 15–23 (cf. ARISTOTLE, *De anima* Γ.5, 430a13–15): “set anima secundum partem intellectiuam quandoque est in potencia et quandoque in actu; *necesse* est igitur *in anima* intellectiua esse *has diferencias*, ut scilicet sit unus *intellectus in quo* possunt *omnia* intelligibilia fieri (et hic est intellectus possibilis, de quo supra dictum est) et alius intellectus sit ad hoc quod possit *omnia* intelligibilia *facere* in actu (qui uocatur intellectus agens) et est *sicut habitus quidam*.” Ibid., 36–42: “Dicendum est ergo quod «habitus» hic accipitur secundum quod Philosophus frequenter consuevit nominare omnem formam et naturam habitum, prout habitus distinguitur contra priuationem et potenciam, ut sic per hoc quod nominat eum habitum distinguat eum ab intellectu possibili qui est in potencia.”

<sup>70</sup> *In De anima* 3, c. 4, 43–53 (cf. ARISTOTLE, *De anima* Γ.5, 430a15–17): “Vnde dicit [Philosophus] quod est habitus *ut lumen*, quod *quodam modo* *facit colores existentes in potencia* esse *actu colores*. Et dicit «quodam modo», quia supra ostensum est quod color secundum se ipsum est uisibilis, hoc autem solummodo lumen facit ipsum esse actu colorem in quantum facit dyaphanum esse in actu ut moueri possit a colore et sic color uideatur; intellectus autem agens facit ipsa intelligibilia esse in actu, que prius erant in potencia, per hoc quod abstrahit ea a materia: sic enim sunt intelligibilia in actu.”

color and color can become visible. The agent intellect, on the other hand, makes the intelligible (species) themselves—which were priorly in potency (in the images)—to be in act because it abstracts them from matter, for they are, thus, intelligible in act (► 49.10).

The images, however, are received by sense.<sup>71</sup> Whence, the principle of cognition of the aforesaid principles is from sense and memory (► 50.1; 50.2). And thus, such principles do not lead us beyond the cognition we can receive from those (things) that are comprehended by sense.

#### 58.14. The Principle and the Terminus of Cognition

Two (extremities) are to be considered in any cognition: to wit, the principle and the terminus.<sup>72</sup> The principle clearly pertains to apprehension, while the terminus (pertains) to judgment.

The principle of any cognition of ours is in sense, for the apprehension of **imagination** (*phantasia* = φαντασία)—which, as ARISTOTLE says, is *a motion produced from sense* (*motus a sensu factus* < κίνησις ὑπὸ τῆς αἰσθήσεως τῆς κατ' ἐνέργειαν γιγνομένη)—proceeds (*oritur*, is originated) from the apprehension of sense.<sup>73</sup> From which (i.e., from the apprehension of imagination), again, proceeds in us intellectual apprehension, since images are as objects (in relation) to the intellectual soul (< τῆ... διανοητικῆ ψυχῆ τὰ φαντάσματα ὅσον αἰσθήματα ὑπάρχει).

The image is the principle of our cognition as *that from which* the operation of the intellect begins: not as (something) that passes off (*non sicut transiens*), but as (something) that remains as some foundation of the intellectual operation, just like the principles of a demonstration must remain in every process of science.<sup>74</sup> Indeed, images are compared to the intellect as objects in which it considers (*inspiciit*) everything that it considers, either

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<sup>71</sup> *In De Trin.*, q. 6 a. 4 co., 129–135: “Phantasmata autem a sensu accipiuntur, unde principium cognitionis predictorum principiorum est ex sensu et memoria, ut patet per Philosophum in fine Posteriorum; et sic huiusmodi principia non ducunt nos ulterius nisi ad ea quorum cognitionem accipere possumus ex his que sensu comprehenduntur.”

<sup>72</sup> *In De Trin.*, q. 6 a. 2 co., 67–71: “in qualibet cognitione duo est considerare, scilicet principium et terminum. Principium quidem ad apprehensionem pertinet, terminus autem ad iudicium: ibi enim cognitio perficitur.”

<sup>73</sup> *In De Trin.*, q. 6 a. 2 co., 71–77 (cf. ARISTOTLE, *De anima* Γ.3, 429a1–2; Γ.7, 431a14–15): “Principium igitur cuiuslibet nostre cognitionis est in sensu, quia ex apprehensione sensus oritur apprehensio phantasie, que est «motus a sensu factus», ut dicit Philosophus; a qua iterum oritur apprehensio intellectiva in nobis, cum phantasmata sint intellectiva anime ut obiecta, ut patet in III De anima.”

<sup>74</sup> *In De Trin.*, q. 6 a. 2 ad 5, 171–182: “phantasma est principium nostre cognitionis ut ex quo incipit intellectus operatio, non sicut transiens, set sicut permanens ut quoddam fundamentum intellectualis operationis; sicut principia demonstrationis oportet manere in omni processu scientie, cum phantasmata comparentur ad intellectum ut obiecta in quibus inspiciit omne quod inspiciit, uel secundum perfectam representationem, uel per negationem. Et ideo quando phantasmatum cognitio impeditur, oportet totaliter impediri cognitionem intellectus etiam in diuinis.”

according a perfect representation or through negation. And hence, when cognition of the images is impeded, the cognition of the intellect must be totally impeded—even in metaphysical (things).

Although the operation of our intellect, in (its) present state, is not (had) without images in respect of the principle of cognition, it is not necessary for our cognition to always be terminated at images: to wit, such that we would judge, what we understand, to be such as what imagination apprehends.<sup>75</sup>

Indeed, to be drawn into something (or to be deduced to something, *deduci ad aliquid*) is to be terminated at it.<sup>76</sup> Hence, in metaphysics we must draw (our judgment) into neither imagination nor sense; in mathematical (things), however, (we must draw our judgment) into imagination and not at sense; and in natural (things), even to sense. Wherefrom, those err who try to uniformly proceed in their arguments (*procedere nituntur*) in these three parts of speculative (science; i.e., the method, too, must be diverse; ► 58.24).

### **58.15. The Terminus of Natural, Mathematical, and Metaphysical Cognition**

(As just explained), the terminus of cognition is not always uniformly (had): for sometimes it is (had) in sense; sometimes, in imagination; and sometimes, in the intellect alone.<sup>77</sup>

1. Sometimes, the properties and accidents of a thing that are demonstrated by sense sufficiently express the nature of the thing.<sup>78</sup> And then, the judgment about the nature of the thing that the intellect produces must be conformed to these (properties and accidents) that sense demonstrates about the thing.

Such are all **natural** things, which are determined to sensible matter.<sup>79</sup> These are the natural (things) that are concrete, with sensible matter and motion, both according to being

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<sup>75</sup> *In De Trin.*, q. 6 a. 2 ad 2, 151–157: “intellectus nostri operatio non est in presenti statu sine phantasmate quantum ad principium cognitionis; non tamen oportet quod nostra cognitio semper ad phantasmata terminetur, ut scilicet illud, quod intelligimus, iudicemus esse tale quale est illud quod phantasia apprehendit.”

<sup>76</sup> *In De Trin.*, q. 6 a. 2 co., 137–143: “deduci autem ad aliquid est ad illud terminari, et ideo in diuinis neque ad ymaginationem neque ad sensum debemus deduci, in mathematicis autem ad ymaginationem et non ad sensum, in naturalibus autem etiam ad sensum. Et propter hoc peccant qui uniformiter in his tribus speculatiue partibus procedere nituntur.”

<sup>77</sup> *In De Trin.*, q. 6 a. 2 co., 77–80: “Set terminus cognitionis non semper est uniformiter: quandoque enim est in sensu, quandoque in ymaginatione, quandoque autem in solo intellectu.”

<sup>78</sup> *In De Trin.*, q. 6 a. 2 co., 81–85: “Quandoque enim proprietates et accidentia rei que sensu demonstrantur, sufficienter exprimunt naturam rei, et tunc oportet quod iudicium de rei natura quod facit intellectus, conformetur his que sensus de re demonstrat.”

<sup>79</sup> *In De Trin.*, q. 6 a. 2 co., 85–94 (cf. ARISTOTLE, *De caelo* Γ.7, 306a16–17): “huiusmodi sunt omnes res naturales, que sunt determinate ad materiam sensibilem. Et ideo in scientia naturali terminari debet cognitio ad sensum, ut scilicet hoc modo iudicemus de rebus naturalibus secundum quod sensus eas demonstrat, ut patet in III Celi et mundi; et qui sensum neglegit in naturalibus, incidit in errorem. Et hec sunt naturalia, que sunt concreta cum materia sensibili et motu, et secundum esse et secundum considerationem.”

and according to consideration. Hence, cognition in natural science must be terminated at sense: to wit, such that we should judge about natural things according as sense demonstrates them, as ARISTOTLE says (< τέλος... τῆς... φυσικῆς τὸ φαινόμενον ἀεὶ κυρίως κατὰ τὴν αἴσθησιν). Whosoever neglects sense in natural (things) falls into error.

2. On the other hand, there are some (things) whose judgment does not depend on those (properties and accidents) that are perceived by sense.<sup>80</sup> For, although they should be in sensible matter according to being (*secundum esse*), they are nonetheless abstracted from sensible matter according to (their) definitive *ratio* (*secundum rationem diffinitivam*; ►8.1); and a judgment of any one thing is produced (*fit*) above all (*potissime*) according to its definitive *ratio*. Yet, since—according to *ratio*—they do not abstract from any matter whatsoever, but only from sensible (matter)—and (when) the sensible conditions (are) removed, something imaginable remains—, hence, judgment in such (things) must be taken according to that which imagination demonstrates.

Such are the **mathematical** (things).<sup>81</sup> Hence, in mathematical (things), cognition according to judgment must be terminated at imagination, not at sense. For mathematical judgment rises above (*superat*) the apprehension of sense. Whence, sometimes a judgment about a sensible line is not the same (as a judgment) about a mathematical line: for example, in that a straight line touches a sphere in only one point, which befits a separated straight line—but not a straight line in matter, as ARISTOTLE says.

3. On the other hand, there are some (things) that exceed both that which falls under sense and that which falls under imagination: for example, those (things) that altogether do not depend on matter—neither according to being nor according to consideration.<sup>82</sup>

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<sup>80</sup> *In De Trin.*, q. 6 a. 2 co., 95–106: “Quedam uero sunt quorum iudicium non dependet ex his que sensu percipiuntur, quia quamuis secundum esse sint in materia sensibili, tamen secundum rationem diffinitivam sunt a materia sensibili abstracta; iudicium autem de unaquaque re potissime fit secundum eius diffinitivam rationem. Set quia secundum rationem diffinitivam non abstraunt a qualibet materia, set solum a sensibili, et remotis sensibilibus condicionibus remanet aliquid ymaginabile, ideo in talibus oportet quod iudicium sumatur secundum id <quod> imaginatio demonstrat.”

<sup>81</sup> *In De Trin.*, q. 6 a. 2 co., 106–116 (cf. ARISTOTLE, *De anima* A.1, 403a10–15): “huiusmodi autem sunt mathematica. Et ideo in mathematicis oportet cognitionem secundum iudicium terminari ad ymaginationem, non ad sensum, quia iudicium mathematicum superat apprehensionem sensus. Vnde non est idem iudicium quandoque de linea mathematica quod est de linea sensibili, sicut in hoc quod recta linea tangit speram solum secundum punctum; quod conuenit recte lineae separate, non autem recte lineae in materia, ut dicitur in I De anima.”

<sup>82</sup> *In De Trin.*, q. 6 a. 2 co., 117–132 (cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, 7.3): “Quedam uero sunt que excedunt et id quod cadit sub sensu et id quod cadit sub ymaginatione, sicut illa que omnino a materia non dependent, neque secundum esse, neque secundum considerationem; et ideo talium cognitio secundum iudicium neque debet terminari ad ymaginationem neque ad sensum. Set tamen ex his que sensu uel ymaginatione apprehenduntur in horum cognitionem deuenimus, uel per uiam causalitatis, sicut ex effectu causa perpenditur que non est effectui commensurata set excellens, uel per excessum, uel per remotionem, quando omnia que sensus uel ymagnatio apprehendit a rebus huiusmodi separamus. Quos modos cognoscendi diuina ex sensibilibus ponit Dionisius in libro De diuinis nominibus.”

And hence, the cognition of such (things) according to judgment must be terminated neither at sense nor at imagination. However, we arrive into their cognition from those (properties and accidents) that are apprehended by sense or by imagination, whether **(a)** through the way of **causality**, as a cause that is not commensurate to—rather, it excels—(its) effect is considered (*perpenditur*) from the effect; or **(b)** through **excess**; or **(c)** through **removal**, when we separate from such things all (properties and accidents) that sense or imagination apprehends. And these (three) are the modes of knowing metaphysical (things) that (pseudo-)DIONYSIUS posits.

Therefore, we can use in metaphysics both sense and imagination as principles of our consideration, but not as a terminus—to wit, such that we would judge such **metaphysical** (things) to be such as sense or imagination apprehends (them).<sup>83</sup>

Indeed, judgment of metaphysical (things) is not formed according to imagination.<sup>84</sup> And hence, although imagination should be necessary in any consideration of metaphysical (things; ►58.14), we should never be drawn into them in metaphysical (judgments).

#### 58.16. Speculative vs. Practical Sciences

The theoretical or speculative intellect (*theoricus sive speculativus intellectus* = νοῦς θεωρητικός) is properly distinguished from the practical (*practicus* = πρακτικός) in that the speculative (intellect) has for (its) end the truth that it considers, while the practical (intellect) orders the truth considered into an operation as into (its) end (►51.3).<sup>85</sup> Hence, the end (*finis* = τέλος) of the speculative (intellect) is truth (*veritas* = ἀλήθεια), while the end of the operative intellect is action (*actio, opus, operatio* = ἔργον).

<sup>83</sup> *In De Trin.*, q. 6 a. 2 co., 133–137: “Vti ergo possumus in diuinis et sensu et imaginatione sicut principiis nostre considerationis set non sicut terminis, ut scilicet iudicemus talia esse diuina qualia sunt que sensus uel ymaginatio apprehendit.”

<sup>84</sup> *In De Trin.*, q. 6 a. 2 ad 5, 185–190: “non tamen iudicium diuinorum secundum imaginationem formatur. Et ideo quamuis ymaginatio in qualibet diuinorum consideratione sit necessaria secundum statum uie, numquam tamen ad eam deduci oportet in diuinis.”

<sup>85</sup> *In De Trin.*, q. 5 a. 1 co., 93–102: “theoricus siue speculatiuus intellectus in hoc proprie ab operatiuo siue practico distinguitur, quod speculatiuus habet pro fine ueritatem quam considerat, practicus uero ueritatem consideratam ordinat in operationem tamquam in finem; et ideo dicit Philosophus in III De anima quod differunt ad inuicem fine, et in II Metaphisice dicitur quod finis speculatiue est ueritas, set finis operatiue scientie est actio.” *In De anima* 3, c. 9, 43–49: “Dicit ergo [Philosophus] primo quod intellectus qui mouet est *intellectus qui ratiocinatur propter aliquid*, non propter ratiocinari tantum, et hic est intellectus *practicus*, qui *differt a speculatiuo* secundum finem: nam speculatiuus speculatur ueritatem non propter aliquid aliud, set propter ipsam tantum, practicus autem speculatur ueritatem propter operationem.” Cf. ARISTOTLE, *De anima* Γ.10, 433a14–15: “νοῦς δὲ ὁ ἕνεκά του λογιζόμενος καὶ ὁ πρακτικός· διαφέρει δὲ τοῦ θεωρητικοῦ τῷ τέλει.” *In Metaph.* 2, l. 2, §290: “Theorica, idest speculativa, differt a practica secundum finem: nam finis speculatiuae est ueritas: hoc enim est quod intendit, scilicet ueritatis cognitionem. Sed finis practicae est opus, quia etsi «practici,» hoc est operatiui, intendunt cognoscere ueritatem, quomodo se habeat in aliquibus rebus, non tamen quaerunt eam tamquam ultimum finem. Non enim considerant causam ueritatis secundum se et propter se, sed ordinando ad finem operationis, sive applicando ad aliquod determinatum particulare, et ad aliquod determinatum tempus.” Cf. ARISTOTLE, *Metaphysica* α.1, 993b20–23: “θεωρητικῆς μὲν γὰρ τέλος ἀλήθεια, πρακτικῆς δ’ ἔργον· καὶ γὰρ ἂν τὸ πῶς ἔχει σκοπῶσιν, οὐ τὸ αἰδιον ἀλλὰ πρὸς τι καὶ νῦν θεωροῦσιν οἱ πρακτικοί.”

Therefore, since matter must be proportionate to end, the matter of the practical sciences must be those things that can be produced by our work, such that their cognition can be ordered into an operation as into an end.<sup>86</sup> On the other hand, the matter of the speculative sciences must be the things that are not produced by our work; whence, their consideration cannot be ordered into an operation as into an end; and the speculative sciences must be distinguished according to the distinction of these things.

### 58.17. The Liberal Arts Compared to the Other Sciences

Among the other sciences, those (contained in the trivium and the quadrivium) are said (to be) *arts* because they not only have cognition, but (also) some work that is immediately of reason itself: for example, the construction of a syllogism, or to form a sentence, to number, to measure, to form melodies, and to compute the course of heavenly bodies.<sup>87</sup>

The other sciences, on the other hand, either **(a)** do not have a work but only cognition, as metaphysics and natural (science), whence they cannot have the name of *art*; or **(b)** they have corporeal work, as medicine, (practical) chemistry (*alchimia*), and other such (sciences), whence they cannot be called *liberal arts*, for they are acts of man such (that they are exerted) from that part (of man) which is not free (*liber*)—namely, from the part of the body—, whence they are servile in some mode—insofar as the body is subordinated (*subditur*) to the soul, and man is free according to the soul.<sup>88</sup>

On the other hand, moral science, even though it should be for the sake (*propter*) of an operation, that operation is, however, not an act of science: rather (it is an act) of virtue.<sup>89</sup>

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<sup>86</sup> *In De Trin.*, q. 5 a. 1 co., 102–112: “Cum ergo oporteat materiam fini esse proportionatam, oportet practicarum scientiarum materiam esse res illas que a nostro opere fieri possunt, ut sic earum cognitio in operationem quasi in finem ordinari possit; speculatiuarum uero scientiarum materiam oportet esse res que a nostro opere non fiunt, unde earum consideratio in operationem ordinari non potest sicut in finem. Et secundum harum rerum distinctionem oportet scientias speculatiuas distinguui.”

<sup>87</sup> *In De Trin.*, q. 5 a. 1 ad 3, 229–234: “Vel ideo hee inter ceteras scientias artes dicuntur, quia non solum habent cognitionem, set opus aliquod quod est immediate ipsius rationis, ut constructionem sillogismi uel orationem formare, numerare, mensurare, melodias formare et cursus siderum computare.”

<sup>88</sup> *In De Trin.*, q. 5 a. 1 ad 3, 234–243: “Alie uero scientie uel non habent opus set cognitionem tantum, sicut scientia diuina et naturalis, unde nomen artis habere non possunt, cum ars dicatur ratio factiua, ut dicitur in VI Metaphisice; uel habent opus corporale, sicut medicina, alchimia, et alie huiusmodi, unde non possunt dici artes liberales, quia sunt hominis huiusmodi actus ex parte illa qua non est liber, scilicet ex parte corporis.” *STh I-II*, q. 57 a. 3 ad 3: “etiam in ipsis speculabilibus est aliquid per modum cuiusdam operis, puta constructio syllogismi aut orationis congruae aut opus numerandi vel mensurandi. Et ideo quicumque ad huiusmodi opera rationis habitus speculativi ordinantur, dicuntur per quandam similitudinem artes, sed liberales; ad differentiam illarum artium quae ordinantur ad opera per corpus exercita, quae sunt quodammodo serviles, in quantum corpus seruiliter subditur animae, et homo secundum animam est liber. Illae uero scientiae quae ad nullum huiusmodi opus ordinantur, simpliciter scientiae dicuntur, non autem artes. Nec oportet, si liberales artes sunt nobiliores, quod magis eis conveniat ratio artis.”

<sup>89</sup> *In De Trin.*, q. 5 a. 1 ad 3, 243–250: “Scientia uero moralis quamuis sit propter operationem, tamen illa operatio non est actus scientie set magis uirtutis, ut patet in libro Ethicorum, unde non potest dici ars, set magis in illis operationibus se habet uirtus loco artis; et ideo ueteres diffinierunt uirtutem esse artem bene recteque uiuendi, ut Augustinus dicit in IV De ciuitate Dei.”



Whence, it cannot be called an *art*. Instead, in those (moral) operations, virtue has the place of art. And hence, the ancients defined **virtue** to be *the art of well and rightly living*, as AUGUSTINE says.

### 58.18. Logic Is Not a Speculative Science

The speculative sciences are about those (knowable things) whose cognition is sought for themselves.<sup>90</sup> On the other hand, the things about which logic is are not sought (in order) to know (them) on account of themselves, but as some support (in relation) to the other sciences. And hence, logic is not contained under speculative philosophy as a principal part, but as something reduced to speculative philosophy insofar as it furnishes to (the act of) speculation its instruments: to wit, syllogisms, definitions, and other such (things), which we need in the speculative sciences. Whence, according to BOETHIUS in his *Commentary* on PORPHYRY's (*Isagoge*), it is not so much a science as the instrument of science (*scientiae instrumentum*).

Moreover, the logician considers intentions absolutely (► 21.10, ¶1).<sup>91</sup> According to this, nothing prevents immaterial (beings) from agreeing (in genus) with material (bodies); and incorruptible (bodies from agreeing) with corruptible (bodies). The natural (philosopher) and the first philosopher, on the other hand, consider essences according as they have being (*esse*) in things; and hence, wherever they find a diverse mode of potency and act—and therefore a diverse mode of being—, they say that there are diverse genera.

Thus, created immaterial substances are indeed in a genus.<sup>92</sup> And although considering (them) logically they should agree with sensible substance in the remote genus, which is (that of) *substance*, however, speaking naturally they do not agree in the same genus (► 21.11), as neither (should) celestial bodies (according to ancient science, agree) with lower (bodies): for the corruptible and the incorruptible are not of one genus (► 41.30).

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<sup>90</sup> *In De Trin.*, q. 5 a. 1 ad 2, 193–207: “scientie speculatiue, ut patet in principio Metaphisice, sunt de illis quorum cognitio queritur propter se ipsa. Res autem de quibus est logica non queruntur ad cognoscendum propter se ipsas, set ut adminiculum quoddam ad alias scientias; et ideo logica non continetur sub speculatiua philosophia quasi principalis pars, set sicut quiddam reductum ad philosophiam speculatiuam prout ministrat speculationi sua instrumenta, scilicet sillogismos, et diffinitiones, et alia huiusmodi quibus in scientiis speculatiuis indigemus. Vnde secundum Boetium in Commento super Porphyrium, non tam est scientia quam scientie instrumentum.” See BOETHIUS, *In Porphyrium Commentariorum* I: “manifestum est non eam [sc., logicam] esse philosophiae partem, sed potius instrumentum” (PL 64, 74B–C).

<sup>91</sup> *In De Trin.*, q. 6 a. 3 co., 145–153: “Logicus enim considerat absolute intentiones, secundum quas nichil prohibet conuenire immaterialia materialibus et incorruptibilia corruptibilibus; set naturalis et philosophus primus considerant essentias secundum quod habent esse in rebus, et ideo ubi inueniunt diuersum modum potentie et actus, et per hoc diuersum modum essendi, dicunt esse diuersa genera.”

<sup>92</sup> *In De Trin.*, q. 6 a. 3 co., 138–145 (cf. ARISTOTLE, *Metaphysica* I.10, 1058b26–29): “substantie immateriales create sunt quidem in genere; et quamuis logice considerando conueniant cum istis substantiis sensibilibus in genere remoto quod est substantia, naturaliter tamen loquendo non conueniunt in eodem genere, sicut nec etiam corpora celestia cum istis inferioribus: corruptibile enim et incorruptibile non sunt unius generis, ut dicitur in X Metaphisice.”

### 58.19. The Object of a Speculative Potency or Habit

When habits or potencies are distinguished in virtue of (*penes*) the objects, they are not distinguished in virtue of any differences of objects, but in virtue of those that are (differences) by themselves of the objects insofar as they are objects (►58.2).<sup>93</sup> Thus, to be animal or plant is accidental (*accidit*) to the sensible insofar as it is sensible; and hence, the distinction of senses is not taken in virtue of this, but rather in virtue of a difference of color or sound. Hence, the speculative sciences must be divided by the differences of the speculable (objects) insofar as they are speculable (*in quantum speculabilia sunt*).

Something befits the speculable that is the object of the speculative potency from the part of the intellective potency (¶1); and something (else befits the speculable object) from the part of the habit of science (¶2), by which the intellect is perfected:<sup>94</sup>

1. From the part of the **intellect**, it befits (the object of the speculative potency) to be **immaterial**, since the intellect itself is immaterial too (►50.3; 52.10, ¶1).<sup>95</sup>

2. From the part of the **science**, it befits (the object of the speculative potency) **to be necessary**, for science is about necessary (things; ►53.4, ¶3; 52.10, ¶2); and every necessary (thing) as such (*in quantum huiusmodi*) is **immobile**, for everything that is movable, as such, can be and not be—whether simply or according to something.<sup>96</sup>

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<sup>93</sup> *In De Trin.*, q. 5 a. 1 co., 113–123: “Sciendum tamen quod quando habitus uel potentie penes obiecta distinguuntur, non distinguuntur penes quaslibet differentias obiectorum, set penes illas que sunt per se obiectorum in quantum sunt obiecta: esse enim animal uel plantam accidit sensibili in quantum est sensibile, et ideo penes hoc non sumitur distinctio sensuum, set magis penes differentiam coloris et soni; et ideo oportet scientias speculatiuas diuidi per differentias speculabilium, in quantum speculabilia sunt.”

<sup>94</sup> *In De Trin.*, q. 5 a. 1 co., 123–126: “Speculabili autem, quod est obiectum speculatiue potentie, aliquid competit ex parte intellectiue potentie et aliquid ex parte habitus scientie quo intellectus perficitur.”

<sup>95</sup> *In De Trin.*, q. 5 a. 1 co., 126–128: “Ex parte siquidem intellectus competit ei quod sit immateriale, quia et ipse intellectus immaterialis est.”

<sup>96</sup> *In De Trin.*, q. 5 a. 1 co., 128–135: “ex parte uero scientie competit ei quod sit necessarium, quia scientia de necessariis est, ut probatur in I Posteriorum; omne autem necessarium in quantum huiusmodi est immobile, quia omne quod mouetur in quantum huiusmodi est possibile esse et non esse, uel simpliciter uel secundum quid, ut dicitur in IX Metaphisice.” St. Thomas explains the latter as follows. Thus, as ARISTOTLE says, every potency simultaneously is of contradiction (*omnis potentia simul est contradictionis* = πᾶσα δύναμις ἅμα τῆς ἀντιφάσεώς ἐστιν). However, he does not say this of active potency, for irrational potencies are not (in relation) to opposites. Rather, he speaks here of passive potency, according to which something is said (to be) *possible to be* and (*possible*) *not to be*, whether simply or according to something. And he manifests this through an opposite, since where(ever) such a potency is not, neither part of the contradiction can be (< τὸ... μὴ δυνατόν ὑπάρχειν οὐκ ἂν ὑπάρξειεν οὐθενί). For what is incapable of being is never in something: indeed, if it is not capable of being, it is impossible (for it) to be: and it is necessary (for it) not to be. On the other hand, that which is capable of being, may not be in act (< τὸ δυνατόν... πᾶν ἐνδέχεται μὴ ἐνεργεῖν). Therefore, it is manifest that what is capable of being may be and (may) not be (< τὸ ἄρα δυνατόν εἶναι ἐνδέχεται καὶ εἶναι καὶ μὴ εἶναι). And thus, potency simultaneously is of contradiction, since the same is in potency to be and not to be (< τὸ αὐτὸ ἄρα δυνατόν καὶ εἶναι καὶ μὴ εἶναι). On the other hand, that which is capable of not being may not be (< τὸ... δυνατόν μὴ εἶναι ἐνδέχεται μὴ εἶναι), for these two are equivalent (*aequipollent*). And what may not be is corruptible, either simply or according to something, insofar as it is said to be possible (for it) not to be. For example, if it is possible for some body not to be in a place, it is corruptible according to place. And (the case) is likewise concerning a quantum and a qualified (being). Yet, that is corruptible simply which is capable of not being according to substance. It therefore remains that everything that is

Other diversities of things—such as abstract and non-abstract, corporeal and incorporeal, animated and inanimate—are not differences by themselves of them insofar as they are scientifically knowable; and hence, the sciences are not distinguished in virtue of them.<sup>97</sup>

Therefore, separation from matter and motion—or application to them—befits by itself the speculable that is the object of the speculative science.<sup>98</sup> And hence, the speculative sciences are distinguished according to an order of removal from matter and motion.

## **58.20. Distinction of the Speculative Sciences According to Removal from Matter**

**1.** There are some speculable (objects) that depend on matter according to being, since they can only be in matter.<sup>99</sup> And these are (further) distinguished, since:

**(a)** Some (speculable objects) depend on matter according to being and according to understanding: for example, those in whose definition *sensible matter* is posited.<sup>100</sup> Whence, they cannot be understood without sensible matter, as flesh and bones must be accepted in the definition of man. And **physics** or **natural science** is about these (objects).

**(b)** There are some (speculable objects) that, even though they should depend on matter according to being,<sup>101</sup> (they) nonetheless (do) not (depend on matter) according to

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in potency, as such, is corruptible. *In Metaph.* 9, l. 9, §1868 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050b8–9): “Omnis potentia simul est contradictionis. Dicit autem [Philosophus] hoc non de potentia activa: iam enim supra dictum est, quod potentiae irrationales non sunt ad opposita; sed loquitur hic de potentia passiva, secundum quam aliquid dicitur possibile esse et non esse, vel simpliciter, vel secundum quid.” Ibid., §1869 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050b9–12): “Hoc autem quod posuerat manifestat per oppositum; quia ubi non est talis potentia, non contingit utraque pars contradictionis. Nam quod non est possibile esse, nunquam in aliquo est. Si enim non est possibile esse, impossibile est esse, et necesse est non esse. Sed id quod possibile est esse, contingit non esse in actu. Manifestum est ergo, quod illud quod possibile est esse, contingit esse et non esse. Et sic potentia simul contradictionis est, quia idem est in potentia ad esse et non esse.” Ibid., §1870 (cf. ARISTOTLE, *Metaphysica* Θ.8, 1050b12–15): “Sed id quod potest non esse, contingit non esse. Haec enim duo aequipollent. Quod autem contingit non esse, est corruptibile, vel simpliciter, vel secundum quid, prout dicitur contingere non esse. Sicut si contingat aliquod corpus non esse in aliquo loco, illud est corruptibile secundum locum. Et similiter est de quanto et de quali. Sed simpliciter est corruptibile, quod potest non esse secundum substantiam. Relinquitur ergo, quod omne quod est in potentia, in quantum huiusmodi, corruptibile est.”

<sup>97</sup> *In De Trin.*, q. 5 a. 1 ad 8, 343–346: “alīe diuersitates rerum quas obiectio tangit [sc., *per abstractum et non abstractum, utpote per corporeum et incorporeum, animatum et inanimatum et per alia huiusmodi*], non sunt differentie per se earum in quantum sunt scibiles; et ideo penes eas scientie non distinguuntur.”

<sup>98</sup> *In De Trin.*, q. 5 a. 1 co., 135–140: “Sic ergo speculabili, quod est obiectum scientie speculatiue, per se competit separatio a materia et motu uel applicatio ad ea; et ideo secundum ordinem remotionis a materia et motu scientie speculatiue distinguuntur.”

<sup>99</sup> *In De Trin.*, q. 5 a. 1 co., 141–143: “Quedam ergo speculabilium sunt, que dependent a materia secundum esse, quia non nisi in materia esse possunt. Et hec distinguuntur: quia [...]”

<sup>100</sup> *In De Trin.*, q. 5 a. 1 co., 144–149: “quedam dependent a materia secundum esse et intellectum, sicut illa in quorum diffinitione ponitur materia sensibilis, unde sine materia sensibili intelligi non possunt, ut in diffinitione hominis oportet accipere carnem et ossa; et de his <est> phisica siue scientia naturalis.”

<sup>101</sup> *In De Trin.*, q. 5 a. 1 co., 149–154: “Quedam uero sunt, que quamuis dependeant a materia secundum esse, non tamen secundum intellectum, quia in eorum diffinitionibus non ponitur materia sensibilis, sicut linea et numerus; et de his est mathematica.”

understanding, since *sensible matter* is not posited in their definition, as line and number. And **mathematics** is about these (objects).

2. There are some speculable (objects) that do not depend on matter according to being, since they can be without matter—whether they never should be in matter, as God and the angels; or in some (cases) they should be in matter and in some (other cases they should) not (be in matter), such as substance, quality, being, potency, act, one, many, and (other) such (things). And **metaphysics** is about all of these (objects).<sup>102</sup>

◀ It is not possible for there to be some things that should depend on matter according to understanding and not according to being, since the intellect, of itself (*quantum est de se*), is immaterial.<sup>103</sup> And hence, there is no fourth genus of philosophy apart from the aforesaid.

### 58.21. The Division of Speculative Sciences Is Not a Division of Genera of Things

As ARISTOTLE says, any moving (beings) such that they should (also) be movable (bodies) pertain to the consideration of natural (science).<sup>104</sup> On the other hand, those (beings) that move but are not moved, do not belong to the consideration of natural philosophy, to which it belongs to consider (the truth) about natural (bodies), which have in themselves the principle of motion. Now, such movers (that are) not moved do not have in themselves the principle of motion, since they should not be movable, but immovable. And thus, they are not natural—and consequently, they do not belong to the consideration of natural philosophy.

Whence, it is evident that that the study and intention of philosophy is threefold, according to the three genera of things that are found.<sup>105</sup> For **(1)** some of the things (that are found)

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<sup>102</sup> *In De Trin.*, q. 5 a. 1 co., 154–167: “Quedam uero speculabilia sunt que non dependent a materia secundum esse, quia sine materia esse possunt, siue numquam sint in materia, sicut Deus et angelus, siue in quibusdam sint in materia et in quibusdam non, ut substantia, qualitas, ens, potentia, actus, unum et multa et huiusmodi; de quibus omnibus est theologia, id est scientia diuina, quia precipuum in ea cognitorum est Deus. Que alio nomine dicitur metaphisica, id est trans phisicam, quia post phisicam discenda occurrit nobis, quibus ex sensibilibus oportet in insensibilia deuenire; dicitur etiam philosophia prima, in quantum alie omnes scientie ab ea sua principia accipientes, eam consequuntur.”

<sup>103</sup> *In De Trin.*, q. 5 a. 1 co., 168–172: “Non est autem possibile quod sint aliquae res que secundum intellectum dependeant a materia et non secundum esse, quia intellectus quantum est de se immaterialis est: et ideo non est quartum genus philosophie preter predicta.”

<sup>104</sup> *In Physic.* 2, l. 11, n. 3 (cf. ARISTOTLE, *Physica* B.7, 198a27–29): “proponit [Philosophus] secundum, quod est, de quibus scilicet consideret naturalis. Et dicit quod quaecumque moventia movent ita quod moveantur, pertinent ad considerationem naturalis; quae uero movent sed non moventur, non sunt de consideratione naturalis philosophiae, cuius est considerare de naturalibus, quae habent in se principium motus. Huiusmodi autem moventia non mota non habent in se principium motus, cum non moveantur, sed sint immobilia; et sic non sunt naturalia, et per consequens non sunt de consideratione naturalis philosophiae.”

<sup>105</sup> *In Physic.* 2, l. 11, n. 3 (cf. ARISTOTLE, *Physica* B.7, 198a29–31): “Unde patet quod tria sunt negotia, id est triplex est studium et intentio philosophiae, secundum tria genera rerum quae inveniuntur. Rerum enim quaedam sunt immobilia, et circa hoc est unum studium philosophiae; aliud uero studium eius est

are **immobile**, and about these there is one study of philosophy; **(2)** another study of it (i.e., of philosophy) is about those (bodies) that are **mobile but incorruptible**, as are celestial bodies (i.e., according to ancient science); and **(3)** a third study of it is about **mobile and corruptible** (bodies), as are the lower bodies (i.e., those composed from the elements). The first treatment (*negotium* < πραγματεῖαι) pertains to metaphysics, while the other two (pertain) to natural science, to which it belongs to determine (the truth) about all mobile (bodies), corruptible as much as incorruptible.

Thus, as AVERROES says (referring to ARISTOTLE's saying in the *Physics*, just explained, that there are three subjects to be studied: the immobile, the incorruptible mobile, and the corruptible, τρεῖς αἱ πραγματεῖαι, ἡ μὲν περὶ ἀκινήτων, ἡ δὲ περὶ κινουμένων μὲν ἀφθάρτων δέ, ἡ δὲ περὶ τὰ φθαρτά), ARISTOTLE does not intend to distinguish here the speculative sciences, since the natural (scientist) determines (the truth) about the mobile (body), whether it should be corruptible or incorruptible.<sup>106</sup> And the mathematician as such (*in quantum huiusmodi*) does not consider something mobile.

Rather, ARISTOTLE intends to distinguish (here, in the *Physics*) the things about which the speculative sciences determine (the truth), (that is, the genera of things) about which (scientists) ought to treat separately and according to an order, even if those three genera of things could be appropriated by the three sciences.<sup>107</sup> Thus, incorruptible and immobile beings pertain precisely (*precise*, i.e., with precision; ► 14.12, ¶2) to the metaphysician, while mobile and incorruptible (beings), due to their uniformity and regularity, can be determined in respect of their motions through mathematical principles—which cannot be said of mobile, corruptible (beings). And hence, according to the genus of beings, it is attributed to the mathematical (science) by reason of astronomy, while the third (kind of being, i.e., the corruptible mobile) remains proper to the natural (science) alone. And this is how (Claudius) PTOLEMY speaks (in his *Almagest* or *Syntaxis Mathematica*).

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circa ea quae sunt mobilia sed incorruptibilia, sicut sunt corpora caelestia; tertium vero studium eius est circa mobilia et corruptibilia, sicut sunt corpora inferiora. Et primum quidem negotium pertinet ad metaphysicam; alia vero duo ad scientiam naturalem, cuius est determinare de omnibus mobilibus, tam corruptibilibus quam incorruptibilibus.”

<sup>106</sup> *In De Trin.*, q. 5 a. 3 ad 8, 404–410: “sicut dicit Commentator ibidem, Philosophus non intendit ibi distinguere scientias speculativas, quia de quolibet mobili, siue sit corruptibile siue incorruptibile, determinat naturalis, mathematicus autem in quantum huiusmodi non considerat aliquod mobile.”

<sup>107</sup> *In De Trin.*, q. 5 a. 3 ad 8, 410–423: “Intendit autem [Philosophus] distinguere res de quibus scientie speculativae determinant, de quibus seorsum et secundum ordinem agendum est, quamvis illa tria genera rerum tribus scientiis appropriari possint. Entia enim incorruptibilia et immobilia precise ad metaphysicum pertinent, entia uero mobilia et incorruptibilia propter sui uniformitatem et regularitatem possunt determinari quantum ad suos motus per principia mathematica; quod de mobilibus corruptibilibus dici non potest. Et ideo secundum genus entium attribuitur mathematice ratione astrologie, tertium uero remanet proprium soli naturali. Et sic loquitur Ptolemeus.” Cf. Claudius PTOLEMY, *Syntaxis Mathematica*, 2 vols., ed. Johan Ludvig Heiberg (Leipzig: Teubner, 1898–1903), vol. 1, 5.7–10: “καὶ τὸ θεωρητικὸν ὁ Ἀριστοτέλης πάνυ ἐμμελῶς εἰς τρία τὰ πρῶτα γένη διαιρεῖ τὸ τε φυσικὸν καὶ τὸ μαθηματικὸν καὶ τὸ θεολογικόν.”

Whence, those who want to reduce these three (genera of things) to three parts of philosophy—namely, mathematics, metaphysics, and physics—have badly understood (the division of the sciences).<sup>108</sup> For astronomy, which seems to have its consideration about incorruptible mobile (bodies), is more natural than mathematical. Indeed, insofar as it applies mathematical principles to natural matter (►64), it has a consideration about mobile (bodies). Therefore, this division is according to the diversity of things that exist outside the soul, (and is) not taken according to the division of the sciences.

## 58.22. The Affections

1. It does not pertain to a science to consider (the truth) about those (affections) that are in its subject by accident, but only about those (affections) that are in (it) by themselves (< τὰ τοῦτω ὑπάρχοντα καθ' αὐτό).<sup>109</sup>

Thus, about the triangle, the geometer does not consider whether it should be brazen or wooden.<sup>110</sup> Instead, he only considers it absolutely insofar as it has three (internal) angles equal (to two right angles, or 180°).

Likewise, the science whose subject is *being* (i.e., metaphysics) does not need to consider (the truth) about all (those affections) that are in *being* by accident, since it would then consider the accidents that are sought in all the sciences: for all accidents are in some being, but not insofar as it is a being (e.g., as are *divided* and *undivided*).<sup>111</sup>

Thus, those (affections) that are accidents by themselves of lower (subjects) are had by accident (in relation) to the higher.<sup>112</sup> For example, the accidents by themselves of man are not accidents by themselves of animal.

2. On the other hand, since accidents are referred to substance in some order (►35.6), it is not unbecoming for that which is an accident in respect to something to also be a subject

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<sup>108</sup> *In Physic.* 2, l. 11, n. 3: “Unde male intellexerunt quidam, volentes haec tria reducere ad tres partes philosophiae, scilicet ad mathematicam, metaphysicam et physicam. Nam astronomia, quae videtur circa mobilia incorruptibilia considerationem habere, magis est naturalis quam mathematica, ut supra dictum est; in quantum enim applicat principia mathematica ad materiam naturalem, circa mobilia considerationem habet. Est igitur haec divisio secundum diversitatem rerum extra animam existentium, non secundum divisionem scientiarum accepta.”

<sup>109</sup> *In Metaph.* 4, l. 1, §531 (cf. ARISTOTLE, *Metaphysica* Γ.1, 1003a21–22): “Dicit etiam «et quae huic insunt per se» et non simpliciter quae huic insunt, ad significandum quod ad scientiam non pertinet considerare de his quae per accidens insunt subiecto suo, sed solum de his quae per se insunt.”

<sup>110</sup> *In Metaph.* 4, l. 1, §531: “Geometra enim non considerat de triangulo utrum sit cupreus vel ligneus, sed solum considerat ipsum absolute secundum quod habet tres angulos aequales etc.”

<sup>111</sup> *In Metaph.* 4, l. 1, §531: “Sic igitur huiusmodi scientia, cuius est ens subiectum, non oportet quod consideret de omnibus quae insunt enti per accidens, quia sic consideraret accidentia quaesita in omnibus scientiis, cum omnia accidentia insint alicui enti, non tamen secundum quod est ens.”

<sup>112</sup> *In Metaph.* 4, l. 1, §531: “Quae enim sunt per se accidentia inferioris, per accidens se habent ad superius, sicut per se accidentia hominis non sunt per se accidentia animalis.”

in respect of another. For example, a surface is an accident of a corporeal substance, which surface is, (in turn), the first subject of color.<sup>113</sup>

However, that is a substance which is a subject in such a way that it is an accident of none.<sup>114</sup> Whence, in those sciences whose subject is some substance, that which is the subject can in no mode be an affection: for example, in first philosophy and in natural science, which is about mobile substance.

On the other hand, in those sciences that are about some accident, nothing prevents that which is taken as a subject in respect of some affection to be taken also as an affection in respect of a prior subject.<sup>115</sup> However, this does not proceed infinitely, for we must arrive at some first (subject) in that science, which is taken in such a way as a subject that (it is) in no mode (taken) as an affection.

### 58.23. Proper Inquiries, Responses, and Disputations

ARISTOTLE shows that there are proper responses and disputations in any sciences:<sup>116</sup>

1. From what has been said, it is evident that not just any scientific knower may inquire about whatever question.<sup>117</sup> Whence, it is also evident that neither may he respond about every inquiry, but only about those (inquiries) that are according to a proper science, since inquiry and response pertain to the same science.
2. Since a disputation is produced from inquiry and response, ARISTOTLE consequently shows that there is a proper disputation in any science. Thus, he says that, if a geometer disputes (*disputat* = διαλέξεται) with a geometer insofar as he is a geometer—that is, (if he disputes) about those (subjects) that pertain to the geometer—, it is manifest that the disputation proceeds well if the disputation should be produced not only of that (subject)

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<sup>113</sup> *In Post. an.* 1, l. 2, 75–80: “Cum enim accidentia quodam ordine ad substantiam referantur, non est inconueniens id quod est accidens in respectu ad aliquid, esse etiam subiectum in respectu alterius, sicut superficies est accidens substantie corporalis, que tamen superficies est primum subiectum coloris.”

<sup>114</sup> *In Post. an.* 1, l. 2, 80–86: “Id autem quod est ita subiectum quod nullius est accidens, substantia est; unde in illis scienciis quorum subiectum est aliqua substantia, id quod est subiectum nullo modo potest esse passio, sicuti est in philosophia prima, et in scientia naturali, que est de substantia mobili.”

<sup>115</sup> *In Post. an.* 1, l. 2, 86–93: “In illis autem scienciis que sunt de aliquibus accidentibus, nichil prohibet id quod accipitur ut subiectum respectu alicuius passionis, accipi etiam ut passionem respectu anterioris subiecti. Hoc tamen non in infinitum procedit: est enim deuenire ad aliquod primum in scientia illa, quod ita accipitur ut subiectum quod nullo modo ut passio.”

<sup>116</sup> *In Post. an.* 1, l. 21, 80–84 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b6–15): “ostendit [Philosophus] quod in qualibet scientia sunt proprie responsiones et disputationes. Et primo, quod sint proprie responsiones; secundo, quod sint proprie disputationes.”

<sup>117</sup> *In Post. an.* 1, l. 21, 86–92 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b6–9): “Dicit ergo [Philosophus] primo quod ex predictis patet quod non contingit *unumquemque scientem* de qualibet questione *interrogare*, unde etiam patet quod nec contingit de omni interrogato *respondere*, set solum de hiis *que sunt secundum propriam scientiam*, eo quod ad eandem scientiam pertinet interrogatio et responsio.”

which belongs to geometry, but also from geometrical principles. On the other hand, if the disputation in geometry should not be thus produced, it is not well disputed.<sup>118</sup>

Thus, if someone should dispute with a geometer, (but) not of geometrical (subjects), it is manifest that he would not argue—that is, he would not convince—the geometer, except by accident: for example, if the disputation should be about harmonics and the geometer should happen to be a musician by accident.<sup>119</sup> Whence, it is manifest that it is not to be disputed about geometry in non-geometrical (disputations, < οὐκ ἂν εἴη ἐν ἀγεωμετρήτοις περὶ γεωμετρίας διαλεκτέον); for it would be impossible to judge through the principles of that science whether it is well or badly disputed.

And (this) is likewise in the other sciences.<sup>120</sup>

#### 58.24. The Modes of Proceeding in the Sciences

The (method or) mode of (proceeding in) the sciences is taken from the potencies of the soul on account of the mode that the potencies of the soul have in acting (*in agendo*).<sup>121</sup> Whence, the modes of the sciences do not respond to the potencies of the soul, but to the modes in which the potencies of the soul can proceed. These (modes of proceeding) are not diversified only in virtue of (*penes*) the potencies, but also in virtue of the objects.

However, it can be said that, just as the mode of physics is taken from reason insofar as it receives (something) from sense, while the mode of metaphysics (is taken) from the intellect insofar as it considers something denuded (from matter, *nude*), so, too, the mode of a mathematical (science) can be taken from reason insofar as it takes (something) from imagination.<sup>122</sup> (These methods or modes are discussed in the ensuing chapters.)

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<sup>118</sup> *In Post. an.* 1, l. 21, 93–102 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b9–11): “Et quia ex interrogatione et responsione fit disputatio, <consequenter ostendit [Philosophus] quod in qualibet sciencia est propria disputatio,> dicens quod, *si disputat* geometer *cum geometra secundum quod est geometer*, id est de hiis que ad geometriam pertinent, *manifestum est quod bene* procedit disputatio, *si tamen non solum* disputatio fiat de eo quod est geometrie, set etiam ex principiis geometricis procedatur; *si uero non* sic fiat disputatio in geometria, *non bene* disputatur.”

<sup>119</sup> *In Post. an.* 1, l. 21, 102–110 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b11–14): “Si enim aliquis disputet cum geometra non de geometricis, *manifestum est quod non arguit*, id est non conuincit, <*geometram*>, nisi per *accidens*, puta si sit disputatio de musica et contingat geometram per accidens esse musicum; unde manifestum est quod non est *in non geometricis de geometria disputandum*, quia <non> poterit iudicari per principia illius sciencie utrum bene disputetur uel male.”

<sup>120</sup> *In Post. an.* 1, l. 21, 110–111 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b14–15): “Et *similiter se habet in aliis scienciis*.”

<sup>121</sup> *In De Trin.*, q. 6 a. 1 qc. 2 ad 4, 312–320: “a potentiis anime sumitur modus scientiarum propter modum quem habent potentie anime in agendo; unde modi scientiarum non respondent potentiis anime set modis quibus potentie anime procedere possunt, qui non solum diuersificantur penes potentias tantum, set etiam penes obiecta; et sic non oportet quod modus cuiuslibet scientie denominetur ab aliqua potentia anime.”

<sup>122</sup> *In De Trin.*, q. 6 a. 1 qc. 2 ad 4, 320–326: “Potest tamen dici, quod sicut modus phisice sumitur a ratione secundum quod a sensu accipit, modus autem diuine scientie ab intellectu secundum quod nude aliquid considerat, ita etiam et modus mathematice potest sumi a ratione secundum quod accipit ab ymaginatione.”



## 59. Metaphysics

*Here, we briefly examine metaphysics—above all, its subject, and its method.*

### 59.1. Wisdom and Order

As ARISTOTLE says, when some multiple (things) are ordered to one, one of them must be the regulator or ruler (*regulans, sive regens*), and the others the regulated or ruled (*regulata, sive recta*).<sup>1</sup> This is evident in the union of soul and body, for the soul naturally orders (*imperat*), whereas the body obeys (*obedit*). Likewise, in the natural order among the powers of the soul, the irascible and the concupiscible (appetites) are ruled by reason.

Now, all sciences and arts are ordered to one (end): to wit, to the perfection of man, which is its happiness. Whence, it is necessary that one of them be the ruler of all the others, which rightly lays claim to (*vindicat*) the name of *wisdom*, for it behooves the wise to order the others.<sup>2</sup>

### 59.2. Wisdom as the Maximally Intellectual Science

We can consider what science this should be, and about what sort (of things), if we diligently observe the mode that is fitting for someone to rule.<sup>3</sup> Thus, as ARISTOTLE says, men of vigorous intellect naturally are rulers and masters, whereas men that are of robust body but deficient in intellect naturally are servants.

Likewise, that science must naturally be the regulator of the others which is maximally intellectual—that is, (that science) which busies itself with maximally intelligible (things).<sup>4</sup> However, we can take *maximally intelligible* in three (modes):

**1. From the order of understanding**, for those (things) seem to be more intelligible from which the intellect receives certitude (►65).<sup>5</sup> Whence, since the certitude of science

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<sup>1</sup> *In Metaph.* pr.: “Sicut docet Philosophus in Politicis suis, quando aliqua plura ordinantur ad unum, oportet unum eorum esse regulans, sive regens, et alia regulata, sive recta. Quod quidem patet in unione animae et corporis; nam anima naturaliter imperat, et corpus obedit. Similiter etiam inter animae vires: irascibilis enim et concupiscibilis naturali ordine per rationem reguntur.”

<sup>2</sup> *In Metaph.* pr.: “Omnes autem scientiae et artes ordinantur in unum, scilicet ad hominis perfectionem, quae est eius beatitudo. Unde necesse est, quod una earum sit aliarum omnium rector, quae nomen sapientiae recte vindicat. Nam sapientis est alios ordinare.”

<sup>3</sup> *In Metaph.* pr.: “Quae autem sit haec scientia, et circa qualia, considerari potest, si diligenter respiciatur quomodo est aliquis idoneus ad regendum. Sicut enim, ut in libro praedicto Philosophus dicit, homines intellectu vigentes, naturaliter aliorum rectores et domini sunt: homines vero qui sunt robusti corpore, intellectu vero deficientes, sunt naturaliter servi.”

<sup>4</sup> *In Metaph.* pr.: “ita scientia debet esse naturaliter aliarum regulatrix, quae maxime intellectualis est. Haec autem est, quae circa maxime intelligibilia versatur. Maxime autem intelligibilia tripliciter accipere possumus.”

<sup>5</sup> *In Metaph.* pr.: “Primo quidem ex ordine intelligendi. Nam ex quibus intellectus certitudinem accipit, videntur esse intelligibilia magis. Unde, cum certitudo scientiae per intellectum acquiratur ex causis, causarum cognitio maxime intellectualis esse videtur.”

is acquired by the intellect from the causes, the cognition of causes seems maximally to be intellectual.

Whence, too, the science that considers the **first causes** seems maximally to be the regulator of the others.<sup>6</sup>

**2. From a comparison of understanding to sense**, for, since sense is a cognition of particular (things), the intellect (*intellectus*) seems to differ from it in that it comprehends universals (▶49.1).<sup>7</sup>

Whence, too, that science is maximally intellectual which busies itself (*versatur*) with **maximally universal principles**, which are *being*, and those that follow upon *being*, such as *one* and *many*, *potency* and *act*.<sup>8</sup>

However, such (maximally universal principles) must not remain altogether undetermined; for, without these, a complete cognition of those (things) that are proper to some genus or species cannot be had (▶56.5; 58.10).<sup>9</sup> Nor, again, must they be treated in some particular science: since any genus of things stands in need of them for its (own) cognition, they would—for the same reason—be treated in every particular science. Whence, it remains that (maximally universal principles) should be treated in one such **common science**, which, being maximally intellectual, is the regulator of the others.

**3. From the intellect's cognition** itself, for, since each thing has an intellectual virtue from its being immune to matter, those (things) must be maximally intelligible which are maximally separated from matter (▶58.20).<sup>10</sup>

Indeed, the intellect and the intelligible (object) must be **proportionate**, and **of one genus** (i.e., of one subject genus, insofar as *genus* is said in common; ▶27.1), since the intellect and the intelligible (object) are one in act (▶28.10). Now, those (things) are maximally **separated from matter** which abstract not only from designated matter, as (are) natural

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<sup>6</sup> *In Metaph.* pr.: “Unde et illa scientia, quae primas causas considerat, videtur esse maxime aliarum regulatrix.”

<sup>7</sup> *In Metaph.* pr.: “Secundo ex comparatione intellectus ad sensum. Nam, cum sensus sit cognitio particularium, intellectus per hoc ab ipso differre videtur, quod universalia comprehendit.”

<sup>8</sup> *In Metaph.* pr.: “Unde et illa scientia maxime est intellectualis, quae circa principia maxime universalia versatur. Quae quidem sunt ens, et ea quae consequuntur ens, ut unum et multa, potentia et actus.”

<sup>9</sup> *In Metaph.* pr.: “Huiusmodi autem non debent omnino indeterminata remanere, cum sine his completa cognitio de his, quae sunt propria alicui generi vel speciei, haberi non possit. Nec iterum in una aliqua particulari scientia tractari debent: quia cum his unumquodque genus entium ad sui cognitionem indigeat, pari ratione in qualibet particulari scientia tractarentur. Unde restat quod in una communi scientia huiusmodi tractentur; quae cum maxime intellectualis sit, est aliarum regulatrix.”

<sup>10</sup> *In Metaph.* pr.: “Tertio ex ipsa cognitione intellectus. Nam cum unaquaeque res ex hoc ipso vim intellectivam habeat, quod est a materia immunis, oportet illa esse maxime intelligibilia, quae sunt maxime a materia separata.”

forms taken universally (*in universali acceptae*), of which natural science treats (► 58.20, ¶1a), but altogether (separated) from sensible matter; and not only (separated) according to *ratio* (*secundum rationem*), as (are) mathematical (things; ► 58.20, ¶1b), but also according to being (*secundum esse*; ► 58.20, ¶2). Whence, the science that considers these things maximally seems to be intellectual, and the leader or master (*princeps sive domina*) of the others.<sup>11</sup>

◀ This triple consideration (► ¶1, ¶2, ¶3) must be attributed, not to diverse (sciences), but to one science; for separate substances are the universal and first causes of being (*causae essendi*); and it belongs to the same science to consider the proper causes of some genus and the genus itself, just as the natural (scientist) considers the principles of natural bodies (in addition to considering natural bodies themselves).<sup>12</sup> Whence, it must pertain to the same science to consider separate substances and common being, which is the (subject) genus of the aforesaid common substances and universal causes.

### 59.3. The Names of This Science

Three names of this science follow upon the aforesaid three (modes; ► 59.2, ¶1, ¶2, ¶3) from which (intellectual) perfection it is considered, for it is called:<sup>13</sup>

**1. Divine science or theology**, insofar as it considers separated substances, for God is chief among those (beings) known in it.<sup>14</sup>

**2. Metaphysics**, i.e., *beyond the physics*, insofar as it considers *being* and those that follow upon it; for these trans-physical (principles) are found in the way of resolution as the more common (are found) after the less common; and because it happens to be learned by us after physics, for we must arrive from the sensible into the non-sensible.<sup>15</sup>

<sup>11</sup> *In Metaph.* pr.: “Intelligibile enim et intellectum oportet proportionata esse, et unius generis, cum intellectus et intelligibile in actu sint unum. Ea vero sunt maxime a materia separata, quae non tantum a signata materia abstrahunt, sicut formae naturales in universali acceptae, de quibus tractat scientia naturalis, sed omnino a materia sensibili. Et non solum secundum rationem, sicut mathematica, sed etiam secundum esse, sicut Deus et intelligentiae. Unde scientia, quae de istis rebus considerat, maxime videtur esse intellectualis, et aliarum princeps sive domina.”

<sup>12</sup> *In Metaph.* pr.: “Haec autem triplex consideratio, non diversis, sed uni scientiae attribui debet. Nam praedictae substantiae separatae sunt universales et primae causae essendi. Eiusdem autem scientiae est considerare causas proprias alicuius generis et genus ipsum: sicut naturalis considerat principia corporis naturalis. Unde oportet quod ad eandem scientiam pertineat considerare substantias separatas, et ens commune, quod est genus, cuius sunt praedictae substantiae communes et universales causae.”

<sup>13</sup> *In Metaph.* pr.: “Secundum igitur tria praedicta, ex quibus perfectio huius scientiae attenditur, sortitur tria nomina. Dicitur enim [...]”

<sup>14</sup> *In Metaph.* pr.: “scientia divina sive theologia, inquantum praedictas substantias considerat.” *In De Trin.*, q. 5 a. 1 co., 160–162: “theologia, id est scientia diuina, quia precipuum in ea cognitorum est Deus.”

<sup>15</sup> *In Metaph.* pr.: “Metaphysica, inquantum considerat ens et ea quae consequuntur ipsum. Haec enim transphysica inveniuntur in via resolutionis, sicut magis communia post minus communia.” *In De Trin.*, q. 5 a. 1 co., 162–165: “que alio nomine dicitur metaphysica, id est trans phisicam, quia post phisicam discenda occurrit nobis, quibus ex sensibilibus oportet in insensibilia deuenire.”

3. **First philosophy**, insofar as it considers the first causes of things; and insofar as, taking from it their principles, all other sciences follow (after it).<sup>16</sup>

#### 59.4. The Subject Genus of Metaphysics

1. From what has just been said, it is evident that, although this aforesaid science considers three (things: first causes, maximally universal principles, and things separated from matter; ► 59.2, ¶1, ¶2, ¶3), it does not consider any of them as a subject.<sup>17</sup> Rather, (it considers as a subject) only **common being** (► 30.2), for the **subject** in (any) science is *that whose causes and affections we inquire* (► 56), and not the causes themselves of some inquired genus (► 55.14, ¶3). Indeed, the cognition of the causes of some genus is the end towards which the consideration of a science extends (*pertingit*, ► 53.2).

2. Although the subject of this science is *common being*, the whole (science) is said (to be the science) of those (beings) that are **separated from matter** according to being and (according to) *ratio* (► 59.2, ¶3).<sup>18</sup> For not only those (beings) that can never be in matter, but also those (beings) that can be without matter—such as *common being*—, are said to be separated according to being and (according to) *ratio*—which would not happen if they should depend on matter according to being.

(Common) being (*ens*), (and its parts, such as) substance, potency, and act, are said (to be) *separated from matter and motion* not because it belongs to their *ratio* to be without matter and motion, as it belongs to the ratio of *ass* to be *without reason*, but because it does not belong to their *ratio* to be in matter and motion; although sometimes they are in matter and motion—as *animal* abstracts from *reason*, although some animal is rational.<sup>19</sup>

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<sup>16</sup> *In Metaph.* pr.: “Dicitur autem prima philosophia, in quantum primas rerum causas considerat.” *In De Trin.*, q. 5 a. 1 co., 165–167: “dicitur etiam philosophia prima, in quantum alie omnes scientie ab ea sua principia accipientes, eam consequuntur.”

<sup>17</sup> *In Metaph.* pr.: “Ex quo apparet, quod quamvis ista scientia praedicta tria consideret, non tamen considerat quodlibet eorum ut subiectum, sed ipsum solum ens commune. Hoc enim est subiectum in scientia, cuius causas et passiones quaerimus, non autem ipsae causae alicuius generis quaesiti. Nam cognitio causarum alicuius generis, est finis ad quem consideratio scientiae pertingit.”

<sup>18</sup> *In Metaph.* pr.: “Quamvis autem subiectum huius scientiae sit ens commune, dicitur tamen tota de his quae sunt separata a materia secundum esse et rationem. Quia secundum esse et rationem separari dicuntur, non solum illa quae nunquam in materia esse possunt, sicut Deus et intellectuales substantiae, sed etiam illa quae possunt sine materia esse, sicut ens commune. Hoc tamen non contingeret, si a materia secundum esse dependerent.” *In De Trin.*, q. 5 a. 4 co., 185–193: “dupliciter potest esse aliquid a materia et motu separatum secundum esse: uno modo sic quod de ratione ipsius rei que separata dicitur sit quod nullo modo in materia et motu esse possit, sicut Deus et Angeli dicuntur a materia et motu separati; alio modo sic quod non sit de ratione eius quod sit in materia et motu, set possit esse sine materia et motu quamvis quandoque inueniatur in materia et motu.”

<sup>19</sup> *In De Trin.*, q. 5 a. 4 co., 193–196: “ens et substantia et potentia et actus sunt separata a materia et motu, quia secundum esse a materia et motu non dependent.” *Ibid.*, ad 5, 305–313: “ens et substantia dicuntur separata a materia et motu non per hoc quod de ratione ipsorum sit esse sine materia et motu, sicut de ratione asini est sine ratione esse, set per hoc quod de ratione eorum non est esse in materia et motu quamvis quandoque sint in materia et motu, sicut animal abstract a ratione quamvis aliquid animal sit rationale.”

Thus, the parts of *being*, such as *potency* and *act*, *one* and *many*, *substance* and *accident*, require the same mode of treating as *common being* because they, too, do not depend on matter.<sup>20</sup> Hence, the science (that treats) of them is not distinguished from the science that is of common being.

And just as the consideration of all the parts of *being* pertains to one science—namely, to (first) philosophy—so, too, (does the consideration) of all the parts of *one*: namely, *same*, *alike*, etc.<sup>21</sup>

The necessity for this science that theorizes (about) *being* and the accidents by themselves of *being* is apparent because such (things) must not remain unknown.<sup>22</sup> For the cognition of other (things) depends upon it, just as the cognition of proper things depends on the cognition of common (things).

The more perfectly some principle is known, the greater the multitude (of things that) are known in it.<sup>23</sup> For example, he who is of a more perspicacious disposition (*ingenii*) sees more conclusions in one principle of demonstration than someone who is of a slower disposition.

However, it is not necessary for someone who scientifically knows a cause to know all its effects—unless he should comprehend the cause.<sup>24</sup>

3. On the other hand, since this science considers *common being*—which is divided into *substance* and the ten genera of accidents—as a *proper subject*, and the cognition of accidents depends on (the cognition of) **substance**, it remains that the principal intention of such a science is about *substances*.<sup>25</sup>

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<sup>20</sup> *In De Trin.*, q. 5 a. 1 ad 7, 338–342 (cf. *ibid.*, arg. 7, 52–59): “ille partes entis [sc., potentia et actus, unum et multa, substantia et accidens] exigunt eundem modum tractandi cum ente communi, quia etiam ipsa non dependent ad materiam; et ideo scientia de ipsis non distinguitur a scientia que est de ente communi.”

<sup>21</sup> *In Metaph.* 4, l. 2, §561 (cf. ARISTOTLE, *Metaphysica* Γ.2, 1003b34–36): “Et sicut ad unam scientiam, scilicet ad philosophiam, pertinet consideratio de omnibus partibus entis, ita et de omnibus partibus unius, scilicet eodem et simili et huiusmodi.”

<sup>22</sup> *In Metaph.* 4, l. 1, §531: “Necessitas autem huius scientiae quae speculatur ens et per se accidentia entis, ex hoc apparet, quia huiusmodi non debent ignota remanere, cum ex eis aliorum dependeat cognitio; sicut ex cognitione communium dependet cognitio rerum propriarum.”

<sup>23</sup> *In Sent.* 4, d. 49 q. 2 a. 5 co.: “quanto aliquod principium perfectius cognoscitur, tanto plura sciuntur in ipso; sicut in uno demonstrationis principio ille qui est perspicacior ingenii, plures conclusiones videt quam alius qui est ingenii tardioris.”

<sup>24</sup> *In Sent.* 4, d. 49 q. 2 a. 5 co.: “Non est enim necessarium quod sciens causam, sciat omnes ejus effectus, nisi causam comprehendat.”

<sup>25</sup> *In Metaph.* 8, l. 1, §1682: “Cum enim haec scientia consideret ens commune sicut proprium subiectum, quod quidem dividitur per substantiam et novem genera accidentium, accidentium vero cognitio ex substantia dependeat, ut in septimo probatum est, relinquitur quod principalis intentio huiusmodi scientiae sit circa substantias.”

4. As to **mathematical** (things), they are neither moved (by other things) nor do they move (other things) nor do they have will.<sup>26</sup> Whence, *good* (which is convertible with *being*) is not considered in them under the name of *good* or *end*. However, that which is good—namely, the (act of) being (*esse*) and the essence (*quod quid est*)—is considered in them (by this science). Whence, it is false that there should be no good in mathematical (things).

5. This science considers even **singular** beings—not indeed according to their proper *ratios*, by which they are *such* and *such* a being, but insofar as they participate in the common *ratio* of *being*.<sup>27</sup> And thus, even matter and motion pertain to its consideration.

6. Hence, this science principally considers *being by itself*, which is (the being that is) outside the soul, as opposed to being by accident (► 30.4) and being insofar as it signifies the true (► 30.5).<sup>28</sup> It determines (the truth) concerning (common) being insofar as it is a being (*determinat de ente in quantum est ens*), the division of *being* into the ten categories, the division of *being* into act and potency, and (the truth) concerning the first principles of beings. And since *being* and *one* are concomitant (*se consequuntur*), and fall under the same consideration, it determines (also the truth) of *one* and of its concomitants.

#### 59.5. Which Sciences Are or Are Not Parts of Metaphysics

Although the subjects of the other sciences should be parts of *being*, which is the subject of metaphysics, however, it is not necessary for the other sciences to be its parts.<sup>29</sup> For each of the sciences takes one part of *being* according to a special mode of considering (*being*), (which is) other than the mode in which *being* is considered in metaphysics.

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<sup>26</sup> *In Metaph.* 3, l. 4, §385: “Mathematica autem non moventur, nec movent, nec habent voluntatem. Unde in eis non consideratur bonum sub nomine boni et finis. Consideratur tamen in eis id quod est bonum, scilicet esse et quod quid est. Unde falsum est, quod in mathematicis non sit bonum, sicut ipse infra in nono probat.”

<sup>27</sup> *In De Trin.*, q. 5 a. 4 ad 6, 314–319: “metaphysicus considerat etiam de singularibus entibus, non secundum proprias rationes, per quas sunt tale uel tale ens, set secundum quod participant communem rationem entis; et sic etiam pertinet ad eius considerationem materia et motus.”

<sup>28</sup> *In Metaph.* 7, l. 1, §1245: “Postquam Philosophus removet a principali consideratione huius scientiae ens per accidens, et ens secundum quod significat verum, hic incipit determinare de ente per se, quod est extra animam, de quo est principalis consideratio huius scientiae. Dividitur autem pars ista in duas partes. Haec enim scientia et determinat de ente in quantum est ens, et de primis principiis entium [...]. In prima ergo parte determinatur de ente. In secunda de primis principiis entis [...]. Quia vero ens et unum se consequuntur, et sub eadem consideratione cadunt [...], ideo prima pars dividitur in partes duas. In prima determinat de ente. In secunda de uno et de his quae consequuntur ad unum [...]. Ens autem per se, quod est extra animam, dupliciter dividitur [...]. Uno modo per decem praedicamenta, alio modo per potentiam et actum. Dividitur ergo prima pars in duas. In prima determinat de ente secundum quod dividitur per decem praedicamenta. In secunda determinat de ente secundum quod dividitur per potentiam et actum [...].”

<sup>29</sup> *In De Trin.*, q. 5 a. 1 ad 6, 322–337: “quamvis subiecta aliarum scientiarum sint partes entis, quod est subiectum metaphisice, non tamen oportet quod alie scientie sint partes ipsius: accipit enim unaqueque scientiarum unam partem entis secundum specialem modum considerandi, alium a modo quo consideratur ens in metaphisica. Vnde proprie loquendo subiectum illius non est pars subiecti metaphisice: non enim est pars entis secundum illam rationem qua ens est subiectum metaphisice, set hac ratione considerata ipsa est specialis scientia aliis condiuisa.”

Whence, properly speaking, the subject of that (particular science) is not a part of the subject of metaphysics: for it is not a part of *being* according to that *ratio* whereby *being* is the subject of metaphysics; instead, considered in this *ratio*, it is a special science (that is) co-divided (against) the others.

However, that science can be said (to be a) *part* of it (i.e., of metaphysics) which is about potency; or which is about act; or about one; or about something such.<sup>30</sup> For these have the same mode of considering as *being*, about which metaphysics treats.

#### **59.6. Use of Common Principles: Metaphysics vs. Dialectic**

The truth and cognition of indemonstrable principles depends on the *ratio* of the termini; for (when it is) known what a whole and what a part is, it is immediately (*statim*) known that every whole is greater than its part.<sup>31</sup> However, to know the *ratio* of *being* and *non-being*, of *whole* and *part*, and of other (such things) that follow upon being (*ens*), from which the indemonstrable principles are constituted as from termini, pertains to wisdom, for common being is an effect of the highest cause. Hence, wisdom does not only use the indemonstrable principles—about which there is understanding—(by) concluding from them, as the other sciences (do), but also (by) judging (the truth) about them and disputing against who deny (them). Whence, it follows that wisdom should be a virtue greater than understanding.

Thus, ARISTOTLE shows that some sciences use common principles in another mode.<sup>32</sup> For dialectic is about common (principles), and some other science is also about common (principles): namely, first philosophy, whose subject is *being* (*ens*), and (which) considers those that follow upon *being*, as the proper affections of *being*.

However, it is to be known that dialectic—and logic—is about common (principles) for a reason another than first philosophy (is about them). For first philosophy is about common

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<sup>30</sup> *In De Trin.*, q. 5 a. 1 ad 6, 322–337: “Sic autem posset dici pars ipsius scientia que est de potentia uel que est de actu aut de uno uel de aliquo huiusmodi; quia ista habent eundem modum considerandi cum ente de quo tractatur in metaphisica.”

<sup>31</sup> *STh* I-II, q. 66 a. 5 ad 4: “veritas et cognitio principiorum indemonstrabilium dependet ex ratione terminorum, cognito enim quid est totum et quid pars, statim cognoscitur quod omne totum est maius sua parte. Cognoscere autem rationem entis et non entis, et totius et partis, et aliorum quae consequuntur ad ens, ex quibus sicut ex terminis constituuntur principia indemonstrabilia, pertinet ad sapientiam, quia ens commune est proprius effectus causae altissimae, scilicet Dei. Et ideo sapientia non solum utitur principiis indemonstrabilibus, quorum est intellectus, concludendo ex eis, sicut aliae scientiae; sed etiam iudicando de eis, et disputando contra negantes. Unde sequitur quod sapientia sit maior virtus quam intellectus.”

<sup>32</sup> *In Post. an.* 1, l. 20, 104–110 (cf. ARISTOTLE, *Analytica Posteriora* A.11, 77a29–30): “ostendit [Philosophus] quod quedam scientie utuntur principiis communibus alio modo quam dictum est. *Dyaletica* enim est *de communibus*, et *aliqua* <alia> scientia est etiam de communibus, scilicet philosophia prima, cuius subiectum est ens, et considerat ea que consequuntur ens, ut proprias passiones entis.”

(principles) because its consideration is about common things themselves: about *being* (*ens*), and the parts and affections of *being*.<sup>33</sup>

Since reason has to treat of all (the principles) that are in things, and logic is about the operations of reason, logic too will be about those (principles) that are common to all: to wit, about the intentions of *ratio* (or of reason, *de intentionibus rationis*), which are related to all things.<sup>34</sup> Not that logic should be about the common things themselves as subjects: for logic considers as subjects *sylogism*, *enunciation*, *category*, or something such. And the part of logic that is demonstrative, even if it should deal about common intentions (when) teaching (*docendo*), in the demonstrative use of science (i.e., in the use that science makes of logic), the process is not from those common intentions (in order) to show something about the things that are the subjects of the other sciences.

However, dialectic does this because the dialectician, in arguing, proceeds from common intentions to those (principles) that belong to the other sciences, whether they be proper or common—but above all (*maxime*) to common (principles).<sup>35</sup> For example, (dialectic proceeds in this mode when) it is argued that hatred is in the concupiscible (appetite), in which love is; and this (reasoning proceeds dialectically) from this (common principle): that contraries are about the same (subject). Therefore, dialectic is about common (principles) not only because it investigates the common intentions of reason, which is common to the whole of logic, but also because it argues about common things.

Any science that argues about common things must argue about common principles, since the truth of common principles is manifest from the cognition of the common terms: for example, (those) of *being* and *non-being*, *whole* and *part*, and similar (terms).<sup>36</sup> Thus,

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<sup>33</sup> *In Post. an.* 1, l. 20, 111–116: “Sciendum tamen est quod alia ratione dyaletica est de communibus et logica et philosophia prima. Philosophia enim prima est de communibus, quia eius consideratio est circa ipsas res communes, circa ens et partes et passiones entis.”

<sup>34</sup> *In Post. an.* 1, l. 20, 116–129: “Et, quia circa omnia que in rebus sunt habet negotiari ratio, logica autem est de operationibus rationis, logica etiam erit de hiis que communia sunt omnibus, id est de intentionibus rationis, que ad omnes res se habent; non autem ita quod logica sit de ipsis rebus communibus sicut de subiectis: considerat enim logica sicut subiecta sillogismum, enunciationem, predicamentum aut aliquid huiusmodi. Pars autem logice que demonstratiua est, etsi circa communes intentiones uersetur docendo, tamen usu demonstratiue sciencie non est in procedendo ex hiis communibus intentionibus ad aliquid ostendendum de rebus, que sunt subiecta aliarum scienciarum.”

<sup>35</sup> *In Post. an.* 1, l. 20, 129–139: “Set hoc dyaletica facit, quia ex communibus intentionibus procedit arguendo dyaeticus ad ea que sunt aliarum scienciarum, siue sint propria siue communia, maxime tamen ad communia, sicut argumentatur quod odium est in concupiscibili in qua est amor, ex hoc quod contraria sunt circa idem; est ergo dyaletica de communibus non solum quia pertractat intentiones <communes> rationis, quod est commune toti logice, set etiam quia circa communia rerum argumentatur.”

<sup>36</sup> *In Post. an.* 1, l. 20, 155–160 (cf. ARISTOTLE, *Analytica Posteriora* A.11, 77a29–30): “Quecunque autem sciencia argumentatur circa communia rerum, oportet quod argumentetur circa principia communia, quia ueritas principiorum communium est manifesta ex cognitione terminorum communium, ut entis et non entis, totius et partis, et similium. Dicit autem [Philosophus] signanter: *Et si aliqua sciencia temptet monstrare communia*, quia philosophia prima non demonstrat principia communia: sunt enim



ARISTOTLE clearly (*signanter*) says, “even if some science should attempt to demonstrate the [common] principles,” first philosophy does not demonstrate the common principles. Indeed, they are simply indemonstrable; yet, some (thinkers) erroneously attempted to demonstrate them. Or (explaining this alternatively, ARISTOTLE says this), also, because, even if they cannot be demonstrated simply, however, the first philosopher attempts to demonstrate them in that mode in which it is possible: to wit, contradicting those who negate them through those (principles) that should be conceded by them—not through those (principles) that are more known.

It is to be known, too, that the first philosopher does not only show (*monstrat*) them in this mode, but also shows something about them as about subjects: for example, that it is impossible for the mind to conceive their opposites.<sup>37</sup>

Therefore, both the first philosopher and the dialectician should dispute about these principles, but diversely.<sup>38</sup> For dialectic does not proceed from some determinate principles. Nor does it assume only one of the two parts of a contradiction. Instead, it is related to one and to the other, for one or the other may be probable or may be shown from more probable (principles) that the dialectician accepts—wherefrom, he inquires (*interrogat*). The demonstrator, on the other hand, does not inquire, for he is not related to opposites. Therefore, first philosophy proceeds about common principles by the mode of demonstration and not by the mode of dialectical disputation.

### 59.7. The Method of Metaphysics

Just as to proceed reasonably is attributed to natural philosophy because the mode of reason is maximally observed in it (► 63.3), so, (too), to proceed intellectually is attributed to metaphysics because the mode of the intellect is maximally observed in it.<sup>39</sup>

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indemonstrabilia simpliciter; set aliqui errantes tentauerunt ea demonstrare, ut patet in IV Metaphisice. Vel etiam quia, etsi non possunt demonstrari simpliciter, tamen philosophus primus tentat ea demonstrare eo modo quo est possibile, scilicet contradicendo negantibus ea per ea que oportet ab eis concedi, non per ea que sunt magis nota.”

<sup>37</sup> *In Post. an.* 1, l. 20, 155–160: “Sciendum est etiam quod philosophus primus non solum hoc modo monstrat ea, set etiam monstrat aliquid de eis sicut de subiectis, sicut quod impossibile est mente concipere opposita eorum, ut patet in IV Metaphisice.”

<sup>38</sup> *In Post. an.* 1, l. 20, 161–174 (cf. ARISTOTLE, *Analytica Posteriora* A.11, 77a31–35): “Cum ergo disputet circa hec principia et philosophus primus et dyaleticus, tamen aliter et aliter: dyaletica enim non procedit ex aliquibus principiis determinatis, neque assumit alteram partem contradictionis tantum, set se habet ad utramque (contingit enim utramque quandoque uel probabilem esse uel ex probabilibus ostendi, que accipit dyaleticus), et propter hoc interrogat; demonstrator autem non interrogat, quia non se habet ad opposita. Et hec differentia utriusque posita est *in hiis que sunt de sillogismo*, id est in libro Priorum. Philosophia ergo prima procedit circa communia per modum demonstrationis et non per modum dyaletice disputationis.” For greater detail about metaphysical disputation concerning first principles, see *In Metaph.* 4, l. 6, §§606–610 (cf. ARISTOTLE, *Metaphysica* Γ.3, 1005b35–1006a18).

<sup>39</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 327–332: “sicut rationabiliter procedere attribuitur naturali philosophie eo quod in ipsa maxime obseruatur modus rationis, ita intellectualiter procedere attribuitur diuine scientie eo quod in ipsa maxime obseruatur modus intellectus.”

However, to proceed intellectually is not attributed to metaphysics as though it itself should not reason proceeding from principles to conclusions, but because its reasoning is most proximate to intellectual consideration; and its conclusions (are most proximate) to the principles.<sup>40</sup>

Reason differs from intellect as multitude (differs) from unit (► 40; 44).<sup>41</sup> Whence, BOETHIUS says (in his *Consolation of Philosophy*) that reason is related to intellect like time to eternity, and like a circle to (its) center.<sup>42</sup> For it is proper of reason to be diffused (*diffundi*, i.e., scattered or spread) about many (things), and to gather one simple cognition from them.

Whence, (pseudo-)DIONYSIUS says that souls have rationality insofar as they diffusedly encircle (*diffusius circueunt*) the truth of (multiple) existent (things).<sup>43</sup> And, conversely, the intellect priorly considers one simple truth and grasps the cognition of a whole multitude in it.

It is therefore evident that rational consideration (*rationalis consideratio*) is terminated at intellectual (consideration) according to the way of resolution (i.e., in analysis), insofar as reason gathers one simple truth from many.<sup>44</sup> And conversely, intellectual consideration is a principle of rational (consideration) according to the way of composition or invention (i.e., of synthesis or discovery), insofar as the intellect comprehends a multitude in one. Therefore, the consideration that is the terminus of the whole human reasoning maximally is an intellectual consideration.

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<sup>40</sup> *In De Trin.*, q. 6 a. 1 qc. 3 ad 1, 396–401: “intellectualiter procedere non attribuitur scientie diuine quasi ipsa non ratiocinetur procedendo de principiis ad conclusiones, set quia eius ratiocinatio est intellectuali considerationi propinquissima, et conclusiones eius principiis.”

<sup>41</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 332–338: “Differt autem ratio ab intellectu sicut multitudo ab unitate; unde dicit Boetius in IV De consolatione quod similiter se habent ratio ad intellectum et tempus ad eternitatem et circulus ad centrum: est enim rationis proprium circa multa diffundi et ex eis unam simplicem cognitionem colligere.”

<sup>42</sup> See Anicius Manlius Severinus BOETHIUS, *Philosophiae Consolationis*, ed. Rudolf Peiper (Leipzig: Teubner, 1871), 4.6, 110.74–77: “uti est ad intellectum ratiocinatio, ad id quod est id quod gignitur, ad aeternitatem tempus, ad punctum medium circulus: ita est fati series mobilis ad prouidentiae stabilem simplicitem.”

<sup>43</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 338–350 (cf. Pseudo-DIONYSIUS, *De Divinis Nominibus*, 7.2): “Vnde Dionisius dicit VII c. De diuinis nominibus quod anime secundum hoc habent rationalitatem quod diffusius circueunt existentium ueritatem, et in hoc deficiunt ab angelis; set in quantum conuoluunt multa ad unum quodam modo angelis equantur. Intellectus autem e conuerso per prius unam et simplicem ueritatem considerat et in illa totius multitudinis cognitionem capiunt, sicut Deus intelligendo suam essentiam omnia cognoscit; unde Dionisius ibidem dicit quod angelice mentes habent intellectualitatem in quantum uniformiter intelligibilia diuinorum intelligunt.” Here, (Pseudo-)DIONYSIUS and St. Thomas also compare reasoning to both angelical and divine intellection.

<sup>44</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 350–359: “Sic ergo patet quod rationalis consideratio ad intellectualem terminatur secundum uiam resolutionis, in quantum ratio ex multis colligit unam et simplicem ueritatem; et rursum intellectualis consideratio est principium rationalis secundum uiam compositionis uel inuentionis, in quantum intellectus in uno multitudinem comprehendit. Illa ergo consideratio que est terminus totius humane ratiocinationis, maxime est intellectualis consideratio.”

## 59.8. Metaphysics as the Terminus of Analysis

The whole consideration of resolving reason (i.e., of analytical reason) in all the sciences is terminated at the consideration of metaphysics, for:<sup>45</sup>

1. Reason sometimes proceeds from one into another **according to thing** (*secundum rem*), as when a demonstration is through **extrinsic** causes or effects.<sup>46</sup>

**(a) By composing** (i.e., synthetically), when we proceed from (extrinsic) causes (i.e., agents and ends) to effects.<sup>47</sup>

**(b) As (by) resolving** (i.e., analytically), when we proceed from effects to causes, since causes are simpler, more immobile, and (more) uniformly permanent than effects.<sup>48</sup>

Therefore, the last terminus of resolution in this way is when we arrive at the highest, most simple (extrinsic) causes, which are separated substances.<sup>49</sup>

2. On the other hand, (reason) sometimes proceeds from one into another **according to ratio** (*secundum rationem*), as when the process is according to **intrinsic** causes:<sup>50</sup>

**(a) By composing** (i.e., synthetically), when we proceed from maximally universal forms into more particularized (forms).<sup>51</sup>

**(b) By resolving** (i.e., analytically), when (we proceed) conversely, since the more universal is simpler.<sup>52</sup>

And since (those *ratios*) are maximally universal which are common to all beings, the last terminus of resolution in this way is the consideration of *being* and of those that belong to *being* as such (*in quantum huiusmodi*).<sup>53</sup>

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<sup>45</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 360–362: “Tota autem consideratio rationis resoluentis in omnibus scientiis ad considerationem diuine scientie terminatur.”

<sup>46</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 362–365: “Ratio enim, ut prius dictum est, procedit quandoque de uno in aliud secundum rem, ut quando est demonstratio per causas uel effectus extrinsecos.”

<sup>47</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 365–366: “componendo quidem cum proceditur a causis ad effectus.”

<sup>48</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 366–369: “quasi resoluendo cum proceditur ab effectibus ad causas, eo quod cause sunt effectibus simpliciores et magis immobiliter et uniformiter permanentes.”

<sup>49</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 369–372: “ultimus ergo terminus resolutionis in hac uia est cum peruenitur ad causas supremas maxime simplices, que sunt substantie separate.”

<sup>50</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 372–374: “Quandoque uero procedit de uno in aliud secundum rationem, ut quando est processus secundum causas intrinsecas.”

<sup>51</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 374–376: “componendo quidem quando a formis maxime uniuersalibus in magis particulata proceditur.”

<sup>52</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 376–378: “resoluendo autem quando e conuerso, eo quod uniuersalius est simplicius.”

<sup>53</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 378–382: “maxime autem uniuersalia sunt que sunt communia omnibus entibus, et ideo terminus resolutionis in hac uia ultimus est consideratio entis et eorum que sunt entis in quantum huiusmodi.”

◀ These are, then, (the things) about which metaphysics considers (the truth): namely, separate substances (¶1) and the common (principles) of all beings (¶2).<sup>54</sup> Whence, it is evident that its consideration is maximally intellectual. Wherefrom, too, it bestows (*largitur*) the principles to all the other sciences insofar as intellectual consideration is the principle of rational (consideration); wherefrom it is called *first philosophy*. And nonetheless, it is learned after the physical and the other sciences, insofar as intellectual consideration is the terminus of rational (consideration); wherefrom, it is called *metaphysics*, as beyond physical (science), since it occurs after physical (science) by resolving.

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<sup>54</sup> *In De Trin.*, q. 6 a. 1 qc. 3 co., 383–395: “Hec autem sunt de quibus scientia diuina considerat, ut supra dictum est, scilicet substantie separate, et communia omnibus entibus; unde patet quod sua consideratio est maxime intellectualis. Et exinde etiam est quod ipsa largitur principia omnibus aliis scientiis, in quantum intellectualis consideratio est principium rationalis, propter quod dicitur prima philosophia; et nichilominus ipsa addiscitur post phisicam et ceteras scientias, in quantum consideratio intellectualis est terminus rationalis, propter quod dicitur metaphisica quasi trans phisicam, quia post phisicam resoluendo occurrit.” For greater detail concerning the first principles that metaphysics considers, see, for example, *In Metaph.* 4, l. 5, §§588–595 (cf. ARISTOTLE, *Metaphisica* Γ.3, 1005a19–b8); *ibid.*, l. 6, §§596–605 (cf. ARISTOTLE, *Metaphisica* Γ.3, 1005b8–34).

## 60. The Mathematical Sciences

*Here, we briefly examine the subject genus of the mathematical sciences.*

### 60.1. Mathematical Demonstration Is Always in One Proper Genus

The subjects of diverse sciences are diverse.<sup>1</sup> Therefore, as ARISTOTLE says, arithmetical demonstration always has a proper genus about which the demonstration is produced; and likewise, (each of) the other sciences (has its own proper genus).

Hence, the subject genus of arithmetic and of geometry is diverse.<sup>2</sup> For arithmetic is about numbers (i.e., discrete multitudes composed from indivisible parts and measurable by an altogether indivisible unit). And geometry is about magnitudes (i.e., continua that are always divisible into—and measurable by—continua of the same genus).

Therefore, as ARISTOTLE says, it is impossible for a demonstration that proceeds from the principles of arithmetic to agree in respect of the accidents of magnitudes, which are the subjects of geometry—unless perhaps magnitudes should be contained under numbers.<sup>3</sup> However, magnitudes are not contained under numbers—except perhaps insofar as magnitudes are numbered (i.e., in which case they are treated as multitudes rather than magnitudes). Thus, since the subjects of diverse sciences are diverse, arithmetical demonstration always has a proper genus about which a demonstration is produced.

For example, number (and not magnitude; ► 3.4) is the subject of even and odd as proper affections.<sup>4</sup> Therefore, it does not happen that the geometer should demonstrate some (affection of numbers, such as even or odd) from the proper principles (of geometry) descending into arithmetical (conclusions).<sup>5</sup>

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<sup>1</sup> *In Post. an.* 1, l. 15, 63–66 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b7–8): “Subiecta etiam diuersarum scienciarum diuersa sunt: *arismetica* enim demonstratio *semper habet genus proprium circa quod <fit> demonstratio, et alie sciencie similiter.*”

<sup>2</sup> *In Post. an.* 1, l. 15, 49–51: “in illis scientiis quarum est diuersum *genus* subiectum, *sicut arismetice*, que est de numeris, *et geometrie*, que est de magnitudinibus [...].”

<sup>3</sup> *In Post. an.* 1, l. 15, 49–65 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b3–6): “in illis scientiis quarum est diuersum *genus* subiectum, *sicut arismetice*, que est de numeris, *et geometrie*, que est de magnitudinibus, non contingit quod demonstratio que procedit ex principiis unius sciencie, puta arismetice, *conuenire* quantum ad *accidencia* subiectis alterius sciencie, sicut ad magnitudines, que sunt subiecta geometrie, *nisi* forte subiectum unius sciencie contineatur sub subiecto alterius, sicut si *magnitudines* contineantur sub numeris ([...] magnitudines enim sub numeris non continentur, nisi forte secundum quod magnitudines numerate sunt). Subiecta etiam diuersarum scienciarum diuersa sunt: *arismetica* enim demonstratio *semper habet genus proprium circa quod <fit> demonstratio.*”

<sup>4</sup> *De substantiis separatis*, c. 6, 54–55: “numerus est subiectum paris et imparis sicut propriarum passionum.”

<sup>5</sup> *In Post. an.* 1, l. 15, 28–30 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75a38–39): “sicut non contingit quod geometra ex propriis principiis demonstret aliquid descendens in arismeticalia.” The Greek “οἷον τὸ γεωμετρικὸν ἀριθμητικῆ” is interpreted conversely in ROSS’s edition: “We cannot, for instance, prove geometrical truths by arithmetic,” rather than “ut geometricum [*<descendentem>*] demonstrare] in arithmetica.” Considering the wording, together with what follows, ROSS’s edition seems more accurate

Moreover, no science demonstrates something about the subject of another science, whether it should be of a **more common** science or of another, **separate** science.<sup>6</sup>

For example, (in the case of a **more common** science), geometry does not demonstrate that contraries belong to the same science (*contrariorum eadem est scientia* < τῶν ἐναντίων μία ἐπιστήμη).<sup>7</sup> Indeed, contraries pertain to a common science: to wit, to first philosophy (i.e., in respect of the contrariety of *being* as such) or to dialectic (i.e., in respect of the contrariety of *ratios* as such).

Likewise, (in the case of a **separate** science), geometry does not demonstrate that a cubic number multiplied by a cubic number renders another cubic number (i.e.,  $x^3y^3 = [xy]^3$ , where  $x$ ,  $y$  and  $xy$  are measurable multitudes rather than magnitudes; nor does geometry demonstrate this *ex operibus rationis* of logical quantities, which are not subject genera, for they are neither multitudes nor magnitudes; however, logic, which is a more common science, can prove that this is *reasonable*; ► 52.6, ¶1).<sup>8</sup> Therefore, the arithmetician—not the geometer—has to prove this (i.e., from the proper principles of measurable multitude, and not from the proper principles of measurable magnitude).

Moreover, a science does not prove (just) any which accident about its own subject, but the accident that is of its genus.<sup>9</sup> For example, geometry does not demonstrate something about lines if this something is in the lines neither insofar as they are lines (i.e., not like

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than the versions available to St. Thomas—but the result is the same. Indeed, ARISTOTLE'S point is that arithmetic and geometry do not have the same subject genus; it is therefore just as impossible to demonstrate arithmetical truths through geometric principles as it is to demonstrate geometrical truths through arithmetical principles. The latter is the example mentioned here and explained thereafter by St. Thomas.

<sup>6</sup> *In Post. an.* 1, l. 15, 142–145: “nulla scientia demonstrat aliquid de subiecto alterius scientie, siue sit scientie communioris siue alterius scientie dispertite.”

<sup>7</sup> *In Post. an.* 1, l. 15, 145–148 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b12–13): “sicut geometria non demonstrat quod contrariorum eadem est scientia: contraria enim pertinent ad scientiam communem, scilicet philosophiam primam siue dyaleticam.”

<sup>8</sup> *In Post. an.* 1, l. 15, 148–152 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b13–14): “et similiter geometria non demonstrat quod duo cubi sint unus cubus, id est quod ex ductu unius numeri cubici in alium numerum cubicum surgat numerus cubicus.” Ibid., 162–163: “hoc ergo habet probare arismeticus, non geometra.” St. Thomas explains what a cube number is (i.e., that  $x^3 = x \cdot x \cdot x$ ) and provides the example that  $8 = 2^3 = 2 \cdot 2 \cdot 2$ ; and that  $\sqrt[3]{27} = 3$ , for  $27 = 3^3 = 3 \cdot 3 \cdot 3$ ; wherefrom, a cubic number results from multiplying these two numbers, such that  $8 \cdot 27 = 216$ , and  $\sqrt[3]{216} = 6$ , for  $6 \cdot 6 \cdot 6 = 6^3 = 216$ . Ibid., 152–162: “dicitur autem numerus cubicus qui consurgit ex ductu unius numeri in seipsum bis, sicut octonarius est numerus cubicus, surgit enim ex ductu binarii in seipsum bis, quia bis duo bis sunt octo; et eadem ratione uiginti septem est numerus cubicus et radix eius est tria, quia ter tria ter faciunt uiginti septem; si ergo ducantur octo in uiginti septem, consurgit numerus cubicus, scilicet ducenta sexdecim, cuius radix est sex, quia sexies sex sexies sunt ducenta sexdecim.”

<sup>9</sup> *In Post. an.* 1, l. 15, 169–179 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b17–20): “scientia etiam de proprio subiecto non probat quodlibet accidens, set accidens quod est sui generis, sicut si aliquid inest lineis non secundum quod sunt lineae neque secundum propria principia linearum, hoc non demonstrat geometra de lineis, sicut quod linea recta sit pulcherrima linearum, aut si recta linea est contraria circulari uel non: hec enim non sunt secundum proprium genus lineae, set secundum aliquid communius; pulchrum enim et contrarium, genus lineae transcendunt.”

straightness is in lines insofar as they are lines; ►55.2, ¶2) nor according to the proper principles of lines (i.e., not like points are in lines; ►55.2, ¶1). For example, that the straight (line) should be the most beautiful of lines; or whether the straight line is contrary to the circular (line) or not. Indeed, *beautiful* and *contrary* transcend the genus of *line*.

## 60.2. How an Accident Can Be the Subject of a Science

(As noted above, ►58.22, ¶2), in those sciences that are about some accident, nothing prevents that which is taken as a subject in respect of some affection to be taken also as an affection in respect of a prior subject.<sup>10</sup> However, this does not proceed infinitely, for we must arrive at some first (subject) in that science, which is taken in such a way as a subject that (it is) in no mode (taken) as an affection.

This is evident in the mathematical sciences, which are about continuous or discrete quantity.<sup>11</sup> Indeed, those (subjects) that are prior in the genus of quantity are supposed in these sciences (►57.8, ¶2). For example, arithmetic (*arithmetica* = ἡ ἀριθμητική) considers units (*unitates* = μονάδας); and geometry (*geometria* = ἡ... γεωμετρία) considers points (*signa* = σημεία, *id est puncta*) and lines (*lineas* = γραμμάς). The aforesaid (sciences) suppose (both) *that these (subjects) are* and *what they are* (*supponunt haec esse et hoc esse* < ταῦτα... λαμβάνουσι τὸ εἶναι καὶ τοῦ εἶναι).

Concerning the affections, these sciences suppose what each of them should signify (►57.8, ¶3).<sup>12</sup> For example, arithmetic supposes *what odd or even is* (*quid <est> impar aut par* = τί περιπτόν ἢ ἄρτιον) and *what a square or cubic number is* (<*quid est numerus*> *quadratus aut cubicus* = τετράγωνον ἢ κύβος).

Likewise, geometry supposes *what is rational* (*quid <est> rationale* = τί τὸ ἄλογον) in lines:<sup>13</sup> for *rational* is said of that line about which we can reason through a given line (i.e., we can use another line to measure both using their ratios); and every line (that is)

<sup>10</sup> *In Post. an.* 1, l. 2, 86–93: “In illis autem scienciis que sunt de aliquibus accidentibus, nichil prohibet id quod accipitur ut subiectum respectu alicuius passionis, accipi etiam ut passionem respectu anterioris subiecti. Hoc tamen non in infinitum procedit: est enim deuenire ad aliquod primum in scientia illa, quod ita accipitur ut subiectum quod nullo modo ut passio.”

<sup>11</sup> *In Post. an.* 1, l. 2, 93–98: “sicut patet in mathematicis scienciis, que sunt de quantitate continua uel discreta: supponuntur enim in hiis scienciis ea que sunt prima in genere quantitatis, sicut unitas et linea et superficies et alia huiusmodi.” *Ibid.*, l. 18, 110–113 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b4–6): “sicut *arismetica* considerat *unitates* et *geometria* considerat *signa*, id est *puncta*, et *lineas*. Predictae enim supponunt *hec esse et hoc esse*, id est supponunt de eis et quia sunt et quid sunt.”

<sup>12</sup> *In Post. an.* 1, l. 18, 113–116 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b7–8): “de passionibus supponunt predictae sciencie quid significet unaqueque, sicut *arismetica* supponit *quid est impar aut par*, et quid est numerus quadratus aut cubicus.”

<sup>13</sup> *In Post. an.* 1, l. 18, 116–123 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b9): “et *geometria* supponit *quid est rationale* in lineis (dicitur enim linea rationalis de qua possumus ratiocinari per lineam datam, huiusmodi autem est omnis linea commensurabilis lineae date; que uero est ei non commensurabilis, uocatur irrationalis uel surda); similiter et *geometria* supponit quid est reflexum aut curuum.”

commensurable with a given line is of such a mode, while that (line) which is not commensurable with it is called *irrational* or *surd* (►5.5). Likewise, geometry supposes, too, *what the reflex* or the *curved* is (*quid est reflexum aut curuum* < τὸ κεκλάσθαι ἢ νεύειν).

Thus, in mathematics, both *what the unit is* (*quid <est> unitas* = τί μονάς), which is a principle, and *what the straight is* and *what the triangle is* (*quid <est> rectum et <quid> triangulus* = τί τὸ εὐθύ καὶ τρίγωνον), which are not principles, are accepted by supposition.<sup>14</sup> On the other hand, *that there should be a unit* or *that there should be a magnitude*, the mathematician accepts as principles (< εἶναι... τὴν μονάδα λαβεῖν καὶ μέγεθος), while the others (e.g., *that there is a triangle*), he demonstrates (< τὰ... ἕτερα δεικνύναι).

The subjects having been supposed, some others are sought through demonstration: for example, the equilateral triangle and the square among geometrical (subjects), and other such (subjects are sought through geometric construction).<sup>15</sup> These demonstrations (i.e., constructive proofs or problems; ►1.5) are said (to be), as it were, *operative*: for example, “over a given straight-line, to construct an equilateral triangle” (►1.6). This having been found, again, some affections are proven about it: for example, that its angles are equal, or something of this sort.

Therefore, it is evident that the triangle in the first mode of demonstration is related as an affection (i.e., of the subject *surface*, which is said to be *triangular*), (while) in the second (mode) it is related as a subject (i.e., where the triangle is the subject of the angles).<sup>16</sup> Whence, ARISTOTLE provides an example about the triangle as an affection and not as a subject when he says, concerning the (name) *triangle*, that (in order for there to be a geometrical demonstration) we must foreknow *what* it signifies.

However, the aforesaid sciences demonstrate, of all the aforesaid affections, *that they should be* (*quod sint* < ὄτι... ἔστι) through common principles (*per communia* <*principia*>

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<sup>14</sup> *In Post. an.* 1, l. 18, 51–58 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a34–36): “sicut in mathematicis accipitur supponendo et *quid est unitas*, que est principium, et *quid est rectum et quid triangulus*, que non sunt principia; set quod unitas sit aut quod magnitudo sit accipit mathematicus quasi principia, alia uero demonstrat, scilicet que sunt ex principiis: demonstrat enim triangulum equilaterum et angulum rectum, et etiam hanc lineam rectam esse.”

<sup>15</sup> *In Post. an.* 1, l. 2, 98–106: “quibus suppositis, per demonstrationem queruntur quedam alia, sicut triangulus equilaterus, quadratum, in geometricis, et alia huiusmodi; que quidem demonstrationes quasi operative dicuntur, ut est illud: «Super rectam lineam datam triangulum equilaterum constituere»; quo adinuento, rursus de eo alique passionem probantur, sicut quod eius anguli sunt equales aut aliquid huiusmodi.”

<sup>16</sup> *In Post. an.* 1, l. 2, 106–112 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a14–15): “patet igitur quod triangulus in primo modo demonstrationis se habet ut passio, in secundo se habet ut subiectum. Vnde Philosophus hic exemplificat de triangulo ut est passio, non ut est subiectum, cum dicit quod de triangulo oportet prescire «quoniam hoc significat».”



= διὰ... τῶν κοινῶν) and from those principles that are demonstrated from common [principles] (*et ex illis principiis que demonstrantur ex communibus* < καὶ ἐκ τῶν ἀποδεδειγμένων; ►60.3).<sup>17</sup> And what has been said about geometry and arithmetic is to be understood of astronomy too (►64).

### 60.3. How Mathematics Takes Common Principles

ARISTOTLE gives examples of proper and of common principles.<sup>18</sup> He says that proper principles are, for example, that *there is* (such thing as) a *line* (i.e., the subject), or (what) *straight* (signifies, i.e., an affection of that subject). Thus, a definition of a subject, as much as of an affection, is had in the sciences as a principle. Common principles (►57.8, ¶1), on the other hand, are, for example, “if equals are subtracted from equals, the remainders are equal,” and other such common conceptions of the soul (*communes animi conceptiones*, i.e., the axioms that EUCLID calls *common notions*, κοινὰ ἔννοια; ►1.2).

Thus, geometry would produce the same (*idem... faciet* = ταὐτὸ... ποιήσει, i.e., geometry would still produce a conclusion in the genus of magnitude) if it should not take the aforesaid common principle (i.e., *if equals are subtracted from equals, the remainders are equal*) in its community (*in sua communitate* < κατὰ πάντων), but only in magnitudes (*solum in magnitudinibus* = ἐπὶ μεγεθῶν μόνον).<sup>19</sup> For geometry could thus conclude: “if equal magnitudes are subtracted from equal magnitudes, the remainder [magnitudes] are equal,” as if it should say: “if equals are subtracted from equals, the remainders are equal.”

And arithmetic (would produce conclusions of the same genus if it should not take the aforesaid common principle in its community, but) only in numbers (*in <solis> numeris* = ἐπ’ ἀριθμῶν).<sup>20</sup> Likewise, (something analogical) is to be said concerning numbers (i.e., in arithmetic, the same common principle is contracted to the genus of measurable multitudes: “if equal numbers are subtracted from equal numbers, the remainder numbers are equal”).

<sup>17</sup> *In Post. an.* 1, l. 18, 123–128 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b9–11): “Set predicte sciencie *demonstrant* de omnibus predictis passionibus *quod sint, per communia* principia *et ex illis* principiis *que demonstrantur* ex communibus. Et quod dictum est de geometria et arismetica, intelligendum est etiam de *astrologia*.”

<sup>18</sup> *In Post. an.* 1, l. 18, 83–89 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a40–42): “exemplificat [Philosophus] de utrisque, dicens quod *propria principia sunt ut lineam esse huiusmodi* uel *rectum*: tam enim subiecti quam passionis diffinitio in scienciis pro principio habetur; *communis* uero principia sunt, *ut ‘si ab equalibus equalia auferas, que relinquuntur sunt equalia’*; et alie *communes animi conceptiones*.”

<sup>19</sup> *In Post. an.* 1, l. 18, 96–103 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76a43–b1): “*Idem enim faciet* geometria, *si non accipiat* premissum principium commune in sua communitate, *set solum in magnitudinibus* [...]. Ita enim poterit concludere geometria: ‘si ab equalibus magnitudinibus equales auferas magnitudines, que remanent sunt equales’, sicut si diceret: ‘si ab equalibus equalia auferas, que remanent sunt equalia’.”

<sup>20</sup> *In Post. an.* 1, l. 18, 98–104 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b2): “et arismetica *in solis numeris*. [...] et similiter dicendum est de numeris.”

#### 60.4. No Science of Quantity as Such

As ARISTOTLE argues, any common (principles) are taken particularly by the particular sciences and do not pertain to the consideration of that science insofar as they are in their community; now the first principles are taken by the mathematical (sciences) and by the other particular sciences only particularly; therefore, their consideration, insofar as they are common, belongs to the science that considers being insofar as it is being.<sup>21</sup>

Thus, ARISTOTLE says that the mathematician uses common principles insofar as they are appropriate to his matter (*mathematicus utitur «<principiis> communibus proprie,» idest secundum quod appropriantur suae materiae < ὁ μαθηματικός χρήται τοῖς κοινοῖς ἰδίως*).<sup>22</sup> However, it must pertain to first philosophy to consider such principles according to their community, for thus taken they are principles of the same (particular sciences) insofar as they are appropriate to some matter.

ARISTOTLE manifests this through an example: for the principle “If equals be subtracted from equals, the remainders are equal”<sup>23</sup> is common in all quanta, in which the equal and the unequal are found.<sup>24</sup> However, mathematicians (lit. *mathematica* = ἡ μαθηματική)

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<sup>21</sup> *In Metaph.* 11, l. 4, §2206 (cf. ARISTOTLE, *Metaphysica* K.4, 1061b17–27): “ostendit [Philosophus] quomodo consideratio huius scientiae est de primis principiis *demonstrationis*: et dividitur in duas partes. In prima ostendit quod *ad hanc scientiam pertinet considerare de his*. In secunda determinat de quodam principio *demonstrationis* quod est inter alia primum [...]. Circa primum duo facit. Primo *ostendit propositum ex consideratione scientiae mathematicae*. Secundo ex consideratione scientiae naturalis [...]. Utitur autem in prima parte tali ratione. Quaecumque communia a scientiis particularibus accipiuntur particulariter, et non secundum quod sunt in sua communitate, pertinent ad considerationem huius scientiae. Sed prima principia *demonstrationis* accipiuntur a mathematica et ab aliis particularibus scientiis particulariter tantum: ergo eorum consideratio secundum quod sunt communia, pertinet ad hanc scientiam, quae considerat de ente in quantum est ens.”

<sup>22</sup> *In Metaph.* 11, l. 4, §2207 (cf. ARISTOTLE, *Metaphysica* K.4, 1061b17–19): “Dicit ergo [Philosophus] quod mathematicus utitur «principiis communibus proprie,» idest secundum quod appropriantur suae materiae. Oportet autem quod ad primam philosophiam pertineat considerare principia huiusmodi secundum suam communitatem. Sic enim accepta sunt principia sui ipsorum secundum quod sunt alicui materiae particulari appropriata. Et hoc quod dixerat manifestat per exemplum.”

<sup>23</sup> ARISTOTLE, *Metaphysica* K.4, 1061b20: “ἀπὸ τῶν ἴσων ἴσων ἀφαιρεθέντων ἴσα τὰ λειπόμενα.” This is the third of the so-called *common notions* (κοινὰ ἔννοιαι) in EUCLID, *Opera Omnia*, v.1, 10.4–5: “Καὶ ἐὰν ἀπὸ ἴσων ἴσα ἀφαιρεθῆ, τὰ καταλειπόμενά ἐστιν ἴσα.” The wording of this principle in St. Thomas, “si ab aequalibus aequalia demas, quae relinquuntur aequalia sunt,” resembles most closely the first (full) Latin translation of the *Elements*, which was possibly completed in 1167, having been taken from an Arabic manuscript of mixed origin: see BUSARD, *The First Translation of Euclid's Elements Commonly Ascribed to Adelard of Bath*, 3–4; 33. Characteristic of this translation is the use of *demas* instead of *auferantur* (< ἀφαιρεθῆ in EUCLID; cf. ἀφαιρεθέντων in ARISTOTLE), which is what is found in most versions, including that ascribed to St. ALBERT the Great: see Paul Marie Josef Emanuel TUMMERS, *Albertus (Magnus)' Comentaar op Euclides' Elementen der Geometrie* (Nijmegen: Rijsuniversiteit te Leiden, 1984), v. 2, 23; cf. Anthony LO BELLO, *The Commentary of Albertus Magnus on Book I of Euclid's Elements of Geometry* (Boston; Leiden: Brill, 2003). On the other hand, *demantur*, rather than *demas* or *auferantur*, is found in ANARITIUS, *In decem libros priores Elementorum Euclidis commentarii*, 36.

<sup>24</sup> *In Metaph.* 11, l. 4, §2207: “Et hoc quod dixerat manifestat [Philosophus] per exemplum.” *Ibid.*, §2208 (cf. ARISTOTLE, *Metaphysica* K.4, 1061b19–22): “Nam hoc principium: si ab aequalibus aequalia demas, quae relinquuntur aequalia sunt, est commune in omnibus quantis, in quibus inveniuntur aequale et inaequale. Sed mathematica assumunt huiusmodi principia ad propriam considerationem circa aliquam partem quanti, quae est materia sibi conveniens.”

assume (*assumunt* < ἀπολαβοῦσα) such principles for their proper consideration (< ποιεῖται τὴν θεωρίαν) about some part of the quantum that is the matter that befits them (< περὶ τι μέρος τῆς οἰκείας ὕλης).

Thus, there is no mathematical science that should consider those (principles) that are common to quantity insofar as it is quantity; for this belongs to first philosophy. Rather, the mathematical sciences consider those (principles) that are *of this* or *of that* quantity, as arithmetic (considers) those (principles) that are *of number*, and geometry (considers) those (principles) that are *of magnitude*.<sup>25</sup>

Whence, the arithmetician takes the aforesaid principle (i.e., *if equals be subtracted from equals, the remainders are equal*) insofar as it pertains only to numbers, while the geometer (takes the same principle) insofar as it pertains to lines or to angles.<sup>26</sup> And the geometer does not consider this principle about beings insofar as they are beings, but about being insofar as it is a continuum—whether according to one dimension, as the line, according to two (dimensions), as the surface, or according to three (dimensions), as the body.

First philosophy, on the other hand, does not consider (*non intendit* [*de*] = οὐ σκοπεῖ) the parts of being insofar as something happens (*accidit* = συμβέβηκεν) to any one of them; rather, when it theorizes on any such common (principles) it theorizes about being insofar as it is a being (*circa ens inquantum est ens* = περὶ τὸ ὄν... ἧ ὄν).<sup>27</sup>

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<sup>25</sup> *In Metaph.* 11, l. 4, §2208: “Non est enim aliqua mathematica scientia, quae consideret ea quae sunt quantitatis communia, inquantum est quantitas. Hoc enim est primae philosophiae. Sed considerant mathematicae scientiae ea quae sunt huius vel illius quantitatis, sicut arithmetica ea quae sunt numeri, et geometria ea quae sunt magnitudinis.”

<sup>26</sup> *In Metaph.* 11, l. 4, §2208 (cf. ARISTOTLE, *Metaphysica* K.4, 1061b23–25): “Unde arithmeticus accipit praedictum principium, secundum quod pertinet ad numeros tantum; geometra autem secundum quod pertinet ad lineas vel ad angulos. Non autem considerat geometra hoc principium circa entia inquantum sunt entia; sed circa ens inquantum est continuum, vel secundum unam dimensionem ut linea, vel secundum duas ut superficies, vel secundum tres ut corpus.”

<sup>27</sup> *In Metaph.* 11, l. 4, §2208 (cf. ARISTOTLE, *Metaphysica* K.4, 1061b25–27): “Sed philosophia prima non intendit de partibus entis inquantum aliquid accidit unicuique eorum; sed cum speculatur unumquodque communium talium, speculatur circa ens inquantum est ens.”



## 61. Mathematical Demonstration

*We briefly turn our attention to mathematical demonstration.*

### 61.1. Demonstration According to Each of the Four Causes

ARISTOTLE shows that there are no more causes than the aforesaid (four species; ►9.2, ¶1).<sup>1</sup> This is manifested as follows. The (question) *on account of what* (something is so, *propter quid*; ►55.4, ¶2) inquires about a cause (►11.6); but only some (i.e., one) among the aforesaid causes is answered; therefore, there are no more causes than the aforesaid. And thus, according to number, there are as many (answers to the question) *on account of what* (something is so) as there are said causes.

1. (Reduction into a **formal** cause; ►9.4.)<sup>2</sup> Sometimes, (the answer to the question) *on account of what* is ultimately reduced into an essence (*in quod quid est* = εἰς τὸ τί ἔστιν): that is, into a definition (*in definitionem*). This is evident in all immobile (things), as are mathematical (things), in which (the answer to the question) *on account of what* (something is so) is reduced to the definition of *straight*, *commensurate*, or some other (affections) that are demonstrated in mathematical (subjects).

For example, the definition of **right angle** is that it be (*an angle*) *constituted from a line that falls on another (line) that would produce two equal angles on either part*.<sup>3</sup> Hence, if it should be inquired *on account of what* this angle should be a right (angle), (the question) would be (thus) responded: *because it is constituted from a line that produces two equal angles on either part*. And it is likewise in the other (cases in which reduction or analysis leads to a formal cause).

2. (Reduction into an **efficient** cause; ►9.7.)<sup>4</sup> Sometimes, (the answer to the question) *on account of what* is reduced into a first mover (*in primum movens* = εἰς τὸ κινῆσαν

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<sup>1</sup> *In Physic. 2, l. 10, n. 14* (cf. ARISTOTLE, *Physica* B.7, 198a14–21): “ostendit [Philosophus] quod causae non sunt plures iis quae sunt dictae. Quod quidem manifestatur sic. Hoc quod dico *propter quid*, quaerit de causa; sed ad *propter quid* non respondetur nisi aliqua dictarum causarum; non igitur sunt plures causae quam quae dictae sunt. Et hoc est quod dicit, quod hoc quod dico *propter quid*, tot est secundum numerum, quot sunt causae praedictae.”

<sup>2</sup> *In Physic. 2, l. 10, n. 14* (cf. ARISTOTLE, *Physica* B.7, 198a16–18): “Quandoque enim propter quid reducitur ultimo in quod quid est, idest in definitionem, ut patet in omnibus immobilibus, sicut sunt mathematica; in quibus propter quid reducitur ad definitionem recti vel commensurati vel alicuius alterius quod demonstratur in mathematicis.”

<sup>3</sup> *In Physic. 2, l. 10, n. 14*: “Cum enim definitio recti anguli sit, quod constituatur ex linea super aliam cadente, quae ex utraque parte faciat duos angulos aequales; si quaeratur propter quid iste angulus sit rectus, respondetur quia constituitur ex linea faciente duos angulos aequales ex utraque parte; et ita est in aliis.”

<sup>4</sup> *In Physic. 2, l. 10, n. 14* (cf. ARISTOTLE, *Physica* B.7, 198a19–20): “Quandoque vero reducitur propter quid in primum movens; ut *propter quid aliqui pugnaverant? quia furati sunt*: hoc enim est quod incitavit ad pugnam.”

πρώτον). For example, *on account of what* did some (people) fight? Because they were pillaged—for this is what incited (them) to fight. (There is no demonstration through an efficient cause in mathematics because the mathematical sciences abstract from motion.)

3. (Reduction into a **final** cause; ►9.8.)<sup>5</sup> Sometimes, (the answer to the question *on account of what*) is reduced into a final cause (*in causam finalem* < τίνοϛ ἔνεκα). For example, if we should inquire for what cause (*cuius causa*) some (people) fight, (this question) is (thus) answered: (in order) that they may rule. (There is no demonstration through a final cause in mathematics because the end is a principle only in the efficient cause, and, again, mathematics abstracts from motion.)

4. (Reduction into a **material** cause; ►9.3.)<sup>6</sup> Sometimes, (the answer to the question *on account of what*) is reduced into a material cause (*in causam materialem* < ὕλη). For example, if it should be inquired why this body is corruptible, (this question) is (thus) answered: because it is composed from contraries.

### 61.2. Causal Relation between Subject and Proper Affection

ARISTOTLE shows how cause and effect should follow upon each other.<sup>7</sup> Thus, he says that such a mode of consequence is found between cause and caused—and (between) the subject in which that caused (affection) is (and the affection itself)—that if someone should take that of which the cause is (i.e., the affection caused) according to some one particular thing, it will be in more (things) than the cause or the subject.

For example, *to have external angles equal to four right (angles, i.e., to have external angles that add up to 360°)* befits the triangle for the same reason that three angles external to it, together with the three internal (angles), are equal to six right (angles, i.e., 540°).<sup>8</sup> Therefore, since the three internal (angles) are equal to two right (angles, i.e., 180°), it follows that the three external (angles) should be equal to four right (angles, i.e., 360°).

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<sup>5</sup> *In Physic. 2, l. 10, n. 14* (cf. ARISTOTLE, *Physica* B.7, 198a20): “Quandoque autem reducitur in causam finalem; ut si quaeramus cuius causa aliqui pugnant, respondetur, ut dominantur.”

<sup>6</sup> *In Physic. 2, l. 10, n. 14* (cf. ARISTOTLE, *Physica* B.7, 198a20–21): “Quandoque autem reducitur in causam materialem; ut si quaeratur quare istud corpus est corruptibile, respondetur, quia compositum est ex contrariis.”

<sup>7</sup> *In Post. an. 2, l. 19, 85–98* (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a16–18): “ostendit [Philosophus] secundum premissa qualiter sibi inuicem cause <et effectus> consequantur. [...] Dicit ergo primo quod talis modus consequencie inuenitur inter causam et causatum et subiectum cui inest illud causatum, quod si aliquis accipiat secundum unum aliquid particulare id *cuius causa* queritur, *erit in plus* quam causa uel subiectum.”

<sup>8</sup> *In Post. an. 2, l. 19, 99–104*: “Sicut habere angulos extrinsecos equales quatuor rectis conuenit triangulo eadem ratione, quia tres anguli eius extrinseci simul cum tribus intrinsecis sunt equales sex rectis; cum igitur tres intrinseci sint equales duobus rectis, sequitur quod tres extrinseci sint equales quatuor rectis.”

The quadrangle, too, has external angles equal to four right (angles, i.e., 360°), but for another reason.<sup>9</sup> Indeed, its internal and external angles are equal to eight right (angles, i.e., 720°); but the internal angles of the quadrangle are equal to four right (angles, i.e., 360°). Therefore, the external angles are equal to four right (angles, i.e., 360°).

Therefore, to have external angles equal to four right (angles, i.e., 360°) is in more (plane figures) than (only in) the triangle or the quadrangle.<sup>10</sup> But if they should be taken together, they would be related equally: for any figure that communicates in (i.e., has in common) this—that they should have external angles equal to four right (angles, i.e., 360°)—must likewise communicate in (i.e., have in common) the mean, which is the cause of equality (in relation) to right (angles, i.e., 360°).

And he proves this like (he did) priorly: because the mean is the definition of the greater extremity (i.e., of the major premise, < ἔστι... τὸ μέσον λόγος τοῦ πρώτου ἄκρου). Wherefrom, all sciences are produced through a definition (*omnes scientiae fiunt per definitionem* = πᾶσαι αἱ ἐπιστῆμαι δι' ὀρίσμοῦ γίνονται).<sup>11</sup>

### 61.3. Example of Manifesting the Essence of a Thing through Definition: *Three*

ARISTOTLE manifests what he says (concerning the requirements for manifesting the essence of a thing through definition; ►54.11) using an example.<sup>12</sup> Thus, let us take these four (terms): *number*, *odd*, (and) *first* in either mode—for a **number** is said (to be) **first** in two modes: (**a**) because *it is not measured by some other number (non mensuratur aliquo alio numero* < μὴ μετρεῖσθαι ἀριθμῷ, i.e., what we call *prime number*, ►3.3), as it is evident—by an opposite—that four is not a first number because it is measured by two, while three is a first number because it is not measured by some number, but by the unit

<sup>9</sup> *In Post. an. 2*, l. 19, 104–110: “quadrangulus etiam habet exteriores quatuor angulos equales quatuor rectis, sed [sic] alia ratione: anguli enim eius intrinseci et extrinseci sunt equales octo rectis, set anguli intrinseci quadranguli sunt equales quatuor rectis, ergo anguli extrinseci sunt equales quatuor rectis.”

<sup>10</sup> *In Post. an. 2*, l. 19, 111–118 (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a19–21): “Sic igitur habere angulos exteriores *equales quatuor rectis* est *in plus quam triangulus aut quadrangulus*; set si simul accipiantur, equaliter se habebunt: *quecunque enim* figure communicant in hoc quod habeant angulos *exteriores equales quatuor rectis*, oportet quod *similiter* communicent in medio, quod est causa equalitatis ad quatuor angulos rectos.”

<sup>11</sup> *In Post. an. 2*, l. 19, 118–121 (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a21–23): “Et hoc probat sicut et prius, per hoc quod medium est diffinitio maioris extremitatis. Et inde est quod *omnes scientie fiunt per diffinitionem*.”

<sup>12</sup> *In Post. an. 2*, l. 13, 68–85 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96a35–37): “manifestat [Philosophus] quod dixerat per exemplum. Accipiamus enim ista quatuor, scilicet *numerus*, *inpar*, *primus utroque modo*. Dupliciter enim dicitur aliquis numerus primus: uno modo, quia *non* mensuratur aliquo alio *numero*, sicut per oppositum patet quod quaternarius non est numerus primus, quia mensuratur dualitate, ternarius autem est numerus primus, quia non mensuratur aliquo numero, set sola unitate; alio modo dicitur aliquis numerus primus, quia *non* componitur ex pluribus *numeris*, sicut patet per oppositum de septenario, qui primo modo est primus, non enim mensuratur nisi unitate, non autem est primus secundo modo, componitur enim ex ternario et quaternario; set ternarius non componitur ex pluribus numeris, set ex sola dualitate et unitate. Sic ergo patet quod quodlibet predictorum quatuor conuenit uniuersaliter trinitati.”

alone; **(b)** because *it is not composed from multiple numbers (non componitur ex pluribus numeris < μὴ συγκεῖσθαι ἐξ ἀριθμῶν)*, as is evident—by an opposite—of seven, which is first (i.e., prime) in the first mode, for it is measured only by the unit; but is not first in the second mode, for it is composed from three and four (i.e.,  $7 = 3 + 4$ ), while three is not composed from multiple numbers, but by two and the unit alone (i.e.,  $3 = 2 + 1$ ; whence, it is composed from two, which is a number, and the unit, which is not a number; ►2.1).

Thus, whichever of them (i.e., any of the terms *number*, *odd*, or *first* in either mode), also befits other (things) in the genus of number: for *number* and *odd* befit all odd numbers; and the latter—to wit, that it be *first* in one or in the other mode—befits also two, which is neither measured by another number nor is it composed from numbers, but from units alone.<sup>13</sup> Whence, all these (terms) simultaneously joined signify the essence of *three* (< τοῦτο τοίνυν ἤδη ἐστὶν ἡ τριάς, ἀριθμὸς περιπτὸς πρῶτος καὶ ὠδὶ πρῶτος, i.e., and of no other number, πάντα δὲ οὐδενί).

ARISTOTLE shows what he said above:<sup>14</sup>

1. The aforesaid (terms, i.e., *number*, *odd*, and *first* in both modes) must be predicated universally and of necessity of (the number) *three*.

As has been said (►17.4), those are of necessity in (a thing) which are predicated in the (*ratio* of its) essence.<sup>15</sup> And any of those that are of necessity in (a thing), are predicated (in the *ratio* of its essence). Therefore, it is necessary for those that are predicated in (the *ratio* of) the essence, whether of (the number) three or of any other thing, should be taken in the aforesaid mode: that they should be predicated of necessity and universally.

2. The essence itself of (the number) *three* should be constituted from the aforesaid (i.e., from *number*, *odd*, and *first* in both modes).

Indeed, if what has been posited above (i.e., *number*, *odd*, and *first* in both modes, joined simultaneously) should not be the substance itself of (the number) *three*, since it would be

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<sup>13</sup> *In Post. an. 2*, l. 13, 86–93 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96a37–b1): “Quodlibet autem eorum conuenit etiam aliis in genere numeri: nam hoc quod dicitur numerus et impar, conuenit *omnibus* numeris *imparibus*, *ultimum autem*, scilicet quod sit primus utroque modo, conuenit etiam *dualitati*, que nec mensuratur alio numero nec componitur ex numeris, set ex solis unitatibus; unde *omnia* ista simul iuncta significant ‘quod quid est’ ternarius.”

<sup>14</sup> *In Post. an. 2*, l. 13, 133–144 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96b1–14): “ostendit [Philosophus] quod supra dixerat. Et primo quod oporteat predicta uniuersaliter et ex necessitate predicari de ternario; secundo quod ex predictis constituatur ipsa essentia ternarii.”

<sup>15</sup> *In Post. an. 2*, l. 13, 133–137 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96b1–6): “Dicit ergo primo quod quia superius *ostensum est quod ea que predicantur in eo ‘quod quid est’* ex necessitate insunt, quecunque autem ex necessitate insunt, uniuersaliter predicantur, necesse est quod siue de ternario siue de quocunque alio accipiantur predicto modo ea que predicantur *in eo quod quid*, quod *ex necessitate* et uniuersaliter predicentur.”



predicated in (the ratio of) the essence, it would be necessary for it to be some genus, whether named or unnamed (< ἢ ὠνομασμένον ἢ ἀώνυμον).<sup>16</sup> For not every *ratio* has a name imposed; wherefrom, many—among the genera as much as among the species—are unnamed (►61.6). And hence, if the aforesaid *ratio* should not signify the essence of *three*, it must be its genus: for everything that is predicated in the essence is either the genus or the definition that signifies the essence.

However, it is not possible for it to be the genus.<sup>17</sup> For it would follow that it should be in more (things) than (in the number) *three*. Indeed, we suppose that to be a **genus which contains in potency multiple species under itself**. And it has been (shown) that the aforesaid *ratio* befits only individuals (*athomis* = ἀτόμοις, *id est individuis*) contained under (the species) *three*. It therefore remains that the aforesaid *ratio* should be the definition that signifies the essence of (the number) *three*. For that is supposed to be the essence of any one (thing) which is found in the individuals of that species finally according to the aforesaid mode of predication (i.e., of necessity and universally).

And what was said of (the *ratio* of the number) *three* is to be understood likewise of whatever other (*ratios*) of which something would be demonstrated to be the same through the aforesaid mode.<sup>18</sup>

#### 61.4. Example of Immediate Contraries in a Mathematical Definition: *Even* and *Odd*

Differences that are immediate (contraries; ►54.12) when compared to a lower genus are not immediate (contraries) if they are compared to a higher genus.<sup>19</sup> For example, *even* and *odd* are immediate (contraries) when compared to (the genus) *number*, of which they are proper differences; but (they are) not (immediate contraries) if they are compared to (the predicable genus) *quantity*.

<sup>16</sup> *In Post. an. 2*, l. 13, 138–159 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96b6–8): “ostendit [Philosophus] quod ex hiis que predicto modo accipiuntur constituatur essentia ternarii uel cuiuscunque alterius. Quia *necesse est, si hoc* quod supra positum est *non* esset ipsa substantia ternarii, cum predicetur in eo quod quid, quod esset quoddam *genus*, uel *nominatum* uel innominatum (non enim cuilibet rationi est nomen inpositum, et inde est quod multa sunt innominata tam in generibus quam in speciebus; ideo autem oportet quod predicta ratio sit genus ternarii, si non significet essentiam eius, quia omne quod predicatur in quid aut est genus aut diffinitio significans essentiam).”

<sup>17</sup> *In Post. an. 2*, l. 13, 159–169 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96b8–13): “Non est autem possibile quod sit genus, quia sequeretur quod esset *in plus quam* ternarius. Hoc *enim* supponimus esse *genus*, cuius potencia sub se plures species continet. Habitum est autem quod predicta ratio non conuenit nisi *athomis*, id est indiuiduis, sub ternario contentis. Relinquitur ergo quod predicta ratio sit diffinitio significans essentiam ternarii. *Hec enim* supponitur esse essentia *uniuscuiusque*, que inuenitur in indiuiduis illius speciei finaliter secundum predictum modum predicationis.”

<sup>18</sup> *In Post. an. 2*, l. 13, 169–172 (cf. ARISTOTLE, *Analytica Posteriora* B.13, 96b13–14): “Et sicut dictum est de ternario, ita etiam est intelligendum de quibuscunque aliis demonstraretur aliquid esse *idem* per modum predictum.”

<sup>19</sup> *In Post. an. 2*, l. 15, 82–87: “Differencie enim que sunt immediate si comparentur ad genus inferius, non sunt immediate si comparentur ad genus superius, sicut par et impar sunt immediata si comparentur ad numerum, cuius sunt proprie differencie, non autem si comparentur ad quantitatem.”

### 61.5. Example of Partial Universal: The First Subject of Parallel Lines

ARISTOTLE provides an example of the third mode (of erring in the acceptance of the universal: namely, when that of which something is demonstrated as the first universal is related to that which is demonstrated of it as whole to part; ►53.14, ¶3).<sup>20</sup> Thus, he says that, if someone should demonstrate, concerning straight lines, *that they would not meet* (if they should be produced indefinitely), the demonstration would seem to be of that—i.e., of a first universal—on account of (the proper affection) *not meeting* being in some straight lines; but not in such a way that this (demonstration) would be produced only if the straight lines should be equidistant. On the other hand, if (the straight lines) should be equidistant, then (the property) *not meeting* befits them in whatever (such lines), for it is universally true that equidistant straight lines, even if they should be infinitely produced, do not meet in either part.

### 61.6. Example of Unnamed Universal: The First Subject of Alternation

ARISTOTLE provides an example of the second mode (of erring in the acceptance of the universal: namely, when many lower species can be taken under something common, but that something common, which is found in the things that differ in species, is unnamed; ►53.14, ¶2).<sup>21</sup>

To understand this, it is to be known that a **proportion** (*proportio*, i.e., a ratio) is *a relation of one quantity to another*.<sup>22</sup> For example, six and three are related in *double* proportion.

A **proportionality** (*proportionalitas*), in turn, is *a collection of two proportions* (►6.10).<sup>23</sup> If this (collection) should be **disjoint**, it has four terms: for example, as four to two are

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<sup>20</sup> *In Post. an.* 1, l. 12, 66–77 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a13–16): “subiungit [Philosophus] exempla ad predictos modos. Et primo ad tertium, dicens quod, si quis demonstret de lineis rectis *quod non intercidant*, id est non concurrant, *uidebitur huius esse demonstratio*, scilicet uniuersalis primi, *propter hoc quod non concurrere inest aliquibus lineis rectis, non autem ita quod hoc fiat nisi lineae recte sint equales*, id est equedistantes; set, si fuerint *equales*, id est equedistantes, tunc non concurrere conuenit eis *in quolibet*, quia uniuersaliter uerum est quod lineae recte equedistantes, etiam si in infinitum protrahantur, in neutram partem concurrent.”

<sup>21</sup> *In Post. an.* 1, l. 12, 66–77 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a13–16): “subiungit [Philosophus] exempla ad predictos modos. Et primo ad tertium, dicens quod, si quis demonstret de lineis rectis *quod non intercidant*, id est non concurrant, *uidebitur huius esse demonstratio*, scilicet uniuersalis primi, *propter hoc quod non concurrere inest aliquibus lineis rectis, non autem ita quod hoc fiat nisi lineae recte sint equales*, id est equedistantes; set, si fuerint *equales*, id est equedistantes, tunc non concurrere conuenit eis *in quolibet*, quia uniuersaliter uerum est quod lineae recte equedistantes, etiam si in infinitum protrahantur, in neutram partem concurrent.”

<sup>22</sup> *In Post. an.* 1, l. 12, 93–95: “Circa primum sciendum est quod proportio est habitudo unius quantitatis ad alteram, sicut sex ad tria se habent in proportione dupli.” Cf. BOETHIUS, *De institutione arithmetica*, 2.40, 137.13–16: “Proportio est duorum terminorum ad se invicem quaedam habitudo et quasi quodammodo continentia, quorum compositio quod efficit, proportionale est.” Cf. NICOMACHUS, *Introductio arithmeticae*, 2.21, 120.5–6: “λόγος μὲν οὖν ἐστὶ δύο ὄρων πρὸς ἀλλήλους σχέσις.”

<sup>23</sup> *In Post. an.* 1, l. 12, 96–112: “proportionalitas uero est collectio duarum proportionum, que, si sit disiuncta, habet quatuor terminos, ut hic: «Sicut se habent quatuor ad duo, ita sex ad tria», si uero sit coniuncta, habet tres terminos, nam uno utitur ut duobus, ut hic: «Sicut se habent octo ad quatuor, ita quatuor ad duo». Patet autem quod in proportionalitate duo termini se habent ut antecedencia, duo uero

related, so (are related) six to three (i.e.,  $4 : 2 :: 6 : 3$ ). If, on the other hand, it should be **conjoined**, it has three terms, for one (term) is used as two (terms): for example, as eight to four are related, so (are related) four to two (i.e.,  $8 : 4 :: 4 : 2$ ).

Therefore, ARISTOTLE says that *to be proportionate according to alternation* (*proportionale commutabiliter* < ἀνάλογον ὅτι καὶ ἐναλλάξ) befits numbers, lines, bodies, and times.<sup>24</sup> And just like (this) has at some time (< ποτε) been determined separately—of numbers, in arithmetic; of lines and bodies, in geometry; of times in natural philosophy or in astronomy—, so, it may be demonstrated—of all of the aforesaid in one demonstration—that they should be proportionate by alternation. Yet, that they should be proportionate by alternation is demonstrated separately of each of them because that (which is) common, (i.e., that) in which all these are (something) one (< ταῦτα πάντα ἓν), is unnamed.

Thus, even if *quantity* is common to all these, however, (*to be proportionate by alternation*) comprehends under itself other (subjects) apart from these: for example, sentences, and other (subjects) that are quantities by accident (► 35.3, ¶1).<sup>25</sup>

Or (alternatively), better (still), it is to be said that *to be proportionate by alternation* does not befit quantity insofar as it is a quantity, but insofar as it is compared to another quantity according to some proportionality.<sup>26</sup> And hence, ARISTOTLE says in the beginning (of this discussion) that (it is) a proportional that can be alternated (τὸ ἀνάλογον ὅτι καὶ ἐναλλάξ);

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ut consequentia, ut hic: «Sicut se habent quatuor ad duo, ita se habent sex ad tria»: sex et quatuor sunt antecedentia, tria et duo sunt consequentia. Permutata ergo proportio est quando antecedentia inuicem conferuntur et consequentia similiter, ut si dicam: «Sicut se habent quatuor ad duo, ita se habent sex ad tria», ergo: «Sicut se habent quatuor ad sex, ita se habent duo ad tria.» Cf. BOETHIUS, *De institutione arithmetica*, 2.40, 137.8–17: «Est igitur proportionalitas duarum vel trium vel quotlibet proportionum adsumptio ad unum atque collectio. Ut etiam communiter definiamus: proportionalitas est duarum vel plurium proportionum similis habitudo, etiamsi non eisdem quantitibus et differentiis constitutae sint. Differentia vero est inter numeros quantitas. [...] Ex iunctis enim proportionibus proportionalitas fit.» Cf. NICOMACHUS, *Introductio arithmeticae*, 2.21, 120.2–10: «ἔστιν οὖν ἀναλογία κυρίως δυεῖν ἢ πλειόνων λόγων σύλληψις ἐς τὸ αὐτό, κοινότερον δὲ δυεῖν ἢ πλεόνων σχέσεων, κἂν μὴ λόγῳ τῷ αὐτῷ ὑποτάσσωνται, διαφορὰ δὲ ἢ τινι ἐτέρῳ. λόγος μὲν οὖν ἐστὶ δύο ὄρων πρὸς ἀλλήλους σχέσις, σύνθεσις δὲ τῶν τοιούτων ἢ ἀναλογία, ὥστε ἐν ἐλαχίστοις ὄροις τρισὶν αὕτη συμμέμικται, δύναται γε μὴν καὶ ἐν πλείοσι κατὰ τὸ αὐτὸ διάστημα ἢ κατὰ τὸν αὐτὸν λόγον προχωρεῖν.»

<sup>24</sup> *In Post. an.* 1, l. 12, 113–124 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a17–23): «Dicit ergo [Philosophus] quod esse *proportionale commutabiliter*, conuenit numeris et lineis et firmis, id est corporibus, et temporibus; sicut autem de singulis *determinatum est aliquando seorsum*, de numeris quidem in arismetica, de lineis et firmis in geometria, de temporibus in naturali philosophia uel astrologia, ita *contingens* est quod *de omnibus* predictis commutatim proportionari *una demonstratione* demonstretur; *set* ideo commutatim proportionari de singulis horum seorsum demonstratur, quia *non est* nominatum illud commune, *in quo omnia ista sunt unum.*»

<sup>25</sup> *In Post. an.* 1, l. 12, 125–128 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a17–23): «Etsi enim quantitas omnibus hiis communis est, tamen et sub se alia preter hec comprehendit, sicut orationem et quedam que sunt quantitates per accidens.»

<sup>26</sup> *In Post. an.* 1, l. 12, 128–135 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a17–23): «Vel melius dicendum quod commutatim proportionari non conuenit quantitati in quantum est quantitas, set in quantum est comparata alteri quantitati secundum proportionalitatem quandam, et ideo etiam dixerat [Philosophus] in principio *proportionale esse quod commutabiliter est*; omnibus autem istis, in quantum sunt *proportionalia*, non est nomen commune positum.»

and there is no posited common name for all of these (i.e., for numbers, lines, bodies, and times) *insofar as they are proportional*.

Thus, since *to be proportionate by alternation* is demonstrated individually of each of the aforesaid, the universal is not shown.<sup>27</sup> For *to be proportionate by alternation* is not in numbers or in lines insofar as they are such, but as something common. And those who demonstrate (this) separately, about lines or about numbers, posit *to be proportionate by alternation* as some universal predicate of line insofar as it is a line; or of number insofar as (it is a) number.

### 61.7. Mathematical Demonstration is from Proper—Not Common—Principles

ARISTOTLE proves that it is not sufficient to demonstrate something from true and immediate (principles).<sup>28</sup> For, in this way, something could be demonstrated as BRYSON (of Heraclea) demonstrated the squaring of the circle, showing, through some common principles, that some square is equal to a circle.

(The demonstration proceeds, according to a report by Pseudo-ALEXANDER of Aphrodisia) in the following mode.<sup>29</sup> Any genus in which something greater and (something) lesser is to be found, in the same (genus) is to be found also (something that is) equal to them. Now, in the genus of squares, some square is to be found (that is) less than a circle: to wit, which is inscribed inside a circle. And some (square) greater than the circle (is to be found), inside of which a circle is described. Therefore, some square equal to the circle is to be found.

This proof is according to a common (principle), for *equal*, *greater*, and *less* exceed the genus of *square* and of *circle*. Whence, it is evident that such *ratios* (*rationes* = λόγοι) are

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<sup>27</sup> *In Post. an.* 1, l. 12, 136–145 (cf. ARISTOTLE, *Analytica Posteriora* A.5, 74a23–25): “Cum autem demonstratur commutatim proportionari de singulis predictorum diuisim, *non monstratur uniuersale: non enim* commutatim proportionari inest numeris uel lineis *secundum quod* huiusmodi, *set secundum* quoddam commune; demonstrantes autem de lineis seorsum uel de numeris *ponunt* hoc quod est commutabiliter proportionari esse quasi quoddam *uniuersale* predicatum lineae secundum quod linea est, aut numeri secundum quod numerus.”

<sup>28</sup> *In Post. an.* 1, l. 17, 19–25 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 75b40–40): “probat [Philosophus] propositum, scilicet quod non sufficiat ex ueris et immediatis aliquid demonstrare, quia sic contingeret aliquid demonstrare *sicut* Brisso demonstrauit *tetragonismum*, id est quadraturam circuli, ostendens aliquod quadratum esse circulo equale per aliqua principia communia.”

<sup>29</sup> *In Post. an.* 1, l. 17, 25–32: “hoc modo: in quocunque genere est inuenire aliquid maius et minus alicui, in eodem est inuenire et illi equale; in genere autem quadratorum est inuenire aliquod quadratum minus circulo, quod scilicet scribitur intra circulum, aliquod autem maius circulo, intra quod circulus describitur; ergo est inuenire aliquod quadratum equale circulo.” Cf. CAG 2.3, 90.10–17: “ἀλλ’ ὁ τοῦ Βρύσωνος τετραγωνισμὸς τοῦ κύκλου ἐριστικός ἐστι καὶ σοφιστικός, ὅτι οὐκ ἐκ τῶν οἰκείων ἀρχῶν τῆς γεωμετρίας ἀλλ’ ἐκ τινῶν κοινοτέρων. τὸ γὰρ περιγράφειν ἐκτὸς τοῦ κύκλου τετράγωνον καὶ ἐντὸς ἐγγράφειν ἕτερον καὶ μεταξὺ τῶν δύο τετραγώνων ἕτερον τετράγωνον, εἶτα λέγειν ὅτι ὁ μεταξὺ τῶν δύο τετραγώνων κύκλος, ὁμοίως δὲ καὶ τὸ μεταξὺ τῶν δύο τετραγώνων τετράγωνον τοῦ μὲν ἐκτὸς τετραγώνου ἐλάττονα εἶσι τοῦ δὲ ἐντὸς μείζονα, τὰ δὲ τῶν αὐτῶν μείζονα καὶ ἐλάττονα ἴσα ἐστίν, ἴσος ἄρα ὁ κύκλος καὶ τὸ τετράγωνον.”

demonstrated according to something common, since the mean is in (a subject) other than that (subject) of which the demonstration is produced. And hence, such *ratios* befit other (i.e., more common subjects), and do not befit these (subjects), of which they are given as (though they should be) proximate (principles).<sup>30</sup>

### 61.8. Diversity of the Proper Principles of Mathematical Demonstrations

As ARISTOTLE shows, the principles of true syllogisms are not the same.<sup>31</sup> One of the reasons (he uses to prove this) is taken from the difference of proper principles.<sup>32</sup>

Whence, he says that the principles of true syllogisms are not the same; for the principles of diverse genera are diverse.<sup>33</sup> For example, it is evident that the principles of magnitudes are points; and (that the principles) of numbers (are) units; which do not agree with each other (*non conveniunt sibi invicem* < οὐδ' ἐφαρμόττουσαι, οὐκ ἐφαρμόττουσιν), for units do not have a position (*positio* = θέσις), while points have (a position).

If the principles of all syllogisms should agree with each other, it would be necessary for them to agree in a mean (*in medio* = εἰς μέσα) either upwards (*sursum* = ἡ ἄνωθεν), ascending towards a greater extremity, or downwards (*sursum* = ἡ κάτωθεν), descending towards a lesser (extremity).<sup>34</sup> For, in a syllogism, it is necessary that the termini be taken either internally or externally:

**1. Internally** (*interius* = εἴσω), when syllogisms are multiplied (in order) to prove the propositions brought forward, it is necessary to take means that are between the aforesaid propositions and the subjects.<sup>35</sup> For example, let the syllogism be: "Every *B* is an *A*; every

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<sup>30</sup> *In Post. an.* 1, l. 17, 32–40 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 75b41–42): "Hec quidem probatio est *secundum commune*: equale enim et maius et minus excedunt genus quadranguli et circuli. Vnde patet quod *huiusmodi rationes demonstrantur secundum aliquid commune*, quia medium *alteri inest* quam ei de quo fit demonstratio; et ideo huiusmodi rationes *conveniunt* aliis, et *non* conveniunt istis de quibus dantur tanquam *proximis*."

<sup>31</sup> *In Post. an.* 1, l. 43, 73–75 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88a31–b10): "Deinde cum dicit: *Nec etiam uerorum etc.*, ostendit quod nec sillogismorum uerorum sunt eadem principia, quatuor rationibus."

<sup>32</sup> *In Post. an.* 1, l. 43, 76–77 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88a31–34): "Quarum [ratio] prima sumitur ex differentia principiorum propriorum."

<sup>33</sup> *In Post. an.* 1, l. 43, 78–84 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88a31–34): "Vnde dicit quod *nec etiam uerorum sillogismorum sunt eadem principia*. Diuersorum enim generum diuersa principia sunt, sicut <patet quod magnitudinum principia sunt> puncta, numerorum autem unitates, que *non conveniunt* sibi inuicem, quia unitates *non habent positionem*, puncta uero *habent*." Cf. ARISTOTLE, *Analytica Posteriora* A.32, 88a31–34: "ἕτεροι γὰρ πολλῶν τῶ γενέει αἱ ἀρχαί, καὶ οὐδ' ἐφαρμόττουσαι, οἷον αἱ μονάδες ταῖς σιγμῶν οὐκ ἐφαρμόττουσιν· αἱ μὲν γὰρ οὐκ ἔχουσι θέσιν, αἱ δὲ ἔχουσι."

<sup>34</sup> *In Post. an.* 1, l. 43, 84–90 (cf. ARISTOTLE, *Analytica Posteriora* A.32, 88a35–36): "Si autem principia omnium sillogismorum conuenirent ad inuicem, *nesesse* esset quod uel conuenirent in medio, uel *sursum*, ascendendo uersus maiorem extremitatem, uel *deorsum*, descendendo uersus minorem, quia in sillogismis *nesesse* est quod termini uel assumantur *interius* uel *exterius*."

<sup>35</sup> *In Post. an.* 1, l. 43, 91–101: "Interius quidem, quando multiplicantur sillogismi ad probandum propositiones inductas: tunc enim *nesesse* est quod accipiantur media que sunt inter predicata propositionum et subiecta, puta si sit talis sillogismus: «Omne B est A; Omne C est B; Ergo omne C est

*C* is a *B*; therefore, every *C* is an *A*.” If one should prove that “every *B* is an *A*” (i.e., the major premise), some mean must be taken between *B* and *A*: for example, *D*. Likewise, if one must prove the minor, some mean must be taken between *B* and *C*. And in this way, the terms taken are always had internally.

**2. Externally** (*exteriorius* = ἔξω), when a greater extremity is taken (by) ascending or a lesser (extremity is taken by) descending.<sup>36</sup> For example (ascending from the conclusion, every *C* is an *A*), if *A* is concluded from *C* through *B*, and again *Z* is concluded from *B* through *A*, and so on. Likewise, also, one proceeds descending if *B* is concluded of *F* through *C*.

Therefore, in syllogisms that communicate in (i.e., have in common the same) principles, it is necessary either that the mean of one syllogism be taken above the propositions of another syllogism; or (that) the extremities of one syllogism be taken above or below the extremities of another syllogism.<sup>37</sup>

However, this cannot be (done) in things whose principles are diverse.<sup>38</sup> Thus, points can be taken neither as means nor as extremes in syllogisms in which something is concluded concerning a number. Nor (can) units (be taken as means or as extremes) in syllogisms in which something about magnitudes is concluded.

It remains, therefore, that the principles of all syllogisms cannot be the same.<sup>39</sup>

### 61.9. Mathematical Means and Extremities Are in the Same Genus

ARISTOTLE proves as follows that, in a demonstration, means and extremities must be of one genus.<sup>40</sup> Thus, let it be given that the mean should be of a genus other than (the

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*A*», si oporteat probari: «Omne *B* est *A*», oportet assumere aliquod medium inter *B* et *A*, puta *D*; et similiter si debeat probari minor, oportet accipere aliquod medium inter *B* et *C*, puta *E*; et sic semper termini assumpti interius habentur.”

<sup>36</sup> *In Post. an. 1*, l. 43, 102–107: “Exteriorius autem assumuntur, quando uel maior extremitas accipitur ut medium ascendendo, uel minor descendendo, puta si *A* concludatur de *C* per *B* et iterum *Z* concludatur de *B* per *A*, et sic inde; similiter etiam proceditur descendendo, si *B* concludatur de *F* per *C*.”

<sup>37</sup> *In Post. an. 1*, l. 43, 108–112: “Necesse est ergo in sillogismis communicantibus in principiis, uel quod accipiatur medium unius sillogismi supra propositiones alterius sillogismi, uel accipiantur extrema unius sillogismi supra uel infra extrema alterius sillogismi.”

<sup>38</sup> *In Post. an. 1*, l. 43, 113–117: “Sed hoc non potest esse in rebus quarum sunt principia diuersa, quia puncta non possunt accipi nec ut media nec ut extrema in sillogismis in quibus concluditur aliquid de numero, nec etiam unitates in sillogismis in quibus concluditur aliquid de magnitudinibus.”

<sup>39</sup> *In Post. an. 1*, l. 43, 117–120: “Relinquitur ergo quod non possunt esse eadem principia omnium sillogismorum.”

<sup>40</sup> *In Post. an. 1*, l. 15, 114–124 (cf. ARISTOTLE, *Analytica Posteriora* A.7, 75b11–12): “Quod autem in demonstratione oporteat media et extrema unius generis esse, sic probat [Philosophus]. Detur enim quod medium sit alterius generis ab extremis, sicut si extrema sint ‘triangulus’ et ‘habere tres angulos equales duobus rectis’, <medium autem sit ‘eneum’>: manifestum est quod passio conclusa de triangulo per se inest ei, non autem per se inest eneo; et si e contrario passio per se inesset eneo, puta sonorum esse, uel aliquid huiusmodi, palam est quod per accidens inesset triangulo.”

genus of) the extremities. For example, if the extremities should be *triangle* and *having three (internal) angles equal to two right (angles, i.e., equal to 180°)*; and the mean should be *brazen*. It is manifest that the affection (i.e., having three internal angles equal to 180°) concluded about the triangle is in it by itself; but it is not by itself in the brazen. And, contrarily, if the affection—for example, *to be sonorous* or something such—should be by itself in the brazen, it is evident that it should be by accident in the triangle.

### 61.10. No Paralogisms in Mathematics

As ARISTOTLE says, paralogisms—that is, syllogisms that err in form, as (occurs) in dialectical (syllogisms)—are not produced in mathematics (*in doctrinis* = ἐν... τοῖς μαθήμασιν).<sup>41</sup> For in demonstrative (syllogisms) the mean must always be twofold: that is, (must always) be compared to two extremities, since both the greater extremity is universally predicated of the mean, and, again, the mean is universally predicated of the lesser extremity; but what is predicated is not said *all* [or *every*] (*omne* = πᾶν): that is, the universal sign is not added in apposition to the predicate (e.g., we do not say that every man is *every* mortal).

On the other hand, in the fallacy of equivocation the mean is indeed the same according to voice (*secundum vocem*), but not according to thing (*secundum rem*).<sup>42</sup> And hence, when it is proposed in voice, (the equivocation) lies concealed; but if it should be demonstrated to sense, there could be no deception.

For example, the name *circular* is equivocally said of a (geometrical) figure and of a poem. Therefore, in argumentations (*in rationibus* = ἐν... τοῖς λόγοις, *id est in argumentationibus*) it lies concealed (*latet* = λανθάνει): that is, a deception can occur; as if one should say, “everything that is circular is a figure; Homer’s poem is circular; therefore, Homer’s poem is a figure.”<sup>43</sup> But there could be no deception if a circle should be described to sense, as when a circle is described in sand: indeed, it will be manifest that songs are not circles.

<sup>41</sup> *In Post. an.* 1, l. 22, 96–104 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b27–30): “Dicit ergo [Philosophus] quod *in doctrinis non fit paralogismus*, id est sillogismus peccans in forma, sicut in dyaleticis; in demonstratiuis enim oportet *medium idem semper dupliciter* esse, id est ad duo extrema comparari, quia et de medio maior extremitas uniuersaliter predicatur, et medium iterum uniuersaliter predicatur de minori extremitate. Set *quod predicatur, non dicitur omne*, id est signum uniuersale non apponitur ad predicatum.”

<sup>42</sup> *In Post. an.* 1, l. 22, 105–109: “In fallacia uero equiuocationis est quidem idem medium secundum uocem, non autem secundum rem, et ideo, quando in uoce proponitur, latet, set si ad sensum demonstretur, non potest ibi esse aliqua deceptio.”

<sup>43</sup> *In Post. an.* 1, l. 22, 109–119 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b30–34): “sicut hoc nomen ‘circulus’ equiuoce dicitur de figura et de poemate. *In rationibus* ergo, id est in argumentationibus, *latet*, id est deceptio potest accidere, sicut si dicatur: «Omnis circulus est figura; poema Homeri est circulus; ergo <poema Homeri> est figura»; si uero describatur ad sensum circulus, nulla potest esse deceptio: *manifestum* enim erit quod *carmina* non sunt *circulus*; sicut cum circulus describitur in puluere, manifestum est quod *carmina* non sunt circulus.”

And just like this deception is excluded because the mean is demonstrated to sense, so, too, in demonstrative (syllogisms), (a deception) is excluded because the mean is demonstrated to the intellect.<sup>44</sup> For when something is defined, it is related to the intellect as that which is sensibly described is related to sight. Hence, ARISTOTLE says that the (things) defined in the demonstrative sciences are as though seen by the intellect. And demonstrations always proceed from definitions. Whence, there can be no deception there according to the fallacy of equivocation; and even less according to other fallacies in diction.

### 61.11. Example of an Equivocal Mean: Likeness

ARISTOTLE adds another example (of how a mean is taken as a cause) in equivocal (things).<sup>45</sup> He says that the cause of *being alike* (*esse simile* = ὁμοιον εἶναι) is diverse in colors and in figures, for it is equivocally said in one (subject genus) and in the other. Indeed, in figures, to be alike is only for the sides to be proportional and the angles to be equal (► 41.34, ¶2); but in colors, to be alike is for them to produce the same mutation (*immutatio*) in sense, or some other such (affection).

### 61.12. Example of a Univocal Mean in Mathematics: Alternate Ratio

As ARISTOTLE says, to be proportionate according to alternate ratio (*vicissim analogum* = ἐναλλάξ ἀνάλογον, *id est commutatim proportionari*; ► 6.11, ¶1) is univocally found in many (things; ► 61.6).<sup>46</sup> For example, in numbers and in lines, in which (such a proportion) has in some mode another cause and in some mode the same. (It has) another (cause) according to species: to wit, insofar as numbers and lines are diverse. Yet, (the cause of such a proportion) is the same in genus: to wit, insofar as both lines and numbers agree in that they have (i.e., they are susceptible of) such an addition from which alternate proportion should be demonstrated.

<sup>44</sup> *In Post. an. 1*, l. 22, 119–131 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b30–34): “Sicut autem hec deceptio excluditur per hoc quod medium demonstratur ad sensum, ita et in demonstratiuis excluditur per hoc quod medium demonstratur ad intellectum: cum enim aliquid diffinitur, ita se habet ad intellectum sicut id quod sensibilibus describitur se habet ad uisum. Et ideo dicit [Philosophus] quod *hec*, scilicet diffinita in demonstratiuis scientiis, *sunt ut uidere intellectu*. In demonstrationibus autem semper proceditur ex diffinitionibus, unde non potest ibi esse deceptio secundum fallaciam equiuocationis; et multo minus secundum alias fallacias in dictione.”

<sup>45</sup> *In Post. an. 2*, l. 19, 71–79 (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a11–15): “Aliud autem exemplum subiungit [Philosophus] in equiuocis. Et dicit quod *eius quod est esse simile*, alia causa est in coloribus et in figuris, quia equiuoce dicitur utrobique: in figuris enim nichil est aliud esse simile quam quod *latera* habeant analogiam, id est quod sint ad inuicem proportionalia, et quod anguli sint equales; set *in coloribus* esse simile est quod faciant eandem inmutationem in sensu, uel *aliquid aliud huiusmodi*.”

<sup>46</sup> *In Post. an. 2*, l. 19, 61–70 (cf. ARISTOTLE, *Analytica Posteriora* B.17, 99a8–11): “Sicut *uicissim analogum*, id est commutatim proportionari, uniuoce in multis inuenitur, puta in *numeris* et in *lineis*, in quibus habet quodam modo aliam causam et quodam modo eandem: aliam quidem secundum speciem, in quantum scilicet alii sunt numeri et alie linee, set est genere eadem, in quantum scilicet tam linee quam numeri conueniunt in hoc quod habent tale *augmentum*, ex quo in eis commutata proportio demonstratur.”



### 61.13. Example of Mathematical Demonstration through a Material Cause

ARISTOTLE proposes an example (of demonstration through a material cause) in mathematical (things).<sup>47</sup> And (this) is not against what he says in his *Metaphysics*—that the mathematical sciences do not demonstrate through the material cause.

Indeed, mathematics abstracts from sensible matter, but not from intelligible matter (► 13.13); which intelligible matter is considered insofar as something divisible is taken either in numbers or in continua. And thus, whenever something is demonstrated in mathematics about a whole through the parts, the demonstration seems to be through a material cause—for parts are related to whole according to the *ratio* of matter (► 13.1). Thus, the parts of quantity, from which a demonstration seems to be taken in some mode from a material cause, are not sensible matter: rather, they pertain to intelligible matter, which is found also in mathematical things. And since *matter* is more properly said in sensible (things), on account of this ARISTOTLE does not want to call it *material cause* but *cause of necessity* (< τὸ τίνων ὄντων ἀνάγκη τοῦτ' εἶναι; ► 9.9, ¶1b).

To make this example evident, it is to be known that *every angle that falls in a semicircle is a right (angle; this is the enunciation; ► 1.7)*, as EUCLID proves (in his *Elements*, Book 3, Proposition 31).<sup>48</sup>

The proof is as follows:

**(Exposition.)** Let there be a semicircle *ABC* (► **Figure 17**).<sup>49</sup> And its chord, which is the diameter of the circle (i.e., *AC*), be divided in half at point *D*, which is the center of the

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<sup>47</sup> *In Post. an. 2*, l. 9, 70–86 (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a27–35): “proponit [Philosophus] exemplum in mathematicis. Nec est contra id quod dicitur in III Metaphisice, quod mathematice scientie non demonstrant per causam materialem: mathematica enim abstrahit quidem a materia sensibili, non autem a materia intelligibili, ut dicitur in VI Metaphisice, que quidem materia intelligibilis consideratur secundum quod aliquid diuisibile accipitur uel in numeris uel in continuis; et ideo quandocumque in mathematicis aliquid demonstratur de toto per partes, uidetur esse demonstratio per causam materialem: partes enim se habent ad totum secundum rationem materie, ut habetur in II Phisicorum; et quia materia magis proprie dicitur in sensibilibus, propter hoc noluit eam nominare causam materialem, set causam necessitatis.” *In De Trin.*, q. 5 a. 3 ad 4, 335–342 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a9–12): “mathematica non abstrahuntur a qualibet materia, set solum a materia sensibili. Partes autem quantitatis, a quibus demonstratio sumpta quodammodo a causa materiali uidetur sumi, non sunt materia sensibilis set pertinent ad materiam intelligibilem, que etiam in mathematicis inuenitur, ut patet in VII Metaphisice.”

<sup>48</sup> *In Post. an. 2*, l. 9, 87–92 (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a27–35): “Ad euidenciam autem exempli quod in litera ponitur, sciendum est quod omnis angulus cadens in semicirculo est rectus, ut probatur in III Euclidis. Est autem probatio talis.” Cf. EUCLID, *Opera Omnia*, vol. 1, 240.18–19: “Ἐν κύκλῳ ἢ μὲν ἐν τῷ ἡμικυκλίῳ γωνία ὀρθή ἐστίν,” that is, “in a circle, the angle in the semicircle is right,” which is demonstrated along with other theorems. Cf. HEIBERG’s version (ibid., 241): “In circulo angulus in semicirculo positus rectus est.”

<sup>49</sup> *In Post. an. 2*, l. 9, 92–101: “sit semicirculus *ABC*; chorda autem eius, que est dyiameter circuli, diuidatur per medium in puncto *D*, quod est centrum circuli; erigatur ergo super punctum *D* linea perpendicularis, que attingat circumferenciam circuli in puncto *B*, a quo ducantur due linee ad duo puncta *A* et *C*.”

circle. Therefore, over the point  $D$ , let there be erected a perpendicular line that should touch the circumference of the circle in point  $B$ , from which two lines should be drawn to points  $A$  and  $C$  (i.e., at the extremities of the chord).

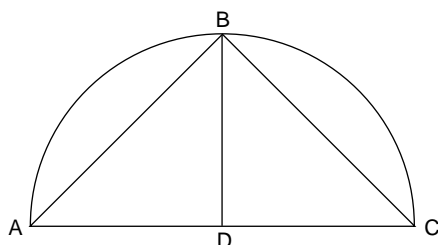


Figure 17: An angle that falls on a semicircle is a right angle.

**(Specification.)** I therefore say that *the angle ABC, which falls in the semicircle, is right.*<sup>50</sup>

**Proof:** The triangle  $BDC$  has three angles equal to two right (angles).<sup>51</sup> And its angle  $BDC$  is right, for the line  $BD$  is perpendicular. Therefore, the other two angles—namely,  $DBC$  and  $BCD$ —are equal to one right (angle). And these two angles are equal, because the two lines  $DB$  and  $DC$  are equal, since they are drawn from the center to the circumference. It therefore remains that the angle  $DBC$  should be a half part of a right (angle). Also, in a similar mode, it is proven that the angle  $ABD$  should be half a part of a right (angle).

**(Conclusion.)** Therefore, *the whole angle ABD is right.*<sup>52</sup>

And this (is the) proof (that) ARISTOTLE uses here.<sup>53</sup> He says that it is manifest, through this mode, *on account of what* the angle that falls in a semicircle is right, while he accepts: (if) that (matter) exists, it follows that (the angle) should be right.

Let therefore **A** be “right angle” (< ὀρθή),<sup>54</sup> which is the greater extremity (i.e., the major term of the syllogism); (let) “half of two right [angles]” (< μίσεια δυοῖν ὀρθαῖν) be the mean, **B** (i.e.,

<sup>50</sup> *In Post. an. 2, l. 9, 101–102:* “dico ergo quod angulus ABC, cadens in semicirculo, est rectus.”

<sup>51</sup> *In Post. an. 2, l. 9, 102–112:* “Probatio: triangulus BDC habet tres angulos equales duobus rectis; set angulus eius BDC est rectus, quia linea BD est perpendicularis; ergo duo alii anguli, scilicet DBC et BCD, sunt equales uni recto; set hii duo anguli sunt equales, eo quod due linee DB et DC sunt equales, quia protrahuntur a centro ad circumferenciam; relinquitor ergo quod angulus DBC sit media pars recti anguli; pari quoque modo probatur quod angulus ABD sit media pars recti.”

<sup>52</sup> *In Post. an. 2, l. 9, 112–113:* “ergo totus angulus ABC est rectus.”

<sup>53</sup> *In Post. an. 2, l. 9, 114–118* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a27–28): “Hac ergo probatione utitur hic Philosophus, dicens quod *manifestum est* per hunc modum <propter quid> est *recta que in semicirculo*, id est, est rectus angulus qui cadit in semicirculo, dum accipit id *quo existente* sequitur quod sit rectus.”

<sup>54</sup> *In Post. an. 2, l. 9, 119–122* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a28–30): “Sit ergo rectus angulus *in quo A*, quod est maior extremitas, medietas duorum angulorum sit medium, *in quo est B*, angulus cadens in semicirculo sit minor extremitas, *in quo est C*.”

the middle term); (and let) “an angle that falls in a semicircle” ( $\epsilon\lambda\lambda\epsilon\upsilon\sigma\epsilon\iota\varsigma$ ) be the lesser extremity, **C** (i.e., the minor term).

Therefore, the cause of that which is for **A** to be in **C**, that is, (the cause) that “an angle [that falls] in a semicircle should be right,” is **B**: to wit, that an angle of (i.e., that falls on) a semicircle is “half of two right [angles].”<sup>55</sup> (That is, the cause for the proper affection, **A** = “right angle,” to be in the subject of the conclusion, **C** = “an angle that falls in a semicircle,” such that **A** in **C** = “an angle that falls in a semicircle is a right angle,” is **B** = “half of two right angles,” which is a definition of *right angle* through a material cause, because right angle—i.e.,  $90^\circ$ —is one half part of the whole two right angles—i.e.,  $180^\circ$ —, which part has the *ratio* of *matter*.)

And this mean (i.e., **B**) is equal by conversion to **A** itself.<sup>56</sup> (That is, **A** =  $90^\circ$  is convertible with **B** = one half of  $180^\circ$ .) And **C** itself is, in a similar mode, equal to **B** itself, for **B** is “to be a half of two right [angles].” (That is, **C** = “an angle that falls in a semicircle” is also equal to **B** = one half of  $180^\circ$ .) Therefore, (if) this exists (i.e., if **B** = one half of  $180^\circ$ , which is as matter, exists), it is necessary for **A** to be in **C**, which is nothing other than for the angle of the semicircle to be right.

ARISTOTLE adds that this mode of demonstration can also pertain to the formal cause, which he calls *essence* (*quod quid erat esse* =  $\tau\omicron\ \tau\acute{\iota}\ \tilde{\eta}\nu\ \epsilon\acute{\iota}\nu\alpha\iota$ ), because *to be a half of two right (angles)* can be taken as the *ratio* that signifies *that which* a right angle is ( $\epsilon\lambda\lambda\epsilon\upsilon\sigma\epsilon\iota\varsigma$   $\epsilon\sigma\tau\iota\ \tau\omega\ \tau\acute{\iota}\ \tilde{\eta}\nu\ \epsilon\acute{\iota}\nu\alpha\iota$ ,  $\tau\omega\ \tau\omicron\ \tau\acute{\iota}\ \tilde{\eta}\nu\ \epsilon\acute{\iota}\nu\alpha\iota$  σημαίνει τον λόγον).<sup>57</sup>

#### 61.14. Geometrical vs. Non-Geometrical Inquiry: Do Parallel Lines Meet?

As ARISTOTLE says, when an inquiry about geometry—that is, about those (things) that pertain to geometry—inquires about something which is against a truth of geometry, it is in some mode geometrical (*geometrica* < γεωμετρικόν) and in another mode (it is) non-geometrical (*non geometrica* < ἀγεωμέτρητον): for example, if a question should be produced about whether parallels—that is, equidistant lines—should meet.<sup>58</sup>

<sup>55</sup> *In Post. an. 2, l. 9, 122–125* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a30–31): “Huius igitur quod est *A* esse in *C*, id est quod angulus in semicirculo sit rectus, causa est *B*, scilicet quod angulus semicirculi est medium duorum rectorum.”

<sup>56</sup> *In Post. an. 2, l. 9, 125–131* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a31–34): “Hoc enim medium est equale per conuersionem *ipsi A*, et ipsum *C* est simili modo equale *ipsi B*. Nam *B* est esse medietatem duorum angulorum rectorum. Hoc igitur existente, necesse est quod *A* sit in *C*, quod nichil est aliud quam angulum semicirculi esse rectum.”

<sup>57</sup> *In Post. an. 2, l. 9, 131–136* (cf. ARISTOTLE, *Analytica Posteriora* B.11, 94a34–35): “Subiungit autem [Philosophus] quod hic modus demonstrationis potest etiam ad causam formalem pertinere, quam nominauerat ‘quod quid erat esse’, eo quod esse medium duorum rectorum potest accipi ut ratio significans ‘quod quid est’ recti anguli.”

<sup>58</sup> *In Post. an. 1, l. 22, 60–66* (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b22–24): “dicit [Philosophus]: interrogatio *de geometria*, id est de hiis que ad geometriam pertinent, cum interrogatur de aliquo quod est contra ueritatem geometrie, sicut si fiat questio de hoc quod est *parallelas subire*, id est lineas eque distantes concurrere, est quodam modo *geometrica* et quodam modo *non geometrica*.”

(To explain this through an analogy), *arhythmical* (ἄρρυθμον)—i.e., that which is without rhythm or sound—is understood in two modes: (1) that which in no mode has sound, such as wool; (2) that which has a poor sound, like a bell that does not sound well.<sup>59</sup> Likewise, *non-geometrical inquiry* is said in two modes: (1) because it is altogether non-geometrical, as having nothing of geometry, as a question proposed about harmonics (has nothing to do with geometry because it is rather about arithmetic applied to sounds); (2) what poorly (*prave* = φαύλως) has that which belongs to geometry because it clearly has (something) contrary to geometrical truth.

Therefore, this inquiry that is about the convergence (*de concursu*) of equidistant lines is not geometrical in the first mode, since it is about geometrical things, but in the second mode, because it poorly has that which belongs to geometry.<sup>60</sup> And ignorance (*ignorantia* = ἄγνοια) of this—to wit, which (consists) in using the principles of geometry poorly—is contrary to geometrical truth.

### 61.15. Two Modes of Geometrical Inquiry

As ARISTOTLE says, geometrical inquiries (*interrogationes*) are those (inquiries) from which something is demonstrated (either) **(a)** concerning those (conclusions) about which geometry (itself) is; or **(b)** concerning those (conclusions) that are demonstrated from the principles of geometry itself: (geometrical questions in this second mode are), for example, those from which something is demonstrated in the science of perspective, which proceeds from the principles of geometry (►64).<sup>61</sup>

And what has (just) been said concerning geometry is to be understood of the other sciences: to wit, because a proposition or an inquiry (*interrogatio*) is properly said to belong to the science from which (the conclusion) is demonstrated, whether in the science itself or in a science that is subaltern to it.<sup>62</sup>

<sup>59</sup> *In Post. an. 1, l. 22, 66–76* (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b24–26): “Sicut enim *dupliciter* dicitur *arismōn*, *id est quod est sine ritmo* uel sono dupliciter intelligitur, uno modo quod nullo modo habet sonum, ut lana, alio modo quod habet prauum sonum, sicut campana non bene sonans, ita et interrogatio non geometrica dicitur dupliciter, uno modo quia est omnino non geometrica, quasi nichil habens de geometria, sicut questio de musica proposita; alio modo quia *prave* habet id quod geometrie est, quia uidelicet habet contrarium geometrice ueritati.”

<sup>60</sup> *In Post. an. 1, l. 22, 76–82* (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b26–27): “Ista ergo interrogatio que est de concursu linearum equidistantium, non est non geometrica primo modo, cum sit de rebus geometricis, set secundo modo, quia *prave* habet id quod geometrie est; *et ignorantia hec*, scilicet que est in *prave* utendo *principiis* geometrie, *contraria est ueritati* geometrice.”

<sup>61</sup> *In Post. an. 1, l. 21, 48–54* (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77a41–b2): “Dicit ergo [Philosophus] primo quod interrogationes *geometrice* sunt *ex quibus demonstratur aliquid* circa illa *de quibus est geometria*, aut circa illa que *demonstrantur* ex principiis eiusdem geometrie, sicut illa ex quibus demonstratur aliquid *in speculatiua* sciencia, id est in perspectiua, que procedit ex principiis geometrie.”

<sup>62</sup> *In Post. an. 1, l. 21, 54–58* (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b2–3): “Et quod dictum est de geometria, intelligendum est *in aliis scienciis*, quia scilicet propositio uel interrogatio dicitur proprie alicuius scientie ex qua demonstratur uel in ipsa sciencia uel in sciencia ei subalternata.”

ARISTOTLE makes geometrical inquiry known insofar as it is a conclusion.<sup>63</sup> He says that, concerning geometrical inquiries, a *ratio* is to be posited (< λόγον ὑφεκτέον) in demonstrating their truth from geometric principles and (from the geometric) conclusions which are demonstrated through those principles (< ἐκ τῶν γεωμετρικῶν ἀρχῶν καὶ συμπερασμάτων). Indeed, not every *ratio* of geometrical demonstration is rendered from the first principles of geometry: sometimes, (a *ratio* of geometrical demonstration is rendered) from those (conclusions) that are concluded from first principles. And a *ratio* can be rendered in inquiries, which are always conclusions in the demonstrative sciences; but a *ratio* of principles cannot be posited by the geometer insofar as he is a geometer.

ARISTOTLE says, “insofar as he is a geometer” (*secundum quod geometer est* = ἢ γεωμέτρης), because the principles of a science may be proven in it insofar as that science assumes those (principles) that are of another science: for example, if the geometer should prove his principles insofar as he assumes the form of a first philosopher.<sup>64</sup>

And it is likewise in the other sciences, for no science demonstrates its principles (► 56.5).<sup>65</sup>

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<sup>63</sup> *In Post. an.* 1, l. 21, 59–71 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b3–6): “notificat [Philosophus] geometricam interrogationem prout est conclusio, dicens quod de interrogationibus geometricis ponenda est ratio, demonstrando scilicet ueritatem ipsarum *ex principiis geometricis et conclusionibus*, que per illa principia demonstrantur (non enim cuiuslibet demonstrationis geometricae ratio redditur ex primis geometrie principiis, set interdum ex hiis que per prima principia sunt conclusa); interrogationum autem, que semper sunt conclusiones in demonstratiuis scienciis, ratio reddi potest in eisdem; *set principiorum ratio non potest poni a geometra secundum quod geometer est.*”

<sup>64</sup> *In Post. an.* 1, l. 21, 74–79 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b5–6): “Dicit autem: «secundum quod geometer est», quia contingit in aliqua sciencia probari principia illius sciencie, in quantum illa sciencia assumit ea que sunt alterius sciencie, sicut si geometra probet sua principia secundum quod assumit formam philosophi primi.”

<sup>65</sup> *In Post. an.* 1, l. 21, 71–74 (cf. ARISTOTLE, *Analytica Posteriora* A.12, 77b6): “Et similiter est in aliis scienciis: nulla enim sciencia probat sua principia, secundum quod ostensum est supra.”



## 62. Cognitive Conditions of Mathematics

*We briefly examine the cognitive conditions of mathematics.*

### 62.1. Demonstration: From Potency into Act

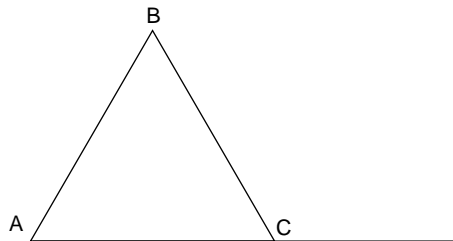
ARISTOTLE compares potency and act according to the understanding of the true and the false, comparing them according to (the act of) understanding (*secundum intelligere*).<sup>1</sup>

He says that diagrams (*diagrammata* = τὰ διαγράμματα)—that is, the descriptions of geometry—are discovered (*inveniuntur* = εὐρίσκεται)—that is, known through discovery—according to the disposition of a figure in act; for geometers discover the true (conclusion) that they seek by dividing lines and surfaces.<sup>2</sup>

Division reduces into act that which was in potency (► 49.3, ¶2); for, before division, the parts of the continuum are in potency in the whole.<sup>3</sup> If they should all be divided in respect to what the discovery of truth requires, the sought conclusions would be manifest; but what is sought does not come to be manifest at once because such divisions are in potency in the first drawing of the figures.

### 62.2. Example of Demonstration: Why the Triangle Has Three Angles = 180°

ARISTOTLE makes this known through the following example, which concerns the question, “Why does the triangle have three angles equal to two right (angles)?” (< διὰ τί δύο ὀρθαὶ τὸ τρίγωνον;). This is demonstrated thus (► **Figure 18**):<sup>4</sup>



**Figure 18: Why does the triangle have three angles equal to two right angles?**

<sup>1</sup> *In Metaph.* 9, l. 10, §1888 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a21–33): “Postquam comparavit [Philosophus] potentiam et actum secundum prius et posterius, et bonum et malum, hic *comparat eadem secundum intelligentiam veri et falsi*. Et circa hoc duo facit. Primo comparat ipsa *secundum intelligere*.”

<sup>2</sup> *In Metaph.* 9, l. 10, §1888 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a21–23): “Dicit ergo [Philosophus] primo, «quod diagrammata,» idest descriptiones geometriae «inveniuntur,» idest per inventionem cognoscuntur secundum dispositionem figurarum in actu. Geometrae enim inveniunt verum quod quaerunt, dividendo lineas et superficies.”

<sup>3</sup> *In Metaph.* 9, l. 10, §1888: “Divisio autem reducit in actum quod erat in potentia. Nam partes continui sunt potentia in toto ante divisionem. Si autem omnia essent divisa secundum quod requirit inventio veritatis, manifestae essent conclusiones quaesitae. Sed quia in prima protractione figurarum sunt in potentia huiusmodi divisiones, ideo non statim fit manifestum quod quaeritur.”

<sup>4</sup> *In Metaph.* 9, l. 10, §1889 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a24): “Hoc autem [Philosophus] notificat per duo exempla: quorum primum est circa quaesitum: «quare trigonum est duo recti,» idest quare triangulus habet tres angulos aequales duobus rectis? Quod quidem sic demonstratur:”

Thus, let  $ABC$  be a triangle having its base  $AC$  prolonged into a continuous and straight (line).<sup>5</sup> Hence, this prolonged base should make with the side  $BC$  of the triangle an angle at point  $C$ ; which external angle is certainly equal to the two interior angles opposite to it: namely, the angle  $ABC$  and the angle  $BAC$ .

Now it is manifest that the two angles that converge (*consistentes*) at point  $C$ , one of which is exterior to the triangle and the other interior, are equal to two right (angles).<sup>6</sup> For it has been demonstrated that (when) one straight line falls upon another straight line in whatever way, it makes two right angles or (two angles) equal to two right angles.<sup>7</sup> Therefore, it remains that the interior angle at point  $C$  constituted (together) with the other two (interior angles) that are equal to the exterior angle—to wit, all three angles—are equal to two right (angles).

Hence, that is what ARISTOTLE says: that it is proved that the triangle has two right (angles) because two angles that are over one point—say, over point  $C$ —, one of which is interior and the other exterior, are equal to two right (angles).<sup>8</sup> And hence, when the external angle—which is made (when) one of the sides of the triangle is prolonged—is produced, it at once comes to be manifest, to one who sees the figure, that the triangle has three angles equal to two right (angles).

<sup>5</sup> *In Metaph.* 9, l. 10, §1889: “Sit triangulus  $ABC$ , et protrahatur basis,  $AC$  in continuum et directum. Haec igitur basis protracta faciet cum latere trianguli  $BC$ , angulum in puncto  $C$ : qui quidem angulus extra existens aequalis est duobus angulis interioribus sibi oppositis, scilicet angulo  $ABC$ , et angulo  $BAC$ .”

<sup>6</sup> *In Metaph.* 9, l. 10, §1889: “Manifestum est autem quod duo anguli consistentes circa punctum  $C$ , quorum unus est extra triangulum, et alter intra, sunt aequales duobus rectis. Demonstratum enim est quod linea recta super aliam lineam cadens qualitercumque, faciet duos angulos rectos, aut aequales duobus rectis. Relinquitur ergo quod angulus interior in puncto  $C$ , constitutum cum aliis duobus qui sunt aequales angulo exteriori, omnes scilicet tres, sunt aequales duobus rectis.”

<sup>7</sup> The demonstration is found in Proposition 13 of *Elements* 1. See EUCLID, *Opera Omnia*, vol. 1, 36.2–4: “Ἐάν εὐθεία ἐπ’ εὐθείαν σταθεῖσα γωνίας ποιῆ, ἧτοι δύο ὀρθὰς ἢ δυσὶν ὀρθαῖς ἴσας ποιήσῃ.” HEIBERG’s version (*ibid.*, 37): “Si recta super rectam lineam erecta angulos effecerit, aut duos rectos aut duobus rectis aequales angulos efficiet.” HEATH’s version of the demonstration is as follows: “If a straight line set up on a straight line make angles, it will make either two right angles or angles equal to two right angles. For let any straight line  $AB$  set up on the straight line  $CD$  make the angles  $CBA$ ,  $ABD$ ; I say that the angles  $CBA$ ,  $ABD$  are either two right angles or equal to two right angles. Now, if the angle  $CBA$  is equal to the angle  $ABD$ , they are two right angles. [Def. 10] But, if not, let  $BE$  be drawn from the point  $B$  at right angles to  $CD$ ; [l. 11] therefore the angles  $CBE$ ,  $EBD$  are two right angles. Then, since the angle  $CBE$  is equal to the two angles  $CBA$ ,  $ABE$ , let the angle  $EBD$  be added to each; therefore the angles  $CBE$ ,  $EBD$  are equal to the three angles  $CBA$ ,  $ABE$ ,  $EBD$ . [C. N. 2] Again, since the angle  $DBA$  is equal to the two angles  $DBE$ ,  $EBA$ , let the angle  $ABC$  be added to each; therefore the angles  $DBA$ ,  $ABC$  are equal to the three angles  $DBE$ ,  $EBA$ ,  $ABC$ . [C. N. 2] But the angles  $CBE$ ,  $EBD$  were also proved equal to the same three angles; and things which are equal to the same thing are also equal to one another; [C. N. 1] therefore the angles  $CBE$ ,  $EBD$  are also equal to the angles  $DBA$ ,  $ABC$ . But the angles  $CBE$ ,  $EBD$  are two right angles; therefore the angles  $DBA$ ,  $ABC$  are also equal to two right angles. Therefore etc. Q. E. D.” All brackets and emphasis as in the original text.

<sup>8</sup> *In Metaph.* 9, l. 10, §1890 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a24–26): “Hoc est ergo quod Philosophus dicit, quod probatur triangulum habere duos rectos, quia duo anguli qui sunt circa unum punctum, puta circa punctum  $C$ , quorum unus est interior et alius exterior, sunt aequales duobus rectis. Et ideo quando producitur angulus qui fit extra, producto uno latere trianguli, statim manifestum fit videnti dispositionem figurae, quod triangulus habet tres angulos aequales duobus rectis.”



In this way, then, ARISTOTLE concludes that it is manifest that when some (things) are reduced from potency into act, then their truth is found.<sup>9</sup> And the cause of this is that the (agent) intellect is an act (►50.3). And hence, those (things) that are understood must be in act. Therefrom, potency is known from act. Whence, those know who make something (to be) in act, as is evident in the preceding description, for act must be posterior to potency according to the order of generation and of time (►48; 46.29, ¶1).

### 62.3. No Particulars in Mathematics

ARISTOTLE excludes some doubt.<sup>10</sup> For some used to say that the geometer would seem to use a false supposition when he says that a line should be of one foot (in length), which (line) is not of one foot; or that a line drawn in the sand should be straight, which (line) is not straight. However, he says that the geometer does not suppose (something) false on account of this. For the geometer demonstrates nothing about particulars, but of universals. And these lines are some particulars. It is (therefore) manifest that he demonstrates nothing about these lines—nor (does he demonstrate anything) from them. Rather, he uses them as examples of the universals about which—and from which—he demonstrates, which (universals) are understood through these examples.

There is no definition of singular circles because those (things) that have a definition are known by their definition; but singular things are only known as long as they are under sense or imagination, which in some places is called *intelligence* by ARISTOTLE because it considers things without sense, as the intellect (does).<sup>11</sup> It may be unclear whether such singular circles exist insofar as they are singular when they are removed from the actual inspection of sense—in the case of sensible (circles)—or of imagination—in the case of

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<sup>9</sup> *In Metaph.* 9, l. 10, §1894 (cf. ARISTOTLE, *Metaphysica* Θ.9, 1051a29–33): “Sic igitur concludit Philosophus manifestum esse, quod quando aliqua reducuntur de potentia in actum, tunc invenitur earum veritas. Et huius causa est, quia intellectus actus est. Et ideo ea quae intelliguntur, oportet esse actu. Propter quod, ex actu cognoscitur potentia. Unde facientes aliquid actu cognoscunt, sicut patet in praedictis descriptionibus. Oportet enim quod in eodem secundum numerum, posterius secundum ordinem generationis et temporis sit actus quam potentia, ut supra expositum est.”

<sup>10</sup> *In Post. an.* 1, l. 19, 92–105 (cf. ARISTOTLE, *Analytica Posteriora* A.10, 76b39–77a3): “excludit [Philosophus] quamdam dubitationem. Dicebant enim quidam quod *geometer* falsa suppositione utebatur, cum diceret *lineam esse unius pedis* que *non est unius pedis*, aut lineam descriptam in pulvere esse *rectam* que non est *recta*. Set ipse dicit quod geometer non supponit falsum propter hoc: cum enim geometra nichil demonstret de particularibus, set de uniuersalibus, ut ostensum est, hee autem lineae sunt quedam particularia, manifestum est quod de hiis lineis nichil demonstrat, neque etiam ex eis, set utitur eis ut exemplis uniuersalium que *per hec* exempla intelliguntur, de quibus et ex quibus demonstrat.”

<sup>11</sup> *In Metaph.* 7, l. 10, §1495 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a5–8): “Ideo autem singularium circulorum non est definitio, quia illa, quorum est definitio, cognoscuntur per suam definitionem; sed singularia non cognoscuntur nisi dum sunt sub sensu vel imaginatione, quae hic intelligentia dicitur, quia res considerat sine sensu, sicut intellectus. Sed huiusmodi singulares circuli *abeuntes* ab *actu*, idest recedentes ab actuali inspectione sensus, quantum ad sensibiles, aut imaginationis, quantum ad mathematicos, non est manifestum, utrum sint in quantum sunt singulares; sed tamen semper dicuntur et cognoscuntur per rationem universalis. Cognoscuntur enim hi circuli sensibiles, etiam quando non actu videntur, in quantum sunt circuli, non in quantum sunt hi circuli.”

mathematical (circles). But they are always said to be—and are known—by a universal *ratio*. Indeed, these sensible circles are known even when they are not actually seen—that is, insofar as they are *circles*, and not insofar as they are *these circles*.

The reason for this is that matter, which is a principle of individuation, is unknown (or unknowable) by itself (*secundum se ignota*) and is only known (or knowable) through a form, from which the universal *ratio* is taken.<sup>12</sup> Thus, singular things are known in its absence only through universals. And matter is a principle of individuation not only in singular sensible things, but also in mathematical things; for there is sensible matter and intelligible matter (► 13.13). Sensible matter: for example, bronze and wood; or whatever mobile matter, such as the elements, and all such things; and from such matter are individuated singular sensible things. On the other hand, intelligible matter is that which is in sensible things, but not insofar as they are sensible: for example, are mathematical things. Just as the form of man is in a matter such that it is an organic body, so the form of a circle or triangle is in *this* matter that is a continuum—a surface or a body.

Thus, it makes no difference whether singular things are sensible or intelligible.<sup>13</sup> Sensible singular things are like bronze or wooden circles; intelligible singular things are like mathematical circles. And that in mathematics some singular things are considered is evident because in it are considered multiple things of one species: for example, multiple equal lines, and multiple similar figures. Such singulars are said to be intelligible insofar as they are, without sense, comprehended by fantasy (*phantasia*, i.e., imagination) alone, which is sometimes called (*passibile*) *intellect*, and is corruptible.

#### 62.4. The Consideration of the Mathematician

The mathematician who abstracts does not consider a thing otherwise than it should be. For he does not understand that the line is without sensible matter.<sup>14</sup> Instead, he considers

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<sup>12</sup> In *Metaph.* 7, l. 10, §1496 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a8–12): “Ratio autem huius est, quia materia, quae principium est individuationis, est secundum se ignota, et non cognoscitur nisi per formam, a qua sumitur ratio universalis. Et ideo singularia non cognoscuntur in sua absentia nisi per universalia. Materia autem non solum est principium individuationis in singularibus sensibilibus, sed etiam in mathematicis. Materia enim alia est sensibilis, alia intelligibilis. Sensibilis quidem ut aes et lignum, vel etiam quaelibet materia mobilis, ut ignis et aqua, et huiusmodi omnia; et a tali materia individuantur singularia sensibilia. Intelligibilis vero materia est, quae est in sensibilibus, non in quantum sunt sensibilia, sicut mathematica sunt. Sicut enim forma hominis est in tali materia, quae est corpus organicum, ita forma circuli vel trianguli est in hac materia quae est continuum vel superficies vel corpus.”

<sup>13</sup> In *Metaph.* 7, l. 10, §1494 (cf. ARISTOTLE, *Metaphysica* Z.10, 1036a2–5): “Nec differt utrum singularia sint sensibilia vel intelligibilia. Singularia quidem sensibilia sunt sicut circuli aerei et lignei. Intelligibilia singularia sunt sicut circuli mathematici. Quod autem in mathematicis considerentur aliqua singularia, ex hoc patet, quia considerantur ibi plura unius speciei, sicut plures lineae aequales, et plures figurae similes. Dicuntur autem intelligibilia, huiusmodi singularia, secundum quod absque sensu comprehenduntur per solam phantasiam, quae quandoque intellectus vocatur secundum illud in tertio *De anima: intellectus passivus corruptibilis est.*” Note that such singulars are intelligible in potency.

<sup>14</sup> In *De Trin.*, q. 5 a. 3 ad 1, 291–301 (cf. ARISTOTLE, *Physica* B.2, 193b35): “mathematicus abstrahens non considerat rem aliter quam sit: non enim intelligit lineam esse sine materia sensibili, set considerat

the line and its affections without the consideration of sensible matter. And thus, there is no dissonance between what is understood and the thing, since—even according to thing (*secundum rem*)—that which belongs to the nature of the line does not depend upon that which makes matter to be sensible: rather, conversely. And thus, it is evident, as ARISTOTLE says, that there is no falsehood in those who abstract (< οὐδὲ γίγνεται ψεῦδος χωριζόντων).

Moreover, not only that is said (to be) *material* whose part is matter, but also that which has being (*esse*) in matter.<sup>15</sup> According to this mode, a sensible line can be said (to be) something material. Whence, that a line could be understood without matter is not prevented by this. For sensible matter is not compared to a line as a part, but rather as the subject in which it has being. And (the case) is likewise concerning a surface and a body. For the mathematician does not consider the body that is in the genus of substance insofar as its part is matter or form, but insofar it is perfected by three dimensions in the genus of quantity; and in this way, it is compared to the body that is in the genus of substance—whose part is physical matter—as accident to subject.

#### **62.5. Consideration According to Being vs. According to *Ratio***

Number and unit, insofar as they are in the genus of quantity, are only found in those (things) in which a commensuration of quantities is found.<sup>16</sup> Whence, they are found only in things that have continuous quantity. Whence, ARISTOTLE says that we know number through the division of the continuum: and only this number is the subject of the arithmetical (scientist), as also AVICENNA says.

Since the number that is a species of quantity is caused from the division of the continuum, just as continuous quantity is something mathematical—for it is separated from sensible matter according to *ratio* (*secundum rationem*) and not according to being (*secundum esse*)—so, too, (is something mathematical) the number that is a species of quantity,

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lineam et eius passiones sine consideratione materie sensibilis; et sic non est dissonantia inter intellectum et rem, quia etiam secundum rem id quod est de natura lineae non dependet ab eo quod facit materiam esse sensibilem, set magis e conuerso. Et sic patet quod abstrahentium non est mendacium, ut dicitur in II Phisicorum.”

<sup>15</sup> *In De Trin.*, q. 5 a. 3 ad 2, 302–317: “materiale dicitur non solum id cuius pars est materia, set etiam illud quod in materia esse habet. Secundum quem modum linea sensibilis materiale quoddam dici potest, unde per hoc non prohibetur quin linea sine materia intelligi possit: non enim materia sensibilis comparatur ad lineam sicut pars, set magis sicut subiectum in quo esse habet; et similiter est de superficie et corpore: non enim mathematicus considerat corpus quod est in genere substantie prout eius pars est materia et forma, set secundum quod est in genere quantitatis tribus dimensionibus perfectum, et sic comparatur ad corpus quod est in genere substantie, cuius pars est materia phisica, sicut accidens ad subiectum.”

<sup>16</sup> *In Sent.* 1, d. 24 q. 1 a. 3 co.: “numerus et unitas, secundum quod sunt in genere quantitatis, non inveniuntur nisi in quibus inuenitur commensuratio quantitatis: unde inveniuntur tantum in rebus habentibus quantitatem continuam; unde Philosophus dicit, quod numerum cognoscimus divisione continui: et hic tantum numerus est subjectum arithmetici, ut etiam Avicenna dicit.”

which is also the subject of arithmetic, whose principle is the *one* that is the first measure of quantity.<sup>17</sup> Whence, it is evident that this number cannot be in immaterial things: in them, rather, there is a multitude that is opposed to the *one* that is convertible with *being* (► 38.1), which indeed is caused from formal division, which is by opposite forms, whether absolute or relative; and such a number is (found only) in metaphysics.

To act and to be acted upon (i.e., to be affected) do not belong to beings insofar as they are in consideration (*secundum quod sunt in consideratione*), but according as they are in being (*secundum quod sunt in esse*).<sup>18</sup> The mathematician, on the other hand, considers abstract things according only to consideration. Hence, to be the principle or the end of motion does not belong to those things insofar as they fall in the consideration of the mathematician. Whence, the mathematician does not demonstrate by efficient or final causes. In contrast, those things that the metaphysician considers are existents separated in the nature of things, such that they can be the principle and the end of motion. Hence, nothing prevents (him) from demonstrating by efficient and final causes.

Mathematical things do not subsist separated according to being (*secundum esse*).<sup>19</sup> If they should thus subsist, there would be in them (something) good: namely, their (act of) being (*esse*). Rather, mathematical things are separated only according to *ratio* (*secundum rationem*), insofar as they are abstracted from motion and matter. Thus, they are abstracted from the *ratio* of *end*, which the *ratio* of *mover* has (► 9.7). But there is no difficulty (*inconueniens*) if there is no good in some being according to *ratio*, or no *ratio* of *good*, for the *ratio* of *being* is prior to the *ratio* of *good* (► 30.10).

Thus, those things about which the mathematician considers are good according to the (act of) being that they have in things (*secundum esse quod habent in rebus*), for the (act

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<sup>17</sup> *De potentia*, q. 9 a. 5 ad 8: “numerus qui est species quantitatis, causatur ex divisione continui; unde sicut quantitas continua est quid mathematicum,—quia est separata a materia sensibili secundum rationem, et non secundum esse,— ita et numerus qui est species quantitatis, qui est etiam subiectum arithmeticae, cuius principium est unum quod est prima mensura quantitatis. Unde patet quod hic numerus non potest esse in rebus immaterialibus, sed est in eis multitudo, quae opponitur uni quod convertitur cum ente; quae quidem causatur ex divisione formali, quae est per quasdam formas oppositas, vel absolutas vel relativas. Et talis numerus est in divinis.”

<sup>18</sup> *In De Trin.*, q. 5 a. 4 ad 7, 320–332: “agere et pati non conuenit entibus secundum quod sunt in consideratione set secundum quod sunt in esse, mathematicus autem considerat res abstractas secundum considerationem tantum; et ideo ille res prout cadunt in consideratione mathematici, non conuenit esse principium et finis motus, et ideo mathematicus non demonstrat per causas efficientem et finalem. Res autem, quas considerat diuinus, sunt separate exsistentes in rerum natura, tales que possunt esse principium et finis motus; unde nichil prohibet quin per causas efficientem et finalem demonstret.”

<sup>19</sup> *STh I*, q. 5 a. 3 ad 4: “mathematica non subsistunt separata secundum esse, quia si subsisterent, esset in eis bonum, scilicet ipsum esse ipsorum. Sunt autem mathematica separata secundum rationem tantum, prout abstrahuntur a motu et a materia, et sic abstrahuntur a ratione finis, qui habet rationem moventis. Non est autem inconueniens quod in aliquo ente secundum rationem non sit bonum vel ratio boni, cum ratio entis sit prior quam ratio boni, sicut supra dictum est.”

of) being of a line or of a number is good.<sup>20</sup> However, these are not considered by the mathematician according to their (act of) being, but only according to the *ratio* of the species (*secundum rationem speciei*); for he considers them abstracted. However, they are not abstracted according to being (*secundum esse*), but only according to *ratio* (*secundum rationem*). Good follows upon the *ratio* of a species only according to the being it has in some (real) thing (*secundum esse quod habet in re aliqua*). Hence, the *ratio* of *good* does not befit a line or a number insofar as they fall in the consideration of the mathematician, even if line and number should be good.

## 62.6. Knowledge vs. Being of Number

(When objecting against a position that denies the possibility of the existence of time, which is some kind of number), ARISTOTLE says that, if it should be impossible for there to be something capable of numbering (*si impossibile esset esse aliquod potens numerare* = ἀδυνάτου... ὄντος εἶναι τοῦ ἀριθμήσοντος), it would (also) be impossible for there to be something numerable (*impossibile esset esse aliquod numerabile* < ἀδύνατον καὶ ἀριθμητόν τι εἶναι), i.e., capable of being numbered (*potens numerari*).<sup>21</sup>

Whence, if there is no numerable (thing), there is no number, since number is only in that which is numbered in act (*quod numeratur actu* < ἠριθμημένον) or that which is numerable in potency (*quod est numerabile in potentia* < ἀριθμητόν).<sup>22</sup> It remains, therefore, that if there is not something capable of numbering, there would be no number.

However, nothing else is naturally apt (*natum* = πέφυκεν) to number (*numerare* = ἀριθμεῖν, i.e., to enumerate or count) than the soul; and among the parts of the soul (*anima* = ψυχὴ), no other than the intellect (*intellectus* = νοῦς), since numbering (*numeratio*) comes to be (*fit*) through the collation of the (things) numbered (*per collationem numeratorum*) toward one first measure (*ad unam primam mensuram*); and to bring together is proper of reason (*conferre rationis est*).<sup>23</sup> Hence, if there is no intellectual soul, there is no number.

<sup>20</sup> *De veritate*, q. 21 a. 6 ad 3: “ea de quibus mathematicus considerat, secundum esse quod habent in rebus, bona sunt. Ipsum enim esse lineae vel numeri bonum est, sed a mathematico non considerantur secundum suum esse, sed solum secundum rationem speciei; considerat enim ea abstracte: non sunt autem abstracta secundum esse, sed solum secundum rationem. [...] bonum non consequitur rationem speciei nisi secundum esse quod habet in re aliqua; et ideo ratio boni non competit lineae vel numero secundum hoc quod cadunt in consideratione mathematici, quamvis linea et numerus bona sint.”

<sup>21</sup> *In Physic.* 4, l. 23, n. 4 (cf. ARISTOTLE, *Physica* Δ.14, 223a22–23): “si impossibile esset esse aliquod potens numerare, impossibile esset esse aliquod numerabile, potens scilicet numerari.”

<sup>22</sup> *In Physic.* 4, l. 23, n. 4 (cf. ARISTOTLE, *Physica* Δ.14, 223a23–25): “Sed si non est numerabile, non est numerus; quia numerus non est nisi in eo quod numeratur actu, vel quod est numerabile in potentia. Relinquitur ergo quod si non est aliquod potens numerare, quod non sit numerus.”

<sup>23</sup> *In Physic.* 4, l. 23, n. 4 (cf. ARISTOTLE, *Physica* Δ.14, 223a25–27): “Sed nihil aliud natum est numerare quam anima, et inter partes animae non alia quam intellectus; quia numeratio fit per collationem numeratorum ad unam primam mensuram, conferre autem rationis est. Si igitur non est anima intellectiva, non est numerus.”

Now, it ought to be considered that (if) numbered things (are) posited, it is necessary to posit number.<sup>24</sup> Whence, just as the numbered things (*res numeratae*) depend upon that which numerates (*numerans*), so, too, (does) their number.

Yet, the being of the things numbered (*esse rerum numeratarum*) does not depend upon the intellect—unless there should be an intellect that is the cause of the things, as is the divine intellect.<sup>25</sup> But it does not depend upon the intellect of the (rational) soul; whence, neither (does) the number of things depend upon the intellect of the soul. Rather, only the numeration itself, which is an act of the soul, depends upon the intellect of the soul.

Therefore, just as there can be sensible things (*sensibilia*) when a sensing power does not exist (*sensu non existente*), and intelligible things (*intelligibilia*) when an intellect does not exist (*intellectu non existente*), so can there be numerable things (*numerabilia*) and number when that which numerates does not exist (*non existente numerante*).<sup>26</sup>

However, perhaps the conditional that ARISTOTLE posited first—to wit, that if it should be impossible for there to be something capable of numbering, it would (also) be impossible for there to be something numerable—is true, just as it is true that if it is impossible for there to be something that senses, it is impossible for there to be something sensible.<sup>27</sup> For if it is sensible, it can be sensed; and if it can be sensed, there can be something that senses, even if it would not follow that if there is (something) sensible (then) there should be something that senses.

Likewise, it follows that if there is something numerable, (then) there could be something that numbers.<sup>28</sup> Whence, if it is impossible for there to be something that numerates, it is impossible for there to be something numerable. However, it does not follow that if there is not (something) that numerates, (then) there would be no numerable (thing), as ARISTOTLE's objection proceeded.

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<sup>24</sup> *In Physic.* 4, l. 23, n. 5: "considerandum est, quod positus rebus numeratis, necesse est poni numerum. Unde sicut res numeratae dependent a numerante, ita et numerus earum."

<sup>25</sup> *In Physic.* 4, l. 23, n. 5: "Esse autem rerum numeratarum non dependet ab intellectu, nisi sit aliquis intellectus qui sit causa rerum, sicut est intellectus divinus: non autem dependet ab intellectu animae. Unde nec numerus rerum ab intellectu animae dependet: sed solum ipsa numeratio, quae est actus animae, ab intellectu animae dependet."

<sup>26</sup> *In Physic.* 4, l. 23, n. 5: "Sicuti ergo possunt esse sensibilia sensu non existente, et intelligibilia intellectu non existente, ita possunt esse numerabilia et numerus, non existente numerante."

<sup>27</sup> *In Physic.* 4, l. 23, n. 5 (cf. ARISTOTLE, *Physica* Δ.14, 223a22–23): "Sed forte conditionalis quam primo posuit [Philosophus], est vera, scilicet quod si est impossibile esse aliquem numerantem, impossibile est esse aliquid numerabile: sicut haec est vera, si impossibile est esse aliquem sentientem, impossibile est esse aliquid sensibile. Si enim est sensibile, potest sentiri, et si potest sentiri, potest esse aliquid sentiens; licet non sequatur quod si est sensibile, quod sit sentiens."

<sup>28</sup> *In Physic.* 4, l. 23, n. 5: "Et similiter sequitur quod si est aliquid numerabile, quod possit esse aliquid numerans. Unde si impossibile est esse aliquid numerans, impossibile est esse aliquid numerabile: non tamen sequitur quod si non est numerans, quod non sit numerabile, ut obiectio Philosophi procedebat."

## 62.7. The Principles of Knowing Quantities

The *one* that is the principle of knowing is not the same in all genera, for the principles of diverse genera are diverse.<sup>29</sup> However, in all of them there is something common: that which is the first measure is indivisible (*indivisible* = ἀδιαίρετον) according to quantity (*secundum quantitatem* = τῷ ποσῶ) or according to species (*secundum speciem* = τῷ εἴδει).

Therefore, that which is one and first in the genus of quantity must also be indivisible according to quantity:<sup>30</sup>

1. If it is altogether (*omnino* = πάντη) indivisible according to quantity and does not have a position (< ἄθετον), it is said (to be a) **unit** (*unitas* = μονάς).<sup>31</sup>

In number simply (*simpliciter* = ἀπλῶς), there is to be found some altogether minimum (ἐλάχιστος) number: namely, two (*dualitatem* = δυάς).<sup>32</sup> But if we take the number of some continuous thing, in some mode a minimum is to be found; and in some mode, not. For according to multitude, there is a minimum to be found, but not according to magnitude.

For example, in *many lines*, there is a minimum *according to multitude*, as one line or two lines: *one* indeed if we take that which is a minimum simply in number; and *two* if we take that which is the minimum in the genus of number that has the *ratio* of number.<sup>33</sup> However, in lines, there is no minimum to be found *according to magnitude*—namely, such that there would be a minimal line—, for any line can always be divided.

2. A **point** (*punctus, punctum* = στιγμή), on the other hand, is that which is altogether indivisible according to quantity, but has a position (*habet positionem* < θέσιν ἔχον).<sup>34</sup>

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<sup>29</sup> *In Metaph.* 5, l. 8, §873 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b21–23): “Hoc autem unum, quod est principium cognoscendi, non est idem in omnibus generibus.” *In De anima* 1, c. 12, 69: “diversorum generum diversa sunt principia.” *Ibid.*, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b23–24): “In omnibus tamen istis hoc est commune, quod illud, quod est prima mensura, est indivisibile secundum quantitatem, vel secundum speciem.”

<sup>30</sup> *In Metaph.* 5, l. 8, §874: “Quod igitur est in genere quantitatis unum et primum, oportet quod sit indivisibile et secundum quantitatem.”

<sup>31</sup> *In Metaph.* 5, l. 8, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b24–25): “Si autem sit omnino indivisibile et secundum quantitatem et non habeat positionem, dicitur unitas.”

<sup>32</sup> *In Physic.* 4, l. 19, n. 2 (cf. ARISTOTLE, *Physica* Δ.12, 220a27–28): “In numero autem simpliciter est omnino invenire aliquem minimum numerum, scilicet dualitatem. Sed si accipiamus numerum quendam, scilicet numerum alicuius rei continuae, quodammodo est invenire minimum, et quodammodo non; quia secundum multitudinem est invenire minimum, non autem secundum magnitudinem.”

<sup>33</sup> *In Physic.* 4, l. 19, n. 2 (cf. ARISTOTLE, *Physica* Δ.12, 220a28–30): “Sicut in multis lineis secundum multitudinem quidem est minimum, ut una linea vel duae lineae; una quidem si accipiatur id quod est minimum simpliciter in numero; duae autem si accipiatur id quod est minimum in genere numeri, habens rationem numeri. Sed in lineis non est invenire minimum secundum magnitudinem, ut sit scilicet aliqua linea minima; quia semper est dividere quamcumque lineam.”

<sup>34</sup> *In Metaph.* 5, l. 8, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b25–26): “Punctus vero est id, quod est omnino indivisibile secundum quantitatem et tamen habet positionem.”

By reduction, the point is in the genus of *continuous quantity* as a principle (►29.10), as is the unit in the genus of *number* as a measure.<sup>35</sup>

3. A **line** (*linea* = γραμμή), in turn, is that which is divisible according to one dimension only (< μοναχῆ).<sup>36</sup>

4. A **surface** (*superficies* = ἐπίπεδον, is that which is divisible) according to two (dimensions, < διχῆ).<sup>37</sup>

5. A **body** (*corpus* = σῶμα) is (that which is) divisible in every mode according to quantity ([*id quod est*] *omnibus modis divisibile secundum quantitatem* = τὸ... πάντη... διαιρετὸν κατὰ τὸ πρῶτον): to wit, according to three dimensions (< τριχῆ).<sup>38</sup>

These descriptions are convertible (*convertuntur* = ἀντιστρέψαντι); for everything that is divisible in two dimensions is a surface, and so on.<sup>39</sup>

The intelligible matter of mathematical figures is a continuum, such as a line or a surface.<sup>40</sup> Hence, if from the circle or the triangle is removed the continuum that the line is, all that remains is a unit or a number; for the circle has one line and the triangle, three.<sup>41</sup>

Thus, among mathematical (things), numbers are prior.<sup>42</sup>

Indeed, the first distinction—and plurality—is found in numbers (i.e., this is the first genus where distinction and plurality is found, since *being* is not a genus properly speaking).<sup>43</sup>

This is why the Pythagoreans posited the void first in numbers; so that, through the nature

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<sup>35</sup> *De potentia*, q. 7 a. 3 ad 7: “potest tamen dici quod sit in genere [...] per reductionem, sicut principium, et sicut punctum est in genere quantitatis continuae, et unitas in genere numeri; et per hunc modum est mensura [...], sicut unitas numerorum.”

<sup>36</sup> *In Metaph.* 5, l. 8, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b26): “Linea vero est quod est divisibile secundum unam dimensionem tantum.”

<sup>37</sup> *In Metaph.* 5, l. 8, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b26–27): “superficies vero secundum duas.”

<sup>38</sup> *In Metaph.* 5, l. 8, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b27–28): “Corpus autem est omnibus modis divisibile secundum quantitatem, scilicet secundum tres dimensiones.”

<sup>39</sup> *In Metaph.* 5, l. 8, §874 (cf. ARISTOTLE, *Metaphysica* Δ.6, 1016b28–31): “Et hae descriptiones convertuntur. Nam omne quod duabus dimensionibus dividitur, est superficies, et sic de aliis.”

<sup>40</sup> *In Metaph.* 7, l. 11, §1508: “Materia autem figurarum mathematicarum intelligibilis, est continuum, ut linea vel superficies.”

<sup>41</sup> *In Metaph.* 7, l. 11, §1509: “Removendo autem a triangulo et circulo continuum, quod est linea, nihil remanet nisi unitas et numerus, quia triangulus est tres lineas habens, et circulus unam.”

<sup>42</sup> *In Metaph.* 1, l. 7, §120: “inter mathematica numeri sunt priores.”

<sup>43</sup> *In Physic.* 4, l. 9, n. 12 (cf. ARISTOTLE, *Physica* Δ.6, 213b25–26): “dicit [Philosophus] quod etiam Pythagorici affirmaverunt esse vacuum [...] ac si vacuum nihil esset aliud quam distinctio rerum. Et quia prima distinctio et pluralitas invenitur in numeris, ideo vacuum primo ponebant in numeris: ut per naturam vacui una unitas distingueretur ab alia, ne numerus sit continuus, sed habeat naturam discretam. Sed quia isti quasi aequivoce loquebantur de vacuo, appellantes rerum distinctionem vacuum, propter hoc infra de hac opinione non prosequitur.”



of the void, one unit would be distinguished from another; for numbers are not continuous—rather, they have a discrete nature—, and they equivocally call the distinction of things *void*.

### 62.8. The Curved is Known through the Straight

The cognition of every (one) thing can be had by fewer (things).<sup>44</sup> This is evident because the composite should be constituted from something perfect and (something) imperfect; hence, the *ratio* of knowing the imperfect is the perfect; and, since contraries should be reduced into privation and habit (►43.9), the other part—to wit, that (part) which is had by the mode of habit and of the perfect—is sufficient (in order) to know itself and the other part that is by the mode of privation and of the imperfect, as ARISTOTLE says (< ἰκανὸν... θάτερον μέρος τῆς ἐναντιώσεως ἑαυτὸ τε κρίνειν καὶ τὸ ἀντικείμενον).

Thus, as ARISTOTLE says, by the straight we know and judge the straight itself and the curved; for (the straight is) the canon (< τῷ εὐθεῖ καὶ αὐτὸ καὶ τὸ καμπύλον γινώσκομεν· κριτῆς γὰρ ἀμφοῖν ὁ κανὼν): that is, the rule by which the judgment of one and of the other is had.<sup>45</sup> On the other hand, by the curved we know neither (the curved) itself nor the straight (< τὸ... καμπύλον οὔθ' ἑαυτοῦ οὔτε τοῦ εὐθέος [γινώσκομεν]).

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<sup>44</sup> *In De anima* 1, c. 12, 232; 235–243 (cf. ARISTOTLE, *De anima* A.1, 411a3–4): “cognitio omnis rei possit haberi per pauciora [...]; et quod cognitio habeatur per pauciora, patet quia, cum compositum constet ex aliquo perfecto et imperfecto, ratio cognoscendi imperfectum est perfectum, et «cum contraria reducuntur in priuationem et habitum», *sufficiens est altera pars*, scilicet illa que se habet per modum habitus et perfecti, ad cognoscendum se ipsam et alteram partem que est per modum priuationis et imperfecti.”

<sup>45</sup> *In De anima* 1, c. 12, 243–248 (cf. ARISTOTLE, *De anima* A.1, 411a5–7): “Nam per rectum diiudicamus et cognoscimus ipsum rectum et etiam obliquum (canon enim, id est regula, «est illud per quod habetur iudicium de utroque»), per obliquum uero nec ipsum cognoscimus neque rectum.”



## 63. Natural Science

*We briefly treat of natural science: its subject genus, order, method, and selected topics.*

### 63.1. The Subject Matter of Natural Science

We must assign what should be the matter and subject of natural science.<sup>1</sup>

It is therefore to be known that, since every science is in the intellect (►51.6), and something becomes intelligible in act because it is somehow abstracted from matter (►49.8), some (i.e., diverse things) pertain to diverse sciences according as they are diversely related to matter (►58.15).<sup>2</sup>

On the other hand, since every science is had through demonstration (►53.2), and the mean of demonstration should be a definition (►55.7; 55.12), it is necessary for sciences to be diversified according to a diverse mode of definition.<sup>3</sup>

It is therefore to be known that:<sup>4</sup>

1. There are some things that do not depend upon matter (►18.19): neither according to being nor according to *ratio*—whether they are never in matter, such as God and other separated substance, or because they are not universally in matter, such as substance, potency, act, and being (*ens*) itself. Therefore, **metaphysics** is about such (things).<sup>5</sup>
2. There are some (things) that, although they can only be (i.e., exist) in sensible matter, however, sensible matter does not fall in their definition (►18.18).<sup>6</sup> For example, the curved, even if it can only be in sensible matter, however, sensible matter does not fall in its definition. And such are all mathematical (things), such as numbers, magnitudes, and figures. Thus, **mathematics** is about those (things) that depend upon sensible matter according to being but not according to *ratio*.

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<sup>1</sup> *In Physic.* 1, l. 1, n. 1: “Quia liber Physicorum, cuius expositioni intendimus, est primus liber scientiae naturalis, in eius principio oportet assignare quid sit materia et subiectum scientiae naturalis.”

<sup>2</sup> *In Physic.* 1, l. 1, n. 1: “Sciendum est igitur quod, cum omnis scientia sit in intellectu, per hoc autem aliquid fit intelligibile in actu, quod aequaliter abstrahitur a materia; secundum quod aliqua diversimode se habent ad materiam, ad diversas scientias pertinent.”

<sup>3</sup> *In Physic.* 1, l. 1, n. 1: “Rursus, cum omnis scientia per demonstrationem habeatur, demonstrationis autem medium sit definitio; necesse est secundum diversum definitionis modum scientias diversificari.”

<sup>4</sup> *In Physic.* 1, l. 1, n. 2: “Sciendum est igitur quod [...]”

<sup>5</sup> *In Physic.* 1, l. 1, n. 2: “Quaedam vero sunt quae non dependent a materia nec secundum esse nec secundum rationem; vel quia nunquam sunt in materia, ut Deus et aliae substantiae separatae; vel quia non universaliter sunt in materia, ut substantia, potentia et actus, et ipsum ens.” *Ibid.*, n. 3: “De huiusmodi igitur est Metaphysica.”

<sup>6</sup> *In Physic.* 1, l. 1, n. 2: “quaedam vero sunt quae licet esse non possint nisi in materia sensibili, in eorum tamen definitione materia sensibilis non cadit. [...] curvum vero, licet esse non possit nisi in materia sensibili, tamen in eius definitione materia sensibilis non cadit; et talia sunt omnia mathematica, ut numeri, magnitudines et figurae.” *Ibid.*, n. 3: “de his vero quae dependent a materia sensibili secundum esse sed non secundum rationem, est Mathematica.”

3. There are some (things) whose being (*esse*) depends upon matter and cannot be defined without matter (►18.18).<sup>7</sup> And such are all natural (things), such as man and stone. Thus, **natural (science)**, which is called **physics**, is about those (things) that depend upon matter not only according to being, but also according to *ratio*.

And since everything that has matter is mobile, it follows that **mobile being** (*ens mobile*) should be the subject of natural philosophy.<sup>8</sup> For natural philosophy is about natural (things); **natural** (things) are *those whose principle is nature*; and **nature** is *the principle of motion and of rest in that in which it is*. Therefore, natural science is about *those (things) that have in themselves the principle of motion*.

I do not say **mobile body** because it has to be proven in physics that every mobile is a body, and no science proves its own subject.<sup>9</sup>

### 63.2. The Order of Natural Science

(Just as there is a fourfold order of practical reason and of speculative reason; ►51.17; 51.18; 51.19), a fourfold order is also considered in the process of natural science:<sup>10</sup>

1. The common (principles) of nature are determined in the *Physics*, which treats about the **mobile** insofar as it is mobile.<sup>11</sup> Whence, in the other books of natural science, it remains to apply such common (principles of nature) to proper subjects (i.e., insofar as we proceed from the more common to the less common in the first order of speculative reason; ►51.19, ¶1). And the subject of motion is a magnitude and a body, for nothing is moved except for the quantum.

Those (things) that follow upon something common are to be determined first (*prius*) and separately, lest it should become necessary to repeat (what is said) of common (principles) multiple times (when) treating of all the parts.<sup>12</sup> Hence, it is necessary to set

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<sup>7</sup> *In Physic.* 1, l. 1, n. 2: “quaedam sunt quorum esse dependet a materia, nec sine materia definiri possunt [...]; et talia sunt omnia naturalia, ut homo, lapis.” *Ibid.*, n. 3: “de his vero quae dependent a materia non solum secundum esse sed etiam secundum rationem, est Naturalis, quae Physica dicitur.”

<sup>8</sup> *In Physic.* 1, l. 1, n. 3: “Et quia omne quod habet materiam mobile est, consequens est quod ens mobile sit subiectum naturalis philosophiae. Naturalis enim philosophia de naturalibus est; naturalia autem sunt quorum principium est natura; natura autem est principium motus et quietis in eo in quo est; de his igitur quae habent in se principium motus, est scientia naturalis.”

<sup>9</sup> *In Physic.* 1, l. 1, n. 4: “Non dico autem *corpus mobile*, quia omne mobile esse corpus probatur in isto libro; nulla autem scientia probat suum subiectum.”

<sup>10</sup> *In De caelo* 1, pr. 3: “Et hic quadruplex ordo consideratur etiam in processu scientiae naturalis.”

<sup>11</sup> *In De caelo* 1, pr. 3: “Nam primo determinantur communia naturae in libro *Physicorum*, in quo agitur de mobili inquantum est mobile. Unde restat in aliis libris scientiae naturalis huiusmodi communia applicare ad propria subiecta. Subiectum autem motus est magnitudo et corpus: quia nihil movetur nisi *quantum*.”

<sup>12</sup> *In Physic.* 1, l. 1, n. 4: “Sed quia ea quae consequuntur aliquod commune, prius et seorsum determinanda sunt, ne oporteat ea multoties pertractando omnes partes illius communis repetere;

forth one book in natural science that should treat about those (things) that follow upon mobile being in common, just like first philosophy—in which those (truths) that are about *being* insofar as it is a being are treated—is set forth (before) all the sciences. And ARISTOTLE’S *Physics* is that book whose subject is *mobile being* simply.

2. In (respect of) **bodies**, three other orders are to be considered:<sup>13</sup>

(a) Insofar as the whole corporeal universe is prior in consideration than its parts (i.e., insofar as we proceed from whole to parts in the second order of speculative reason; ►51.19, ¶2).<sup>14</sup>

(b) Insofar as simple bodies are considered before compounds (i.e., insofar as we proceed from simple to composite in the third order of speculative reason; ►51.19, ¶3).<sup>15</sup>

(c) Insofar as, among simple bodies, it is necessary first (*prius*) to consider the prior (body): that is, the celestial (body), by which the others are supported (i.e., insofar as we proceed from foundations in the fourth order of speculative reason; ►51.19, ¶4).<sup>16</sup>

These three (orders) are treated in *On the Heavens*, which consigns: (a) some (things) that pertain to the whole universe, as is evident in the first book; (b) some (things) that pertain to the celestial body, as is evident in the second (book); (c) some (things) that pertain to other simple bodies, as is evident in the third and fourth (books).<sup>17</sup> Wherefrom, this book is ordered first after the *Physics*. And on account of this, *On the Heavens* treats in the beginning about the body, to which all (the principles) that are consigned in the *Physics* are to be applied.

Thus, after the *Physics*, other books of natural science follow, which treat of a species of mobile. The book *On the Heavens* (treats) about the mobile according to local motion,

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necessarium fuit quod praemitteretur in scientia naturali unus liber, in quo tractaretur de iis quae consequuntur ens mobile in communi; sicut omnibus scientiis praemittitur philosophia prima, in qua determinatur de iis quae sunt communia enti in quantum est ens. Hic autem est liber *Physicorum*, qui etiam dicitur *de Physico* sive *Naturali Auditu*, quia per modum doctrinae ad audientes traditus fuit: cuius subiectum est *ens mobile* simpliciter.”

<sup>13</sup> *In De caelo* 1, pr. 3: “In corporibus autem est attendere tres alios ordines.”

<sup>14</sup> *In De caelo* 1, pr. 3: “uno quidem modo secundum quod totum universum corporeum est prius in consideratione quam partes eius.”

<sup>15</sup> *In De caelo* 1, pr. 3: “alio modo secundum quod simplicia corpora prius considerantur quam mixta.”

<sup>16</sup> *In De caelo* 1, pr. 3: “tertio secundum quod inter simplicia corpora prius necesse est de priori considerare, scilicet de caelesti corpore, per quod omnia alia firmantur.”

<sup>17</sup> *In De caelo* 1, pr. 3: “Et haec tria in hoc libro aguntur, qui apud Graecos intitulatur *de Caelo*. Traduntur enim in hoc libro quaedam pertinentia ad totum universum, sicut patet in primo libro; quaedam pertinentia ad corpus caeleste, sicut patet in secundo; quaedam pertinentia ad alia simplicia corpora, sicut patet in tertio et quarto. Et ideo rationabiliter hic liber ordinatur primus post librum *Physicorum*. Et propter hoc statim in principio huius libri agitur de corpore, cui necesse est applicari omnia quae tradita sunt de motu in libro *Physicorum*.”

which is the first species of motion. The book *On Generation and Corruption* (treats) about motion towards a form and (about) the first mobiles—to wit, the elements—in respect of their transmutations in common. The book *Meteorology* (treats about such first mobile elements) in respect of their special transmutations. The book *On Minerals* treats of inanimate compound mobiles. The book *On the Soul*, and those that follow it, (treat) about animate mobiles.<sup>18</sup>

### 63.3. The Method of Natural Science

In its processes, natural science preserves the proper mode of the rational soul in two respects:<sup>19</sup>

1. Just as the rational soul receives the cognition of intelligible (things), which are more known according to nature, from sensible (things; ►49.4), which are more known in respect of us (►49.2), so, (too), natural science proceeds from those (things) that are more known in respect of us and less known according to nature; and the demonstration that is through a sign (►57.7) or (through) an effect (►57.5, ¶2) is maximally used in natural science.<sup>20</sup>

2. It befits reason to traverse through (*discurrere*) from one (thing) into another (►52.2, ¶3), and this is maximally observed in natural science, where we arrive from the cognition of one thing at the cognition of another: for example, from the cognition of an effect (we arrive) at the cognition of the cause.<sup>21</sup>

The mode of reason is preserved in all the sciences insofar as we proceed from one into another according to *ratio*, but not insofar as we proceed from one thing into another.<sup>22</sup>

This, instead, is proper of natural science.

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<sup>18</sup> *In Physic.* 1, l. 1, n. 4: “Sequuntur autem ad hunc librum alii libri scientiae naturalis, in quibus tractatur de speciebus mobilium: puta in libro *de Caelo* de mobili secundum motum localem, qui est prima species motus; in libro autem *de Generatione*, de motu ad formam et primis mobilibus, scilicet elementis, quantum ad transmutationes eorum in communi; quantum vero ad speciales eorum transmutationes, in libro *Meteororum*; de mobilibus vero mixtis inanimatis, in libro *de Mineralibus*; de animatis vero, in libro *de Anima* et consequentibus ad ipsum.”

<sup>19</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 164–166: “Scientia enim naturalis in suis processibus seruat proprium modum rationalis anime quantum ad duo.”

<sup>20</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 166–175: “Primo quantum ad hoc quod sicut anima rationalis a sensibilibus, que sunt nota magis quoad nos, accipit cognitionem intelligibilium, que sunt magis nota secundum naturam, ita scientia naturalis procedit ex his que sunt nota magis quoad nos et minus nota secundum naturam, ut patet in I Phisicorum, et demonstratio que est per signum uel effectum maxime usitatur in scientia naturali.”

<sup>21</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 175–179: “Secundo quia cum rationis sit de uno in aliud discurrere, hoc maxime in scientia naturali obseruatur, ubi ex cognitione unius rei in cognitionem alterius deuenitur, sicut ex cognitione effectus in cognitionem cause.”

<sup>22</sup> *In De Trin.*, q. 6 a. 1 qc. 1 ad 3, 208–212: “in omnibus scientiis seruatur quantum ad hoc modus rationis, quod proceditur de uno in aliud secundum rationem, non autem quod procedatur de una re in aliam; set hoc est proprium naturalis scientie.”

And not only do we proceed from one into another according to a *ratio* that is not diverse according to thing: for example, if we should proceed from *animal* to *man*.<sup>23</sup>

Thus, in the mathematical sciences we proceed only through those (*ratios*) that belong to the essence of the thing, since (these sciences) demonstrate only through the formal cause.<sup>24</sup> Hence, nothing is demonstrated in them from one thing through another thing, but (only) through the proper definition of that thing. And even if some demonstrations are indeed given of the circle from the triangle or conversely, this is only insofar as there is a triangle in potency in the circle, and conversely.

On the other hand, in natural science, in which a demonstration is produced through extrinsic causes, something is proven about one thing through another, altogether extrinsic thing.<sup>25</sup> And thus, the mode of reason is maximally observed in natural science. Wherefrom, natural science, among the other (sciences), is maximally conformed (*conformis*) to the intellect of man.

Therefore, to proceed reasonably (*rationabiliter*) is attributed to natural science not because it befits it alone, but because it befits it above all.<sup>26</sup>

#### 63.4. Knowledge of Motion, Time, and Number

ARISTOTLE shows that, just as we know motion by time, so, too, (do we know) time by motion:<sup>27</sup> And this (happens):

1. From the ratio of *ratio* of *number* and *numbered*.<sup>28</sup> Thus, not only do we measure motion by time, but we also measure time by motion on account of their being defined by each other (< διὰ τὸ ὀρίζεσθαι ὑπ' ἀλλήλων), for the quantity of one must be taken according to the quantity of the other.

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<sup>23</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 179–182: “Et non solum proceditur ab uno in aliud secundum rationem quod non est aliud secundum rem, sicut si ab animali procedatur ad hominem.”

<sup>24</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 182–190: “in scientiis enim mathematicis proceditur per ea tantum que sunt de essentia rei, cum demonstrent solum per causam formalem, et ideo non demonstratur in eis aliquid de una re per aliam rem, set per propriam diffinitionem illius rei: etsi enim alique demonstrationes dentur de circulo ex triangulo uel e conuerso, hoc non est nisi in quantum in circulo est potentia triangulus et e conuerso.”

<sup>25</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 190–196: “Set in scientia naturali, in qua fit demonstratio per causas extrinsecas, probatur aliquid de una re per aliam rem omnino extrinsecam; et ita modus rationis maxime in scientia naturali obseruatur, et propter hoc scientia naturalis inter alias est maxime hominis intellectui conformis.”

<sup>26</sup> *In De Trin.*, q. 6 a. 1 qc. 1 co., 197–199: “Attribuitur ergo rationabiliter procedere scientie naturali, non quia ei soli conueniat, set quia ei precipue competit.”

<sup>27</sup> *In Physic.* 4, l. 19, n. 6 (cf. ARISTOTLE, *Physica* Δ.12, 220b14–32): “ostendit [Philosophus] quod sicut motum cognoscimus tempore, ita et tempus motu: et hoc primo ex ratione numeri et numerati; secundo ex similitudine magnitudinis et motus.”

<sup>28</sup> *In Physic.* 4, l. 19, n. 6 (cf. ARISTOTLE, *Physica* Δ.12, 220b14–24): “Dicit ergo [Philosophus] primo quod non solum mensuramus motum per tempus, sed etiam mensuramus tempus per motum, propter hoc quod ad invicem definiuntur. Oportet enim accipere quantitatem unius secundum quantitatem alterius.”

That time should determine motion occurs because it is its number (i.e., time is the number of motion according to the prior and the posterior).<sup>29</sup> Conversely, on the other hand, motion determines time in respect of us (*quoad nos*). Thus, sometimes we perceive the quantity of time from motion, as when we say that time is much or little according to a measure of motion (that is) certain to us.

We know number itself, too, through numerable (things); and conversely.<sup>30</sup> Thus, we know a multitude of horses by a number (i.e., by a simple or absolute number; ► 34.4, ¶1); and, again, we know a number of horses by one horse. Thus, we will know how many thousands there are only if we know what a thousand is.

It is likewise (the case) in time and motion.<sup>31</sup> When a quantity of time is certain to us and the quantity of motion (is) unknown, then we measure motion by time; and when motion is known and time (is) unknown, conversely.

2. From the likeness of magnitude and motion.<sup>32</sup> What has been said concerning time and motion happens reasonable (*rationabiliter* = εὐλόγως), since just as motion imitates magnitude in quantity, continuity, and divisibility, so time, too, imitates motion: for these (i.e., quantity, continuity, and divisibility) are found in motion on account of magnitude; and (they are found) in time on account of motion (► 48.26).

Indeed, we measure both magnitude through motion and motion through magnitude.<sup>33</sup> Thus, we say that the way is long (lit., *many*, since it is measured as a multitude, *dicimus enim multam esse viam* = πολλὴν γὰρ εἶναί φαμεν τὴν ὁδόν) when we perceive our motion to be much (lit., *many*, *quando percipimus motum nostrum fuisse multum* = ἂν ἡ πορεία πολλή); conversely, too, when we consider the magnitude of the way, we say that our motion is much. And it is so, too, concerning time and motion, as said above.

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<sup>29</sup> *In Physic.* 4, l. 19, n. 6 (cf. ARISTOTLE, *Physica* Δ.12, 220b14–19): “Quod enim tempus determinet motum, ex hoc contingit, quia est numerus ipsius; sed e converso motus determinat tempus quoad nos. Percipimus enim interdum quantitatem temporis ex motu, utpote cum dicimus tempus esse multum vel paucum, secundum mensuram motus nobis certam.”

<sup>30</sup> *In Physic.* 4, l. 19, n. 6 (cf. ARISTOTLE, *Physica* Δ.12, 220b19–22): “quia et ipsum numerum aliquando per numerabilia cognoscimus, et e converso. Cognoscimus enim numero equorum multitudinem, et iterum uno equo cognoscimus numerum equorum. Non enim sciremus quot sunt millia, nisi sciremus quid est milliare.”

<sup>31</sup> *In Physic.* 4, l. 19, n. 6 (cf. ARISTOTLE, *Physica* Δ.12, 220b22–24): “Et similiter est in tempore et motu. Quia cum est nobis certa quantitas temporis, quantitas autem motus ignota, tunc tempore mensuramus motum; e converso autem, quando motus est notus et tempus ignotum.”

<sup>32</sup> *In Physic.* 4, l. 19, n. 7 (cf. ARISTOTLE, *Physica* Δ.12, 220b24–26): “ostendit [Philosophus] idem ex comparatione motus ad magnitudinem. Et dicit quod rationabiliter accidit quod dictum est de tempore et motu: quia sicut motus magnitudinem imitatur in quantitate et continuitate et divisibilitate, ita et tempus imitatur motum; haec enim in motu inveniuntur propter magnitudinem, et in tempore propter motum.”

<sup>33</sup> *In Physic.* 4, l. 19, n. 7 (cf. ARISTOTLE, *Physica* Δ.12, 220b26–32): “Mensuramus autem et magnitudinem per motum, et motum per magnitudinem. Dicimus enim multam esse viam, quando percipimus motum nostrum fuisse multum: et e converso, quando consideramus magnitudinem viae, dicimus motum nostrum fuisse multum. Et ita etiam est de tempore et motu, ut supra dictum est.”



### 63.5. Motion and Quantity

Motion is univocally predicated at least in the intention of the genus.<sup>34</sup> Hence, one measure can respond to all motions ordered to each other.

According to its nature, however, motion does not pertain to the genus of quantity.<sup>35</sup> It nonetheless participates (in) some (degree) of the nature of quantity from another (part, *aliunde*), insofar as the division of motion is taken either from the division of space or from the division of the mobile. Hence, it does not pertain to the mathematician to consider motion.

However, mathematical principles (*principia mathematica*) can be applied to motion.<sup>36</sup> And thus, insofar as the principles of quantity are applied to motion, the natural (scientist) considers (the truth) concerning the division and continuity of motion. And (the truth) concerning the measures of motions is treated in the mean sciences between the mathematical and the natural (►64): for example, in astronomy.

### 63.6. The Being of Time

As ARISTOTLE says, we must either say that there should be no time if there is no soul; or we must, more truly, say that time is—howsoever—some being without the soul: for example, if motion should happen without the soul.<sup>37</sup> For just as motion is posited, so is it necessary for time to be posited, since the prior and the posterior are in motion. And these—to wit, the prior and the posterior—are time itself insofar as they are numerable.

(As already said; ►), if there is nothing that numerates, it does not follow that there should not be (something) numerable.<sup>38</sup> Therefore, if motion should have a fixed being (*esse*

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<sup>34</sup> *In Sent.* 2, d. 2 q. 1 a. 1 ad 3: “motus univocatur ad minus in intentione generis; et ideo omnibus motibus ordinatis ad invicem, potest una mensura respondere.”

<sup>35</sup> *In De Trin.*, q. 5 a. 3 ad 5, 343–349: “motus secundum naturam suam non pertinet ad genus quantitatis set participat aliquid de natura quantitatis aliunde secundum quod diuisio motus sumitur uel ex diuisione spatii uel ex diuisione mobilis; et ideo considerare motus non pertinet ad mathematicum.”

<sup>36</sup> *In De Trin.*, q. 5 a. 3 ad 5, 349–356 (cf. ARISTOTLE, *Physica* Z.1–5, 231b21–235b35): “set tamen principia mathematica ad motum applicari possunt. Et ideo secundum hoc quod principia quantitatis ad motum applicantur, naturalis considerat de diuisione et continuitate motus, ut patet in VI Phisicorum; et in scientiis mediis inter mathematicam et naturalem tractatur de mensuris motuum, sicut in scientia de sphaera mota et in astrologia.”

<sup>37</sup> *In Physic.* 4, l. 23, n. 4 (cf. ARISTOTLE, *Physica* Δ.14, 223a22–24): “Tempus autem est numerus, ut dictum est. Si ergo non est anima intellectiva, non est tempus.” *Ibid.*, n. 5 (cf. ARISTOTLE, *Physica* Δ.14, 223a24–29): “soluit [Philosophus] dubitationem. Et dicit quod aut oportet dicere quod tempus non sit, si non est anima; aut oportet hoc dicere verius, quod tempus est utcumque ens sine anima, ut puta si contingit motum esse sine anima. Sicut enim ponitur motus, ita necesse est poni tempus: quia prius et posterius in motu sunt; et haec, scilicet prius et posterius motus, in quantum sunt numerabilia, sunt ipsum tempus.”

<sup>38</sup> *In Physic.* 4, l. 23, n. 5 (cf. ARISTOTLE, *Physica* Δ.14, 223a24–29): “non tamen sequitur quod si non est numerans, quod non sit numerabile, ut obiectio Philosophi procedebat. Si ergo motus haberet esse fixum in rebus, sicut lapis vel equus, posset absolute dici quod sicut etiam anima non existente est numerus lapidum, ita etiam anima non existente esset numerus motus, qui est tempus. Sed motus non habet esse

*fixum*) in things, as a stone or a horse (have a fixed being while they exist), it could be said absolutely that, just as (if) the soul (would) not exist there is (nonetheless) a number of stones, so, too, (if) the soul (would) not exist there would be a number of motion, which is time. However, motion does not have a fixed being in things. Nor is there some act of motion found in things—except some indivisible motion, which is the division of motion. Instead, the totality of motion is taken through the consideration of the soul, which compares a prior disposition of motion to a posterior. Therefore, in this way, time does not have being outside the soul—except according to its indivisible (division). And the totality of time itself is taken through an ordination of the soul that numbers the prior and the posterior in motion. Hence, ARISTOTLE clearly says that, if a soul does not exist, time is some being *howsoever* (< ὅ ποτε ὄν ἔστιν ὁ χρόνος): that is, imperfectly, just as if it should be said that motion imperfectly happens to be (i.e., to exist) without the soul.

### 63.7. Measure and Quantity in Qualities

ARISTOTLE shows how quantity should be derived into other species, and to what species of quantity it should be derived.<sup>39</sup> Thus, he says that from number and (from) the *one* that is the principle of number, that is said (to be the) **measure** (*mensura* = μέτρον), in other quantities, *by which each of them is known first* (*quo primo cognoscitur unumquodque* = ὃ ἕκαστον πρώτῳ γινώσκεται; ►28.5). And that *which is the measure in whichever genus of quantity* is said (to be the) **one in that genus** (< καὶ τὸ μέτρον ἕκάστου ἓν [λέγεται]; ►27.8; 28.3).

He exemplifies this in three genera: **(a)** in **dimensions**, which are length, width, and depth (*longitudo, et latitudo, et profunditas* < ἐν μήκει, ἐν πλάτει, ἐν βάθει); **(b)** in **weights** (*in ponderibus*), where he says, “in heaviness” (*in gravitate* = ἐν βάθει); and **(c)** in **motions** (*in motibus*), where he says, “in velocity” (*in velocitate* = ἐν τάχει).<sup>40</sup>

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*fixum* in rebus, nec aliquid actu invenitur in rebus de motu, nisi quoddam indivisibile motus, quod est motus divisio: sed totalitas motus accipitur per considerationem animae, comparantis priorem dispositionem mobilis ad posteriorem. Sic igitur et tempus non habet esse extra animam, nisi secundum suum indivisibile: ipsa autem totalitas temporis accipitur per ordinationem animae numerantis prius et posterius in motu, ut supra dictum est. Et ideo signanter dicit Philosophus quod tempus, non existente anima, est utcumque ens, idest imperfecte; sicut et si dicatur quod motum contingit esse sine anima imperfecte. Et per hoc solvuntur rationes supra positae ad ostendendum quod tempus non sit, quia componitur ex partibus non existentibus. Patet enim ex praedictis, quod non habet esse perfectum extra animam, sicut nec motus.”

<sup>39</sup> *In Metaph.* 10, l. 2, §1940 (cf. ARISTOTLE, *Metaphysica* I.1, 1052b24–26): “Ostendit [Philosophus] *quomodo derivetur in alias species quantitatis*. Et circa hoc duo facit. Primo ostendit *ad quas species quantitatis derivetur*, dicens, quod hinc, scilicet ex numero et uno quod est principium numeri, dicitur mensura in aliis quantitibus, id scilicet quo primo cognoscitur unumquodque eorum. Et id quod est mensura cuiuslibet generis quantitatis, dicitur unum in illo genere.”

<sup>40</sup> *In Metaph.* 10, l. 2, §1941 (cf. ARISTOTLE, *Metaphysica* I.1, 1052b26–27): “Et hoc exemplificat [Philosophus] in tribus generibus; scilicet in dimensionibus quae sunt scilicet longitudo, et latitudo, et profunditas. Et in ponderibus, in hoc quod dicit, in gravitate. Et in motibus, in hoc, quod dicit, in velocitate, quod referatur ad mensuram temporis.”

About dimensions, there was clearly no doubt that they should be quantities; and that *to be measured (mensurari)* should have properly befitted (*competeret*) them first.<sup>41</sup> On the other hand, there could be doubt about heaviness and velocity, since they seem to be qualities rather than (*magis quam*) quantities. Thus, ARISTOTLE says in what mode they pertain to the genus of quantity and in what mode it befits them to be measured.

Thus, he says that heaviness and velocity have something common in contraries (< κοινὸν ἐν τοῖς ἐναντίοις): to wit, because in one of the contraries is found the other.<sup>42</sup> For the heavy is in some mode light, and conversely; and the fast is in some mode slow.

And to explain what he says about the condition of heaviness and velocity in contraries, he adds that velocity is found in the slow itself insofar as that which is simply and absolutely slow is related to (*se habet ad*) slower (things).<sup>43</sup> Likewise, heaviness is found in the light: for example, air is light (compared) to earth; and (it is) heavy compared to fire. (< ἔστι γὰρ τι τάχος καὶ τοῦ βραδέος καὶ βάρους τοῦ κουφοτέρου)

Indeed, each of them is (said) in two modes (< διπλὸν γὰρ ἐκάτερον αὐτῶν), in one of which the *ratio* of quantity and of measure befits it, while in the other (it does) not.<sup>44</sup>

**1. Absolutely (absolute):** and in this mode, it neither pertains to the genus of quantity, nor does it befit it to be measured.<sup>45</sup>

Thus, in one mode, (that) is said (to be) **heavy** (*grave* = βάρους) absolutely *which has an inclination to bear towards a mean (quod habet inclinationem ut feratur ad medium* < τὸ... ἔχον ῥοπὴν), without considering how much it should have of such an inclination (< ὀποσηνοῦν).<sup>46</sup>

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<sup>41</sup> *In Metaph.* 10, l. 2, §1941: “Et de dimensionibus quidem nulli dubium erat, quin quantitates essent, et quod proprie eis primo competeret mensurari. Sed de gravitate et velocitate poterat esse dubium, eo quod magis videntur esse qualitates quam quantitates.” *Ibid.*, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b27–31): “Et ideo dicit [Philosophus], quomodo pertinent ad genus quantitatis, et quomodo competit eis mensurari.”

<sup>42</sup> *In Metaph.* 10, l. 2, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b27): “dicens, quod gravitas et velocitas habent aliquid commune in contrariis, quia scilicet in uno contrariorum invenitur alterum: nam grave est aliquo modo leve, et e converso; et velox est aliquo modo tardum.”

<sup>43</sup> *In Metaph.* 10, l. 2, §1943 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b30–31): “Et ut exponat [Philosophus] quod dixerat de conditione gravitatis et velocitatis in contrariis, subdit quod in ipso tardo invenitur velocitas, in quantum id quod est simpliciter et absolute tardum, per excessum se habet ad tardiora. Et similiter gravitas invenitur in levi, sicut aer est levis ad terram, et gravis ad ignem comparatus.”

<sup>44</sup> *In Metaph.* 10, l. 2, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b28): “Utrumque enim eorum est duplex. [...] Et uno modo competit sibi ratio quantitatis et mensurae. Alio modo non.”

<sup>45</sup> *In Metaph.* 10, l. 2, §1942: “uno modo dicitur absolute [...]: et sic non pertinet ad genus quantitatis, nec competit ei mensurari.”

<sup>46</sup> *In Metaph.* 10, l. 2, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b28–29): “Sicut grave, uno modo dicitur absolute, scilicet quod habet inclinationem ut feratur ad medium, sine hoc quod consideretur quantum habeat de tali inclinatione.”

Likewise, in one mode, (that) is said (to be) **fast** (*velox* = τάχος) absolutely *which has any motion whatever* (*quod habet motum quemcumque* < τὸ... ὅποσηνοῦν κίνησιν ἔχον).<sup>47</sup>

**2. By comparison to another** (*per comparationem ad aliud*): to wit, *that which exceeds another* (*quod excedit alterum* < τὸ ὑπεροχὴν).<sup>48</sup> Therefore, in this mode, some *ratio* of quantity and of measure is found by reason of this excess.

Thus, in another mode, that is said (to be) **heavy** by comparison to another *which exceeds another in the aforesaid inclination* (< τὸ ἔχον ὑπεροχὴν ῥοπής).<sup>49</sup> For example, if we should say that earth is heavier in comparison to water; and lead, in comparison to wood.

Likewise, in another mode, (that) is said (to be) **fast** (*velox* = τάχος) *which has an excess of motion* (*quod habet excessum motus* < τὸ ὑπεροχὴν κινήσεως).<sup>50</sup>

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<sup>47</sup> *In Metaph.* 10, l. 2, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b29–30): “Et similiter velox dicitur dupliciter. Uno modo absolute, scilicet quod habet motum quemcumque.”

<sup>48</sup> *In Metaph.* 10, l. 2, §1942: “Alio modo [...] per comparationem ad aliud, scilicet quod excedit alterum. [...] Sic igitur ratione huius excessus, invenitur aliqua ratio quantitatis et mensurae.”

<sup>49</sup> *In Metaph.* 10, l. 2, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b29): “Alio modo dicitur grave per comparationem ad aliud, scilicet quod excedit alterum in inclinatione praedicta; ut scilicet dicamus, quod terra est gravis in comparatione ad aquam, et plumbum in comparatione ad lignum.”

<sup>50</sup> *In Metaph.* 10, l. 2, §1942 (cf. ARISTOTLE, *Metaphysica* l.1, 1052b29–30): “Et similiter velox dicitur dupliciter. [...] alio modo quod habet excessum motus.”

## 64. Mean or Subaltern Sciences

*We turn our attention to sciences that demonstrate using mathematical principles.*

### 64.1. Modes in Which One Science Is Contained under Another

That *one science is contained under another* is to be understood in two modes:<sup>1</sup>

1. As a **part** of it: to wit, when the subject (of the lower or *contained* science) is some (subjective) part or species (►13.6, ¶1) of the subject of the higher (or *containing*) science.<sup>2</sup>

For example, *animal* is a species of *natural body*, and hence, the science of animals is under natural science.<sup>3</sup> Likewise, *plant* is some (subjective) part of *natural body*; whence, too, the science of plants is contained under natural (science) as a part.

Therefore, medicine is not posited under physics as a part.<sup>4</sup> For the subject of medicine is not a part of the subject of natural science according to that *ratio* whereby it is a subject of medicine. Indeed, although a healable body should be a natural body, it is not a subject of medicine insofar as it is healable by nature, but insofar as it is healable by art.

2. As a **subaltern** of it (*ut ei subalternata*): to wit, instead of the subject of the lower science being a species of the subject of the higher (science), the subject of the lower science is compared to the subject of the higher science as the material (is compared) to the formal.<sup>5</sup> Whence, concerning those (things) about which it is known only *that* (they are so) in the lower science, (the answer to the question) *on account of what* (they are so) is assigned in the higher science.

For example, harmonics (*musica*) is posited under arithmetic.<sup>6</sup>

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<sup>1</sup> *In Post. an.* 1, l. 25, 35–36: “Set intelligendum unam scienciam esse sub altera dupliciter.” *In De Trin.*, q. 5 a. 1 ad 5, 294–295: “aliqua scientia continetur sub alia dupliciter.”

<sup>2</sup> *In Post. an.* 1, l. 25, 36–38: “uno modo, quando subiectum unius sciencie est species subiecti superioris sciencie.” *In De Trin.*, q. 5 a. 1 ad 5, 295–297: “uno modo ut pars ipsius, quando scilicet subiectum eius est pars aliqua subiecti illius.”

<sup>3</sup> *In Post. an.* 1, l. 25, 38–40: “sicut animal est species corporis naturalis et ideo scientia de animalibus est sub scientia naturali.” *In De Trin.*, q. 5 a. 1 ad 5, 297–299: “sicut planta est quedam pars corporis naturalis, unde et scientia de plantis continetur sub scientia naturali ut pars.”

<sup>4</sup> *In De Trin.*, q. 5 a. 1 ad 5, 304–310: “Medicina ergo non ponitur sub phisica ut pars: subiectum enim medicine non est pars subiecti sciencie naturalis secundum illam rationem qua est subiectum medicine: quamuis enim corpus sanabile sit corpus naturale, non tamen est subiectum medicine prout est sanabile a natura, set prout est sanabile ab arte.”

<sup>5</sup> *In Post. an.* 1, l. 25, 40–43: “alio modo, quando subiectum inferioris sciencie non est species subiecti superioris, set subiectum inferioris sciencie comparatur ad subiectum superioris sicut materiale ad formale.” *In De Trin.*, q. 5 a. 1 ad 5, 299–303: “alio modo continetur una scientia sub alia ut ei subalternata, quando scilicet in superiori scientia assignatur propter quid eorum de quibus scitur in scientia inferiori solum quia.”

<sup>6</sup> *In De Trin.*, q. 5 a. 1 ad 5, 303–304: “sicut musica ponitur sub arismetica.”

Likewise, since, in (the operation of) healing, something is produced through art, art is (therefore) an assistant (*ministra*) of nature, since health is perfected with the help of art (*auxilio artis*) from some natural virtue.<sup>7</sup>

Whence, (the answer to the question) *on account of what* (something is so) concerning the operation of an art must be taken from the properties of natural things.<sup>8</sup> Wherefrom, medicine is a subaltern of physical (science). And for the same reason, (practical) chemistry (*alchimia*), the science of agriculture, and all such (operative sciences are subaltern sciences of physics).

On the other hand, physics, according to itself and according to all its parts, is speculative, even though some operative sciences should be subaltern to it.<sup>9</sup>

#### 64.2. To Know *That Something Is So* vs. *On Account of What It Is So*

As has been said (►53.2), a demonstration is a syllogism that produces science; and a demonstration proceeds from the first and immediate causes of a thing.<sup>10</sup> This should be understood of a demonstration (that answers the question) *on account of what* (something is so, *propter quid*; ►55.4, ¶2).

However, as ARISTOTLE says, scientifically to know *that* (something) is so (*scire 'quia' <ita est> = τὸ... ὅτι... ἐπίστασθαι*) differs from knowing *on account of what* it is so ('*propter quid' <ita est> = τὸ διότι*).<sup>11</sup> And since a demonstration should be a syllogism that produces science, as has been said, it is also necessary for a demonstration that makes (someone) scientifically to know *that* (something is so) to differ from a demonstration that makes (someone) scientifically to know *on account of what* (something is so).

Their difference is to be considered first in the same science (►64.3); and thereafter, it is (to be) considered in diverse sciences (►64.4).<sup>12</sup>

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<sup>7</sup> *In De Trin.*, q. 5 a. 1 ad 5, 310–313: “Set quia in sanatione que fit etiam per artem, ars est ministra nature, quia ex aliqua naturali uirtute sanitas perficitur auxilio artis.”

<sup>8</sup> *In De Trin.*, q. 5 a. 1 ad 5, 313–317: “inde est quod propter quid de operatione artis oportet accipere ex proprietatibus rerum naturalium, et propter hoc medicina subalternatur phisice; et eadem ratione alchimia, et scientia de agricultura, et omnia huiusmodi.”

<sup>9</sup> *In De Trin.*, q. 5 a. 1 ad 5, 318–321: “Et sic relinquitor quod phisica secundum se et secundum omnes partes suas est speculatiua, quamuis alique scientie operatiue subalternentur ei.”

<sup>10</sup> *In Post. an.* 1, l. 23, 14–18 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a22–23): “Dicit ergo [Philosophus] primo: superius dictum est quod demonstratio est sillogismus faciens scire et quod demonstratio ex causis rei procedit et primis et immediatis; quod intelligendum est de demonstratione ‘propter quid’.”

<sup>11</sup> *In Post. an.* 1, l. 23, 18–23 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a22): “Set tamen differt scire ‘quia’ ita est et ‘propter quid’ ita est; et cum demonstratio sit sillogismus faciens scire, ut dictum est, oportet etiam quod demonstratio que facit scire ‘quia’ differat a demonstratione que facit scire ‘propter quid’.”

<sup>12</sup> *In Post. an.* 1, l. 23, 23–25 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a22–23): “Et horum *quidem* differencia primo consideranda est *in eadem sciencia*; postea enim considerabitur in diuersis scienciis.”

### 64.3. In One Science

In one science, the aforesaid (demonstrations) differ according to the two (conditions) that were required (in order) for (there to be a) demonstration simply, which makes (someone) scientifically to know *on account of what* (something is so): namely, that it should be from an immediate (proposition; ►54), and that it should be from causes (►55).<sup>13</sup>

1. In one mode, scientifically to know *that* (something is so) differs from scientifically knowing *on account of what* (it is so) because scientifically to know *that* (something is so) is (what takes place) if a syllogism should not be produced through a non-mean—that is, (if a syllogism should not be produced) through an immediate (proposition)—, (and) instead, it should be produced through **mediate** (propositions). For, in this mode, a first cause would not be taken, since a science that is (capable of answering the question) *on account of what* (something is so) should be (capable of demonstrating) according to a first cause; and thus, (if its demonstrations do not follow from immediate propositions) it will not be a science (capable of answering the question) *on account of what* (it is so).<sup>14</sup>

2. In another mode, they differ because *that* (something is so) is (demonstrated) when a syllogism is not produced through means—that is, through mediate (propositions)—but through immediate (propositions), yet it is not produced by a cause: instead, it is produced by convertible and immediate **effects** (►53.5).<sup>15</sup> However, such a demonstration comes to be through the more known (►57.5, ¶2)—otherwise it would not make (someone) know, for we only arrive at the cognition of the unknown through something more known.

Indeed, nothing prevents two convertible (*aeque predicantium* = ἀντικατηγορουμένων, *id est convertibilium*) terms, of which one should be a cause and the other an effect, to be sometimes more known (*notius* = γνωριμώτερον) than which is not a cause but rather an effect.<sup>16</sup> For the effect is sometimes more known than the cause in respect of us and

<sup>13</sup> *In Post. an. 1, l. 23, 25–29* (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a23): “In una autem sciencia *dupliciter* differt utrumque predictorum, secundum duo que requirebantur ad demonstrationem simpliciter, que facit scire ‘propter quid’, scilicet quod sit ex causis, et quod sit ex immediatis.”

<sup>14</sup> *In Post. an. 1, l. 23, 30–37* (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a23–26): “Vno igitur modo differt scire ‘quia’ ab hoc quod est scire ‘propter quid’, quia scire ‘quia’ est *si non fiat sillogismus* demonstratiuus *per non medium*, id est per immediatum, set fiat per mediata: sic *enim non* accipietur *prima causa*, cum tamen *sciencia que est ‘propter quid’* sit *secundum primam causam*; et ita non erit sciencia ‘propter quid’.”

<sup>15</sup> *In Post. an. 1, l. 23, 37–44* (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a26–28): “Alio modo differunt, quia scire ‘quia’ est quando fit sillogismus *non quidem* per media, id est per mediata, set per immediata, set *non* fit *per causam*, set fit *per conuertencia*, id est per effectus conuertibiles et immediatos; et tamen talis demonstratio fit *per notius*, alias non faceret scire: non enim peruenimus ad cognitionem ignoti nisi per aliquid magis notum.”

<sup>16</sup> *In Post. an. 1, l. 23, 44–53* (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78a28–30): “*Nichil enim prohibet* duorum *eque predicantium*, id est conuertibilium, quorum unus sit causa et aliud effectus, *notius esse aliquando non causam*, set magis effectum; nam effectus aliquando est notior causa quo ad nos et secundum sensum, licet causa sit semper notior simpliciter et secundum naturam. Et ita per effectum notiosem causa potest fieri demonstratio non faciens scire ‘propter quid’, set tantum ‘quia’.”

according to sense, even though a cause should always be more known simply and according to nature. And thus, a demonstration can be produced through an effect (that is) more known than the cause, (which demonstration) does not make (someone) scientifically to know *on account of what* (something is so), but only *that* (it is so).

#### 64.4. In Diverse Sciences

As ARISTOTLE says, one science is under another (*sub altera* = ὑπὸ θάτερον, i.e., the former is a **subaltern** science in respect of the latter) whenever they are related in such a way that (demonstrating) *that* (something is so, *quia* = τὸ ὅτι) pertains to one, while (demonstrating) *on account of what* (it is so, *propter quid* = τὸ διότι) pertains to the other.<sup>17</sup>

For example, perspective is so related to geometry.<sup>18</sup> Thus, geometry is about the line and (about) the other magnitudes, while perspective is about a line determined to matter: that is, about the visual line; and the visual line is not a species of line simply, just like a wooden triangle is not a species of triangle, for *wooden* is not a difference of *triangle*.

Likewise, the science of making machines and inventions (*machinativa* = μηχανικά, *id est scientia de faciendis machinis et ingeniis*) is (so) related to stereometry (*steriometria* = στερεομετρία), that is, to the science that is about the mensuration of bodies.<sup>19</sup> Here, too, a science is said to be under (another) science due to (*per*) the application of the formal to the material. For the measurement of bodies, simply, is compared to the measurement of (pieces of) wood and of other materials that are required (in order) to (produce) machines and inventions, due to the application of the formal to the material.

Likewise, harmonics or music (*harmonica* = ἁρμονικά, *id est musica*) is related (as a subaltern science) to arithmetic: for music applies the formal number, which the arithmetician considers, to matter—that is, to sounds.<sup>20</sup>

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<sup>17</sup> *In Post. an.* 1, l. 25, 44–45 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b34–37): “Et hoc modo accipit [Philosophus] hic unam scienciam esse sub altera.” *In Post. an.* 1, l. 25, 31–34: “Dicit ergo primo quod huiusmodi sciencie sunt (scilicet ad quarum unam pertinet ‘quia’, ad aliam autem ‘propter quid’) quecunque sic se habent ad inuicem quod altera est sub altera.”

<sup>18</sup> *In Post. an.* 1, l. 25, 45–52 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b37): “sicut *speculatiua*, id est *perspectiua*, se habet *ad geometriam*: geometria enim est de linea et aliis magnitudinibus, *perspectiua* autem est circa lineam determinatam ad materiam, id est circa lineam uisuaem; linea autem uisualis non est species linee simpliciter, sicut neque triangulus ligneus est species trianguli: non enim ligneum est *differencia* trianguli.”

<sup>19</sup> *In Post. an.* 1, l. 25, 52–61 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b37–38): “Et similiter *machinatiua*, id est *sciencia de faciendis machinis et ingeniis*, se habet *ad steriometriam*, id est ad scienciam que est de mensurationibus corporum: hic etiam sciencia dicitur esse sub sciencia per applicationem formalis ad materiale, nam mensura corporum simpliciter comparantur ad mensuras lignorum et aliarum materierum, que requiruntur ad machinas et ingenia, per applicationem formalis ad materiale.”

<sup>20</sup> *In Post. an.* 1, l. 25, 61–64 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b38): “Et similiter se habet *armonica*, id est *musica*, *ad arismetiam*: nam *musica* applicat numerum formalem, quem considerat *arismeticus*, ad materiam, id est ad sonos.”



Likewise, (the science of) phenomena (*apparentia* = φαινόμενα), that is, the naval science that considers the apparent signs of calm and storm, is related (as a subaltern science) to astronomy, which considers the motion and position of celestial bodies.<sup>21</sup>

#### **64.5. Knowing Only on Account of What—without Knowing That—Something Is So**

Since someone could believe that whoever should know *on account of what* (something is so) would also—of necessity—know *that* (it is so), ARISTOTLE consequently removes this (erroneous assumption). He says that many of those who scientifically know *on account of what* (something is so) do not know *that* (it is so). He manifests this through an example: as many of those who consider the universal do not know some of the singulars because they do not intend (i.e., they do not tend to them) through (their universal) consideration.<sup>22</sup>

For example, whoever knows that every mule should be sterile does not know (it) about *this* (mule), which he does not consider.<sup>23</sup>

Likewise, (the case is the same of) the mathematician who demonstrates *on account of what* (something is so), since he does not apply (mathematical principles) to those (sensible matters) that are demonstrated in the lower sciences.<sup>24</sup>

#### **64.6. Agreement of Subaltern Sciences in the Name of a Genus or Species**

ARISTOTLE shows how the aforesaid sciences are related to each other according to agreement.<sup>25</sup> He says that such sciences are nearly (*ferè* = σχεδόν) univocal to each other. He says, “nearly,” because they have in common the name of the genus, but not the name of the species.

Thus, all the aforesaid (sciences) are said (to be) *mathematical*: some, because they are about a subject abstracted from matter, as geometry and arithmetic, which are

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<sup>21</sup> *In Post. an.* 1, l. 25, 64–67 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b38–39): “Et similiter se habet *apparencia*, id est sciencia naualis que considerat signa apparencia serenitatis uel tempestatis, *ad astrologiam*, que considerat motus et situs astrorum.”

<sup>22</sup> *In Post. an.* 1, l. 25, 110–117 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a3–6): “Et quia posset aliquis credere quod qui sciret ‘propter quid’, sciret etiam de necessitate ‘quia’, consequenter hoc remouet [Philosophus], dicens quod *multocies* illi qui sciunt ‘propter quid’ *nesciunt ‘quia’*; et hoc manifestat per exemplum: *sicut considerantes uniuersale multocies nesciunt quedam singularium propter hoc quod non intendunt per considerationem.*”

<sup>23</sup> *In Post. an.* 1, l. 25, 117–118: “Sicuti qui scit omnem mulam esse sterilem, nescit de ista quam non considerat.”

<sup>24</sup> *In Post. an.* 1, l. 25, 118–121: “et similiter mathematicus qui demonstrat ‘propter quid’, quia non applicat ad ea que demonstrantur in inferiori sciencia.”

<sup>25</sup> *In Post. an.* 1, l. 25, 69–73 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b39–40): “ostendit [Philosophus] qualiter se habent predictae sciencie ad inuicem secundum conuenienciam, dicens quod *ferè* huiusmodi sciencie *sunt uniuoce* ad inuicem. Dicit autem «*ferè*», quia communicant in nomine generis, non in nomine speciei.”

mathematical simply; some, due to the application of mathematical principles to material things, as astronomy is said (to be) *mathematical*; and the naval (*navalis* = ναυτική) science too.<sup>26</sup> Likewise, harmonics or music is said (to be) *mathematical*, and (the science) that is according to hearing (*secundum auditum* = κατὰ τὴν ἀκοήν): that is, the practice of music, which knows sounds from the experience of hearing.

Or (alternatively explained), it can be said that they are univocal because they agree also in the name of the species.<sup>27</sup> For the naval (science), too, is said (to be an) *astronomy*; and the practice of music is said (to be) *music*. (In this alternative explanation), ARISTOTLE says, “nearly,” because it does not happen in all (the sciences), but in many.

#### 64.7. Application of Mathematical Species to Sensible Matter

In all the aforementioned sciences, those that are contained under others apply mathematical principles to sensible (matters), while those that contain others are more mathematical. Whence, ARISTOTLE says first that scientifically to know *that* (something is so) belongs to sensible (matters, τῶν αἰσθητικῶν), that is, to the lower sciences that apply (mathematical principles) to sensible (matters), while scientifically to know *on account of what* (it is so) belongs to the mathematical (sciences), that is, to the sciences whose principles are applied to sensible (matters). For such (sciences) have to demonstrate those (principles) that are assumed as causes in the lower sciences.<sup>28</sup>

Thus, since ARISTOTLE said that to know *on account of what* (something is so) belongs to the mathematician, he wants to show of what mode of cause the genus is taken by the mathematical (sciences).<sup>29</sup> Whence, he says that these sciences that take from the

<sup>26</sup> *In Post. an.* 1, l. 25, 69–83 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b39–79a2): “ostendit [Philosophus] qualiter se habent predictae sciencie ad inuicem secundum conuenienciam, dicens quod *fere* huiusmodi sciencie *sunt uniuoce* ad inuicem. Dicit autem «fere», quia communicant in nomine generis, non in nomine speciei: dicuntur enim omnes predictae ‘mathematicae’, quedam quidem quia sunt de subiecto abstracto a materia, ut geometria et arismetica, que simpliciter mathematicae sunt; quedam autem per applicationem principiorum mathematicorum ad res materiales, sicut *astrologia* dicitur *mathematica* et etiam *naualis* sciencia, et similiter *armonica*, id est musica, dicitur *mathematica*, et que est *secundum auditum*, id est practica musice, que cognoscit ex experientia auditus sonos.”

<sup>27</sup> *In Post. an.* 1, l. 25, 83–87 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b39–79a2): “Vel potest dici quod sunt uniuoce quia etiam in nomine speciei conueniunt: nam et naualis dicitur astrologia et practica musice dicitur musica: dicit autem [Philosophus] «fere» quia hoc non contingit in omnibus, set in pluribus.”

<sup>28</sup> *In Post. an.* 1, l. 25, 98–109 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a2–3): “Sciendum ergo est circa primum quod in omnibus prenominatis scienciis, ille que continentur sub aliis applicant principia mathematica ad sensibilia, que autem sub se continent alias sunt magis mathematicae. Et ideo dicit primo Philosophus quod *scire ‘quia’ est sensibillum*, id est scienciarum inferiorum, que applicant ad sensibilia; set scire ‘*propter quid’ est mathematicorum*, id est scienciarum quarum principia applicantur ad sensibilia: huiusmodi enim habent demonstrare ea que assumuntur ut cause in inferioribus scienciis.”

<sup>29</sup> *In Post. an.* 1, l. 25, 122–130 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a6–7): “Et quia dixerat [Philosophus] quod scire ‘propter quid’ est mathematicorum, uult ostendere cuiusmodi genus cause a mathematicis sumatur; unde dicit quod iste sciencie, que accipiunt ‘propter quid’ a mathematicis, *sunt alterum quiddam*, id est differunt ab eis, *secundum subiectum*, scilicet in quantum applicant ad materiam; unde huiusmodi sciencie *utuntur speciebus*, id est formalibus principiis, que accipiunt a mathematicis.”

mathematical (sciences) *on account of what* (something is so) differ from them according to the subject: to wit, insofar as they apply (mathematical principles) to (sensible) matter. Whence, such sciences use the species—that is, the formal principles—that they take from the mathematical (sciences).

Indeed, the mathematical sciences are about species (*circa species* = περι εἶδη), for their consideration is not about (some) subject (*de subiecto* < *secundum subiectum* < καθ' ὑποκειμένου τινός): that is, of (sensible) matter.<sup>30</sup> Thus, although those (species) about which geometry considers (the truth)—such as the line, the surface, and (others) such—should be in (sensible) matter, however, geometry does not consider (the truth) about them insofar as they are in (sensible) matter, but insofar as they are abstracted. For geometry abstracts from (sensible) matter, according to consideration, those (species) that are in (sensible) matter according to being (*secundum esse*). Conversely, on the other hand, the sciences (that are) subaltern to them take those (species) that are considered in abstraction by the geometer and apply (them) to (sensible) matter. Whence, it is evident that the geometer says *on account of what* (something is so) in these sciences according to a **formal** cause.

#### **64.8. How a Subaltern Science Demonstrates *on Account of What* Something Is So**

ARISTOTLE shows that a subaltern science, too, says *on account of what* (something is so): not in respect of the (science) to which it is a subaltern (*non respectu subalternantis*), but in respect of some other (science).<sup>31</sup>

Thus, perspective is a subaltern (science in respect of) geometry, and if we should compare perspective to geometry, perspective says *that* (something is so), and geometry *on account of what* (it is so); but just as perspective is a subaltern (science in respect of) geometry, so the science of the rainbow is a subaltern (science in respect of) perspective: for it applies to a determinate matter the principles that perspective consigns simply.<sup>32</sup>

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<sup>30</sup> *In Post. an.* 1, l. 25, 130–144 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a7–10): “*Mathematicae enim scientie sunt circa species: non enim eorum consideratio est de subiecto, id est de materia; quia, quamvis ea de quibus geometria considerat sint in materia, sicut linea, superficies et huiusmodi, non tamen considerat de eis geometria secundum quod sunt in materia, set secundum quod sunt abstracta: nam geometria ea que sunt in materia secundum esse abstrahit a materia secundum considerationem; scientie autem ei subalternatae e conuerso accipiunt ea que sunt considerata in abstractione a geometria et applicat ad materiam. Vnde patet quod geometria dicit ‘propter quid’ in istis scientiis secundum causam formalem.*”

<sup>31</sup> *In Post. an.* 1, l. 25, 146–148 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a10–13): “ostendit [Philosophus] quod etiam scientia subalternata dicit ‘propter quid’, non respectu subalternantis, set respectu alicuius alterius.”

<sup>32</sup> *In Post. an.* 1, l. 25, 148–160 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a10–13): “Perspectiua enim subalternatur geometrie et, si comparemus perspectiuam ad geometriam, perspectiua dicit ‘quia’ et geometria ‘propter quid’; set sicut perspectiua subalternatur geometrie, ita scientia *de yride* subalternatur perspectiue: applicat enim principia, que perspectiua tradit simpliciter, ad determinatam materiam: unde ipsius *phisici*, qui tractat de yride, *est scire ‘quia’, set perspectiui est scire ‘propter quid’*. Dicit enim

Whence, it belongs to the same physicist who treats of the rainbow to know *that* (something concerning perspective is so), but (it belongs) to (the physicist who treats) of perspective to know *on account of what* (it is so). Thus, the physicist says that the cause of the rainbow is the turning of sight to a cloud (that is) disposed in a certain mode towards the sun; but *on account of what* (this) should be (so), he takes from the scientist that treats of perspective.

#### 64.9. Demonstrating through Principles Somehow Contained in a Genus

A science that is had from addition to another uses its principles in demonstrating, as geometry uses the principles of arithmetic; for *magnitude* adds *position over number*; whence, the **point** is said (to be a) *posited unit (unitas posita)*.<sup>33</sup> Likewise, *natural body* adds *sensible matter over mathematical magnitude*. And hence, it is not unbecoming if the natural (scientist) in his demonstrations uses mathematical principles, for it is not altogether another genus; rather, it is somehow contained under it.

It is to be known, however, that the difference (between) *that* (something is so) and *on account of what* (it is so) that is according to diverse sciences is contained under the mode of a demonstration that is produced by a remote cause (► 57.6).<sup>34</sup>

#### 64.10. How the Mean of a Demonstration Can Be in Another Genus

Sometimes it happens that the mean of a demonstration is not in the same genus with the conclusion.<sup>35</sup> ARISTOTLE shows how this would occur if the mean should not be in the same proximity to the conclusion, but in that mode according to which something is demonstrated in harmonics through arithmetic. Indeed, it is true that such (conclusions) are also demonstrated likewise. For a demonstration is produced in a lower science through the principles of a higher science, just like (a demonstration is produced) in a higher science through the principles of the higher (science itself).

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physicus quod conuersio uisus ad nubem aliquo modo dispositam ad solem esse causam yridis, 'propter quid' autem sit, sumit a perspectiuo."

<sup>33</sup> *In De caelo* 1, l. 3 n. 6: "scientia quae se habet ex additione ad aliam, utitur principiis eius in demonstrando, sicut geometria utitur principiis arithmeticae: magnitudo enim addit positionem supra numerum, unde punctus dicitur esse unitas posita. Similiter autem corpus naturale addit materiam sensibilem supra magnitudinem mathematicam: et ideo non est inconueniens si naturalis in suis demonstrationibus utatur principiis mathematicis: non enim est omnino aliud genus, sed quodammodo sub illo continetur."

<sup>34</sup> *In Post. an.* 1, l. 25, 177–182: "Sciendum autem est quod illa differentia 'quia' et 'propter quid' que est secundum diuersas scientias, continetur sub altero predictorum modorum, scilicet quando fit demonstratio per causam remotam." Cf. *In Post. an.* 1, l. 24, 1–95 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 78b13–34).

<sup>35</sup> *In Post. an.* 1, l. 17, 54–65 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a9–11): "excludit [Philosophus] quandam dubitationem. Contingit enim aliquando medium demonstrationis non esse in eodem genere cum conclusione; quod qualiter contingat, ostendit dicens: *si uero non sit medium in eadem proximitate conclusioni, set hoc modo sicut demonstratur aliquid in armonica, id est in musica, per arismetiam*. Verum quidem est quod *huiusmodi etiam similiter demonstratur* (fit enim demonstratio in inferiori sciencia per principia superioris sciencie, ut ostensum est, sicut et in sciencia superiori per principia superioris)."

Yet, the sciences that have an order to each other are related in such a mode that one can use the principles of the other.<sup>36</sup> For example, posterior sciences use the principles of prior sciences, whether they should be higher or lower. Whence, metaphysics, which is superior to all, uses those (principles) that are proven in the other sciences.

However, it differs in this: that it belongs to the lower science to know only *that* (something is so) itself; for the subject genus of the lower science is other than the subject genus of the higher science from which the principles are taken.<sup>37</sup> To know *on account of what* (something is so), on the other hand, befits the higher science to which those affections belong by themselves.

Thus, the affection should be in the subject on account of the mean—to which (mean) belongs the affection that is demonstrated.<sup>38</sup> Therefore, that science to which the mean pertains will consider *on account of what* (the affection is by itself in the subject). However, if the subject should pertain to another science, that science will not be (the science that determines) *on account of what* (the affection is in the subject); instead, (it will) only (assume without demonstration) *that* (the affection pertains to the subject); nor will the affection (that is) demonstrated of the subject benefit it by itself, but through an extraneous mean. On the other hand, if the mean and the subject should pertain to the same science, then it will behoove that science to know *that* (the affection is by itself in the subject) and *on account of what* (the affection is by itself in the subject).

#### **64.11. When One Subject Is Not under Another**

ARISTOTLE shows in what mode *that* (something is so) and *on account of what* (it is so) differ in diverse sciences that are not (related such that one is the) subaltern (of the other).<sup>39</sup> He says that many of the sciences that are not one under the other are related

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<sup>36</sup> *In De Trin.*, q. 2 a. 3 ad 7, 223–229: “scientie que habent ordinem ad inuicem hoc modo se habent quod una potest uti principiis alterius, sicut scientie posteriores utuntur principiis scientiarum priorum, siue sint superiores siue inferiores; unde metaphisica, que est omnibus superior, utitur his que in aliis scientiis sunt probata.”

<sup>37</sup> *In Post. an.* 1, l. 17, 65–70 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a11–13): “set in hoc differt quod alterius scientie, scilicet inferioris, est scire *ipsum quia* tantum (*genus enim subiectum* inferioris scientie est alterum a genere subiecto superioris scientie, ex qua sumuntur principia), set scire *propter quid est superioris scientie, cuius sunt per se ille passionis.*”

<sup>38</sup> *In Post. an.* 1, l. 17, 71–81 (cf. ARISTOTLE, *Analytica Posteriora* A.9, 76a9–13): “Cum enim passio insit subiecto propter medium, illa scientia considerabit ‘propter quid’, ad quam pertinet medium, cuius per se est passio que demonstratur. Si uero subiectum sit ad aliam scientiam pertinens, illius scientie non erit ‘propter quid’, set ‘quia’ tantum, nec tali subiecto per se conueniet passio demonstrata de ipso, set per medium extraneum. Si uero medium et subiectum pertineant ad eandem scientiam, tunc illius scientie erit scire ‘quia’ et ‘propter quid’.”

<sup>39</sup> *In Post. an.* 1, l. 25, 162–168 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a13–14): “ostendit [Philosophus] quomodo ‘quia’ et ‘propter quid’ differunt in diuersis <scientiis> non subalternatis, dicens quod *multe scientiarum* que non sunt sub inuicem sic se habent ad inuicem, scilicet quod ad unam pertinet ‘quia’ et ad alteram pertinet ‘propter quid’, sicut patet de medicina et geometria.”

in such a way: to wit, (such) that it pertains to one (of them to know) *that* (something is so), and (it pertains) to the other (to know) *on account of what* (it is so), as is evident of medicine and geometry.

Thus, the subject of medicine is not taken under the subject of geometry as the subject of perspective (is indeed taken under the subject of geometry).<sup>40</sup> Yet, the principles of mathematics are applicable to some considered conclusion in medicine. For example, it belongs to the physician—who is experienced in this—to know that circular wounds should heal more slowly; but it belongs to the geometer—to whom it pertains to know that the circle is a figure without an angle—to know *on account of what* (this is so): whence, the circular parts of a wound are not close to each other such that they could easily be conjoined.

#### **64.12. Different Proofs of the Same**

Mean sciences communicate with natural (science) according to that which is material in their consideration but differ according to that which is formal in their consideration.<sup>41</sup> Hence, nothing prevents these sciences from sometimes having the same conclusions as natural (science). However, they do not demonstrate through the same (mean), except insofar as the sciences are unmixed and one sometimes uses that which belongs to the other. For example, the natural (scientist) proves the roundness of the Earth from the motion of heavy (bodies), while the astronomer (proves the roundness of the Earth) through the consideration of lunar eclipses.

#### **64.13. Summary: The Three Orders of Sciences**

Simple (subjects) and their properties are preserved in composite (subjects), albeit through another mode.<sup>42</sup> For example, the proper qualities of the elements and their proper motions are found in a compound (body). On the other hand, what is proper of composite (subjects) is not found in simple (subjects).

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<sup>40</sup> *In Post. an.* 1, l. 25, 168–177 (cf. ARISTOTLE, *Analytica Posteriora* A.13, 79a14–16): “Non enim subiectum medicine sumitur sub subiecto geometrie sicut subiectum perspectiue, set tamen ad aliquam conclusionem in medicina consideratam applicabilia sunt principia geometrie: sicut *quod uulnera circularia tardius sanentur, medici est scire*, qui hoc experitur, set ‘*propter quid*’ est scire *geometre*, ad quem pertinet cognoscere quod circulus est figura sine angulo, unde partes circularis uulneris non appropinquant sibi ut possint de facili coniungi.”

<sup>41</sup> *In De Trin.*, q. 5 a. 3 ad 7, 392–403: “quia scientie medie de quibus dictum est, communicant cum naturali secundum id quod in earum consideratione est materiale, differunt autem secundum id quod in earum consideratione est formale, ideo nichil prohibet has scientias cum naturali habere interdum easdem conclusiones, non tamen per eadem demonstrant, nisi secundum quod scientie sunt immixte et una interdum utitur eo quod est alterius; sicut rotunditatem terre naturalis probat ex motu grauium, astrologus autem per considerationem lunarium eclipsium.”

<sup>42</sup> *In De Trin.*, q. 5 a. 3 ad 6, 357–362: “in compositis simplicia saluantur et proprietates eorum, licet per alium modum, sicut proprie qualitates elementorum et motus ipsorum proprii inueniuntur in mixto; quod autem est compositorum proprium non inuenitur in simplicibus.”

Hence, when some science is more abstract and considers simpler (things), so much more are its principles applicable to other sciences.<sup>43</sup> Whence, the principles of mathematics are applicable to natural things—but not conversely. Wherefrom, physics is (had) from the supposition of mathematics, but not conversely.

Wherefrom, three orders of sciences are found concerning natural and mathematical things:<sup>44</sup>

1. Some (sciences) are **purely natural**, which consider the properties of natural things as such (*in quantum huiusmodi*).<sup>45</sup> For example, physics, agriculture, and such (sciences).
2. Some (other sciences) are **purely mathematical**, which determine (the truth) about quantities absolutely.<sup>46</sup> For example, geometry (determines the truth) about magnitude; and arithmetic, about number.
3. Some are **mean** (sciences), which apply mathematical principles to natural things.<sup>47</sup> For example, harmonics (*musica*), astronomy, and such (others).

These (mean sciences) are nonetheless more kindred (*affines*) to the mathematical (sciences), since, in their consideration, that which is physical is as material, while that which is mathematical is as formal.<sup>48</sup> For example, harmonics considers sounds not insofar as they are sounds, but insofar as they are proportionable according to numbers; and likewise, in the other (mean sciences).

Wherefrom, (these mean sciences) demonstrate their conclusions about natural things, but through mathematical means.<sup>49</sup> And hence, nothing prevents them from referring to

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<sup>43</sup> *In De Trin.*, q. 5 a. 3 ad 6, 362–369: “Et inde est quod quanto aliqua scientia est abstractior et simpliciora considerans, tanto eius principia sunt magis applicabilia aliis scientiis: unde principia mathematice <sunt> applicabilia naturalibus rebus, non autem e conuerso, propter quod phisica est ex suppositione mathematice, set non e conuerso, ut patet in III Celi et mundi.”

<sup>44</sup> *In De Trin.*, q. 5 a. 3 ad 6, 369–371: “Et inde est quod de rebus naturalibus et mathematicis tres ordines scientiarum inueniuntur.”

<sup>45</sup> *In De Trin.*, q. 5 a. 3 ad 6, 371–374: “Et inde est quod de rebus naturalibus et mathematicis tres ordines scientiarum inueniuntur: quedam enim sunt pure naturales, que considerant proprietates rerum naturalium in quantum huiusmodi, sicut phisica et agricultura et huiusmodi.”

<sup>46</sup> *In De Trin.*, q. 5 a. 3 ad 6, 374–377: “quedam uero sunt pure mathematice, que determinant de quantitibus absolute, sicut geometria de magnitudine, et arismetica de numero.”

<sup>47</sup> *In De Trin.*, q. 5 a. 3 ad 6, 377–379: “quedam uero sunt medie, que principia mathematica ad res naturales applicant, ut musica, astrologia, <et> huiusmodi.”

<sup>48</sup> *In De Trin.*, q. 5 a. 3 ad 6, 379–386: “Que tamen magis sunt affines mathematicis, quia in earum consideratione id quod est phisicum est quasi materiale, quod autem est mathematicum est quasi formale, sicut musica considerat sonos non in quantum sunt soni, set in quantum sunt secundum numeros proportionabiles, et similiter est in aliis.”

<sup>49</sup> *In De Trin.*, q. 5 a. 3 ad 6, 386–391: “et propter hoc demonstrant conclusiones suas circa res naturales, set per media mathematica. Et ideo nichil prohibet si in quantum cum naturali communicant, materiam sensibilem respiciunt: in quantum enim cum mathematica communicant, abstracte sunt.”

sensible matter insofar as they communicate with (i.e., are common to) natural (science):  
for they are abstract insofar as they communicate with the mathematical (sciences).



## 65. The Order of Certitude

*We examine here the modes and order in which there is certitude in the sciences.*

### 65.1. Modes of Scientific Certitude

ARISTOTLE compares science to science according to **certitude** (*certitudo* = ἀκριβολογία), and posits three modes in which one science is more certain than another:<sup>1</sup>

1. That science is prior and more certain which makes (someone) know both *that* (something is so; ►55.4, ¶1) and *on account of what* (*it is so*; ►55.4, ¶2).<sup>2</sup> Also, that (science) which is capable of knowing only *that* (something is so), separately from that (science) which knows *on account of what* (*it is so*), is not more certain. (Note that there is a relation of effect to cause between these questions; ►55.5.)

Thus, this is the disposition of a higher science (in relation) to a subaltern (*subalternantis ad subalternatam*; ►64).<sup>3</sup> For the subaltern science separately knows *that* (something is so) not knowing *on account of what* (*it is so*). For example, the surgeon knows that circular wounds heal more slowly, but does not know *on account of what* (*this is so*); rather, this pertains to the geometer, who considers the *ratio* of *circle* insofar as its parts are not close to each other by the mode of an angle—due to which closeness triangular wounds heal more rapidly.

2. That science which is not about sensible matter is more certain than that (science) which is about sensible matter (►58.20, ¶1b & ¶1a, respectively).<sup>4</sup>

As ARISTOTLE teaches, some sciences are purely mathematical, which altogether abstract from sensible matter according to *ratio*, as geometry and arithmetic.<sup>5</sup> And some sciences

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<sup>1</sup> *In Post. an.* 1, l. 41, 1–14 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a31–37): “Philosophus [...] hic agit de comparatione sciencie, que est demonstrationis effectus. [...] comparat scienciam ad scienciam; [...] comparat scienciam ad scienciam secundum certitudinem; [...] ponit tres modos, quibus una sciencia est alia certior.”

<sup>2</sup> *In Post. an.* 1, l. 41, 15–20 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a31–33): “Primum modum ponit [Philosophus] dicens quod illa *sciencia est prior et certior quam alia, que scilicet eadem facit cognoscere et ‘quia’ et ‘propter quid’*, non autem est illa certior, que est cognoscitiua solum *ipsius ‘quia’*, *separatim* ab ea que cognoscit *‘propter quid’*.”

<sup>3</sup> *In Post. an.* 1, l. 41, 20–30: “Hec enim est dispositio sciencie subalternantis ad subalternatam, ut supra dictum est; nam sciencia subalternata separatim scit *‘quia’*, nesciens *‘propter quid’*, sicut cyurgicus scit quod uulnera circularia tardius curantur, non autem scit *‘propter quid’*, set huius cognitio pertinet ad geometram, qui considerat rationem circuli, secundum quam partes eius non appropinquant sibi per modum anguli, ex qua propinquitate contingit quod uulnera triangularia citius sanantur.”

<sup>4</sup> *In Post. an.* 1, l. 41, 31–34 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a33): “Secundum modum ponit [Philosophus] dicens quod illa sciencia *que non est de subiecto* est certior illa *que est de subiecto*. Et accipitur hic *‘subiectum’* pro materia sensibili.”

<sup>5</sup> *In Post. an.* 1, l. 41, 34–48 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a34): “ut Philosophus docet in II Phisicorum, quedam sciencie sunt pure mathematice, que omnino abstrahunt secundum rationem a materia sensibili, ut geometria et arismetica, quedam autem sciencie sunt medie, que scilicet principia

are a mean (between the mathematical and the natural sciences; ►64): to wit, those that apply mathematical principles to sensible matter, as perspective applies the principles of geometry to the visual line; and harmonics or music applies the principles of arithmetic to sensible sounds. Whence, he says that arithmetic is more certain and prior than harmonics: **(a) prior**, because harmonics uses its principles (i.e., uses the principles of arithmetic to apply them) to another (science); and **(b) more certain** because uncertainty is caused on account of the transmutability of sensible matter; whence, a science is less certain the more it approaches it.

3. A science that is from fewer (principles) is prior and more certain than that (science) which is had from addition (*ex appositione* = ἐκ προσθέσεως, *id est quam illa que se habet ex additione*; ►18.5).<sup>6</sup>

For example, geometry is posterior and less certain than arithmetic; for those (things) about which geometry is, are had by addition to those (things) about which arithmetic is.<sup>7</sup>

This (mode) is more evident to see according to the Platonic positions (►65.2).<sup>8</sup> ARISTOTLE explains here (this kind of priority and certitude) according to these (positions), using them for (his) purpose as, in the books of logic, he often uses the opinions of other philosophers to manifest (his) purpose by way of example.

Although this third mode is explained according to the opinion of PLATO, however, the point is related to the unit by addition also according to the opinion of ARISTOTLE: for the **point** is some *one indivisible in a continuum* (►34.17), abstracting from sensible matter according to *ratio*, while *one* abstracts both from sensible and from intelligible matter (and the arithmetical *one* adds the accident *measure* to this separated *one*; ►38.1, ¶1 & ¶2).<sup>9</sup>

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mathematica applicant ad materiam sensibilem, sicut perspectiva applicat principia geometrie ad lineam visivalem, et armonica, id est musica, applicat principia arismetice ad sonos sensibiles. Vnde hic dicit quod arismetica est certior quam musica et prior, prior quidem quia musica utitur principiis eius ad aliud, certior autem quia incertitudo causatur propter transmutabilitatem materie sensibilis, unde quanto magis acceditur ad eam, tanto sciencia est minus certa.”

<sup>6</sup> *In Post. an.* 1, l. 41, 49–52 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a34–35): “Tertium modum ponit [Philosophus] dicens quod sciencia que est *ex paucioribus* est prior et certior *ea que est ex appositione*, id est quam illa que se habet ex additione.”

<sup>7</sup> *In Post. an.* 1, l. 41, 52–55 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a35–37): “et ponit [Philosophus] exemplum: sicut *geometria* est posterior et minus certa quam *arismetica*, habent enim se ea de quibus est geometria ex additione ad ea de quibus est arismetica.”

<sup>8</sup> *In Post. an.* 1, l. 41, 55–60 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a34–37): “Et hoc quidem planum est videre secundum positiones Platonicas, secundum quas hic [Philosophus] exponit, utens eis ad propositum, sicut frequenter in libris logice utitur opinionibus aliorum philosophorum ad propositum manifestandum per viam exempli.”

<sup>9</sup> *In Post. an.* 1, l. 41, 100–106 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a34–37): “Et, quamuis hic tertius modus expositus sit secundum opinionem Platonis, tamen etiam secundum opinionem Aristotilis punctus se habet ex additione ad unitatem: nam punctum est quoddam unum indivisibile in continuo, abstrahens secundum rationem a materia sensibili, unum autem abstrahit et a materia sensibili et ab intelligibili.”

## 65.2. Modes of Comparing Certitude

According to this (division of certitude into modes; ► 65.1), it is evident that the comparison of certitude of the sciences is taken here according to two (modes):<sup>10</sup>

1. The first mode (i.e., according to which that science is more certain which knows both *that* something is so and *on account of what* it is so; ► 65.1, ¶1) is taken insofar as *a cause is prior and more certain than an effect* (► 10.4).<sup>11</sup>

2. The two other modes are taken insofar as *form is more certain than matter*: to wit, because form is the principle of knowing matter (► 41.11, ¶2).<sup>12</sup> And matter is twofold (► 13.13; 35.6):

(a) **Sensible** (matter), according to which the second mode is taken (i.e., insofar as that science which is not about sensible matter is more certain than that science which is about sensible matter; ► 65.1, ¶2; e.g., as arithmetic and geometry, the purely mathematical sciences, are more certain than the mean sciences).<sup>13</sup>

(b) **Intelligible** (matter): to wit, continuity itself.<sup>14</sup> And the third mode is taken according to this (i.e., insofar as a science that has fewer principles is more certain than a science that adds other principles; ► 65.1, ¶3; e.g., arithmetic is more certain than geometry).

## 65.3. Priority of Arithmetic over Geometry: The Platonic Positions

PLATO posited that *one* is the substance of anything, since he did not distinguish between the *one* that is convertible with *being*, which signifies the substance of a thing, and the *one* that is the principle of number, which the arithmetician considers (► 38.1).<sup>15</sup> Therefore, this *one*, insofar as it receives the addition of *position* in the continuum, receives the *ratio* of *point*. Whence, he used to say that **one** is *a substance that does not have a position*, while a **point** is *a substance that has position*; and thus, *point* adds *position* over *unity*.

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<sup>10</sup> *In Post. an.* 1, l. 41, 89–91 (cf. ARISTOTLE, *Analytica Posteriora* A.27, 87a31–37): “Et secundum hoc patet quod comparatio certitudinis scienciarum accipitur hic secundum duo: nam [...]”

<sup>11</sup> *In Post. an.* 1, l. 41, 91–92: “primus modus accipitur secundum quod causa est prior et certior effectu.”

<sup>12</sup> *In Post. an.* 1, l. 41, 92–96: “alii autem duo modi accipiuntur secundum quod forma est certior materia, utpote quia forma est principium cognoscendi materiam; est autem duplex materia, ut dicitur in VII Metaphisice.”

<sup>13</sup> *In Post. an.* 1, l. 41, 96–98: “una quidem sensibilis, secundum quam accipitur secundus modus.”

<sup>14</sup> *In Post. an.* 1, l. 41, 98–99: “alia uero intelligibilis, scilicet ipsa continuitas, et secundum hanc accipitur tertius modus.”

<sup>15</sup> *In Post. an.* 1, l. 41, 61–71: “Posuit autem Plato quod unum est substantia rei cuiuslibet, quia non distinguebat inter unum quod conuertitur cum ente, quod significat substantiam rei, et unum quod est principium numeri, quod considerat arismeticus. Hoc igitur unum, secundum quod recipit additionem positionis in continuo, accipit rationem puncti; unde dicebat quod unum est substantia non habens positionem, punctum autem est substantia habens positionem; et sic punctum supra unitatem addit positionem.”

Moreover, just like all numbers, which do not have a position, are caused from *one*, so, from the point—according to the Platonists—are caused all the continuous quantities.<sup>16</sup> For a moved point produces a line; a moved line produces a surface; (and) a moved surface produces a body (►46.22, ¶2).

According to this, then, continuous quantities, about which geometry treats, are related by addition to numbers, of which arithmetic treats.<sup>17</sup> Whence, the Platonists posited that numbers are the forms of magnitudes, saying that the form of the point is the unit; (that) the form of the line is (the number) two (*binarium*) on account of the two extremities; that the form of the surface is (the number) three (*ternarium*) on account of the first triangular surface, to wit, that which is terminated by three angles; and they posited the form of the body (to be the number) four (*quaternarium*) on account of the first corporeal figure being the triangular pyramid, which has four corporeal (i.e., solid) angles: to wit, one in the cone (i.e., the apex) and three in the base.

#### 65.4. Necessity in Physics vs. Mathematics

There can be science of those (things) that are as (more) frequently (produced) inasmuch as there is in them something of necessity.<sup>18</sup> And the necessary is diverse in natural (things), which are true as (more) frequently (produced) and fail in the least part (of cases), and in mathematics, which are always true. For in mathematics there is necessity **from a prior** (principle, *a priori*), while in natural (sciences there is necessity) **from a posterior** (principle, *a posteriori*), which nonetheless is prior according to nature: to wit, (there is necessity in mathematics) from the form (which is a prior principle); and (there is necessity in physics) from the end (which is posterior in generation, but prior according to nature).

Whence, ARISTOTLE teaches (in his *Physics*) to show in this way *on account of what* (something is so), such that, if *this* should (come to) be—for example, that an olive (tree) be generated—, it is necessary for *this* to preexist—namely, the seed of the olive (tree).

<sup>16</sup> *In Post. an.* 1, l. 41, 71–76: “Et, sicut ex uno causantur omnes numeri non habentes positionem, ita ex puncto, secundum Platonicos, causantur omnes quantitates continue: nam punctus motus facit lineam, linea mota facit superficiem, superficies mota facit corpus.”

<sup>17</sup> *In Post. an.* 1, l. 41, 76–88: “Et secundum hoc quantitates continue, de quibus est geometria, se habent ex appositione ad numeros, de quibus est arismetica. Vnde Platonici posuerunt numeros esse formas magnitudinum, dicentes formam puncti esse unitatem, formam autem lineae esse binarium, propter duo extrema, formam autem superficiei esse ternarium, propter primam superficiem triangularem, scilicet que tribus angulis terminatur, formam autem corporis ponebant quaternarium, propter hoc quod prima figura corporea est piramis triangularis, que quatuor angulos corporales habet, unum scilicet in conum et tres in basim.”

<sup>18</sup> *In Post. an.* 1, l. 42, 46–56 (cf. ARISTOTLE, *Analytica Posteriora* A.30, 87b19–27): “Est autem considerandum quod de hiis quidem que sunt sicut frequenter contingit esse demonstrationem, in quantum in eis est aliquid necessitatis. Necessarium autem, ut dicitur in II Phisicorum, aliter est in naturalibus, que sunt uera ut frequenter et deficiunt in minori parte, et aliter in disciplinis, id est in mathematicis, que sunt semper uera: nam in disciplinis est necessitas a priori, in naturalibus autem a posteriori (quod tamen est prius secundum naturam), scilicet a fine et forma.”

However, an olive (tree) is not generated from an olive seed of necessity, since the generation can be impeded by some corruption. Whence, if a demonstration should be produced from that which is prior in generation, it would not conclude of necessity—except perhaps if we take this as (meaning) that the seed of olive is frequently apt to generate an olive (tree), since it produces this according to a property of its nature unless impeded.<sup>19</sup>

Natural (things) underly sense.<sup>20</sup> However, they come to be outside of sense. Hence, on account of their fluidity, they do not have great certitude, as do mathematical (things). For mathematical (things) are without motion; but they are in sensible matter according to being (*secundum esse*)—and thus, they can fall under sense and imagination.

As ARISTOTLE says, if we can also perceive through sense that a triangle has three (internal) angles equal to two right (angles), it would still be necessary to seek a demonstration on order to have science.<sup>21</sup> And we will not know scientifically through sense, because sense is of singulars, while science consists in our knowing a universal.

### 65.5. The Certitude of Mathematics vs. Physics and Metaphysics

Since a mathematical (science) is a mean between natural (science) and metaphysics, it is more certain than either:<sup>22</sup>

1. Clearly, (a purely mathematical science is more certain: i.e., arithmetic or geometry) than **natural (science)** because its consideration is detached (*absoluta*) from **motion** and (sensible) **matter**, while the consideration of natural (science) should remain in matter and motion.<sup>23</sup>

Since the consideration of natural (science) is about matter, its cognition depends on more (principles): to wit, (it proceeds) from the consideration of its matter, form, material

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<sup>19</sup> *In Post. an.* 1, l. 42, 56–67 (cf. ARISTOTLE, *Physica* B.4, 196a31–33): “Vnde sic docet ibi Aristoteles ostendere ‘propter quid’, ut, si hoc debeat esse, puta quod oliua generetur, necesse est hoc preexistere, scilicet semen oliue; non autem ex semine oliue generatur oliua ex necessitate, quia potest impediri generatio per aliquam corruptionem; unde, si fiat demonstratio ex eo quod est prius in generatione, non concludet ex necessitate, nisi forte accipiamus hoc ipsum esse necessarium semen oliue ut frequenter esse generatiuum oliue, quia hoc facit secundum proprietatem sue nature, nisi inpediatur.”

<sup>20</sup> *In De Trin.*, q. 6 a. 1 qc. 2 ad 2, 291–297: “naturalia quamuis sensui subiaceant, tamen propter sui fluxibilitatem non habent magnam certitudinem cum extra sensum fiunt, sicut habent mathematica, que sunt absque motu et tamen sunt in materia sensibili secundum esse, et sic sub sensu et ymaginatione cadere possunt.”

<sup>21</sup> *In Post. an.* 1, l. 42, 134–140 (cf. ARISTOTLE, *Analytica Posteriora* A.31, 87b35–39): “dicit [Philosophus] quod, si etiam per sensum percipere possemus quod triangulus habet tres angulos *equales duobus rectis*, adhuc oporteret querere *demonstrationem* ad habendum scientiam neque per sensus perceptionem *sciremus*, quia sensus est singularium, *scientia autem* consistit in hoc quod *uniuersale* cognoscimus.”

<sup>22</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 232–234: “cum enim mathematica sit media inter naturalem et diuinam, ipsa est utraque certior.”

<sup>23</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 234–237: “Naturali quidem propter hoc quod eius consideratio est a motu et materia absoluta, cum naturalis consideratio in materia et motu uersetur.”

dispositions, and properties that follow upon form in matter. And cognition is more difficult wherever many (principles) must be considered (in order) to know something. Whence, ARISTOTLE says that a science that is (had) from addition is less certain, as geometry (is less certain) than arithmetic (► 65.1, ¶3).<sup>24</sup>

On the other hand, since the consideration of natural science is about mobile things and (things) that are not uniformly had, its cognition is less firm, for its demonstrations frequently proceed as in the greater part (of the cases), since sometimes it can be otherwise.<sup>25</sup>

And hence, too, the more some science is closer to singulars—as (are) the operative sciences, such as medicine, (practical) chemistry, and moral (science)—the less they can have of certitude: **(a)** on account of the **multitude** of those (things) that are to be considered in such sciences, (for) if any of those (things) should be omitted, error would follow; and **(b)** on account of their **variability**.<sup>26</sup>

2. The mathematical **process** (i.e., the method) is also more certain than the process of **metaphysics**; for those (things) about which metaphysics is, are more removed from **sensible** (things), from which our cognition takes its principle.<sup>27</sup>

(This is the case) both: **(a)** in respect of **separated substances**, into whose cognition they insufficiently lead those that we receive from sensible (things); and **(b)** in respect of those (principles) that are **common** to all beings, which are maximally universal, and thus (are) maximally removed from the particulars that fall under sense.<sup>28</sup>

On the other hand, mathematical (things) themselves—such as a figure, a line, and a number—fall in sense and underlie imagination. Hence, the human intellect, receiving

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<sup>24</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 237–246: “Ex hoc autem quod consideratio naturalis est circa materiam, eius cognitio a pluribus dependet, scilicet ex consideratione materie ipsius et forme et dispositionum materialium, et proprietatum que consequuntur formam in materia; ubicumque autem ad aliquid cognoscendum oportet plura considerare, est difficilior cognitio, unde in I Posteriorum dicitur quod minus certa scientia est que est ex additione, ut geometria arithmetica.”

<sup>25</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 246–251: “Ex hoc uero quod eius consideratio est circa res mobiles et que non uniformiter se habent, eius cognitio est minus firma; quia eius demonstrationes frequenter procedunt ut in maiori parte, ex hoc quod contingit aliquando aliter se habere.”

<sup>26</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 251–258: “Et ideo etiam quanto aliqua scientia magis appropinquat ad singularia, sicut scientie operatiue, ut medicina, alchimia, et moralis, minus possunt habere de certitudine; propter multitudinem eorum que consideranda sunt in talibus scientiis, quorum quodlibet si omittatur sequetur error, et propter eorum uariabilitatem.”

<sup>27</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 259–262: “Est etiam processus mathematice certior quam processus scientie diuine; quia ea de quibus est scientia diuina sunt magis a sensibilibus remota, a quibus nostra cognitio initium sumit.”

<sup>28</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 262–268: “et quantum ad substantias separatas, in quarum cognitionem insufficienter inducunt ea que a sensibilibus accipimus, et quantum ad ea que sunt communia omnibus entibus, que sunt maxime uniuersalia, et sic maxime remota a particularibus cadentibus sub sensu.”

(such mathematical things) from images (*a phantasmatis*), more easily and with more certitude grasps (*capit*) their cognition than the understandings of any (other) things; or even (more easily and with more certitude) than the quiddity of *substance*, *act*, *potency*, and other such (indivisible understandings).<sup>29</sup>

Thus, it is evident that mathematical consideration is easier and more certain than natural and metaphysical (consideration), and much more (easy and certain) than (the consideration) of other, operative sciences.<sup>30</sup> And hence, it is maximally said to proceed according to the mode of learning (*disciplinaliter*).

And this is what (Claudius) PTOLEMY says in the beginning of the *Almagest*: “May the other two genera of theoretical [science] be said [to be] more opinion than scientific conception: the metaphysical, indeed, on account of its lack of apparentness and its being incomprehensible; the physical, in turn, on account of [its] unstable and non-manifest matter; and only the mathematical will give firm and stable faith to one to turns his thoughts to its inquiry: namely, as by demonstration made through indubitable ways.”<sup>31</sup>

#### 65.6. The Certitude of Mathematics Must Not Be Sought in the Other Sciences

ARISTOTLE shows that the mode (of seeking the truth in science) that is simply the best must not be sought in all (of the sciences).<sup>32</sup> Thus, he says that an **exactness or precision** (*acribologia* = ἀκριβολογία)—that is, *an accurate and certain ratio (idest diligens et certa ratio)*—, as is (had) in mathematics, must not be required in all the things about which the sciences are. Rather, it must be required only in those (things) that do not have matter.

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<sup>29</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 268–274: “Mathematica autem ipsa in sensu cadunt et imaginationi subiacent, ut figura, linea et numerus, et huiusmodi; et ideo intellectus humanus a phantasmatis accipiens facilius capit horum cognitionem, et certius, quam intelligentie alicuius, uel etiam quam quidditatem substantie, et actum et potentiam et alia huiusmodi.”

<sup>30</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 274–278: “Et sic patet quod mathematica consideratio est facilius et certior quam naturalis et theologica, et multo plus quam scientie alie operative; et ideo ipsa maxime dicitur disciplinaliter procedere.”

<sup>31</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 278–287: “Et hoc est quod Ptolemeus dicit in principio Almagesti «Alia duo genera theoricis potius quis opinionem quam conceptionem scientialem dicat, theologicum quidem propter inapparentem ipsius et incomprehensibile, physicum uero propter materie instabile et immanifestum; solum autem mathematicum inquisitionis firmam stabilemque fidem intendentibus dabit, uelut utique demonstratione per indubitabiles uias facta».” Cf. Claudius PTOLEMY, *Syntaxis Mathematica*, 2 vols., ed. Johan Ludvig Heiberg (Leipzig: Teubner, 1898–1903), vol. 1, 6.11–20: “Ἐξ ὧν διανοηθέντες, ὅτι τὰ μὲν ἄλλα δύο γένη τοῦ θεωρητικοῦ μᾶλλον ἢ τις εἰκασίαν ἢ κατάληψιν ἐπιστημονικὴν εἴποι, τὸ μὲν θεολογικὸν διὰ τὸ παντελῶς ἀφανὲς αὐτοῦ καὶ ἀνεπίληπτον, τὸ δὲ φυσικὸν διὰ τὸ τῆς ὕλης ἄστατον καὶ ἀδηλον, ὡς διὰ τοῦτο μηδέποτε ἂν ἐλπίσαι περὶ αὐτῶν ὁμοιοῦσαι τοὺς φιλοσοφοῦντας, μόνον δὲ τὸ μαθηματικόν, εἴ τις ἐξεταστικῶς αὐτῷ προσέρχοιτο, βεβαίαν καὶ ἀμετάπιστον τοῖς μεταχειριζομένοις τὴν εἶδησιν παράσχοι ὡς ἂν τῆς ἀποδείξεως δι’ ἀναμφισβητήτων ὁδῶν γιγνομένης.”

<sup>32</sup> *In Metaph.* 2, l. 5, §335 (cf. ARISTOTLE, *Metaphysica* α.3, 995a14–16): “ostendit [Philosophus], quod ille modus qui est simpliciter melior, non debet in omnibus quaeri.” *Ibid.*, §336: “Ostendit quod ille modus, qui est simpliciter optimus, non debet in omnibus quaeri; dicens quod «acribologia» idest diligens et certa ratio, sicut est in mathematicis, non debet requiri in omnibus rebus, de quibus sunt scientiae; sed debet solum requiri in his, quae non habent materiam.”

Indeed, those (things) that have matter are subjected to motion and variation.<sup>33</sup> And hence, certitude cannot be had in them in every mode. For (what) is sought in them (is) not what should always be of necessity, but what should be as in many (cases). Immaterial (things), on the other hand, are most certain according to themselves because they are immobile. Nonetheless, those (things) that are immaterial in their nature are not certain to us on account of the deficiency of our intellect. And such (things) are separated substances. Mathematical (things), on the other hand, are abstracted from matter, and yet they do not exceed our intellect; hence, a most certain *ratio* is to be required in them.

And since the whole of nature is about matter, hence, this mode of most certain *ratio* does not pertain to the natural philosopher.<sup>34</sup> However, ARISTOTLE says, “perhaps (all of nature has matter, ἅπαντα... ἴσως ἡ φύσις ἔχει ὕλην)” on account of celestial bodies, because (according to ancient belief) they do not have matter in the same mode as the lower (bodies; i.e., because celestial bodies were thought to be material but incorruptible).

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<sup>33</sup> *In Metaph.* 2, l. 5, §336: “Ea enim quae habent materiam, subiecta sunt motui et variationi: et ideo non potest in eis omnibus omnimoda certitudo haberi. Quaeritur enim in eis non quid semper sit et ex necessitate; sed quid sit ut in pluribus. Immaterialia vero secundum seipsa sunt certissima, quia sunt immobilia. Sed illa quae in sui natura sunt immaterialia, non sunt certa nobis propter defectum intellectus nostri, ut praedictum est. Huiusmodi autem sunt substantiae separatae. Sed mathematica sunt abstracta a materia, et tamen non sunt excedentia intellectum nostrum: et ideo in eis est requirenda certissima ratio.”

<sup>34</sup> *In Metaph.* 2, l. 5, §336 (cf. ARISTOTLE, *Metaphysica* α.3, 995a16–17): “Et quia tota natura est circa materiam, ideo iste modus certissimae rationis non pertinet ad naturalem philosophum. Dicit autem [Philosophus] «forsan» propter corpora caelestia, quia non habent eodem modo materiam sicut inferiora.”



## 66. The Order of Learning

To end this Second Part, we briefly examine the order of learning.

### 66.1. To Learn

To **learn** (*addiscere*) is properly for science to be generated in someone (*scienciam in aliquo generari*).<sup>1</sup>

Before generation, that which is generated was not altogether a being, but in some mode a being and in some mode a non-being: a being in potency, but not a being in act.<sup>2</sup> This is (for something) to be generated: to be reduced from potency into act.

Whence, that which someone learns was neither altogether priorly known, as PLATO posited, nor (was it) altogether unknown.<sup>3</sup> Rather, it was known in potency or virtually in the foreknown universal principles; and unknown in act according to proper (as opposed to common) cognition. This is (for someone) to learn: to be reduced from a potential, virtual or universal cognition into proper and actual cognition.

### 66.2. Doctrine and Discipline

The names *doctrine* and *discipline* pertain to the acquisition of cognition:<sup>4</sup>

**1. Doctrine** (*doctrina* = διδασκαλία, i.e., the act of teaching; also, the instruction given) is *the action of he who makes someone know (actio eius qui aliquid cognoscere facit)*.<sup>5</sup>

We say that he is **wiser** in every science *who can assign the causes of anything that is inquired*; and because of this, (he can) *teach (docere)*.<sup>6</sup>

**2. Discipline** (*disciplina* = μάθησις, i.e., the act of learning; also, the instruction received) is *the reception of knowledge from another (receptio cognitionis ab alio)*.<sup>7</sup>

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<sup>1</sup> *In Post. an.* 1, l. 3, 127–128 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71b5–8): “Addiscere enim proprie est scienciam in aliquo generari.”

<sup>2</sup> *In Post. an.* 1, l. 3, 128–132: “quod autem generatur, ante generationem non fuit omnino ens, set quodam modo ens et quodam modo non ens, ens quidem in potencia, non ens uero actu; et hoc est generari, reduci de potencia in actum.”

<sup>3</sup> *In Post. an.* 1, l. 3, 132–140: “Vnde nec illud quod quis addiscit erat omnino prius notum, ut Plato posuit, neque omnino ignotum, ut secundum solutionem supra improbatam ponebatur, set erat notum potencia siue uirtute in principiis precognitis uniuersalibus, ignotum autem actu secundum propriam cognitionem; et hoc est addiscere, reduci de cognitione potenciali siue uirtuali aut uniuersali in cognitionem propriam et actuaalem.”

<sup>4</sup> *In Post. an.* 1, l. 1, 175–177 (cf. ARISTOTLE, *Analytica Posteriora* A.1, 71a1): “nomen autem doctrine et discipline ad cognitionis acquisitionem pertinet.”

<sup>5</sup> *In Post. an.* 1, l. 1, 177–178: “doctrina est actio eius qui aliquid cognoscere facit.”

<sup>6</sup> *In Metaph.* 1, l. 2, §39 (cf. ARISTOTLE, *Metaphysica* A.2, 982a14–16): “Illum dicimus magis sapientem in omni scientia, qui potest assignare causas cuiuslibet quaesiti, et per hoc docere.”

<sup>7</sup> *In Post. an.* 1, l. 1, 178–179: “disciplina autem est receptio cognitionis ab alio.”

### 66.3. Happiness and the Order of Knowing Causes

As ARISTOTLE says, the ultimate felicity of man consists in the best operation of man, which belongs to the highest potency—namely, the intellect—in respect of the best intelligible (thing).<sup>8</sup>

On the other hand, since effect is known by cause, it is manifest that a cause, according to its nature, is more intelligible than an effect, even if sometimes effects should be more known than causes—in respect of us—because we receive the cognition of universal and intelligible causes from particulars that fall under sense.<sup>9</sup>

Therefore, simply speaking, the first causes of things must, according to themselves, be the most and best intelligible (things), since they are maximally beings and maximally true.<sup>10</sup> For they are the cause of the essence and truth of the others, even though such first causes should be less and posteriorly known in respect of us. Indeed, our intellect is related to them as the eye of an owl to the light of the sun, which (light) it cannot perfectly perceive on account of an excess of brightness.

Therefore, the ultimate felicity that man can have in this life must consist in the consideration of first causes, since the little that can be known about them is more lovable and more noble than all those that can be known about lower things.<sup>11</sup> Wherefrom, the intention of the philosophers has been mainly to attain the cognition of the first causes through all those (causes) that they considered in things. Whence, they ordered the science about first causes last, allotting the last part of their lives to its consideration.

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<sup>8</sup> *In De causis*, pr.: “Sicut Philosophus dicit in X Ethicorum, ultima felicitas hominis consistit in optima hominis operatione quae est supremae potentiae, scilicet intellectus, respectu optimi intelligibilis.” *In Ethic.* 10, l. 10, 81–93 (cf. ARISTOTLE, *Ethica Nicomachea* K.3, 1177a19–21): “felicitas est optima operatio. Optima autem inter operationes humanas est speculatio veritatis, et hoc patet ex duobus ex quibus pensatur dignitas operationis: uno modo ex parte potentiae, quae est operationis principium, et sic patet hanc operationem esse optimam sicut et intellectus est optimum eorum quae in nobis sunt, ut prius ostensum est; alio modo ex parte obiecti, quod dat speciem operationi, et secundum hoc etiam haec operatio est optima, quia inter omnia cognoscibilia optima sunt intelligibilia et praecipue divina. Et sic in eorum speculatione consistit perfecta humana felicitas.”

<sup>9</sup> *In De causis*, pr.: “Quia vero effectus per causam cognoscitur, manifestum est quod causa secundum sui naturam est magis intelligibilis quam effectus, etsi aliquando quoad nos effectus sint notiores causis propter hoc quod ex particularibus sub sensu cadentibus universalium et intelligibilium causarum cognitionem accipimus.”

<sup>10</sup> *In De causis*, pr.: “Oportet igitur quod simpliciter loquendo primae rerum causae sint secundum se maxima et optima intelligibilia, eo quod sunt maxime entia et maxime vera cum sint aliis essentiae et veritatis causa, ut patet per Philosophum in II Metaphysicae, quamvis huiusmodi primae causae sint minus et posterius notae quoad nos: habet enim se ad ea intellectus noster sicut oculus noctuae ad lucem solis quam propter excedentem claritatem perfecte percipere non potest.”

<sup>11</sup> *In De causis*, pr.: “Oportet igitur quod ultima felicitas hominis quae in hac vita haberi potest, consistat in consideratione primarum causarum, quia illud modicum quod de eis sciri potest, est magis amabile et nobilius omnibus his quae de rebus inferioribus cognosci possunt [...]. Et inde est quod philosophorum intentio ad hoc principaliter erat ut, per omnia quae in rebus considerabant, ad cognitionem primarum causarum pervenirent. Unde scientiam de primis causis ultimo ordinabant, cuius considerationi ultimum tempus suae vitae deputarent.”

#### 66.4. Why a Child Can Become a Mathematician but Cannot Become Wise

ARISTOTLE brings up the question of why a child can become a mathematician but cannot become wise—that is, a physicist or a metaphysician.<sup>12</sup>

In respect of the natural (scientist), he responds that the mathematical (sciences) are known through abstraction from sensible (things), of which there is experience; and hence, much time (*temporis multitudo*) is not required (in order) to know such (sciences).<sup>13</sup> On the other hand, the principles of natural (things), which are not abstracted from sensible (things), are considered through experience, which requires much time.

In respect of wisdom, he adds that youths do not believe in metaphysical (things): that is, they do not attain (them) in the mind, even if they should say them orally.<sup>14</sup> On the other hand, the essence that concerns mathematical (things) is not unmanifest to them.

The reason for this is that the *ratios* of mathematical (things) are (*ratios*) of imaginable things, while metaphysical (things) are purely intellectual.<sup>15</sup> Youths can easily grasp those (*ratios*) that fall under imagination; but they do not attain in the mind those that exceed sense and imagination, since they do not yet have an understanding (that is) robust (*validum*) and exercised to (grasp) such considerations—both on account of shortness of time, and on account of the many mutations of nature.

#### 66.5. The Order of Learning

Therefore (from what has been said), the order of learning will be here congruous such that children should be instructed:<sup>16</sup>

1. Beginning first in logical (things), since logic teaches-consigns the mode of the whole of philosophy-science.<sup>17</sup>

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<sup>12</sup> *In Ethic.* 6, l. 7, 178–182 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1142a16–20): “mouet [Philosophus] circa hoc quaestionem, scilicet quare <puer> posset fieri mathematicus, non autem possit fieri sapiens, id est metaphysicus, vel physicus, id est naturalis.”

<sup>13</sup> *In Ethic.* 6, l. 7, 182–189 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1142a16–19): “Et ad hoc respondet quantum ad naturalem quia haec quidem, scilicet mathematica, cognoscuntur per abstractionem a sensibilibus quorum est experientia et ideo non requiritur ad cognoscendum talia temporis multitudo, sed principia naturalium, quae non sunt abstracta a sensibilibus, per experientiam considerantur, ad quam requiritur temporis multitudo.”

<sup>14</sup> *In Ethic.* 6, l. 7, 189–193 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1142a19–20): “Quantum autem ad sapientiam, subiungit quod iuvenes sapientialia quidem, scilicet metaphysicalia, non credunt, id est non attingunt mente, licet ea dicant ore, sed circa mathematica non est immanifestum eis quod quid est.”

<sup>15</sup> *In Ethic.* 6, l. 7, 193–202: “Cuius ratio est quia rationes mathematicorum sunt rerum imaginabilium, sapientialia autem sunt pure intellectualia; iuvenes autem de facili possunt capere ea quae sub imaginatione cadunt, sed ad illa quae excedunt sensum et imaginationem non attingunt mente, quia nondum habent intellectum validum et exercitatum ad tales considerationes, tum propter parvitatem temporis, tum propter plurimas mutationes naturae.”

<sup>16</sup> *In Ethic.* 6, l. 7, 202–203: “Erit ergo hic congruus ordo addiscendi, ut [...] pueri [...] instruantur [...]”

<sup>17</sup> *In Ethic.* 6, l. 7, 203–204: “primo quidem pueri logicalibus instruantur, quia logica docet modum totius philosophiae.” *In De causis*, pr.: “primo quidem incipientes a logica quae modum scientiarum tradit.”

In learning (*in addiscendo*), we begin from that which is easier—unless necessity should require something else.<sup>18</sup> For sometimes it is necessary, in learning, to begin not from that which is easier, but from that upon which the cognition of subsequent (things) depends.

For this reason, it is necessary, in learning, to begin from logic.<sup>19</sup> Not because (logic) itself should be easier than the other sciences—indeed, it has the greatest difficulty, since it is about second understandings (i.e., second intentions, such as *genus* and *difference*; ►37.17, ¶2)—, but because the other sciences depend upon it insofar as it teaches (*docet*) the mode of proceeding in all the sciences (►52.6, ¶1; 52.4, ¶1b; 53). And, as ARISTOTLE says, it is necessary scientifically to know (*scire*) the mode of science before science itself.

Indeed, ARISTOTLE shows what should be the suitable mode to inquire the truth—how man should be able to know the suitable mode (to proceed) in the inquiry of truth.<sup>20</sup> He, therefore, says that, since diverse (people) inquire the truth according to diverse modes, hence, a man should be instructed (so that he comes to know) by which mode he ought to receive those (truths) that are said in each of the sciences. And since it is not easy for man to simultaneously grasp two (things)—rather, while he considers two (things) he can grasp neither—, it is absurd that man should simultaneously seek a science and the mode that befits science (< τρόπον ἐπιστήμης).

Wherefrom, he must learn logic before the other sciences.<sup>21</sup> For logic consigns the common mode of proceeding in all the sciences.

However, the proper (mode of each) of the singular sciences must be consigned, in respect of the principle (*circa principium*), in (each of) the singular sciences (►58.11).<sup>22</sup>

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<sup>18</sup> *In De Trin.*, q. 6 a. 1 qc. 2 ad 3, 298–303: “in addiscendo incipimus ab eo quod est magis facile nisi necessitas aliud requirat: quandoque enim necessarium est in addiscendo incipere non ab eo quod est facilius, set ab eo a cuius cognitione sequentium cognitio dependet.”

<sup>19</sup> *In De Trin.*, q. 6 a. 1 qc. 2 ad 3, 303–311: “Et hac ratione oportet in addiscendo a logica incipere, non quia ipsa sit facilius ceteris scientiis, — habet enim maximam difficultatem, cum sit de secundo intellectis —, set quia alie scientie ab ipsa dependent in quantum ipsa docet modum procedendi in omnibus scientiis; oportet autem primo scire modum scientie quam scientiam ipsam, ut dicitur in II Metaphisice.”

<sup>20</sup> *In Metaph.* 2, l. 5, §335 (cf. ARISTOTLE, *Metaphysica* α.3, 995a12–14): “Ostendit [Philosophus] quis sit modus conveniens ad inquirendum veritatem; [...] ostendit, quomodo homo possit cognoscere modum convenientem in inquisitione veritatis. [...] Dicit ergo primo, quod quia diversi secundum diversos modos veritatem inquirent; ideo oportet quod homo instruat per quem modum in singulis scientiis sint recipienda ea quae dicuntur. — Et quia non est facile quod homo simul duo capiat, sed dum ad duo attendit, neutrum capere potest; absurdum est, quod homo simul quaerat scientiam et modum qui convenit scientiae.” *In Metaph.* 4, l. 1, §529: “prius oportet cognoscere modum scientiae quam procedere in scientia ad ea considerata de quibus est scientia, ut in secundo libro dictum est.”

<sup>21</sup> *In Metaph.* 2, l. 5, §335: “Et propter hoc debet prius addiscere logicam quam alias scientias, quia logica tradit communem modum procedendi in omnibus aliis scientiis.”

<sup>22</sup> *In Metaph.* 2, l. 5, §335: “Modus autem proprius singularum scientiarum, in scientiis singulis circa principium tradi debet.”

2. Secondly, (children) are to be instructed in mathematical (things), which neither require experience nor (do they) transcend imagination; whence, even children are capable of them.<sup>23</sup>

To proceed *according to the mode of learning (disciplinaliter procedere)* is attributed to mathematical science not because it alone should proceed according to the mode of learning, but because it befits it above all.<sup>24</sup> Thus, since **to learn (discere)** is nothing other than *to receive a science from another*, we say that we proceed according to the mode of learning when our process leads to certain cognition—which is called *science*. And this maximally happens in the mathematical sciences (► 65.5).

3. Thirdly, (children are to be instructed) in natural (things), which—even if they should not exceed sense and imagination—require time for the sake of experience.<sup>25</sup>

Although natural (science) happens to be learned after mathematical (science) because its universal examples (*documenta*) require experience and time, however, since natural things are sensible, they naturally are more known (or knowable, *magis notae*) than mathematical things, (which are) abstracted from matter.<sup>26</sup>

4. Fourth, (children are to be instructed) in moral (things), which require both experience and a soul free from passions, as ARISTOTLE says; whence, a youth cannot be an adequate pupil.<sup>27</sup>

5. Fifth, (children are to be instructed) in (the things) of wisdom and of metaphysics—the first causes of beings—, which transcend imagination and require robust understanding.<sup>28</sup>

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<sup>23</sup> *In Ethic.* 6, l. 7, 204–207: “secundo autem instruendi sunt in mathematicis, quae nec experientia indigent nec imaginationem transcendunt.” *In De causis*, pr.: “secundo procedentes ad mathematicam cuius etiam pueri possunt esse capaces.”

<sup>24</sup> *In De Trin.*, q. 6 a. 1 qc. 2 co., 225–232: “disciplinaliter procedere attribuitur scientie mathematice non quia ipsa sola disciplinaliter procedat, set quia hoc ei precipue competit. Cum enim discere nichil sit aliud quam ab alio scientiam accipere, tunc dicimur disciplinabiliter procedere, quando processus noster ad certam cognitionem perducit, que scientia dicitur; quod quidem maxime contingit in mathematicis scientiis.” *Ibid.*, ad 1, 288–290: “quamuis in qualibet scientia disciplina accipiatur, tamen in mathematica facilius et certius.”

<sup>25</sup> *In Ethic.* 6, l. 7, 207–209: “tertio autem in naturalibus, quae, etsi non excedant sensum et imaginationem, requirunt tamen experientiam.” *In De causis*, pr.: “tertio ad naturalem philosophiam quae propter experientiam tempore indiget.”

<sup>26</sup> *In De Trin.*, q. 5 a. 1 ad 10, 382–387: “quamuis naturalis post mathematicam addiscenda occurrat ex eo quod uniuersalia ipsius documenta indigent experimento et tempore, tamen res naturales cum sint sensibiles, sunt naturaliter magis note quam res mathematice a sensibili materia abstracte.”

<sup>27</sup> *In Ethic.* 6, l. 7, 209–211 (cf. ARISTOTLE, *Ethica Nicomachea* A.2, 1095a4–9): “quarto autem in moralibus, quae requirunt et experientiam et animum a passionibus liberum, ut in I habitum est.” *In De causis*, pr.: “quarto autem ad moralem philosophiam cuius iuuenis esse conueniens auditor non potest.”

<sup>28</sup> *In Ethic.* 6, l. 7, 211–213: “quinto autem in sapientialibus et diuinis, quae transcendunt imaginationem et requirunt validum intellectum.” *In De causis*, pr.: “ultimo autem scientiae diuinae insistebant quae considerat primas entium causas.”

Although metaphysics should be the first of all the sciences naturally, the other sciences are, nonetheless, prior in respect of us.<sup>29</sup> Indeed, as AVICENNA says, the order (*ordo* = مرتبة *martabah*) of this science is that it should be learned after the natural sciences, in which there are many determined (conceptions) that this science uses: for example, *generation, corruption, motion*, and other such. Likewise, (it should be learned) after the mathematical (sciences) and astronomy. On the other hand, the other sciences—such as harmonics (*musica*), the moral (sciences), and other such—are (ordered) to the wellbeing of (man) itself.

That (metaphysics) itself supposes those (truths) that are proven in the other sciences—when it should prove the principles of the others—does not demand a (vicious) circle.<sup>30</sup> For the principles that another science—namely, the natural (science)—takes from first philosophy do not prove those (truths) that the first philosopher takes from the natural (scientist): instead, they are proven by other principles known by themselves. Likewise, the first philosopher does not prove what the natural (scientist) consigns through the principles that he takes from him, but by other principles known by themselves. And thus, there is no (vicious) circle in the definition.

Besides, the sensible effects from which natural demonstrations proceed are more known in respect of us in the beginning (*in principio*).<sup>31</sup> But when we arrive—through them—at the cognition of the first causes, it becomes apparent—from them—*on account of what* those effects (should be so), (the effects) from which the demonstration *that* (they are so) was proven. And thus, natural science, too, consigns something to metaphysics; and yet, its principles (i.e., the principles of natural science) are made known by it (i.e., by

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<sup>29</sup> *In De Trin.*, q. 5 a. 1 ad 9, 347–361: “quamuis scientia diuina sit prima omnium scientiarum naturaliter, tamen quoad nos alie scientie sunt priores: ut enim dicit Auicenna in principio sue Metaphisice, ordo huius scientie est ut addiscatur post scientias naturales, in quibus sunt multa determinata quibus ista scientia utitur, ut generatio, corruptio, motus et alia huiusmodi; similiter etiam post mathematicas: indiget enim hec scientia ad cognitionem substantiarum separatarum cognoscere numerum et ordinem orbium celestium, quod non est possibile sine astrologia, ad quam tota mathematica preexigitur; alie uero scientie sunt ad bene esse ipsius, ut musica et morales et alie huiusmodi.” See AVICENNA, *The Metaphysics of The Healing*, 14–16. Cf. AVICENNA, *Liber de philosophia prima*, 1.3, 20.77–23.28. Following ancient belief, St. Thomas states that learning astronomy is necessary in order to know the truth about separated substances. However, this does not mean that he accepts the identification of celestial bodies with separated substances (see, for example, *STh* I, q. 51 a. 3).

<sup>30</sup> *In De Trin.*, q. 5 a. 1 ad 9, 361–371: “Nec tamen oportet quod sit circulus quia ipsa supponit ea que in aliis probantur cum ipsa aliarum principia probet, quia principia que accipit alia scientia, scilicet naturalis, a prima philosophia, non probant ea que item philosophus primus accipit a naturali, set probantur per alia principia per se nota; et similiter philosophus primus non probat principia que tradit naturali per principia que ab eo accipit, set per alia principia per se nota; et sic non est aliquis circulus in diffinitione.”

<sup>31</sup> *In De Trin.*, q. 5 a. 1 ad 9, 371–381: “Et preterea, effectus sensibiles, ex quibus procedunt demonstrationes naturales, sunt notiores quoad nos in principio, set cum per eos peruenerimus ad cognitionem causarum primarum, ex eis apparebit nobis propter quid illorum effectuum ex quibus probabantur demonstratione quia; et sic et scientia naturalis aliquid tradit scientie diuine et tamen per eam sua principia notificantur. Et inde est quod Boetius ultimo ponit scientiam diuinam, quia est ultima quoad nos.”

metaphysics). Whence, BOETHIUS posits metaphysics last: because it is last in respect of us.

### 66.6. The Liberal Arts as a Principle of Philosophy

The seven liberal arts do not sufficiently divide theoretical philosophy.<sup>32</sup> Rather, as HUGH of St. Victor says in his *Didascalicon*, omitting some other (sciences), seven are reckoned because those who wanted to learn philosophy were educated in them first. And hence, they are distinguished (i.e., divided) into the trivium and the quadrivium “because, through these as though through some ways, the eager animus should enter the secrets of philosophy.”

This is also evident in the words of ARISTOTLE, who says that the mode of science must be inquired before the sciences (► 66.5, ¶1).<sup>33</sup> And AVERROES, (commenting) the same place, says that one must learn logic, which teaches (*docet*) the mode of all the sciences, before all the other sciences—to which pertains the trivium.

ARISTOTLE says, also, that mathematics can be scientifically known by children, but not physics, which requires experience (► 66.4).<sup>34</sup> Thus, we are given to understand that mathematics is to be learned consequently after logic—to which pertains the quadrivium.

And thus, these (liberal arts), as some ways, prepare the soul to the other philosophical disciplines.<sup>35</sup>

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<sup>32</sup> *In De Trin.*, q. 5 a. 1 ad 3, 208–216: “septem liberales artes non sufficienter diuidunt philosophiam theoreticam, set ideo, ut dicit Hugo de s. Victore in III sui Didascalicon, pretermisissis quibusdam aliis, septem connumerantur quia hiis primum erudiebantur qui philosophiam discere uolebant; et ideo distinguuntur in triuium et quadriuium, «eo quod hiis quasi quibusdam uis uiuax animus ad secreta philosophie introeat».” Literally, HUGH writes *wisdom* rather than *philosophy*, “Hinc trivium et quadrivium nomen accepit, eo quod his, quasi quibusdam uis, uiuax animus ad secreta sophiae introeat.”

<sup>33</sup> *In De Trin.*, q. 5 a. 1 ad 3, 216–222: “Et hoc etiam consonat uerbis Philosophi, qui dicit in II Metaphisice quod modus scientie debet queri ante scientias; et Commentator ibidem dicit quod logicam, que docet modum omnium scientiarum, debet quis addiscere ante omnes alias scientias, ad quam pertinet triuium.” See AVERROES, *tafsir ma ba’d at-tabi’at*, Commentary 15, Book I, Tome V.2, 48.12–49.3 (cf. ARISTOTLE, *Metaphysica* α.3, 995a12–14).

<sup>34</sup> *In De Trin.*, q. 5 a. 1 ad 3, 222–227: “dicit etiam [Philosophus] in VI Ethicorum quod mathematica potest sciri a pueris, non autem phisica, que experimentum requirit; et sic datur intelligi quod post logicam consequenter debet mathematica addisci, ad quam pertinet quadriuium.” *In Ethic.* 6, l. 7, 166–177 (cf. ARISTOTLE, *Ethica Nicomachea* Z.2, 1142a11–16): “Dicit ergo [Philosophus] primo quod signum <est> eius quod supra dictum est, scilicet quod prudentia non sit solum circa universalialia, sed etiam circa particularia, quia iuuenes fiunt geometrici et disciplinati, id est in scientiis disciplinalibus sive mathematicis instructi, et fiunt sapientes in talibus, id est ad perfectionem et terminum harum scientiarum pertingentes, non autem videtur quod iuuenis fiat prudens. Cuius causa est quia prudentia est circa singularia, quae fiunt nobis cognita per experientiam, iuuenis autem non potest esse expertus, quia ad experientiam requiritur temporis multitudo.”

<sup>35</sup> *In De Trin.*, q. 5 a. 1 ad 3, 227–229: “Et ita his quasi quibusdam uis preparatur animus ad alias philosophicas disciplinas.”





**PART III:  
MODERN MATHEMATICS  
REASSESSED**



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## 67. From Algebra to Universal Mathematics

Having determined *the Aristotelian-Thomistic Teaching on Principles* (henceforth, ATOP), we are now equipped to account for some of the key developmental steps of modern so-called mathematics out of ancient Greek mathematics and later influences. Due to the scope of the present work, we shall address only a small but representative selection of authors and works. Nonetheless, it should become progressively evident that an analysis from ATOP can be used to account for any science or art—old or new, mathematical or otherwise.

### 67.1. Al-Khwarizmi's Algebra

Although St. Thomas does not mention Muhammad ibn Musa AL-KHWARIZMI's works, he must have been well acquainted with them: his illustrious teacher, ALBERTUS Magnus (ca. 1193–1280), certainly was.<sup>1</sup> As Louis Charles KARPINSKI says,

Mathematical science in Europe was more vitally influenced by Mohammed ibn Musa than by any other writer from the time of the Greeks to Regiomontanus (1436–1476). Through his arithmetic, presenting the Hindu art of reckoning, he revolutionized the common process of calculation and through his algebra he laid the foundation of modern analysis.<sup>2</sup>

Both works, AL-KHWARIZMI's *Algebra* and his *Arithmetic*, are intimately related. Yet, this "arithmetic" (حساب *ḥisāb*, reckoning, computing, calculation) is not a science of number, but an *art* of calculation (compare to the λογιστική of the ancient Greeks; ► 1). Actually, it would come to be known in the Latin west as *ars minor*, in contrast to algebra, which was called *ars magna*.<sup>3</sup> It should not be surprising, then, that *algorithm*—a word that refers to a procedure for solving a mathematical problem, essentially a recipe of sorts—derives from AL-KHWARIZMI's name. In fact, he describes his *Algebra* in the following terms:

[A] short work on Calculating by (the rules of) Completion and Reduction [حساب الجبر والمقابلة *ḥisāb al-ğabr wal-muqābalah*], confining it to what is easiest and most useful in <arithmetic> [حساب *ḥisāb*], such as men constantly require in cases of inheritance, legacies, partition, law-suits, and trade, and in all their dealings with one another, or where the measuring of lands, the digging of canals, geometrical computation, and other objects of various sorts and kinds are concerned.<sup>4</sup>

Thus, algebra, too, was conceived to be an art rather than a science. This is especially evident from the preponderately practical nature of AL-KHWARIZMI's *Algebra*, more than half of which is devoted to the day-to-day calculations needed to apply Islamic law. For

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<sup>1</sup> Louis Charles KARPINSKI, *Robert of Chester's Latin Translation of the Algebra of Al-Khowarizmi*, 33.

<sup>2</sup> Ibid. Brackets in the original.

<sup>3</sup> Ibid., 35.

<sup>4</sup> Muhammad ibn Musa AL-KHWARIZMI, *The Algebra*, 3 (ʿ). Round brackets in the original.

example, “Suppose that a man on his sick-bed makes to another a present of a slave-girl, worth three hundred dirhams, her dowry being one hundred dirhams; the donee cohabits with her, and afterwards, being also on his sick-bed, makes a present of her to the donor, and the latter cohabits with her. How much does he acquire by her, and how much is deducted?”<sup>5</sup> It may surprise us to learn that the algebraic solution to a problem should depend on whether a man has cohabited with his slave-girl. Indeed, such calculations can become very involved under Islamic law because it dictates, for example, that a daughter should receive half as much as a son in any inheritance.<sup>6</sup> Moreover, a decision may depend on precedent jurisprudence or on the school that is followed by the believers (the Hanafi *madhab*, in AL-KHWARIZMI’s case).<sup>7</sup>

It was precisely due to its usefulness in such matters that the khalif Al-Mamun encouraged or commanded AL-KHWARIZMI to write his *Algebra*.<sup>8</sup> However, as Frederic ROSEN says, such problems “may be considered as belonging rather to Law than to Algebra.”<sup>9</sup> And we are not interested here in the usefulness of algebra in legal matters, but in its nature: what exactly is this art?

**1. On the nature of algebra.** Since the *ratio* or definition of a thing is taken from its principles (► 8.1), we are, therefore, seeking the principles of algebra. And since algebra is an art, it must show us the rational way of performing some kind of work; for art is a productive habit with true reason (► 51.11). From AL-KHWARIZMI’s own description, we would have to conclude that **algebra** is *the art of calculating by completion and reduction*, as the title of his work (حساب الجبر والمقابلة *ḥisāb al-ğabr wal-muqābalaḥ*) itself suggests. Thus, this art produces something through some rational methods of completion and reduction—or restoration and opposition, as some versions have it.

Therefore, before we examine the methods of algebra, we must consider the work that is produced by this art (► 51.12, ¶2). For the matter of a practical science must be those things that can be produced by our work, such that their cognition can be ordered into an operation as into an end (► 58.16). What is it, then, that we seek to produce through the methods of this art? AL-KHWARIZMI answers this question at the outset of his *Algebra*: “When I considered what people <generally> want in calculating, I found that it always is

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<sup>5</sup> Ibid., 169 (١١٩).

<sup>6</sup> Ibid., 90 (٦٨), and footnote (\*).

<sup>7</sup> See, for example, *ibid.*, 159 (١١٣): “Abu Hanifah says: The emancipation is the more important act, and must first be attended to.” For a general discussion of the sources and methods of Islamic Law, see Sami A. ALDEEB Abu-Sahlieh, *Introduction to Islamic Law* (Saint-Sulpice: Centre de droit arabe et musulman, 2012).

<sup>8</sup> AL-KHWARIZMI, *The Algebra*, v; cf. 3 (٢).

<sup>9</sup> Ibid., 91, footnote (\*).

a number [عدد 'adad]."<sup>10</sup> It would seem, then, that the matter-work that algebra produces is a number. And the principle from which it begins must somehow be its opposite.

**2. On the nature of the *number* sought in algebra.** The question is now what this *number* is. Should we assume that the name **number** signifies *a multitude measured by an indivisible unit*, as the ancient Greeks would have it? AL-KHWARIZMI's own words would seem to point in this direction; for he immediately adds:

I also observed that every number is composed of unit<s> [واحد *wāḥid*, i.e., *one*], <and that any number may be divided into units> [والواحد داخل جميع الأعداد] *wal-wāḥidu dāḥilu ġamī'i l-'a'dād*, i.e., and (that) *one* enters in all numbers].<sup>11</sup>

A more detailed discussion is found in his *Arithmetic*, which survives only in Latin:

It has already been made evident in the book of *Algebra and Almucabalah*—that is, of restoration and opposition—that number universally [*uniuersus numerus*] should be composite, and that number universally should be composed upon one. One, therefore, is found in number universally. And this is what is said in another book of arithmetic. For one is the root of number universally and is outside of number. It is the root of number because every number is found through it. But it is outside of number because it is found by itself: that is, without some other number. And the remaining number[s] cannot be found without *one*. For when you say *one*, its being found does not require another number. And the remaining number[s] requires *one*: because you cannot say *two* or *three* unless *one* precedes. Therefore, number is nothing other than a collection of units; and what we said—that you cannot say *two* or *three* unless *one* precedes—we do not say about the voice, such that I would say, but about the thing [*de re*]. For there cannot be two or three if one should be removed. But there can be one without a second or a third. Therefore, two are nothing other than a doubling [*duplicitas vel geminatio*] of one. And, likewise, three are nothing other except the triplication of the same unit. Understand this of the remaining number[s].<sup>12</sup>

This text would, indeed, seem to point to the order of dependence that we find in the arithmetical unit of ancient Greek and medieval Latin philosophers (►2.3; 47.1, ¶1). However, it is not conclusive; for this order of dependence is found in any genus. In fact,

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<sup>10</sup> Ibid., 5 (٣).

<sup>11</sup> Ibid.

<sup>12</sup> AL-KHWARIZMI, *De numero indorum*, 2: "Et iam patefeci in libro algebre et almucabalah, idest restaurationis et oppositionis, quod uniuersus numerus sit compositus, et quod uniuersus numerus componatur super unum. Vnum ergo inuenitur in uniuerso numero; et hoc est quod in alio libro arithmetice dicitur. Quia unum est radix uniuerſi numeri, et est extra numerum. Radix numeri est, quare per eum inuenitur omnis numerus. Extra numerum uero est, quare inuenitur per se, idest absque alio aliquo numero. Reliquus autem numerus sine uno inueniri non potest. Cum enim unum dicis, inuentione sui non indiget alio numero. Reliquus autem numerus indiget indiget (*sic*) uno: quare non potes dicere duo uel tria, nisi precedat unum. Nichil aliud est ergo numerus, nisi unitatum collectio; et hoc quod diximus non potes dicere duo uel tria, nisi precedat unum: non de uoce diximus, ut ita dicam, set de re. Non enim possunt esse duo uel tria, si unum auferatur. Vnum uero potest esse absque secundo uel tercio. Igitur nichil aliud sunt duo, nisi unius duplicitas uel geminatio: et similiter tria nichil aliud sunt, nisi eiusdem unitatis triplicatio: sic de reliquo numero intellige." All brackets and emphasis in the original. The translation is ours.

all modes of priority are reduced to the mode of dependence (►47.19); everything is measured by that on which it depends (►37.10); and a measure in any genus is something one (►28.3). What is more, everything that is divisible, is divisible into ones; and everything that is composed, is composed from ones (►40). Besides, this lengthier discussion seems to be a gloss. Indeed, not only do we find that “this is what is said in another book of arithmetic” (perhaps that of BOETHIUS?): even the words that immediately follow add, “But now let us return to the book. It is found, Al-Khwarizmi says, [...]”<sup>13</sup>

Therefore, we must examine more carefully what kinds of things are those that AL-KHWARIZMI calls *numbers*:

I observed that the numbers which are required in calculating by Completion and Reduction are of three kinds [ضروب *ḍurūb*], namely, roots [جذور *ǧudūr*], squares [اموال *ʿamwāl*], and simple numbers [عدد مفرد *ʿadad mufrad*] relative to neither root nor square. A root [جذر *ǧidr* or *ǧadr*] is any <quantity> [كل شيء *kullu šayʿin*, lit., *any- or every-thing*] which is to be multiplied by itself, <consisting> of units, <or> numbers ascending [من الواحد وما فوقه من الاعداد *mina l-wal-wāḥidi wamā fawqahū mina l-ʿa dād*, lit., from *one* and whatever is above it among the numbers], <or> fractions [كسور *kusūr*] <descending> [وما دونه من الكسور *wamā dūnahū mina l-kusūr*, and whatever is below it among the fractions]. A square [مال *māl*] is <the whole amount of> [كلما اجتمع من *kullumā ǧtumiʿa min*, everything that is gathered from] the root multiplied by itself. A simple number is any number <which may be> pronounced without reference to root or square.<sup>14</sup>

Clearly, according to this, there are numbers that are less than the unit. This seems inconsistent with what he says above—that *one* enters in all numbers—unless perhaps we understand by this that numbers are not *composed* from units (and *divided into* units, as ROSEN translates), but, instead, are somehow *related* to *one*: for example, such that *one* enters in their definition. On the other hand, if we read the text literally, AL-KHWARIZMI is saying that *one*, too, is a number: for *one* is a root; and a root is a kind of “number.”

Be that as it may, we find that some “numbers” are *roots*, while others are *squares*. Square numbers, as well as other so-called powers (►31.24), were known to the Pythagoreans. However, they did not use the name *root* for its opposite or “inverse.” This terminology (akin to that of BOETHIUS; ►4.7) was used by the Arabs, as Jeffrey A. OAKS explains:

<sup>13</sup> Ibid.: “Set nunc redeamus ad librum. Inueni, inquit algorithmi [...]” An adaptation and enlargement of this work by JOHN of Seville (see KARPINSKI, *Robert of Chester’s Latin Translation of the Algebra of Al-Khwarizmi*, 15, footnote 3) contains essentially the same explanation, but also adds a definition of number that differs in nothing from EUCLID’s; thus, Johannes HISPALENSIS, *Liber Algorismi de pratica arismetrice*, 25–26: “Unitas est origo et prima pars numeri. Omnis enim numerus ex ea componitur: sed ipsa extra omnem numerum intelligitur. Quia unum ad esse suum non indiget numero; sed numerus numquam inuenitur absque uno. Duo enim uel tria etc. nou possunt esse, si unum defuerit. Vnum uero potest esse, quamuis duo uel tria numquam sint. Nichil enim aliud sunt duo quam unius duplicatio siue geminatio, nec tria quam unius triplicatio, et sic de ceteris. Vnde numerus sic diffinitur: numerus est unitatum collectio; que quia in infinitum progreditur; multitudo enim crescit in infinitum.”

<sup>14</sup> AL-KHWARIZMI, *The Algebra*, 5–6 (٣).



The different powers of the unknown were given individual names in Arabic algebra. The first power, corresponding to our  $x$ , is called *shay'* ("thing"), or sometimes *ǧidr* ("root"). Its square is called *māl* ("sum of money", "possession"). Units were counted in dirhams, a unit of currency, or sometimes as *āḥād* ("units") or *mina l-'adad* ("in number"), and often the name was dropped altogether. So "ten dirhams", "ten units", "ten in number" and "ten" all take the meaning of the number ten. The terms *ǧidr* and *māl* were borrowed from arithmetical problem solving, where the *māl* is literally an amount of money or an abstract quantity, and the "root" is its square root. Many problems in Arabic arithmetic ask for an unknown *māl* satisfying some condition, sometimes involving its [square] root.<sup>15</sup>

This is precisely what we find in AL-KHWARIZMI's *Algebra*. St. Thomas, too, uses *root* in this way, which may be further indication that he was familiar with algebra; not only that, but he uses *root* for higher powers (► 60.1, footnote 8), and these "first appear later in the [ninth] century in Qusṭā ibn Lūqā's translation of Diophantus' *Arithmetica*."<sup>16</sup>

Thus, in AL-KHWARIZMI, *root* and *thing* are the same.<sup>17</sup> He makes this explicit when he explains a multiplication of the form  $(10 - x) \times 10 = 10 \times 10 - 10x = 100 - 10x$ :

For instance: "Ten less thing (the signification of thing being root [ومعنى الشيء الجذر *wama 'nà š-šay' i l-ǧidr*]) to be multiplied by ten." You begin by taking ten times ten, which is a hundred; less thing by ten is ten roots negative; the product is therefore a hundred less ten things.<sup>18</sup>

This also explains why ROSEN translates كل شيء *kullu šay'* as *any quantity*, rather than *anything*; for a *root* or *thing* is anything that can be quantified—and we often use *quantity* or *quantum* indistinctly because, in predication, quantity takes the mode of substance and of accident due to abstraction from matter (► 49.10).

It remains that AL-KHWARIZMI is not referring to any genus of quantity in particular when he uses the name *number* (عدد *'adad*). This can be easily corroborated; for he does not care, for example, whether such quantities should be lines or dirhams. To demonstrate the case when "a square and ten roots are equal to thirty-nine dirhams" ( $x^2 + 10x = 39$ ), he even uses a geometric figure to represent the quantities.<sup>19</sup>

On the other hand, his *root* or *thing* includes fractions. These "numbers," unlike the multitude-numbers of the ancient Greeks, are less than the unit. They serve to divide quantities into parts. For example, the Fourth Problem states: "I have multiplied one-third

<sup>15</sup> Jeffrey A. OAKS, "Algebraic symbolism in medieval Arabic algebra," *Philosophica* 87 (2012), 41–42. All brackets in the original. Transliteration adapted to our conventions.

<sup>16</sup> Ibid., 42.

<sup>17</sup> Ibid.

<sup>18</sup> AL-KHWARIZMI, *The Algebra*, 23 (١٦). Round brackets in the original.

<sup>19</sup> Ibid., 13–16 (٨–١١).

of thing and one dirham by one-fourth of thing and one dirham, and the product was twenty.”<sup>20</sup> This means that  $(\frac{1}{3}x + 1)(\frac{1}{4}x + 1) = 20$ .

In his *Arithmetic*, AL-KHWARIZMI teaches the methods for adding, subtracting, multiplying, and dividing such “numbers” using the decimal notation invented by the Indians (*per literas indorum*). He introduces operations on fractions with the following words:

These are all [the things] that are necessary for men [to know] about division and multiplication in that number that is integer [*integer*]. And now we begin to treat about the multiplication of fractions and their division; and about the extraction of roots.<sup>21</sup>

To our knowledge, this is the first time in the Latin west that an “integer number” is mentioned. Of course, the fractions of such a number need not be multitudes measured by a unit: they are parts of a quantity regardless of the specific genus.

Summarizing our findings, by AL-KHWARIZMI’s **number** (عدد *‘adad*) we are to understand, simply, a *quantum*. Indeed, quantity has two generic properties (►3): from the part of its matter, it is divisible (►34.1); from the part of its form, it is measurable (►34.2).

**3. On equations.** AL-KHWARIZMI adds a property that applies to all three kinds of numbers: they can be equal to each other. This implies that they are—somehow—homogeneous:

<A number belonging to one> of these three classes [ضروب *ḍurūb*] <may be> equal [يعدل *ya ‘dilu*, is equal; is equivalent] to <a number of> another <class>; you <may> say, for instance, “squares are equal to roots,” or “squares are equal to [a simple] number<s>,” or “roots are equal to [a simple] number<s>.”<sup>22</sup>

Let us examine some of AL-KHWARIZMI’s examples:

Of the case in which *squares are equal to roots*, this is an example. “A square is equal to five roots of the same [مال يعدل خمسة اجذاره *mālun ya ‘dilu ḥamsata ‘aḡḍārihī*, lit., a square equals five of its roots];” the root of the square is five, and the square is twenty-five, which <is equal to> [مثل *miṭlu*, lit. (is) like] five times its root[s].<sup>23</sup> [In modern notation,  $x^2 = 5x$ ; thus,  $x = 5$ ; and  $x^2 = 25$ .]

As to the case in which *squares are equal to numbers*; for instance, you say, “a square is equal to nine;” then this is a square, and its root is three. Or “five squares are equal to eighty;” then one

<sup>20</sup> Ibid., 38 (٢٧).

<sup>21</sup> AL-KHWARIZMI, *De numero indorum*, 17: “Hec sunt uniuersa que necessaria sunt hominibus ex diuisione et multiplicatione in eo numero qui fuerit integer. Et nunc incipimus tractare de multiplicatione fractionum, et earum diuisione, et de extractione radicum.” The translation is ours.

<sup>22</sup> AL-KHWARIZMI, *The Algebra*, 5–6 (٣).

<sup>23</sup> Ibid., 6 (٤). Emphasis in the original.

square is equal to one-fifth of eighty, which is sixteen. Or “the half of the square is equal to eighteen;” then the square is thirty-six, and its root is six.<sup>24</sup> [In modern notation,  $x^2 = 9$ ; therefore,  $x = 3$ . In the next example,  $5x^2 = 80$ ; therefore,  $x^2 = \frac{80}{5} = 16$ . In the last example,  $\frac{x^2}{2} = 18$ ; therefore,  $x^2 = 36$ ; and  $x = 6$ .]

As to the case in which *roots are equal to numbers*; for instance, “one root equals three in number;” then the root is three, and its square nine. Or “four roots are equal to twenty;” then one root is equal to five, and the square to be formed of it is twenty-five. Or “half the root is equal to ten;” then the whole root is equal to twenty, and the square which is formed of it is four hundred.<sup>25</sup> [In modern notation,  $x = 3$ ; therefore,  $x^2 = 9$ . In the next example,  $4x = 20$ ; therefore,  $x = 5$ . In the last example,  $\frac{1}{2}x = 10$ ; therefore,  $x = 20$ ; and  $x^2 = 400$ .]

In all of these examples, we find what we nowadays call equations. In fact, one manuscript of Robert of CHESTER’s 1145 translation of AL-KHWARIZMI’s *Algebra* adds a subtitle that reads, “Containing Demonstrations of the Rules of the equations of Algebra [*continens demonstrationes aequationum regularum algebrae*],” although this is found only in the *Codex Universitatis Columbiae*.<sup>26</sup>

Thus, in each case, we have some subject that is said to be the same as its predicate according to quantity. And the “numbers” above defined are the terms from which such propositions are constituted—alone or in conjunction. The conjunctions are additions, subtractions, multiplications, and divisions.

**4. On the methods.** Finally, we must examine the methods of completion and reduction. We resort to CHESTER’s summary, which will save us a great deal of examination:<sup>27</sup>

*First.* When roots are equal to a number, divide the number by (the number of) the roots, and the quotient represents the desired quantity. [That is, when  $ax = n$ , then  $x = a/n$ .]

*Second.* When squares are equal to a number, divide the number by (the number of) the squares, and the root of that which you obtain represents the desired quantity. [That is, when  $ax^2 = n$ , then  $x^2 = a/n$ , and  $x = \sqrt{a/n}$ .]

*Third.* When roots are equal to squares, divide (the number of) the roots by (the number of) the squares, and the quotient represents the desired quantity. [That is, when  $ax^2 = bx$ , then  $x = b/a$ .]

*Fourth.* When a number is equal to the sum of squares and roots, divide by (the number of) the squares. Take one-half of (the number of) the roots after the division and multiply it by itself. To

<sup>24</sup> Ibid., 7 (¶). Emphasis in the original.

<sup>25</sup> Ibid., 7–8 (¶–¶). Emphasis in the original.

<sup>26</sup> KARPINSKI, *Robert of Chester’s Latin Translation of the Algebra of Al-Khowarizmi*, 66–67; see critical apparatus.

<sup>27</sup> Ibid., 126–127. Round brackets and emphasis in the original.

this product add the number. The root of this sum less one-half of the number of roots, represents that which is sought. [That is, when  $ax^2 + bx = n$ , then  $x = \sqrt{(b/2a)^2 + n/a} - b/2a$ .]

*Fifth.* When roots are equal to a number and squares, divide the roots and the number by (the number of) the squares. Take one-half of (the number of) the roots after the division, and multiply it by itself. From this product subtract the number; the root of the remainder subtracted from one-half of (the number of) the roots is the desired quantity. But if it is not possible to subtract the root of the remainder from one-half of (the number of) the roots, it is permissible to add the same. [That is, when  $ax^2 + n = bx$ , then  $x = b/2a \pm \sqrt{(b/2a)^2 - n/a}$ .]

*Sixth.* When squares are equal to a number and roots, on this side divide by (the number of) the squares. Take one-half of (the number of) the roots after the division, and multiply it by itself. To this product add the number; the root of this sum plus one-half of (the number of) the roots represents that which is sought. [That is, when  $ax^2 = bx + n$ , then  $x = b/2a + \sqrt{(b/2a)^2 + n/a}$ .]

It is not difficult to see how these rules come to be. For they presuppose axioms such as those found in EUCLID's *Elements*. Thus, if we add, subtract, multiply, or divide equals to equals, the remainders are equal; likewise, if we square or find roots of equals, the remainders are equal. These common notions, applied to the subject and to the predicate, produce a new subject and a new predicate, but preserve quantitative identity or oneness.

## 67.2. What is Algebra?

Having examined AL-KHWARIZMI's works, we are now in a position to define **algebra** from ATOP as *the analytic part of formal logic that treats of quantity*. We account for this definition as follows.

1. Algebra proceeds to prove something from the predicable genus of *quantity*, which is a work of reason (as are *ratios* such as *genus*, *species*, *opposite*, and all such intentions that the logicians consider; ►52.6, ¶1).

That the predicable genus of *quantity* is a work of reason is evident because it is impossible for a generic quantity to exist, as such, in a subject—not even according to our mode of considering it through formal abstraction. Indeed, every quantum is divisible; and it is by division that we arrive at its principles. If it should be a discrete quantity, we would ultimately arrive at an indivisible unit. If, on the other hand, it should be a continuous quantity, we would always arrive through division at a magnitude of the same genus. But a generic quantity is neither continuous nor discrete. Likewise, a measurable multitude does not have a position, while a magnitude does; thus, a generic quantity would have to be neither, which is impossible. And there is no mean between continuous and discrete; whence, nor can it be both continuous and discrete, since this would involve a contradiction. Therefore, a generic quantity—as such—cannot exist in a subject.

## 2. Algebra proceeds through the logical way.

As explained above (► 52.6, ¶1), logical reasons are taken either from common principles (in the case of formal analytic; ► 52.4, ¶1a) or from more probable but non-necessary principles (in the case of dialectic; ► 52.4, ¶2a). And *quantity* is a common principle because it is not in any particular genus (► 33.23). According to this, algebra proceeds reasonably because it proceeds through the logical way from common principles.

This mode of proceeding cannot properly be suited to a particular science, in which an error would ensue if we should not proceed from proper principles (► 52.6, ¶1). However, this may properly and suitably come to be in logic and in metaphysics, since either science is common and—in some mode—about the same subject.

## 3. Algebra is used in the other sciences in the same way as *logica docens* is used.

There is no particular science of quantity insofar as it is a quantity; for this belongs to metaphysics (► 60.4). And algebra does not treat of quantity insofar as it is a property of being, but insofar as something is predicated of it. Therefore, from the part of the principles from which we proceed, we must say that algebra proceeds reasonably in the first mode (► 52.6, ¶1): that is, we use in the mathematical sciences, and in the other sciences, the propositions about quantity that are consigned in logic insofar as it teaches (*logica docens*). This process is denominated *rational* from the *rational science*, for logic—which is said to be the rational science—is used in this mode (► 52.6).

Indeed, a judgment is produced in us by analysis into principles (► 52.3); but not into any principles. For a judgment must be taken from the proper principles of the thing, while an inquiry is produced even by common principles (► 52.4, ¶1).

For example, when AL-KHWARIZMI inquires, “what must be the amount of two squares which, when summed up and added to ten times the root of one of them, make up a sum of forty-eight dirhams? [i.e., analyze or resolve for  $x$  when  $2x^2 + 10x = 48$ ],”<sup>28</sup> if by *dirham* we are to understand some currency, we must consider the principles of that currency. Anyone with a background in financial services knows that currencies are not infinitely divisible. Hence, the resolution of this inquiry may require us to consider that there is some minimum in that currency; or that there are some rounding rules. On the other hand, if by *dirham* we are to understand any generic quantity, we can reasonably prove that  $x = 3$ ; but this is not a demonstration in any particular science, because we are not proceeding from the proper principles of a subject genus, which is a condition of demonstration (► 56).

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<sup>28</sup> AL-KHWARIZMI, *The Algebra*, 9 (¶).

### 67.3. Is Diophantus the Father of Algebra?

We are finally prepared to determine whether DIOPHANTUS is the father of algebra, as KLEIN claims (►7.1).

Thus, analyzing this question from ATOP, the last terminus that an inquiry of reason must attain is the understanding of principles through analysis. When this is produced, the process or proof is said to be *demonstrative* (►53) instead of *reasonable* (i.e., *reasonable* in the second mode; ►52.6, ¶2). This is what happens when DIOPHANTUS reaches the first principles of arithmetic: that is, when he determines that  $x$  is a multitude measured by the unit (a number properly said; ►2.1).

However, as discussed above (►7.1), in his *Arithmetic*, DIOPHANTUS tackles complex problems in which a reduction to the first principles of arithmetic fails; he then backtracks and attempts some other route. We also noted there that this is how dialectic works. The reason for this is that dialectic (which is *tentative*; ►7.1) belongs to the part of logic that is called *inventive*; and discovery is not always had with certitude (►52.4, ¶2).

Indeed, sometimes, the inquiry of reason cannot be conducted up to its proper terminus; instead, it stops in the inquiry itself when a way to either part of a contradiction still remains for the inquirer: for example, when DIOPHANTUS has not yet been able to determine whether  $x$  is a measurable multitude. This happens when we proceed through probable reasons (►52.4, ¶2b; 52.6, ¶2), which are naturally apt to produce opinion or faith—not science. And in this mode, the *reasonable* process of arithmetic is divided against its *demonstrative* process. Therefore, we can proceed *reasonably* in arithmetic too, such that a way towards necessary proofs should be furnished from probable principles. In this mode, logic (*logica utens*) is used in arithmetic as an instrument.

However, what DIOPHANTUS never does is to content himself with attaining contradictory principles. For example, as noted above (►7.2), there is a proposition in which he reaches an apparent analysis of the form  $35x^2 = 5$ ; but he rejects this solution because “ $x$  is not rational.” This is precisely what frustrates his modern readers: why would he not accept  $\frac{1}{\sqrt{7}}$  as a solution and say, as we do today, that  $x$  is an *irrational number*? Evidently, because he does not understand numbers to be generic quantities.

Hence, DIOPHANTUS is not the father of *modern* algebra. Otherwise, he would accept not only generic quantities, but all kinds of beings of *ratio*, such as potential quantities (i.e., “negative numbers”) and privation in the genus of quantity (i.e., “the number zero”). He is not a logician, but an arithmetician: he *uses* the analytic method dialectically to resolve a question into the proper principles of the subject genus considered by arithmetic (►60.1).

#### 67.4. Regiomontanus's Definition of Mathematics as *the Science of Quantity*

During the Renaissance, as Giovanni CRAPULLI explains, mathematics was unified according to two orders of considerations (inherited from the ancient Greeks through medieval philosophy): the order of the quadrivium (►58.17; 66.6), and the Aristotelian order of the speculative sciences according to abstraction (►58.20) and certitude (►65).

At the beginning of the sixteenth century mathematics appeared [to be] unified by a double order of considerations. In the first [order], a common nature or genus was recognized to the disciplines of the *mathesis universa* [i.e., the whole of mathematics], from whose specification the subjects of each of them drew [their] origin. This common nature in the traditional classification of the quadrivium was identified with "quantitas" [i.e., a generic quantity]. In consideration of this basic position of quantity Regiomontanus had defined mathematics [as] "scientia considerativa quantitatis" [i.e., *the science that considers quantity...*]. Another order of considerations in which the mathematical disciplines were found unified concerned their mean position in the tripartite division of theoretical or contemplative philosophy, whether due to the greater simplicity of their subject compared to the concreteness and mutability of that of natural philosophy, or due to the consequent greater degree of certitude of their demonstrations.<sup>29</sup>

We find formulated here (perhaps for the first time) the idea that **mathematics** is *the science of quantity*. This definition is true specifically of *each* of the purely mathematical sciences (►60). Thus, arithmetic is the science of discrete quantity (i.e., of number), while geometry is the science of continuous quantity (i.e., of magnitude). Likewise, descending to the mean or subaltern sciences (►64), we could say that harmonics is the science of acoustic numbers, while perspective is the science of visual lines.

However, this definition is false of mathematics *as a whole* because quantity as such cannot be reduced to one subject genus (►14.3), which is the genus that the scientist uses (►21.11). In other words, attending to the underlying subject, quantity is not univocal but equivocal (►21.10, ¶1). To be more precise, if **measure** is *that whereby a quantity is known* (►28.1); and this measure is something one (►27.8) according to analogy (►38.1); then quantity, too, must be analogical (►38.1). And if *quantity* is analogical, it must be divided according to its modes (►20.12, ¶3). Wherefrom, *quantity* is divided as something common according to prior and posterior (►27.2, ¶2).

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<sup>29</sup> Giovanni CRAPULLI, *Mathesis universalis: Genesi di una idea nel XVI secolo* (Rome: Edizioni dell'Ateneo, 1969), 9; 12: "Agli inizi del sec. XVI le matematiche figuravano unificate per un duplice ordine di considerazioni. Nel primo si riconosceva alle discipline della *mathesis universa* una natura comune o genere, dalla cui specificazione traevano origine i soggetti di ciascuna di esse. Questa natura comune nella classificazione tradizionale del quadrivio veniva identificata con la 'quantitas'. In considerazione di questa posizione basilare della quantità Regiomontano aveva definito la matematica: «scientia considerativa quantitatis». [...] Un altro ordine di considerazioni in cui le discipline matematiche figuravano unificate verteva sulla loro posizione mediale nella divisione tripartita della filosofia teorica o contemplativa, sia per la maggiore semplicità del loro soggetto rispetto alla concretezza e mutevolezza di quello della filosofia naturale, sia per il conseguente più alto grado di certezza delle loro dimostrazioni."

It is precisely because quantity is something common that there is no mathematical science of quantity as such (►60.4). Indeed, no particular science demonstrates from common principles alone (►56.5; 56.2; 60.1). There are, however, two common (i.e., non-particular) sciences that can properly treat of quantity as such: metaphysics treats of quantity insofar as it is a being, while logic treats of *quantity* insofar as it is predicable.

In this respect, we must recall that the analytical part of logic is a demonstrative science; for analytic is a demonstrative science that is apt to inquire by resolving into principles known by themselves (►52.4, ¶1). However, these principles are only a work of reason.

Therefore, we can say that there is a logical science of quantity that studies not real quantities but the quantities of reason. And this science belongs, again, to the *formal* part of logic, because it proves its theorems supported exclusively on the right form of reasoning. Hence, it ignores the material conditions of demonstration—including proper principles. This science is like mathematics in that it proves exclusively through the formal cause. But it differs from the mathematical sciences in that its subject is a common *ratio*—i.e., the *ratio of quantity*—and not a particular thing—i.e., a real quantum. And if we should choose to call this science *mathematics*, we would do so only metaphorically.

It is evident that ARISTOTLE’S material conditions of demonstration (►53.6) were ignored when Johannes Müller von Königsberg, better known as REGIOMONTANUS (1436–1476), proposed his definition of mathematics as *the science of quantity*. The emergence of modern so-called mathematics is the result of this conception. Indeed, as CRAPULLI says:

In the unitary body of *mathesis universa* [i.e., the whole of mathematics] the concept of a discipline distinct from the others, as a *mathesis universalis* [i.e., universal mathematics], has been coming to be outlined and clarified [*venne delineandosi e precisandosi*] to the extent that, in the slow and gradual resurgence [in the Renaissance] of an interest in mathematics, seconded by the printed diffusion of classical texts, the reflection [of humanists] became aware of the common principles and properties that derive from the various disciplines from their being participants in one same nature [i.e., in the *ratio of quantity*], and was able to develop the related theme.<sup>30</sup>

### 67.5. The Introduction of the Concept of *Mathesis Universalis*

We have already noted how PROCLUS speaks about ἡ μία καὶ ὅλη μαθηματική, *the single and whole mathematics*, in his *Commentary on the First Book of Euclid’s Elements* (►7.4, ¶4). As CRAPULLI explains, this work (together with others) would become an inspiration:

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<sup>30</sup> Ibid., 13: “Nel corpo unitario della *mathesis universa* il concetto di una disciplina distinta delle altre come *mathesis universalis* venne delineandosi e precisandosi nella misura in cui, nel lento e graduale risorgere dell’interesse per la matematica, secondato dalla diffusione a stampa di testi classici, la riflessione prese consapevolezza di principi e proprietà comuni che derivano alle varie discipline dall’essere partecipi di una medesima natura, e seppe svolgerne la tematica relativa.”



The texts that most inspired the search for this discipline [i.e., for a *mathesis universalis* or universal mathematics], of (its) nature, principles, and common properties, were, in addition to an Aristotelian passage from the *Posterior Analytics*, Euclid's *Elements*, especially the fifth book, and the already mentioned Commentary of Proclus. In truth, none of them offered explicit and unequivocal elements for the clear definition of a *mathesis universalis*. Perhaps their importance is to be recognized rather in the theme they suggested and in the variety of interpretations they could give rise to by justifying them at least in part.<sup>31</sup>

In fact, as CRAPULLI suggests and we have already shown (►7.3; 7.4), none of these works support the existence of a mathematical science of quantity as such—a *mathesis universalis*. Yet, the more ARISTOTLE was misunderstood or rejected by the humanists of the Renaissance, the less they appreciated what it was they were developing: the part of formal logic that concerns quantity. This became evident only in the late nineteenth century, when the heirs of DESCARTES would altogether drop quantity as the genus of their inquiry and turned to pure formal logic. But the path was set many centuries earlier.

1. In 1547, Alessandro PICCOLOMINI, purportedly following PROCLUS, was convinced that there existed such a common science (*scientia communis*):

Incidentally, one [thing] of great weight is to be noted here. That, since we have shown that the imagined quantum is the matter or subject of mathematical [things], this is not said to be the subject of geometry or of arithmetic, which are the first two genera of mathematics, but of some faculty common to geometry and arithmetic. For Proclus clearly shows that some science common to both [of] them is given, which [science] appropriates to itself [*sibi vindicat*] a proper subject, proper affections, and proper principles; and those two are subaltern to it.<sup>32</sup>

A *common* science with *proper* subject, affections, and principles, such as PICCOLOMINI proposes, is nothing short of an oxymoron (►54.5; 58.11). It comes to show how poorly Renaissance “philosophers” understood ARISTOTLE’s theory of science. Not all of them, however: PICCOLOMINI adds that he says this against some (unspecified thinkers) who do not hold the same opinion because, he claims, “they are not skilled in this discipline.”<sup>33</sup>

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<sup>31</sup> Ibid.: “I testi che maggiormente ispirarono la ricerca di questa disciplina della natura, dei principi e delle proprietà comuni furono, oltre ad un brano aristotelico degli *Analitici posteriori*, gli Elementi di Euclide, specie il V libro, e il già menzionato Commento di Proclo. In verità, nessuno di essi offriva elementi espliciti e inequivocabili per la chiara definizione di una *mathesis universalis*. Forse la loro importanza è da riconoscere piuttosto nella tematica che suggerirono e nella varietà di interpretazioni cui potevano dare adito giustificandole almeno in parte.”

<sup>32</sup> Alessandro PICCOLOMINI, *Commentarium de certitudine Mathematicarum disciplinarum* (Rome: apud Antonium Asolanum, 1547), LXXXVII, *vto.*: “Et hic obiter unum est notandum magni ponderis, quod cum quantum phantasiatum ostenderimus esse mathematicorum materiam sive subiectum: hoc quidem non Geometriae, vel Arithmeticae, quae duae sunt Mathematicae prima genera, subiectum esse dicitur, sed cuiusdam facultatis communis ad Geometriam, & Arithmeticae. Nam manifestissime Proclus in primo & 2. libro passim ostendit, dare quendam scientiam communem ad illas duas: quae proprium subiectum, & proprias passiones, propriaque principia sibi vindicat, & illas duas sibi subalternat.”

<sup>33</sup> Ibid.: “Et hoc es contra quodam, qui non satis in hac disciplina periti, hoc non tenent.”

CRAPULLI attempts to determine who were the authors on either camp of the question.<sup>34</sup> His work is quite important to those seeking the historical origins of modern so-called mathematics and the controversies that preceded its development. For our part, we are more interested in the principles themselves. However, we shall at least mention the names of some of the main authors that were in favor of the so-called science of universal mathematics.

2. CRAPULLI next mentions Petrus RAMUS, who is notorious for his harsh criticism of ARISTOTLE. In his *Animadversionum aristotelicarum*, he concludes that analogy, like all comparisons (including cause, genus, contrary, etc.), belongs to logic; all other arts or disciplines take these principles from it.<sup>35</sup> Wherefrom, according to him, even EUCLID's theory of proportion is mostly logical.

RAMUS also finds the Aristotelian category of quantity to be inconsistent, since it should include place and time, and yet it should also abstract from motion. What is worse, quantity should be—according to ARISTOTLE—among the first differences of *being*: how, then, could it be a category, if it is found in all the genera? Therefore, he argues that quantity, too, belongs to logic, because it consists in some comparison. Evidently, RAMUS, a functional logician (he defended the primacy of logic above all disciplines), is unable to distinguish between virtual quantity and dimensive quantity (►22.1), on the one hand, and the metaphysical genus and the logical genus of quantity (►35.4), on the other.

In his *Scholarum mathematicarum*, RAMUS concludes that, just as arithmetic is the doctrine of well numbering, and geometry is the doctrine of well measuring, so, too, mathematics is the doctrine or art of quantifying (*ars quantitandi*).<sup>36</sup>

3. Conrad DASYPODIUS approaches the same question from metaphysics. Following PROCLUS almost to the letter, he argues that some universal mathematical cognition and doctrine is to be established, which embraces all the other disciplines, their principles, and their universal propositions: universal mathematics (*universalis mathematica*).<sup>37</sup>

4. Benito PEREIRA, in his widespread manual of natural philosophy, *De communibus omnium rerum naturalium principiis & affectionibus*, treats in a classical Aristotelian-

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<sup>34</sup> CRAPULLI, *Mathesis universalis*, 41ff.

<sup>35</sup> Petrus RAMUS, *Animadversionum aristotelicarum libri XX* (Paris: apud apud Andream Wechelum, 1556), 128–134. Cf. CRAPULLI, *Mathesis universalis*, 63–69.

<sup>36</sup> Petrus RAMUS, *Scholarum mathematicarum libri unus et triginta* (Basel: per Eusebium Episcopum, 1569), 113–116. Cf. CRAPULLI, *Mathesis universalis*, 69–72.

<sup>37</sup> Conrad DASYPODIUS, *Volumen II Mathematicum* (Strasbourg: Iosias Rihelius, 1570), 162–176; *Protheoria Mathematica* (Strasbourg: Iodocus Martinus, 1593), 4–8. Cf. CRAPULLI, *Mathesis universalis*, 72–91.

Thomistic way of the division of philosophy into theoretical and practical (► 58.16); and of the division of the theoretical sciences into metaphysics, mathematics, and physics (► 58.20).<sup>38</sup> Again, following the classical distinction, he determines which one is prior naturally and in respect of us; and which one is prior in the order of learning (► 66). However, he argues in favor of a common mathematical science (*scientia mathematica communis*):

In some mode, there is no doubt that there should be some common mathematical science that must speculate [about] the affections common to magnitude and number. However, this science is not counted by mathematicians as distinct from geometry and arithmetic.<sup>39</sup>

What these common affections should be, he does not say in this place. However, he adds in another chapter that “the Mathematician considers some certain affections that befit quantity not in order to substance, but by itself, either simply and absolutely or in comparison to another quantity.”<sup>40</sup> He thereafter explains further:

The affections that are demonstrated by the mathematician about quantity do not befit it in order to substance, but by itself: for example, to be divisible, commensurable, proportionable, equal or unequal.<sup>41</sup>

Even though PEREIRA claims to follow St. Thomas, it is clear that, against him (► 60.4), he endorses a common mathematical science of quantity as such. As CRAPULLI explains, PEREIRA’S manual would have great influence in future thinkers—especially in Adrianus ROMANUS.<sup>42</sup>

5. Adrianus ROMANUS writes his *Apologia pro Archimede* against Joseph Justus SCALIGER, who supported ARISTOTLE’S position that we cannot pass over from one genus into another in a demonstration (► 56.2).<sup>43</sup> Among the various arguments that ROMANUS puts forward, he claims—as many of our contemporaries still do against the evidence—

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<sup>38</sup> See CRAPULLI, *Mathesis universalis*, 93–99.

<sup>39</sup> Benito PEREIRA, *De communibus omnium rerum naturalium principiis & affectionibus* (Rome: apud Franciscum Zanettum, 1585), 34D: “Quemadmodum non est dubium quin sit aliqua scientia Mathematica communis, quae debeat speculati affectiones communes magnitudini & numero, quae tamen scientia, a Mathematicis non numeratur distincta a Geometria & Arithmetica.”

<sup>40</sup> *Ibid.*, 349: “Considerat igitur Mathematicus certas quasdam affectiones quae conveniunt quantitati non in ordine ad substantiam, sed per se, vel simpliciter & absolute, vel in comparatione ad aliam quantitatem.”

<sup>41</sup> *Ibid.*, 350: “affectiones quae a Mathematico demonstrantur de quantitate, non ei conveniunt in ordine ad substantiam, sed per se; vt esse diuisibilem, commensurabilem, proportionabilem, aequalem, vel inaequalem.”

<sup>42</sup> See CRAPULLI, *Mathesis universalis*, 98.

<sup>43</sup> Adrianus ROMANUS, *Apologia pro Archimede* in *In Archimedis Circuli dimensionem expositio & analysis* (Würzburg, 1597), 19–55; according to CRAPULLI, this work was not actually published in Würzburg, but in Geneva. See CRAPULLI, *Mathesis universalis*, 101–143.

that a *mathesis universalis* must have been known to ancient Greek mathematicians. As usual, he bases his position primarily on the theory of proportion. And he concludes that there is some science that is common to arithmetic and geometry, which considers the affections that are common to all quantities.

Unlike his predecessors, ROMANUS develops in greater detail the definitions and axioms of this so-called science, and “demonstrates” some of its theorems. He even provides methods for a universal arithmetic.

Analyzed from ATOP, all of these principles, proofs, and methods evidently belong to formal analytic. Indeed, they are all based on common principles, such as the addition of generic quantities to generic quantities.

6. Johann Heinrich ALSTED dedicates the first book of his *Methodus admirandorum mathematicorum* (basically, a compilation of passages from various authors, including DASYPIDIUS, PEREIRA, and ROMANUS) to what he calls *general mathematics (mathematica generalis)*.<sup>44</sup> According to him, **mathematics** is *the part of the circle of philosophical arts that treats of quantity in common*.

He divides mathematics into *general*—or *common* and *universal*—and *special*.<sup>45</sup> And he claims that the genus of mathematics is *science*. Firstly, because it has three (things) that (every) science contains: subject, principles, and properties. Secondly, it has two (things) that are adjoined to a science: evidence and certitude. Thirdly, demonstration through proximate causes is given in mathematics. He orders the rest of the work to these parts.

However, unlike his predecessors, ALSTED does not claim that there is a separate science of quantity as such.

7. It is also worth mentioning that SASAKI builds on the work of CRAPULLI, adding Francesco BAROZZI (1537–1604), Christopher CLAVIUS (1538–1612), and other authors who either promoted a *mathesis universalis* in the sixteenth century or otherwise paved the way to the Cartesian revolution.<sup>46</sup>

### 67.6. Identification of Algebra with *Mathesis Universalis* in Descartes

In Rule IV of his posthumously published *Rules for the Direction of the Mind*,<sup>47</sup> René DESCARTES seeks to establish a method for investigating the truth. He criticizes “most

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<sup>44</sup> Johann Heinrich ALSTED, *Methodus admirandorum mathematicorum: Novem libris exhibens universam Mathesin* (Herborn, 1613), 5–22. See CRAPULLI, *Mathesis universalis*, 125–143.

<sup>45</sup> ALSTED, *Methodus admirandorum mathematicorum*, 6.

<sup>46</sup> SASAKI, *Descartes's Mathematical Thought*, 333–358.

<sup>47</sup> René DESCARTES, *Regulae ad directionem ingenii*, 371 (9).

Chemists, many Geometricians, and Philosophers” for blindly seeking the truth: for they would stumble upon it only by chance without such a method. In fact, it would be “far better never to think of investigating truth at all, than to do so without a method.”

Moreover by a method I mean certain and simple rules [*regulas certas & faciles*], such that, if a man observe them accurately, he shall never assume what is false as true, and will never spend his mental efforts to no purpose, but will always gradually increase his knowledge [*scientiam*] and so arrive at a true understanding of all that does not surpass his powers [*eorum omnium quorum erit capax*].<sup>48</sup>

According to DESCARTES, “no science is acquired except by mental intuition or deduction” (*nullam scientiam haberi posse, nisi per mentis intuitum vel deductionem*).<sup>49</sup> To him, these operations (i.e., intuition and demonstration) are the most simple and primary of all. The other operations (or rules),<sup>50</sup> which dialectic uses, are rather impediments, because “nothing can be added to the pure light of reason which does not in some way obscure it.”<sup>51</sup> Naming arithmetic and geometry, “the easiest sciences” (*facillimis scientiarum*), as examples of this method he immediately adds:

At the present day also there flourishes a certain <kind> [*genus*] of Arithmetic, called Algebra, which designs to effect, when dealing with numbers, what the ancients achieved in the matter of figures. These two <methods> [arithmetic and geometry] are nothing else than the spontaneous fruit sprung from the inborn principles <of the discipline here in question> [*hujus methodi*, of this method]; and I do not wonder that these sciences with their <very simple subject matter> [*simplicissima objecta*, most simple objects] should have yielded results so much more satisfactory than others in which greater obstructions choke all growth.<sup>52</sup>

However, DESCARTES claims that ordinary mathematics (i.e., arithmetic and geometry) are rather “the outer husk than the constituents” of his new science: a science that should contain “the first rudiments of human reason” (*prima rationis humane rudimenta*).<sup>53</sup> For numbers and figures “are <a matter> more of the eyes and the imagination than of the understanding.”<sup>54</sup> Wherefrom, he suspects that the first philosophers, who insisted in the study of arithmetic and geometry as exercise and preparation for greater sciences, knew of another species of mathematics, though they had imperfect knowledge of it.

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<sup>48</sup> Ibid., 371–372 (9).

<sup>49</sup> Ibid., 372.15–16 (10).

<sup>50</sup> According to note *b* in the critical edition: “Texte défectueux, comme on le voit par la copie de Hanovre. Le sens demanderait : *Aliae autem regulae, quarum auxilio mentis operationes dirigere se contendit Dialectica.*”

<sup>51</sup> Ibid., 373.1–2 (10).

<sup>52</sup> Ibid., 373.16–22 (10).

<sup>53</sup> Ibid., 374.7–8 (11).

<sup>54</sup> Ibid., 375.18–19 (11).

Although he believes to have discovered a new science, DESCARTES is convinced that there are some traces of this “true mathematics” in PAPPUS and DIOPHANTUS, who must have hidden their discoveries for fear—perhaps—that their most easy and simple method would become vilified upon being divulged.<sup>55</sup> Fortunately, some men of talent have tried to revive this art:

For it seems to be precisely that science known by the barbarous name Algebra, if only we could extricate it from that vast array of numbers and inexplicable figures by which it is overwhelmed, so that it might display the clearness and simplicity which, we imagine, ought to exist in a genuine Mathematics. It was these reflections that recalled me from the particular studies of Arithmetic and Geometry to a general investigation of Mathematics, and thereupon I sought to determine what precisely was universally meant by that term, and why not only the above mentioned sciences, but also Astronomy, Music, Optics, Mechanics and several others are styled parts of Mathematics. Here indeed it is not enough to look to the origin of the word; for since the name ‘Mathematics’ means exactly the same thing as ‘scientific study’, these other branches could, with as much right as Geometry itself, be called Mathematics.<sup>56</sup>

This general science or **universal mathematics** (*mathesis universalis*), vulgarly called **algebra**, would investigate only order and measure—whether in numbers, figures, stars, sounds or whatever other object.<sup>57</sup> Therefore, this science is contained in all the others, which would be nothing but parts of it.

DESCARTES’s identification of algebra with universal mathematics is quite natural. Indeed, as we have determined from ATOP, they are the same discipline: *the analytic part of formal logic that treats of quantity*. This part of logic can reasonably proceed **scientifically**, as *logica docens* (► 52.6, ¶1), or be **dialectically** used in science (► 52.6, ¶2).

However, the identification of algebra with a general scientific method has devastating consequences: all the particular—not just the mean or subaltern—sciences would seem to have been turned into parts of mathematics (today, we would say that they have been *mathematized*), when in fact they have been reduced to a dialectical use of formal logic (*per probabiles rationes*) that is not based on the proper principles of each science, but on the common logical principles of quantity. DESCARTES’s so-called science has thus been detached from sense-experience and reality. Later thinkers would try to correct the course in respect of empirical evidence; but logical—not real—quantitative analysis would remain an essential part of the so-called scientific method: without a subject genus, *scientific demonstration* has been degraded and turned into *reasonable proof* until today.

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<sup>55</sup> Ibid., 376.21–28 (12).

<sup>56</sup> Ibid., 377.4–19 (12–13).

<sup>57</sup> Ibid., 377.22–378.11 (13).

## 68. From Universal Mathematics to Set Theory

So-called universal mathematics, often under the name of *algebra* or *analysis*, was further developed after DESCARTES. In this chapter, we focus primarily on the steps that led from the formulation of *number* in universal mathematics to its formulation in set theory.

### 68.1. Newton's "Number"

According to Isaac NEWTON, "ordinary arithmetic and algebra ought to be conjoined as synthesis and analysis [respectively], and a single, more general arithmetic compounded from both; and on that ground I shall develop one and the other together jointly."<sup>1</sup> He did so above all in a work entitled *Arithmetica Universalis, sive De compositione et resolutione arithmetica*.<sup>2</sup> Therein, following in his predecessors' footsteps in establishing a universal mathematics, NEWTON offers the following definition of **number** that signals a profound break with ancient Greek mathematics while still clinging somehow to EUCLID's *Elements*:

By *number* we understand not so much a multitude of unities, as the abstracted *ratio* of any quantity, to another quantity of the same kind, which we take for unity.<sup>3</sup>

Evidently, this is akin to EUCLID's definition of ratio (λόγος) as "a sort of relation in respect of size between two magnitudes of the same kind" (δύο μεγεθῶν ὁμογενῶν ἢ κατὰ πηλικότητά ποια σχέσις).<sup>4</sup> In fact, it is even more closely related to the Latin versions of Arabic translations of the same Euclidian definition, all of which render the original μέγεθος as *quantitas* through the Arabic مقدار *miqdār* (in other works, this Arabic term is sometimes rendered in Latin as *mensura*, "measure," an equivalent of *magnitude*; ► 34.2).

Thus, as already noted (► 7.3, ¶5), when ANARITIUS explains that a ratio (*proportio* < نسبة *nisbah* < λόγος) is a relation of one quantity (*quantitas* < مقدار *miqdār* < μέγεθος) to another quantity, he adds that both quantities "are of one genus: namely, a relation of line to line,

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<sup>1</sup> Isaac NEWTON, "The 'science' of mathematical investigation" in *The Mathematical Papers of Isaac Newton* (henceforth, MPN) VIII, I, 3, §2, 184–185.

<sup>2</sup> The first edition was published against NEWTON's will (and without the author's name) under the title *Arithmetica Universalis: sive De Compositione et Resolutione Arithmetica Liber* (Cambridge: Cambridge Academic Press, 1707). It was prepared by William Winston from the Lucasian lectures given three decades earlier. The manuscript, which does not bear a title, was deposited in the spring of 1684, after which NEWTON began working on his unfinished *Arithmeticae Universalis Liber primus*. In fact, the *editio princeps* "was scorned by Newton till he found time and patience to issue his own improved edition of the work in 1722," as explained by Derek Thomas WHITESIDE in his edition of MPN, I, xvi.

<sup>3</sup> [Isaac NEWTON], *Universal Arithmetick: Or, a Treatise of Athmetical Composition and Resolution*, trans. Joseph Raphson (London: J. Senex, 1720), 2. Emphasis in the original. Quoted according to the first English edition, in which NEWTON's authorship appears in a note to the reader, but which the author had no authority to supervise. Neither the Lucasian lectures nor the unfinished *Arithmetica* (mentioned in the preceding note) contain the definition (see MPN V). However, it is found in NEWTON's improved edition (London: Tooke, 1722), 2: "Per Numerum non tam multitudinem unitatum quam abstractam quantitatis cujusvis ad aliam ejusdem generis quantitatem quae pro unitate habetur rationem intelligimus."

<sup>4</sup> EUCLID, *Opera Omnia*, vol. 2, 2.6–7.

or a relation of surface to surface, or of body to body, or of number to number...” This is probably why NEWTON adds that his “number” is an “abstracted ratio of any quantity.” Hence, he seems to be referring to ratios between generically indeterminate quantities. But he could also be referring to ratios such as 2 : 1 and 4 : 2, which, abstractly speaking, are the same. Regrettably, he does not clarify this important question in his *Arithmetica Universalis*, and we have been unable to find an account of it elsewhere.

On the other hand, with the expression “not so much a multitude of unities,” NEWTON is clearly distancing himself from EUCLID’s definition of number (ἀριθμός) as “a multitude composed of units” (ἐκ μονάδων συγκείμενον πλῆθος).<sup>5</sup> Yet, the expression “not so much” can be interpreted as inclusive rather than exclusive: after all, there is always a ratio or proportion between a measurable multitude (a kind of quantity) and the unit; or between a measurable multitude and another measurable multitude (►37.2).

NEWTON says that this *number* is threefold: **(a) integer**, if the unity measures it (i.e., if the second quantity or *unity* measures the first quantity); **(b) fracted**, if the unity measures a submultiple part of it; and **(c) surd**, if (the first quantity) is incommensurable with the unity.<sup>6</sup> It should be clear, therefore, that NEWTON’s *unity* is not always a unit-measure; and that his *number* is not necessarily a quantity: rather, it is always a ratio between quantities.

Indeed, although a unit-measure (which is either a quantity or can be reduced to the genus of quantity as its principle; ►29.10) must be homogeneous with the thing measured (►28.6), just like the quantities found in NEWTON’s definition of *number*, however, only that which is measured by a unit-measure is—properly speaking—a quantity. Therefore, only NEWTON’s so-called *integer* number is, strictly speaking, a quantity. This distinction is quite important, for we are dealing here with two diverse relations:

1. A ratio or proportion, which is *any* relation of containment between quantities of the same genus (►37.1, ¶1). This ratio, which NEWTON calls “number,” can be according to some numeric proportion or according to an incommensurable excess (►37.7). And, in this case, an opposite relation is found (*secundum rem*) in each of the two quantities.
2. A relation of measurable to measure (►37.1, ¶3). In this case, the relation is found only in one of the extremes (►37.10); and it is a relation of dependence (►47.2).

<sup>5</sup> EUCLID, *Opera Omnia*, vol. 2, 184.4–5.

<sup>6</sup> NEWTON, *Arithmetica Universalis*, 2: “Estque [numerus] triplex; integer, fractus & surdus: *Integer* quem unitas metitur, *Fractus* quem unitas pars submultiplex metitur, & *Surdus* cui unitas est incommensurabilis.” Emphasis in the original. The 1720 English translation omits the explanation of the first two kinds: “[Number] is threefold: integer, fracted, and surd, to which last Unity is incommensurable” (brackets in the original). However, the *editio princeps* of 1707, which presumably constitutes its source, is identical in this respect to NEWTON’s own 1722 improved edition.



## 68.2. Dedekind's "Number"

1. We owe to Richard DEDEKIND not only our modern understanding of **real numbers**, but also the **number line** that children learn in school. According to him, numbers (*Zahlen*) are "free creations of the human mind" (*freie Schöpfungen des menschlichen Geistes*).<sup>7</sup> They serve "as a means of apprehending more easily and more sharply the difference of things." And by *thing* (*Ding*) he understands an "object of our thought" (*Gegenstand*).<sup>8</sup>

That some creation of the mind should be called "real" surely would seem oxymoronic to any judicious, realist person. But DEDEKIND is not a realist. Imbued as he is in Immanuel KANT's transcendental idealism, the impossibility of knowing the nature of any thing-in-itself (*Ding an sich*) is a given; and "real" numbers are no exception. Under this Kantian dark light, expressions such as "a real creation of the mind" are more ironic than paradoxical. Of course, it matters little for our purpose whether DEDEKIND equivocates when he calls an object of our thought "real"; what matters is the *ratio*, the definition or account that he gives of things, even if such things should turn out to be nothing more than "creations of the mind." As St. Thomas (following AVICENNA) says, it behooves the wise not to argue about names—even if something should be said altogether equivocally.<sup>9</sup>

Nevertheless, DEDEKIND goes even farther than KANT, and considers the *number concept* (*Zahlbegriff*) to be "entirely independent of the notions or intuitions of space and time," that is, of KANT's so-called "a priori forms of sense," on which "pure mathematics" would base its synthetic judgments: instead, the *number concept* is "an immediate result from the laws of thought."<sup>10</sup> In the background of this revolt is the claim that Non-Euclidean geometries had been discovered (a fiction that will be briefly examined; ►68.3). KANT's so-called philosophy of mathematics depended on Euclidean geometry being the one and only true geometry, and this belief seemingly had to be abandoned.

This also explains why DEDEKIND is not satisfied with any account of *number* that is based on extensive magnitudes:

[T]he way in which the irrational numbers are usually introduced is based directly upon the conception of extensive magnitudes [*extensiven Größen*]<sup>11</sup>—which itself is nowhere carefully

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<sup>7</sup> Richard DEDEKIND, *Was sind und was sollen die Zahlen?*, VII–VIII (31–32). Our quotes follow the "authorized translation," *The nature and meaning of numbers*, in *Essays on the theory of numbers*, with corresponding pages referenced in brackets.

<sup>8</sup> *Ibid.*, §1, 1 (44): "Im Folgenden verstehe ich unter einem Ding jeden Gegenstand unseres Denkens."

<sup>9</sup> *In Sent.* 2, d. 38 q. 1 a. 2 co.: "[...] quamvis hoc sit omnino aequivocum dictum: sapientis enim est non curare de nominibus." See AVICENNA, *The Metaphysics of The Healing*, 204, 1–2: "ونحن لا نناقش في الأسماء." The same aphorism is also found a few lines below, in *ibid.*, 10. Cf. AVICENNA, *Liber de philosophia prima*, 6.2, 304.83–84: "Nos autem non curamus de nominibus." *Ibid.*, 306.4.

<sup>10</sup> Richard DEDEKIND, *Was sind und was sollen die Zahlen?*, VII (31).

defined—and explains number as the result of measuring such a magnitude by another of the same kind. Instead of this I demand that arithmetic shall be developed out of itself.<sup>11</sup>

Comparing this account of *number* (rejected by DEDEKIND) to NEWTON's definition, it is evident that *quantity* has been reduced to *extensive magnitude* (a natural assimilation for a Kantian mind). Yet, the idea remains basically the same: DEDEKIND identifies arithmetic (*Arithmetik*) with algebra (*Algebra*) and analysis (*Analysis*).<sup>12</sup> And when he demands that arithmetic be developed out of itself, he thinks he is laying “the foundations of the simplest science” (*der Begründung der einfachste Wissenschaft*), “that part of logic which deals with the theory of numbers” (*desjenigen Theiles der Logik, welcher die Lehre von den Zahlen behandelt*).<sup>13</sup> Analysis is finally acknowledged to be nothing but logic (► 52.4, ¶1).

2. DEDEKIND gives an account of **how numbers are “created”** by the mind. According to him, arithmetic begins with the simplest act of the simplest science: *counting*, which he identifies with the creation of so-called positive integer numbers. This creation is reduced to the *definition* of each “individual” so-called number based on its immediate predecessor:

I regard the whole of arithmetic as a necessary, or at least natural, consequence of the simplest arithmetic act, that of counting, and counting itself as nothing else than the successive creation of the infinite series of positive integers in which each individual [*Individuum*] is defined by the one immediately preceding; the simplest act is the passing from an already-formed individual to the consecutive new one to be formed.<sup>14</sup>

He does not explain how the first “integer number” should be created. Evidently, it cannot be defined “passing from an already-formed individual,” since there should be no “integer” before the first (► 8.3). Yet, there are other operations that produce more “numbers”:

The chain of these numbers forms in itself an exceedingly useful instrument for the human mind; it presents an inexhaustible wealth of remarkable laws obtained by the introduction of the four fundamental operations of arithmetic.<sup>15</sup>

DEDEKIND reduces the first two “fundamental operations” (*Grundoperationen*), addition and multiplication, to the simplest act of counting, such that multiplication follows upon addition just like addition follows upon counting: “Addition is the combination of any arbitrary repetitions of the above-mentioned simplest act into a single act; from it in a

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<sup>11</sup> Richard DEDEKIND, *Stetigkeit und irrationale Zahlen*, §3, 17 (9). Again, our quotes follow the “authorized translation,” *Continuity and irrational numbers*, in *Essays on the theory of numbers*, with corresponding pages referenced in brackets.

<sup>12</sup> Ibid.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid., §1, 12 (4).

<sup>15</sup> Ibid.

similar way arises multiplication.”<sup>16</sup> The remaining operations (subtraction and division) give rise to new kinds of creations of the mind—negative and fractional so-called numbers:

While the performance of these two operations [i.e., addition and multiplication] is always possible, that of the inverse operations, subtraction and division, proves to be limited. Whatever the immediate occasion may have been, whatever comparisons or analogies with experience, or intuition, may have led thereto; it is certainly true that just this limitation in performing the indirect operations has in each case been the real motive for a new creative act; thus negative [*negativen*] and fractional [*gebrochenen*] numbers have been created by the human mind.<sup>17</sup>

DEDEKIND fails to give an account of how exactly these new kinds of “numbers” are created by the mind, dismissing the question as unimportant. What matters to him is the end: they are created to overcome the limitations of subtraction and division. Of course, it is easy to understand from ATOP that negative so-called numbers are potential generic quanta; and that fractional so-called “numbers” are parts of generic quanta. Evidently, “zero,” which he will soon mention, signifies a privation in the same predicable genus of quantity.

DEDEKIND gathers all of these so-called numbers—positive and negative integers and fractions—into what he calls a system (in German, *System*—what soon after came to be known as a *set*) of so-called **rational numbers**, which he denotes using the letter  $R$ .<sup>18</sup>

**3. Completeness and self containedness.** DEDEKIND develops his account of continuity and “irrational numbers” based on the supposition that the “system” (i.e., the set) of “rational numbers”  $R$  possesses the properties of “completeness” (*Vollständigkeit*) and “self containedness” (*Abgeschlossenheit*).<sup>19</sup> These properties consist in that “the four fundamental operations,” that is, addition, subtraction, multiplication, and division, “are always performable with any two individuals in  $R$ , i.e., the result is always an individual of  $R$ , the single case of division by the number zero being excepted.”<sup>20</sup>

Analyzing the system (or set)  $R$  from ATOP, it is evident that DEDEKIND considers it to be some kind of whole, since it is said to be *complete* (i.e., it lacks none of the “individuals” that can be produced by performing the aforesaid fundamental operations). However, this “whole” must always be in potency, since, according to him,  $R$  is created by successive acts of the mind (►¶2). Thus, before the mind “creates” any such “numbers,” there is no  $R$  in act, and the whole is purely in potency. Even after many such “numbers” have been

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<sup>16</sup> Ibid.

<sup>17</sup> Ibid., 12–13 (4).

<sup>18</sup> Ibid., 13 (4–5): “and in the system of all rational numbers [*rationalen Zahlen*] there has been gained an instrument of infinitely greater perfection. This system, which I shall denote by  $R$  [...]”

<sup>19</sup> Ibid., 13 (5).

<sup>20</sup> Ibid.

“created,”  $R$  is an infinite rather than a whole, for there is always something “outside” of  $R$ , some “individual” that has not yet been “created” (► 24.1). DEDEKIND tacitly admits as much when he deploys his infamous “Theorem 66,” thereby “proving” that there exist infinite systems (i.e., sets):

Proof. My own realm of thoughts, i.e., the totality  $S$  of all things, which can be objects of my thought, is infinite [*unendlich*]. For if  $s$  signifies an element of  $S$ , then is the thought  $s'$ , that  $s$  can be an object of my thought, itself an element of  $S$ .<sup>21</sup>

Thus, although DEDEKIND speaks of a “totality” (*Gesammtheit*, written *Gesamtheit* in our days), this totality is composed of “all things” (*aller Dinge*) that “can be” (*sein können*) objects of thought, which is to say that they are objects of thought only potentially, and not actually (► 32.6).

Strictly speaking, therefore, we must say that  $R$  is not a whole according to the proper definition whereby it is infinite. Rather,  $R$  is said to be complete insofar as it terminates at something; but insofar as the “creation” of “numbers” by the mind proceeds infinitely, it is incomplete. Indeed, if  $R$  should be an actual whole (► 13.2), it would lack no “number” from the outset, and the human mind would not need to “create” any of them. But there is always some “number” wanting in  $R$  precisely because the lacking “numbers” are yet to be “created” by the mind. Hence, even though at any given moment the actual whole  $R$  is something one and may contain many parts, there are always more parts that can be contained; and the multitude contained in  $R$  is always determined and finite. Insofar as it is always possible to “create” more “numbers” by means of the four fundamental operations, that which is in act of  $R$  is always contained by something greater. Therefore, in this respect, it is evident that the actual  $R$  is not “self-contained,” as DEDEKIND would have it: rather, it is contained by something greater.

Since the infinite  $R$  is not a whole, it would be erroneous to assume that it is greater than any of its parts; for we understand by **part** *that into which a whole is divided* (► 13.3).

It should be noted, however, that DEDEKIND uses the term “part” equivocally: “A system  $A$  is said to be part of a system  $S$  when every element of  $A$  is also element of  $S$ ” (Definition 3).<sup>22</sup> According to this, every system is a “part” of itself (Theorem 4).<sup>23</sup> On the other hand, “A system  $A$  is said to be a proper [*echter*] part of  $S$ , when  $A$  is part of  $S$ , but different from  $S$ .” (Definition 6). This means that either of them is not a “part” of the other (Theorem 5).

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<sup>21</sup> DEDEKIND, *Was sind und was sollen die Zahlen?*, 17 (64).

<sup>22</sup> *Ibid.*, §1, 2 (46).

<sup>23</sup> This and the following definition and theorem are in *ibid.*, 3 (46). Brackets in the original.

Wherefrom, DEDEKIND's definition of an infinite (*unendlich*) system (i.e., an infinite set) uses the term *part* equivocally: "A system  $S$  is said to be infinite when it is similar to a proper part of itself (32); in the contrary case  $S$  is said to be a finite system" (Definition 64).<sup>24</sup> This so-called similarity is also equivocally said, since it is based on the definition of *transformation*, which we shall not analyze further.

**4. Order and the number line.** DEDEKIND adds that there is another property of the system (i.e., the set) of "rational numbers"  $R$ :

For our immediate purpose, however, another property of the system  $R$  is still more important; it may be expressed by saying that the system  $R$  forms a well-arranged domain of one dimension extending to infinity on two opposite sides. What is meant by this is sufficiently indicated by my use of expressions borrowed from geometric ideas; but just for this reason it will be necessary to bring out clearly the corresponding purely arithmetic properties in order to avoid even the appearance as if arithmetic were in need of ideas foreign to it.<sup>25</sup>

It is curious to see how DEDEKIND himself resorts to "geometric ideas," such as that of a "dimension" that "extends," to explain what he wants to say: that there is an order among his so-called numbers. He has been justly criticized by some cognitivists for his inability to account for his use of geometric criteria while claiming that they are altogether foreign to arithmetic.<sup>26</sup> From ATOP, it is easy to account for this use: the first order that we come to know is that of a magnitude over which motion passes (►8.11). It is only natural, therefore, that we should resort to magnitudes to explain other orders analogically.

Be that as it may, on this line-like "domain" (*Gebiet*, a term that remains undefined), which extends infinitely towards two opposite sides (*nach zwei entgegengesetzten Seiten hin unendliches*), DEDEKIND will analogically signify numbers as points in a line—whence, his famous "number line." But first he explains his so-called arithmetic notation:

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<sup>24</sup> Ibid., §5, 17 (63). Brackets in the original.

<sup>25</sup> DEDEKIND, *Stetigkeit und irrationale Zahlen*, §1, 13 (5).

<sup>26</sup> See George LAKOFF and Rafael E. NÚÑEZ, *Where Mathematics Come From: How the Embodied Mind Brings Mathematics into Being* (New York: Basic Books, 2001), 303: "Dedekind's characterization of the completeness of the real numbers depended on geometry after all, since he took a geometric criterion to define what 'completeness' was to be." On the other hand, these same cognitive so-called scientists are at a complete loss when it comes to ARISTOTLE's theory of principles. This is evident, for example, in *ibid.*, 122: "Since the time of Aristotle, the logic of propositions and predications has been directly linked with what have variously been called categories, classes, or sets. Aristotle conceptualized a predication like 'Socrates is mortal' as a category statement of the form 'Socrates is in the category (or class or set) of mortals.'" For even more outlandish affirmations, see George LAKOFF and Mark JOHNSON, *Philosophy in the Flesh* (New York: Basic Books, 1999), 373: "Aristotle sees the world as having a hierarchical category structure, with all things contained in the ultimate category of Being." And, perhaps most amusing of all, *ibid.* 383: "Aristotle, of course, noticed the existence of metaphoric use of language. But given his central metaphors and the overall conceptual structure of his philosophy, he could not have come up with anything like the contemporary theory of conceptual metaphor that we are using. Aristotle could not possibly have seen metaphor as a conceptual mapping from one conceptual domain to another, where the inferential structure of one domain is mapped onto another."

To express that the symbols  $a$  and  $b$  represent one and the same rational number we put  $a = b$  as well as  $b = a$ . The fact that two rational numbers  $a, b$  are different appears in this that the difference  $a - b$  has either a positive or negative value. In the former case  $a$  is said to be greater than  $b$ ,  $b$  less than  $a$ ; this is also indicated by the symbols  $a > b, b < a$ . As in the latter case  $b - a$  has a positive value it follows that  $b > a, a < b$ .<sup>27</sup>

He then shows how three “laws” (*Gesetze*; ► Table 3) will hold “in regard to these two ways in which two numbers may differ,” analogically comparing the properties of his so-called numbers to “the corresponding relations of position of the points of a straight line  $L$ ,”<sup>28</sup> such that the arithmetic relations are signified by geometric relations thus:

If the two opposite directions existing upon it are distinguished by “right” and “left,” and  $p, q$  are two different points, then either  $p$  lies to the right of  $q$ , and at the same time  $q$  to the left of  $p$ , or conversely  $q$  lies to the right of  $p$  and at the same time  $p$  to the left of  $q$ . A third case is impossible, if  $p, q$  are actually different points.<sup>29</sup>

**Table 3: Dedekind’s analogy between “numbers” and points in a straight line.**

Law	“Numbers”	Points in a Straight Line
I	<p>If <math>a &gt; b</math>, and <math>b &gt; c</math>, then <math>a &gt; c</math>.</p> <p>Whenever <math>a, c</math> are two different (or unequal) numbers, and <math>b</math> is greater than the one and less than the other, we shall, without hesitation because of the suggestion of geometric ideas, express this briefly by saying:</p> <p><math>b</math> lies between the two numbers <math>a, c</math>.</p>	<p>If <math>p</math> lies to the right of <math>q</math>, and <math>q</math> to the right of <math>r</math>, then <math>p</math> lies to the right of <math>r</math>;</p> <p>and we say that</p> <p><math>q</math> lies between the points <math>p</math> and <math>r</math>.</p>
II	<p>If <math>a, c</math> are two different numbers, there are infinitely many different numbers lying between <math>a, c</math>.</p>	<p>If <math>p, r</math> are two different points, then there always exist infinitely many points that lie between <math>p</math> and <math>r</math>.</p>
III	<p>If <math>a</math> is any definite number, then all numbers of the system <math>R</math> fall into two classes, <math>A_1</math> and <math>A_2</math>, each of which contains infinitely many individuals;</p> <p>the first class <math>A_1</math> comprises all numbers <math>a_1</math> that are <math>&lt; a</math>,</p> <p>the second class <math>A_2</math> comprises all numbers <math>a_2</math> that are <math>&gt; a</math>;</p> <p>the number <math>a</math> itself may be assigned at pleasure to the first or second class, being respectively the greatest number of the first class or the least of the second.</p> <p>In every case the separation of the system <math>R</math> into the two classes <math>A_1, A_2</math> is such that every number of the first class <math>A_1</math> is less than every number of the second class <math>A_2</math>.</p>	<p>If <math>p</math> is a definite point in <math>L</math>, then all points in <math>L</math> fall into two classes, <math>P_1, P_2</math> each of which contains infinitely many individuals;</p> <p>the first class <math>P_1</math> contains all the points <math>p_1</math>, that lie to the left of <math>p</math>, and</p> <p>the second class <math>P_2</math> contains all the points <math>p_2</math> that lie to the right of <math>p</math>;</p> <p>the point <math>p</math> itself may be assigned at pleasure to the first or second class.</p> <p>In every case the separation of the straight-line <math>L</math> into the two classes or portions <math>P_1, P_2</math>, is of such a character that every point of the first class <math>P_1</math> lies to the left of every point of the second class <math>P_2</math>.</p>

<sup>27</sup> Ibid., 13–14 (5–6).

<sup>28</sup> Ibid., §1–2, 14–15 (6–7).

<sup>29</sup> Ibid., 14–15 (7).

There is one last requirement for this analogy to become a “real” correspondence:

This analogy between rational numbers and the points of a straight line, as is well known, becomes a real correspondence when we select upon the straight line a definite origin or zero-point  $o$  and a definite unit of length for the measurement of segments. With the aid of the latter to every rational number  $a$  a corresponding length can be constructed and if we lay this off upon the straight line to the right or left of  $o$  according as  $a$  is positive or negative, we obtain a definite end-point  $p$ , which may be regarded as the point corresponding to the number  $a$ ; to the rational number zero corresponds the point  $o$ . In this way to every rational number  $a$ , i.e., to every individual in  $R$ , corresponds one and only one point  $p$ , i.e., an individual in  $L$ . To the two numbers  $a, b$  respectively correspond the two points  $p, q$ , and if  $a > b$ , then  $p$  lies to the right of  $q$ . To the laws I, II, III of the previous Section correspond completely the laws I, II, III of the present.<sup>30</sup>

Typically, this is represented graphically as follows (► Figure 19):

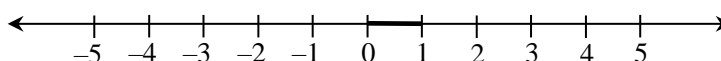


Figure 19: Dedekind’s “Number Line” (unit-measure highlighted)

It is not difficult to see from ATOP what it is that DEDEKIND is trying to say with this analogy. If we begin from the more imaginable magnitude, it is evident that motion towards the right signifies excess, while motion towards the left signifies defect. An arbitrary point in the line is selected as the principle or origin whence all drawing motions begin; and an arbitrary length is chosen as the unit-measure (► 28.2, ¶2). A line is greater in length the more its endpoint is distant from the origin. However, lines are drawn only according to ratios between two numbers (in the strict ancient Greek sense of number-multitude) or between a number and the unit. For example, the ratio 2 : 1 corresponds to a line twice the length of the unit-measure, while the ratio 2 : 3 corresponds to a line two-thirds the length of the unit-measure. Moreover, this method produces lines that signify a greater or lesser excess or defect. A line drawn to the right has the same greatness in excess as a line drawn to the left has greatness in defect if their ratios are the same. Evidently, no line is produced if there is no drawing motion. Since motion to the right signifies excess, addition is signified by the protraction of a line towards the right. Likewise, subtraction can be signified by the retraction of a line towards the left. Wherefrom, we get “positive” and “negative” endpoints.

Let us turn to DEDEKIND’s analogy between this line and his so-called numbers, which are nothing but abstract predicable quantities. Since they are neither multitudes nor magnitudes, these quantities need not have a position; but they must still have some order, which is potentially continuous. This is what he is trying to say when he talks about

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<sup>30</sup> Ibid., 15–16 (7–8).

“expressions borrowed from geometric ideas.” However, his so-called numbers do not correspond to the combination of length and direction found in the lines drawn following the above process. Instead, they correspond to the endpoints of such lines. Why this should be so is evident when examined from ATOP. What DEDEKIND is trying to signify is a specific diversity of predicable quantities: since every motion is specified by its terminus (► 48.21), a quantitative species can be understood to be differentiated in the same mode analogically as motions are differentiated by their end or terminus (► 48.22; 16.6; 8.8, ¶4).

**5. Continuity.** The above method produces only “rational numbers” that correspond to endpoints of rational lines. However, there are potentially infinite endpoints that cannot be produced by this method in a continuous line: the endpoints of irrational lines. Wherefrom, before seeking a method to “create” what he calls “irrational numbers,” DEDEKIND will try to determine what makes the straight line continuous, so he can analogically “create” the missing “numbers” and eliminate the “gaps” between “rational numbers.”<sup>31</sup> He, therefore, asks:

In what then does this continuity consist? Everything must depend on the answer to this question, and only through it shall we obtain a scientific basis for the investigation of all continuous domains. By vague remarks upon the unbroken connection in the smallest parts obviously nothing is gained; the problem is to indicate a precise characteristic of continuity that can serve as the basis for valid deductions.<sup>32</sup>

After pondering over this in vain for a long time, DEDEKIND finally found what he was seeking—his definition of continuity:

“If all points of the straight line fall into two classes such that every point of the first class lies to the left of every point of the second class, then there exists one and only one point which produces this division of all points into two classes, this severing of the straight line into two portions.”<sup>33</sup>

We must admit we are not impressed by this definition: not because it is trivial (*trivial*),<sup>34</sup> as DEDEKIND already expected some people to estimate it (indeed, it *must* be evident), but because he does not define continuity as such. Instead, he imperfectly defines continuity in one genus. Besides, it is not a new and original discovery, as he believes.

Indeed, examined from ATOP, this is but another formulation of ARISTOTLE’s definition: those are **continuous** (*continua* = συνεχῆ) whose extremities are one (*quorum ultima sunt unum* = ὧν τὰ ἔσχατα ἓν; ► 39.2). And ARISTOTLE had no need to refer to lines, points,

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<sup>31</sup> Ibid., §3, 16–17 (8–10).

<sup>32</sup> Ibid., 17–18 (10–11).

<sup>33</sup> Ibid., 18 (11).

<sup>34</sup> Ibid.



classes, division, left, or right. His definition is based purely on the theory of principle and order—i.e., priority, posteriority, and mean—in *any* genus. Indeed, his definition of the continuous is based on the definition of the **contiguous** (*habitus* = ἐχόμενον), which is *a consequent in such a way that it is in contact* (*quando sic est consequenter, quod tangit* < ὁ ἂν ἐφεξῆς ὄν ἄπτηται) such that there is no mean, either of the same genus or of another genus (► 39.3). And those are **consequent** (*consequenter* = ἐφεξῆς) of which *there is no mean of their genus* (*quorum nihil est medium sui generis* = ὧν μηδὲν μεταξὺ συγγενές; ► 39.4).

Granted, the line is the first genus in which *continuity* is found. But there is no need for *division* to enter in its definition. Indeed, division (► 40) is what destroys the oneness of a continuum (► 38.5, ¶1; 39). And a division is an extremity of a continuum only in potency.

**6. The “creation” of “irrational numbers.”** Based on his notion of continuity, DEDEKIND goes on to analogically formulate his famous definition of a “number” as a **cut** (*Schnitt*):

From the last remarks it is sufficiently obvious how the discontinuous domain  $R$  of rational numbers may be rendered complete so as to form a continuous domain. In Section I it was pointed out that every rational number  $a$  effects a separation of the system  $R$  into two classes such that every number  $a_1$  of the first class  $A_1$  is less than every number  $a_2$  of the second class  $A_2$ ; the number  $a$  is either the greatest number of the class  $A_1$  or the least number of the class  $A_2$ . If now any separation of the system  $R$  into two classes  $A_1, A_2$ , is given which possesses only *this* characteristic property that every number  $a_1$  in  $A_1$  is less than every number  $a_2$  in  $A_2$ , then for brevity we shall call such a separation a *cut* [Schnitt] and designate it by  $(A_1, A_2)$ . We can then say that every rational number  $a$  produces one cut or, strictly speaking, two cuts, which, however, we shall not look upon as essentially different; this cut possesses, *besides*, the property that either among the numbers of the first class there exists a greatest or among the numbers of the second class a least number. And conversely, if a cut possesses this property, then it is produced by this greatest or least rational number. But it is easy to show that there exist infinitely many cuts not produced by rational numbers. [...] In this property that not all cuts are produced by rational numbers consists the incompleteness or discontinuity of the domain  $R$  of all rational numbers.<sup>35</sup>

It is through a mean cut, he claims, that the mind “creates” an “irrational number”:

Whenever, then, we have to do with a cut  $(A_1, A_2)$  produced by no rational number, we create a new, an irrational number  $a$ , which we regard as completely defined by this cut  $(A_1, A_2)$ ; we shall say that the number  $a$  corresponds to this cut, or that it produces this cut. From now on, therefore, to every definite cut there corresponds a definite rational or irrational number, and we regard two numbers as *different* or *unequal* always and only when they correspond to essentially different cuts.<sup>36</sup>

<sup>35</sup> Ibid., §4, 19–21 (12–15). Brackets in the original.

<sup>36</sup> Ibid., 21–22 (15).

However, none of these “cuts” are a *definite* mean: e.g., how would one *define*  $\frac{\pi^2}{6}$ ? And we could go on analyzing DEDEKIND’s theory of “irrational numbers” from ATOP: for example, his claim that there are “strictly speaking, two cuts, which, however, we shall not look upon as essentially different.” Thus, just like a point is in some mode divisible when considered separately as the terminus of *this* line and as the terminus of *another* line (► 34.26), so is a predicable quantity divisible in respect of greater and lesser predicable quantities. Yet, this should be enough to prove the superiority of the Aristotelian-Thomistic Teaching on Principles, which is capable of much more profoundly and truly accounting for everything that DEDEKIND says. We shall discuss his “cut” further in the next chapter.

7. Before we close this section, however, we shall address one last claim that DEDEKIND makes: that numbers are “**free creations of the human mind.**”

When DEDEKIND says that he considers numbers to be “a free creation of the mind,” he means that he entirely neglects “the special character of the elements [i.e., of the elements of his systems or sets]; simply retaining their distinguishability and taking into account only the relations to one another in which they are placed” by an order-setting transformation.<sup>37</sup>

With reference to this freeing the elements from every other content (abstraction) we are justified in calling numbers a free creation of the human mind.<sup>38</sup>

Regrettably, he does not provide a thorough account of this “abstraction,” as we certainly can from ATOP (indeed, how could a Kantian—faithful or renegade—do so?). However, he does give us some clues that shed light on typical presuppositions of early set theory:

It very frequently happens that different things, *a, b, c ...* for some reason can be considered from a common point of view, can be associated in the mind, and we say that they form a *system S*; we call the things *a, b, c ... elements [Elemente]* of the system *S*, they are *contained [enthalten]* in *S*; conversely, *S consists [besteht]* of these elements. Such a system *S* (an aggregate [*Inbegriff*], a manifold [*Mannigfaltigkeit*], a totality [*Gesamtheit*]) as an object of our thought is likewise a thing; it is completely determined when with respect to every thing it is determined whether it is an element of *S* or not.<sup>39</sup>

DEDEKIND adds in a footnote to this text:

In what manner this determination is brought about, and whether we know a way of deciding upon it, is a matter of indifference for all that follows; the general laws to be developed in no way depend upon it; they hold under all circumstances. I mention this expressly because Kronecker not long

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<sup>37</sup> DEDEKIND, *Was sind und was sollen die Zahlen?*, §6, 21 (68).

<sup>38</sup> Ibid.

<sup>39</sup> Ibid., §1, 1–2 (45).

ago [...] has endeavored to impose certain limitations upon the free formation of concepts in mathematics which I do not believe to be justified.<sup>40</sup>

This set-theoretic formulation of “number” theory is then used to justify the “extension” of the “number-concept”:

In what way the gradual extension of the number-concept, the creation of zero, negative, fractional, irrational and complex numbers are to be accomplished by reduction to the earlier notions and that without any introduction of foreign conceptions (such as that of measurable magnitudes, which according to my view can attain perfect clearness only through the science of numbers), this I have shown at least for irrational numbers [...].<sup>41</sup>

Analyzed from ATOP, this claim is contradictory and absurd. If something is to be extended, it must substantially remain the same: the change must be accidental. This requires the definition to remain the same. Contrary to what DEDEKIND says, only the name of *number* has remained the same here—it is the definition that has changed. Thus, throughout the centuries, the name *number* has been used first to denote a multitude; then, a ratio; then, a specifying terminus. This happens even within DEDEKIND’s own work.

What is more, DEDEKIND himself would have to acknowledge that we are talking about different things (even if *things* should be mere objects of thought); for, according to him “a thing is completely determined by all that can be affirmed or thought concerning it,” and by *number* we do not merely mean the symbol, but “the thing denoted by” the symbol:

In what follows I understand by *thing* every object of our thought. In order to be able easily to speak of things, we designate them by symbols, e. g., by letters, and we venture to speak briefly of the thing *a* or of *a* simply, when we mean the thing denoted by *a* and not at all the letter *a* itself. A thing is completely determined by all that can be affirmed or thought concerning it. A thing *a* is the same as *b* (identical with *b*), and *b* the same as *a*, when all that can be thought concerning *a* can also be thought concerning *b*, and when all that is true of *b* can also be thought of *a*. That *a* and *b* are only symbols or names for one and the same thing is indicated by the notation  $a = b$ , and also by  $b = a$ . If further  $b = c$ , that is, if *c* as well as *a* is a symbol for the thing denoted by *b*, then is also  $a = c$ . If the above coincidence of the thing denoted by *a* with the thing denoted by *b* does not exist, then are the things *a*, *b* said to be different, *a* is another thing than *b*, *b* another thing than *a*; there is some property belonging to the one that does not belong to the other.<sup>42</sup>

This comes to show that DEDEKIND’s so-called arithmetic cannot be the first science. For we must priorly know both *what* and *that* some things are: number, one (its principle), prior, posterior, order, principle, same, other, etc.; all of which are accounted for from ATOP.

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<sup>40</sup> Ibid., 2 (45).

<sup>41</sup> Ibid., Preface to the first edition, x (35).

<sup>42</sup> Ibid., §1, 1 (44–45).

### 68.3. Fiction: “Non-Euclidean geometries have been discovered”

The myth of so-called non-Euclidean geometries has its origins in the many attempts to prove EUCLID’s fifth postulate (► 1.4), which concerns parallel lines:

If a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than the two right angles.<sup>43</sup>

As already noted, a postulate is a supposition that can only be proven through the principles of another science (► 54.9). Indeed, no science proves its proper principles (► 56.7). Whence, a postulate is a first principle in the science in which it is supposed.

Whoever attempts to prove the fifth postulate using geometry, therefore, is either a fool or is assuming that it is not a first principle in that science, but a theorem to be demonstrated from the first principles of geometry. And many have attempted to demonstrate it “through more than twenty centuries,” as HEATH says.<sup>44</sup> Alas, for the most part, “the list [of those who have attempted its demonstration] consists of the names of the most mediocre, and mathematically altogether unproductive,” as Imre TOTH says.<sup>45</sup>

It was a scholastic philosopher, the Jesuit Giovanni Girolamo SACCHERI, who first came up with the idea of demonstrating EUCLID’s fifth postulate using a *reductio ad absurdum* (i.e., *ad impossibile* = εἰς τὸ ἀδύνατον; ► 53.15, ¶3). As George Bruce HALSTED explains,

This would show that Euclid’s assumptions, though compatible, were not all independent. On the other hand, the independence of the Parallel Postulate from the other assumptions would be established if it were shown to be indemonstrable from them even with the help of its own contradictory opposite.<sup>46</sup>

Evidently, SACCHERI believes he is following ARISTOTLE’S method to show that it is impossible to deny first principles. However, he does not realize that this method is valid only for principles that are altogether indemonstrable: that is, *common principles* (i.e., what EUCLID calls *common notions*; ► 1.2). He is, therefore, assuming that a postulate is the same as an axiom. In fact, that is exactly what he calls EUCLID’S fifth postulate: an axiom (*axioma*).<sup>47</sup> This comes to show how low scholastic philosophers had fallen.

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<sup>43</sup> EUCLID, *Opera Omnia*, vol. 1, 8.15–19: “Καὶ ἐὰν εἰς δύο εὐθείας εὐθεῖα ἐμπίπτουσα τὰς ἐντὸς καὶ ἐπὶ τὰ αὐτὰ μέρη γωνίας δύο ὀρθῶν ἐλάσσονας ποιῆ, ἐκβαλλομένης τὰς δύο εὐθείας ἐπ’ ἄπειρον συμπίπτειν, ἐφ’ ἃ μέρη εἰσὶν αἱ τῶν δύο ὀρθῶν ἐλάσσονες.”

<sup>44</sup> HEATH, *The Thirteen Books of Euclid’s Elements*, vol. 1, 202.

<sup>45</sup> Imre TOTH, *Aristotele e i fondamenti assiomatici della geometria* (Milan: Vita e Pensiero, 1997), 54: “la lista consiste nei nomi dei più mediocri, e matematicamente del tutto improduttivi.”

<sup>46</sup> Giovanni Girolamo SACCHERI, *Euclides Vindicatus*, trans. George Bruce Halsted (Chicago and London: The Open Court, 1920), xxix.

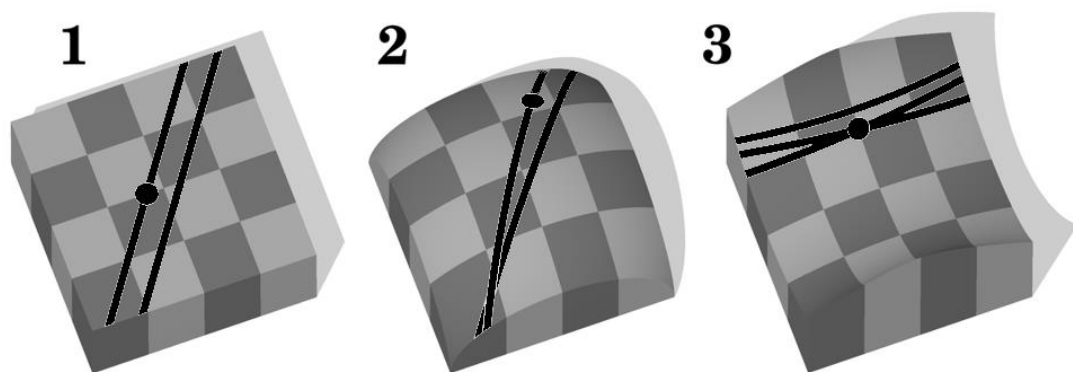
<sup>47</sup> *Ibid.*, 4.

Of course, SACCHERI fails. A demonstration in a particular science cannot be produced from common principles (► 56.5): the principles of its subject genus are required. Yet, he still clings to EUCLID’s fifth postulate. And this is what frustrates more consequent modern thinkers. As HEATH puts it,

Saccheri, however, was the victim of the preconceived notion of his time that the sole possible geometry was the Euclidean, and he presents the curious spectacle of a man laboriously erecting a structure upon new foundations for the very purpose of demolishing it afterwards; he sought for contradictions in the heart of the systems which he constructed, in order to prove thereby the falsity of his hypotheses.

The literature on the subject of Non-Euclidean geometries is overwhelming. The curious reader may want to resort to a concise work such as the classic *Non-Euclidean Geometry: a critical and historical study of its development* by Roberto BONOLA.<sup>48</sup>

Alas, we have not come to praise so-called non-Euclidean geometries, *but to bury them*, and this does not require a detailed exposition—mere common sense shall suffice. Let us examine a typical diagrammatic depiction of Euclidean vs. so-called non-Euclidean geometry (► Figure 20):



**Figure 20: Euclidean vs. Non-Euclidean Geometries:**  
**(1) Euclidean.**  
**(2) Non-Euclidean Riemannian.**  
**(3) Non-Euclidean Lobachevskian.**

For each of the three cases, given a line and a point not on the line, through the given point: **(1)** there is exactly one line parallel to the given line; **(2)** there are no lines parallel to the given line; **(3)** there are infinite many lines parallel to the given line. What is more, for each of the three cases, the sum of the interior angles of a triangle drawn on the surface is: **(1)** exactly  $180^\circ$ ; **(2)** greater than  $180^\circ$ ; **(3)** less than  $180^\circ$ .

<sup>48</sup> Roberto BONOLA, *Non-Euclidean Geometry: a critical and historical study of its development* (Chicago: The Open Court, 1912). This is the “authorized English translation” of *La geometria non-euclidea: esposizione storico-critica del suo sviluppo* (Bologna: Ditta Nicola Zanichelli, 1906).

It would seem, therefore, that EUCLID's fifth postulate is true only in the first case, and that there are many—indeed, infinite—other geometries.

One may ask, however, how it is that we are able to measure any angles in a so-called non-Euclidean geometry. For we should be able to compare any angle to a right angle, and yet there seems to be no right angle in them that can be *constituted from a line that falls on another line that would produce two equal angles on either part*, as the definition of right angle requires.

Indeed, a closer examination of these claims will immediately reveal that names are being used equivocally: parallel lines are not equidistant lines; lines are not lines simply, that is, straight lines; wherefrom, triangles are not really triangles. In fact, it is evident that we are fooling ourselves when we say that these are non-Euclidean geometries. What we are really saying is that, other than plane surfaces, there are curved surfaces; that we are able to determine the properties of figures drawn on them; and that these properties are analogous—neither univocal nor purely equivocal—to those found on a plane.

In fact, we would be utterly unable to measure anything if there should be no straight lines and right angles. That such lines and angles exist and are the same for all of the so-called diverse geometries is evident from the depiction itself (► Figure 21).

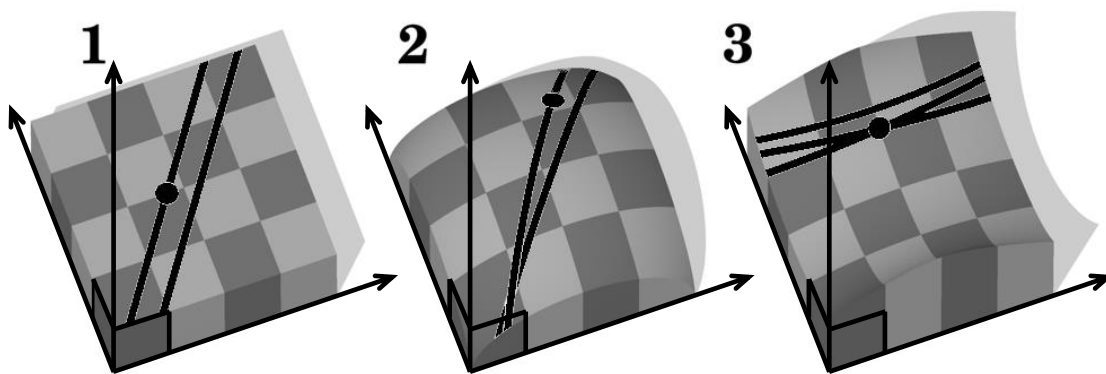


Figure 21: Straight lines and right angles are the same.

Indeed, a curved line can only be known by comparing it to a straight line, while the straight line is known by itself because it is the principle and measure of the other lines (► 62.8).

If the properties of figures in a non-plane surface should be other than the properties of figures in a plane surface, this is only because the subject is diverse, not because the first principles of geometry are diverse. And since the curved subject is reduced to the straight subject, they are of one genus (► 14.3). Hence, there are no so-called non-Euclidean geometries without Euclidean geometry. In fact, the ancient Greeks studied the geometric properties of the sphere, and never concluded that this was a non-Euclidean geometry.

## 69. The Zermelo-Fraenkel Set Theory

As Herbert Bruce ENDERTON explains, “the first axiomatization of set theory was published by Ernst Zermelo in 1908.”<sup>1</sup> The set theory that is taught in most classrooms is a result of building on ZERMELO’s work through subsequent improvements and additions. “The axiom of replacement [...] was proposed by Abraham Fraenkel (in 1922) and others, giving rise to the list of axioms now known as the ‘Zermelo-Fraenkel’ (ZF) axioms.”<sup>2</sup> Yet, not all axioms have been adopted without controversy. Notably, the Axiom of Choice (AC) was once rejected by many authors. The Zermelo-Fraenkel set theory with the axiom of choice (ZFC) is considered the standard nowadays.

Owing to the manifold origin of ZF, instead of resorting first to its sources, we will follow ENDERTON’s *Elements of Set Theory*, one of dozens of ephemeral introductory textbooks for undergraduate students that have at some point been considered classical. We will refer to the primary sources, as needed, to shed more light. However, due to the limitations of the present work, we shall only account for the most fundamental principles of ZF.

### 69.1. What Is a Set?

When we first encounter set theory in elementary school, we are typically given informal definitions such as the following:

A *set* is a collection of things (called its *members* or *elements*), the collection being regarded as a single object. We write “ $t \in A$ ” to say that  $t$  is a member of  $A$ , and we write “ $t \notin A$ ” to say that  $t$  is not a member of  $A$ .<sup>3</sup>

Students with a craving for wisdom will be left wondering: as ARISTOTLE says at the outset of his *Metaphysics*, “all men naturally desire to know.” They will receive many examples of sets and elements (“a swarm of bees,” Socrates would say in PLATO’s *Meno*). Alas, teachers will never give them a satisfactory answer to the question of what exactly are sets and elements or members. In fact, teachers are meant not to have an answer to give.

Our axiom system begins with two *primitive notions*, the concepts of “set” and “member.” In terms of these concepts, we will define others, but the primitive notions remain undefined. Instead we adopt a list of *axioms* concerning the primitive notions. (The axioms can be thought of as divulging partial information regarding the meaning of the primitive notions).<sup>4</sup>

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<sup>1</sup> Herbert Bruce ENDERTON, *Elements of Set Theory* (San Diego: Elsevier Academic Press, 1977), 15. Unless otherwise indicated, all brackets (except for ellipses “[...]”) and emphasis are transcribed from this work as per the original. See Ernst ZERMELO, “Neuer Beweis für die Möglichkeit einer Wohlordnung,” *Mathematische Annalen* 65 (1908), 261–281.

<sup>2</sup> ENDERTON, *Elements of Set Theory*, 15.

<sup>3</sup> *Ibid.*, 1.

<sup>4</sup> *Ibid.*, 11.

Since there can be no science without definition (►55.12), to account for set theory from ATOP, we must seek an adequate definition for its “two primitive notions,” even if this goes against the authorities of the so-called theory. We shall begin our search with the informal definition of our elementary school days, assuming that a set is some kind of *collection*: after all, *this*—we are told—is what we should “intuitively” understand by the word *set*.

Let us, therefore, imagine the following scenario. We claim to have a collection, say, of ancient Carthaginian coins. A colleague challenges us to produce it. If we should reply that it is an empty collection, would we not become the laughingstock of our workplace? Even if we had a single coin, it would not yet be a collection—perhaps the beginning of a collection, but not properly a collection. Indeed, we “intuitively” understand a collection to be a multitude: a collection of *objects*, in plural. Yet, we are told that a set can be empty; or have a single element. And we are supposed to understand this “intuitively.”

Another scenario. We claim to have a collection of 500 ancient Carthaginian coins. A colleague challenges us to produce it. We reply, following DEDEKIND (►68.2), that the collection and its elements are objects of our thought, but that anyone can have them if they think hard enough. Would we not be ridiculed for saying such nonsense?

One last scenario. We claim to have a collection of *infinite* ancient Carthaginian coins. Need we say more?

It seems that a set is not “intuitively” a collection. Moreover, from these observations, we must conclude that an “element of a set” is not—properly speaking—an element. For an “element of a set” is not *an intrinsic principle from which the set is first composed* (►12.9; this, regardless of whether an “element of a set” would be *divisible into other species*). An “element of a set” is not even a material cause of the set: a set is not constituted *from* its “elements.” Even more generally speaking, the “elements of a set” are not in any way the set’s causes; for a cause is *that upon which something depends according to its being or to its coming-to-be* (►9.1), and it is possible for there to be a set without any elements.

What is more, not even metaphorically could we say that an “element of a set” is an element; for it is not *that which is one, small, and useful for many* (►12.12). This would be more properly said of the empty set.

It might be thought at first that the empty set would be a rather useless or even frivolous set to mention, but, in fact, from the empty set by various set-theoretic operations a surprising array of sets will be constructed.<sup>5</sup>

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<sup>5</sup> Ibid., 2.



Let them be said equivocally. We must, still, look elsewhere for definitions. Fortunately, we find at the source of the standard notation itself a better clue to understanding what a set—and its elements or members—should be. As ENDERTON explains,

The use of the symbol  $\in$  (a stylized form of the Greek epsilon) to denote membership was initiated by the Italian mathematician Giuseppe Peano in 1889. It abbreviates the Greek word ἐστίν, which means “is.” The underlying rationale is illustrated by the fact that if  $B$  is the set of all blue objects, then we write  $x \in B$  in order to assert that  $x$  is blue.<sup>6</sup>

Indeed, in his 1889 *Arithmetices Principia* (in Latin), Giuseppe PEANO establishes this notation (except that he uses  $-\in$  instead of  $\notin$  to signify the corresponding negation):

By the symbol [*signum*]  $K$ , a class—or aggregation of beings [*entium aggregatio*]—is signified. The symbol  $\in$  signifies *is* [*est*]. Thus,  $a \in b$  is read “ $a$  is some  $b$ ” [*a est quoddam b*]. Instead of  $-(a \in b)$ , we shall write  $a -\in b$ . The symbol  $-\in$  signifies *is not*.<sup>7</sup>

And, in the same year, he writes in his *Principii di Geometria* (in Italian):

The symbol [*segno*]  $\in$  is read *is* or *are*. The formula  $a \in b$  is read “ $a$  is a  $b$ ” or “ $a$  is an individual of the class  $b$ .” Instead,  $a, b \in c$  is read “ $a$  and  $b$  are  $c$ ’s.” [...] The symbol  $\in$  is the Greek initial of the word *is* [i.e., ἐστίν], *are* [i.e., εἶστί]. [...] The symbol  $-\in$  is read *not* [*non*]. Hence,  $a -\in b$  is read “ $a$  is not a  $b$ .”<sup>8</sup>

According to this, evidently, an element or member is a subject of predication. And a set is something that can be predicated of any of its members. In other words, the relation of the set to its elements or members is that of a universal whole to its subjective parts. Indeed, **universal** is *that which is totally*—i.e., *commonly*—*predicated as some whole being*, because it is predicated of each of its parts (► 13.5).

A set is universal in that, as though **containing** many “elements” as parts, it is predicated of any—or each—of them; and all of them are one in the universal-whole set in such a way that any of them is that one whole. Thus, the universal-whole set is predicated of any of its elements, such that any of the elements contained by the containing set is *something one*—namely, the containing set itself. For example, if  $S = \{a, b\}$ , then  $S$  contains  $a$  and  $b$

<sup>6</sup> Ibid., 16.

<sup>7</sup> Giuseppe PEANO, *Arithmetices Principia: Nova methodo exposita* (Turin: Fratelli Bocca, 1889), x: “Signo  $K$  significatur *classis*, sive *entium aggregatio*. Signum  $\in$  significat *est*. Ita  $a \in b$  legitur *a est quoddam b*;  $a \in K$  significat *a est quaedam classis*;  $a \in P$  significat *a est quaedam propositio*. Loco  $-(a \in b)$  scribemus  $a -\in b$ ; signum  $-\in$  significat *non est*.”

<sup>8</sup> Giuseppe PEANO, *Principii di Geometria logicamente esposti* (Turin: Fratelli Bocca, 1889), 6: “[Il segno]  $\in$  [si legge] *è*, o *sono*. La formula  $a \in b$  si legge « $a$  è un  $b$ », ovvero « $a$  è un individuo della classe  $b$ ». Invece  $a, b \in c$  si legge « $a$  e  $b$  sono dei  $c$ ». [...] Il segno  $\in$  è l’iniziale greca delle parole *è*, *sono*. [Il segno]  $-\in$  [si legge] *non*. Quindi  $-\in$  si legge *non è*;  $a -\in b$  si legge « $a$  non è un  $b$ ». In a very Platonic way, he establishes *one* to be the essence of the point (in *ibid.*): “Quindi le formule  $a \in 1$ , e  $a, b \in 1$  si leggono rispettivamente « $a$  è un punto», « $a$  e  $b$  sono dei punti».”

because  $S$  is predicated of one (i.e.,  $a \in S$ , or  $a$  is an  $S$ ) and of the other (i.e.,  $b \in S$ , or  $b$  is an  $S$ ). Therefore, conversely, we can say that  $a$  and  $b$  are contained in  $S$  (i.e.,  $a, b \in S$ ).

This is so because the universal whole is present in each of its subjective parts according to its whole essence and virtue, both simultaneously and equally—provided the whole is predicated of the parts according to one *ratio*. For example, when we say that  $a \in S$  (i.e., that  $a$  is an  $S$ , or that  $a$  is contained in  $S$ ), the whole virtue of  $S$ , insofar as it is  $S$ , is preserved in whichever “elements” of  $S$  that at once and equally divide the whole set  $S$  (e.g., if  $a, b \in S$ , then  $a \in S$  equally as much as  $b \in S$ ).

However, the universal-whole set is not predicated singularly (*in singulari*) of its plural parts taken simultaneously. Thus,  $a$  and  $b$ , taken singularly, are not the whole  $S$ , but “elements” of  $S$ . This is why  $S$  is “regarded as a single object.”

Moreover, since a set—simply said—is not ordered, its subjective parts are not related as species that are more or less perfect, but as a species is related to its individuals.

On the other hand, from what ENDERTON says (i.e., that the “primitive notions” must remain undefined), it is evident that subsequent authors have distanced themselves from PEANO’s understanding of a universal relation between a set and its elements or members. Indeed, formalists avoid restricting signification to a single mode; in this case, the mode whereby species participate in a genus, or individuals in a species (► 26.2, ¶1; ¶2).

Yet, formalists preserve in their understanding of set theory some indeterminate container-contained(-*in*) relation between the set and its elements or members. And the container-contained relation is found not only between genera, species, and individuals. Indeed, one thing can be understood to be *in another* in multiple modes: as a part in its whole; as a whole in its parts; as a species in its genus; as a genus in its species; as form in matter; as a thing moved in its first mover; as something in its end; as a thing placed in its place (► 29.1); all of which are reduced to the mode that we come to know first (i.e., as a thing placed is in its place; ► 29.2; 48.18). Even some cognitivists acknowledge as much.<sup>9</sup>

Wherefrom, the  $\in$  symbol, which in set-theoretical interpretations of NBG (the class theory of VON NEUMANN, BERNAYS and GÖDEL, about which we shall have more to say; ► 69.11) is taken to mean “belongs-to” (indicating that an object is an element or member of a set),

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<sup>9</sup> See LAKOFF and NÚÑEZ, *Where Mathematics Come From*, 122: “The intuitive premathematical notion of classes is conceptualized in terms of Container schemas. In other words, a class of entities is conceptualized in terms of a bounded region of space, with all members of the class inside the bounded region and nonmembers outside the bounded region. From a cognitive perspective, intuitive classes are thus metaphorical conceptual containers, characterized cognitively by a metaphorical mapping: a grounding metaphor, the Classes Are Containers metaphor.”

receives from Alberto STRUMIA the Aristotelian-Thomistic interpretation of “is *in act* in,” and is “formalized” following the eight modes in which “to be in” is said according to ARISTOTLE and St. Thomas (► 29.1).<sup>10</sup>

To these modes, we must add those in which one thing is said *to have* another; for *to have* and *to be in something* are likewise said; and, in a way, the modes of being follow upon the modes of having (► 42.14).

Therefore, we must conclude that the relation of set to element or member is the relation of predicate to subject; and that this relation is not said univocally, but analogically, such that a set is related to its elements as a container to what is contained in it. Wherefrom, we determine from ATOP that an **element** or **member** (say,  $s$ ) is *that of which something is predicated in some mode*; that a **set** (say,  $P$ ) is *that which is naturally apt to be predicated of another in some mode*; and that the whole of “ $s \in P$ ” is to be understood as a proposition (► 19.1, ¶2), such that  $P$  is predicated of  $s$  in some mode.

That this account is accurate is confirmed by ENDERTON:

Having adopted a list of axioms, we will the proceed to derive sentences that are *logical consequences* (or *theorems*) of the axioms. Here a sentence  $\sigma$  is said to be a logical consequence of the axioms if any assignment of meaning to the undefined notions of set and member making the axioms true also makes  $\sigma$  true.<sup>11</sup>

Indeed, the true and the false are found only in propositions (► 19.1, ¶2); and the simplest sentence-proposition is signified in set theory by  $s \in P$  (► 19.2).

Moreover, also from ATOP, the principles of all things are the same analogically and universally speaking (► 45.9). Whence, since axioms are principles that are common by analogy, they can be applied to any particular proposition just as common notions are applied in mathematics (► 60.3). What a proposition enunciates varies only *in particular*.

We have earlier sketched, in an informal and sometimes vague way, what “set” and “member” are *intended* to mean. But for a sentence to be a logical consequence of the axioms, it must be true whatever “set” and “member” mean, provided only that the axioms are true. The sentences that appear, on the basis of our informal viewpoint, as if they ought to be true, must still be shown to be logical consequences of the axioms before being accepted as theorems. In return for adopting this restriction, we escape any drawbacks of the informality and vagueness of the nonaxiomatic viewpoint.<sup>12</sup>

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<sup>10</sup> Alberto STRUMIA, *The Problem of Foundations*, 87–99.

<sup>11</sup> ENDERTON, *Elements of Set Theory*, 12.

<sup>12</sup> *Ibid.*

Yet, we beg to differ. By blindly adopting axiomatic set theory, we will never “escape any drawbacks of the informality and vagueness of the nonaxiomatic viewpoint.” If we ask ENDERTON how the axioms are chosen, he replies, “Of course the axioms are not chosen at random, but must ultimately reflect our informal ideas about what sets are.”<sup>13</sup>

Evidently, the proponents of set theory cannot give us reasons for what they do. They only know *that* set theory works; but when asked *on account of what* it works (► 55.4), they are clueless and can only provide vague and “informal” answers. Let us, therefore, turn our attention to some of the axioms that ZF puts forward and account for them from ATOP. But before we do so, let us lay out the notation that ENDERTON utilizes:

It will often be advantageous to exploit the symbolic notation of mathematical logic. This symbolic language, when used in judicious amount to replace the English language, has the advantages of both conciseness (so that expressions are shorter) and preciseness (so that expressions are less ambiguous).<sup>14</sup>

The following symbolic expressions will be used to abbreviate the corresponding English expressions:

$\forall x$	for every set $x$
$\exists x$	there exists a set $x$ such that
$\neg$	not
$\&$	and
$or$	or (in the sense “one or the other <i>or both</i> ”)
$\Rightarrow$	implies (“ $\_ \Rightarrow \_$ ” abbreviates “if $\_$ then $\_$ ”)
$\Leftrightarrow$	if and only if, also abbreviated “iff”

(It is only logical—no pun intended—that something like the art of sets should be proposed to complement so-called mathematical logic. In propositional logic—say, that of Boolean algebra—, propositions are principles; and what is simple cannot be analyzed. Set theory provides a means to further analyze such propositions—even if only logically.)

## 69.2. The Extensionality Axiom

As ENDERTON explains, “The first of our axioms is the principle of extensionality.”<sup>15</sup>

**Extensionality Axiom.** If two sets have exactly the same members, then they are equal:

$$\forall A \forall B [\forall x (x \in A \Leftrightarrow x \in B) \Rightarrow A = B]$$

Whenever  $A$  and  $B$  are sets such that exactly the same things are members of one as are members of the other, then  $A = B$ . Imagine for the moment that this were our *only* axiom. For a start, take the sentence: “There cannot be two different sets, each of which has no members.”

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<sup>13</sup> Ibid., 17.

<sup>14</sup> Ibid., 13.

<sup>15</sup> Ibid., 17.

This sentence *is* a logical consequence of extensionality, for we claim that any assignment of meaning to “set” and “member” making extensionality true also makes the above sentence true. To prove this, we argue as follows. Let  $A$  and  $B$  be any sets, each of which has no members. Then exactly the same things belong to  $A$  as to  $B$ , since none belong to either. Hence, by extensionality,  $A = B$ . (The validity of this argument, while independent of the meaning of “set” or “member,” does not depend on the meaning of the logical terms such as “each,” “no,” “equal,” etc).<sup>16</sup>

This gives us an example of what ENDERTON said above about a sentence being a logical consequence of the axioms if the sentence must be true whatever “set” and “member” mean, “provided only that the axioms are true.” However, how can the extensionality axiom be a common principle if its truth depends on the meaning of “set” and “member”?

Of course, examining the question from ATOP, it is easy to see what the so-called axiom of extensionality is all about and to fully account for it. Indeed, the first *ratio* of *distinction* or *division*, according to which something is distinguished from something else, is found in affirmation and negation (► 40.9). Thus, wherever there is some distinction, there is necessarily found an opposition of affirmation and negation; for those things that do not differ according to any affirmation or negation are utterly indistinct, so that—in respect of everything—one of them would necessarily be that which the other is; and, in this way, they would be thoroughly the same and in no mode distinct.

The peculiarity of the axiom of extensionality is that it inverts the predicate and the subject in its criterion of identity. Thus, if, for every subject  $x$  (i.e.,  $\forall x$ ), we affirm of it the predicate  $A$  (i.e.,  $x \in A$ ) if and only if ( $\Leftrightarrow$ ) we affirm of the same subject  $x$  the predicate  $B$  (that is,  $x \in B$ ), then the predicates  $A$  and  $B$  are thoroughly the same and in no mode distinct (i.e.,  $A = B$ ). And this is true for any two predicates  $A$  and  $B$  (i.e.,  $\forall A \forall B$ ).

The way that this identity is expressed is by saying that  $A$  and  $B$  are *equal*, which is to say that they are *one* or *the same in quantity* (► 21.16; 37.8; 37.18; 40.25; 41.1). But, by their own admission, they do not want to give any particular meaning to their “primitive notions.” Therefore, when they say that two sets are *not equal*, they are talking about any kind of distinction, such that there is at least one subject of which a predicate is not predicated. And distinction or alterity (if by alterity we understand a difference whereby some things are constituted to be other than each other) is the principle of plurality (► 40.7).

Indeed, everything that is a cause of division must be posited as a cause of plurality: just as a thing is said to be *one* because it is not divided, so are things said to be *many* because

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<sup>16</sup> Ibid., 12.

they are divided; and just as non-division causes unity, so division causes multitude. Therefore, any judgment concerning one and many must be taken according to their corresponding *ratio* of *division*, regardless of what such things should be. Wherefrom, there are many modes of being one or many (►40); but set theory is unable to account for any other mode than that of predication because it remains in the realm of logic.

That this axiom of set theory should be given the name of *extensionality* is a sign that it is being understood in a nominalist fashion. As far as nominalists are concerned, there are no universals: a name is not a sign of a universal conception, but of an arbitrary collection of individuals. Thus, ZERMELO calls it the Axiom of Definiteness (*Axiom der Bestimmtheit*): “to put it briefly, every set is determined [*bestimmt*] by its elements.”<sup>17</sup> Alas, this view can hardly be supported by the next axiom of set theory: there is a set having no members. For actual members cannot exist unless they are members *of a set*, and what does not exist cannot determine; which is to say that the set is, *in some mode*, prior to the member.

### 69.3. The Empty Set Axiom

The second axiom of set theory is expressed as follows:

**Empty Set Axiom.** There is a set having no members:<sup>18</sup>

$$\exists B \forall x \ x \notin B$$

**Definition.**  $\emptyset$  is the set having no members.

This definition bestows the name “ $\emptyset$ ” on a certain set. But when we write down such a definition there are two things of which we must be sure: We must know that there exists a set having no members, and we must know that there cannot be more than one set having no members. The empty set axiom provides the first fact, and extensionality provides the second. Without both facts the symbol “ $\emptyset$ ” would not be well defined.

Evidently, this axiom depends on the conception of containment: that container is said to be **empty** *which does not contain any of the things that it is naturally apt to contain*. For example, a wine bottle is properly said to be empty when it does not contain wine, even if it should contain air; indeed, it is a container for wine. Likewise, an empty set is a set that does not contain any members; for a set is naturally apt to contain members.

Based on what we have established from ATOP, it is evident that the **empty set**  $\emptyset$  can be defined as *that which is not predicated of another in any mode*. The existence of such a set is taught as a dogma of faith by the proponents of set theory. In contrast, we can perfectly account for it without requiring a leap of faith. Indeed, we are simply talking about

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<sup>17</sup> ZERMELO, “Neuer Beweis für die Möglichkeit einer Wohlordnung,” 263.

<sup>18</sup> ENDERTON, *Elements of Set Theory*, 18.

*the first subject of predication.* Although this set is not predicated of another, other sets can be predicated of it. And that there should be a *first* subject is altogether necessary: otherwise, for example, there would be no demonstration in science (►56).

Moreover, it is also evident from ATOP that there should be only *one* empty set, as required by set theory. For something is said to be *one* or *many* simply—just as it is said to be a *being*—according to substance (►40.16). And *substance* is said in two modes (►15.2; 15.5): the **suppositum**, *which is not predicated of another*; and the form or nature of the species, which is predicated of the suppositum. Therefore, metaphysically speaking, the first subject of predication is the individual substance or suppositum.

However, universally and analogically speaking, there is a first subject in each genus of beings. Indeed, nothing prevents that which is taken as a subject in respect of some affection to be taken also as an affection in respect of a prior subject (►58.22, ¶2). This cannot proceed infinitely; for we must arrive at some first subject—which is taken as that subject of which no affection is predicated. This is evident in the mathematical sciences, which are either about continuous quantity or about discrete quantity (►60.2).

Therefore, something similar must be said of *the analytic part of formal logic that treats of quantity.* For its subject of predication is the common *quantum*, a product of reason that must be supposed if anything is to be predicated in this genus (whence, we should not wonder if formalists want to reduce mathematics to logic). And an affection can only exist in a subject; for the subject is, *in some mode*, the cause of its existence (►15.16).

#### 69.4. The Pairing Axiom

The third axiom of set theory is expressed as follows:

**Pairing Axiom.** For any sets  $u$  and  $v$ , there is a set having as members just  $u$  and  $v$ :<sup>19</sup>

$$\forall u \forall v \exists B \forall x (x \in B \Leftrightarrow x = u \text{ or } x = v)$$

Evidently, what this axiom says (as seen from ATOP) is that, if  $u$  and  $v$  are naturally apt to be predicated—in any mode—of others (i.e., if they are sets), then there is one and the same predicate  $B$  that is predicated of one and of the other. What this predicate should be is not relevant to set theory as such, but it will serve in ZF to signify “numbers” as sets.

This axiom presupposes that anything that is predicated of another can also be a subject of predication (as already noted in our observations to the preceding axiom). Thus, if  $u = v = \emptyset$ , then, by pairing and extensionality, there is a set  $B = \{\emptyset\} \neq \emptyset$ .

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<sup>19</sup> Ibid.

There are six more axioms in ZF, but we will not deal with them all: we shall introduce only what we need here. For now, we have everything that is required to begin discussing how ZF sets are used in modern so-called mathematics to signify “numbers.”

### 69.5. The “Construction” of the “Natural Numbers”

Examined from ATOP, the expression “natural number” may seem oxymoronic: indeed, mathematics abstracts from motion; and nature is a principle of motion (► 12.1). Numbers, like any mathematical things, are not moved; nor do they move other things. Mathematical certitude depends on this mode of considering things (► 65). And ENDERTON introduces such *numbers* without explaining what makes them “natural.” In fact, among the moderns, there is disagreement even as to what counts—no pun intended—as a “natural number”:

Now consider the matter of introducing the natural numbers for further study.<sup>20</sup>

0, 1, 2, ...

There is a curious point of terminology here. Is 0 a natural number? With surprising consistency, the present usage is for school books (through high-school level) to exclude 0 from the natural numbers, and for upper-division college-level books to include 0. Freshman and sophomore college books are in the transition zone. In this book we include 0 among the natural numbers.<sup>21</sup>

ENDERTON turns to the “constructive approach” for natural numbers—as opposed to the “axiomatic approach,” which would simply consider “natural number” as a primitive notion and would adopt a list of axioms (sadly, he does not explain the significance of his choice).

We will define natural numbers in terms of other available objects (sets, of course). In place of axioms for numbers we will be able to prove the necessary properties of numbers from known properties of sets.<sup>22</sup>

At this point, a reasonable reader might be asking what any of this talk about sets has to do with numbers or mathematics. Fortunately, ENDERTON gives us just the kind of answer that we have come to expect from modern authors and that is guaranteed to leave the same reader as utterly perplexed as he was before, but also frustrated:

First we need to define natural numbers as suitable sets. Now numbers do not at first glance appear to be sets. Not that it is an easy matter to say what numbers *do* appear to be. They are abstract concepts, which are slippery things to handle. [...] Nevertheless, we can construct specific sets that will serve perfectly well as numbers. In fact this can be done in a variety of ways.<sup>23</sup>

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<sup>20</sup> Ibid., 66.

<sup>21</sup> Ibid., footnote 1.

<sup>22</sup> Ibid., 66.

<sup>23</sup> Ibid., 67.



Well, at least we know now that numbers are abstract concepts—whatever that should mean—and that they have the inherent property of being slippery to handle. Apparently, that is all we would need to know if we wanted to become faithful believers of the set-theoretic religion. With this wisdom in our hearts we are ready to be illuminated by the ZF high priests concerning the specific sets that will serve *perfectly well* as numbers, even if we do not know what *sets* or *numbers* are—or *appear* to be. Let them, therefore, clearly “define” numbers in terms of sets that—they say—should in principle be left undefined.

In 1908, Zermelo proposed to use  $\emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \dots$  as natural numbers. Later von Neumann proposed an alternative, which has several advantages and has become standard. The guiding principle behind von Neumann’s construction is to make each natural number be the set of all smaller natural numbers. Thus we define the first four natural numbers as follows:<sup>24</sup>

$$\begin{aligned} 0 &= \emptyset, \\ 1 &= \{0\} = \{\emptyset\}, \\ 2 &= \{0,1\} = \{\emptyset, \{\emptyset\}\}, \\ 3 &= \{0,1,2\} = \{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}. \end{aligned}$$

Apparently, the fact that there are alternative ways of “constructing” numbers using sets does not bother the greatest authorities in the field. As seen from ATOP, this is a clear indication that there is something common to the alternatives; and that this commonality is what should be sought as a principle. Instead, they are pleasantly surprised by the unexpected, accidental properties of the sets-numbers they have thus chosen to create:

This construction of the numbers as sets involves some extraneous properties that we did not originally expect. For example,

$$0 \in 1 \in 2 \in 3 \in \dots$$

and

$$0 \subseteq 1 \subseteq 2 \subseteq 3 \subseteq \dots$$

But these properties can be regarded as accidental side effects of the definition. They do not harm, and actually will be convenient at times.<sup>25</sup>

And to define “natural number,” they must define “the set of all natural numbers” first!

Although we have defined the first four natural numbers, we do not yet have a definition of what it means in general for something to be a natural number. That is, we have not defined the set of

<sup>24</sup> Ibid. Correcting the typographical error “ $1 = \{\emptyset\} = \{\emptyset\}$ .”

<sup>25</sup> Ibid. The symbol  $\subseteq$  signifies the *inclusion relation*; see *ibid.*, 3–4: “If  $A \subseteq B$ , then we also say that  $A$  is *included* in  $B$  or that  $B$  *includes*  $A$ . It should not be confused with the membership relation ( $\in$ ). If we want to know whether  $A \in B$ , we look at the set  $A$  as a single object, and we check to see if this single object is among the members of  $B$ . By contrast, if we want to know whether  $A \subseteq B$ , then we must open up the set  $A$ , examine its various members, and check whether its various members can be found among the members of  $B$ .” Thus, for example,  $\emptyset \subseteq \emptyset$ , but  $\emptyset \notin \emptyset$ .

all natural numbers. Such a definition cannot rely on linguistic devices such as three dots or phrases like “and so forth.” First we define some preliminary concepts.<sup>26</sup>

**Definition.** For any set  $a$ , its successor  $a^+$  is defined by

$$a^+ = a \cup \{a\}$$

That is, the successor of a set is the union of the set itself and a set that contains it alone as a member: “The *union* of sets  $A$  and  $B$  is the set  $A \cup B$  of all things that are members of  $A$  or  $B$  (or both).”<sup>27</sup> Therefore,  $\emptyset^+ = \emptyset \cup \{\emptyset\} = \{\emptyset\}$ ; and  $\emptyset^{++} = \{\emptyset\}^+ = \{\emptyset\} \cup \{\{\emptyset\}\} = \{\emptyset, \{\emptyset\}\}$ . Hence,

In terms of the successor operation, the first few natural numbers can be characterized as<sup>28</sup>

$$0 = \emptyset, 1 = \emptyset^+, 2 = \emptyset^{++}, 3 = \emptyset^{+++}, \dots$$

In order to obtain “the set of all natural numbers,” there is still a need in ZF to define what an “inductive set” is.

A set  $A$  is said to be *inductive* iff  $0 \in A$  and it is “closed under successor,” i.e.,<sup>29</sup>

$$(\forall a \in A) a^+ \in A$$

That is, a set is said to be *inductive* if it contains a first set and also contains the successor of any already contained set. Evidently, the underlying notion of induction is logical rather than psychological. It is not a question of abstraction, but of repeating an operation infinitely to show that something is true in each and every case. Paradoxically, however, according to ENDERTON, “although we have not yet given a formal definition of ‘infinite’, we can see informally that any inductive set will be infinite.”<sup>30</sup>

The claim that the “the set of all natural numbers” is infinite will be discussed in the next section. For now, let us account for so-called natural numbers from ATOP:

1. It is evident that we are required to begin from the empty set  $\emptyset$ . This should not come as a surprise; for we have already determined that the empty set signifies the first subject of predication in any genus.

In the case of so-called universal mathematics or algebra—that is, in *the analytic part of formal logic that treats of quantity*—, the first subject is the predicable quantum. However,

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<sup>26</sup> Ibid., 67–68.

<sup>27</sup> Ibid., 3.

<sup>28</sup> Ibid., 68.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid.

this quantum is considered merely as a subject: that is, it is deprived of any quantitative form that can be predicated of it. In other words, it is understood to be a subject that is naturally apt to receive any form of quantity, but it is deprived of all forms of quantity.

This is what we signify by zero. And it is a purely material principle in the predicable genus of quantity. That is, although this subject alone is not a quantity, it is reduced to the genus of quantity because a privation is reduced to a corresponding habit/possession, just like the imperfect is reduced to the genus of the perfect (► 29.11; 55.2, ¶2).

Since this privation in the genus of quantity is imperfect, it lacks the *ratio* of measure. For example, *one* measures the number four because *one* is *one fourth of four*, and two measures four because it is *one half of four*, but we cannot measure four by “zero” because no intrinsic part into which four is divided is altogether deprived of the *ratio* of measure. This is also why we cannot divide a “number” by “zero.”

**2.** The first quantitative form is that of *one*. Materially speaking, however, a subject that has this form is not yet a quantum because it is indivisible; and every quantity is divisible into its intrinsic parts (► 34.1). Yet, for this very reason, it is the first principle and measure of quantity and is reduced to the genus of quantity (► 29.10).

Indeed, formal principles in all genera are small in quantity but great in virtue (► 27.6).<sup>31</sup> Whence, *one*, the principle of number, is less than any number but greater in virtue than any of them; for all numbers exist virtually in *one*.

As seen from ATOP, it is no wonder if ZERMELO proposed to use  $\{\emptyset\}$  to signify one; for the first subject is somehow contained under the first form. Likewise, we will not wonder if VON NEUMANN proposed the same conventional symbol,  $1 = \{0\} = \{\emptyset\}$ .

**3.** The first quantum, properly speaking, is the number two. Unlike the deprived subject and the unit, it is divisible into intrinsic parts, which makes it properly to be a quantum.

On the other hand, like the unit *one*, two is also a measure; but not for all numbers: it is a measure only for even numbers. *One*, alone, is the universal and perfect measure. Yet, two participates somewhat in the *ratio* of *measure*.

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<sup>31</sup> Again, St. Thomas concludes this from his reading of ARISTOTLE, *Metaphysica* Z.17, 1041a18–20: “πλήν εἴ τις λέγοι ὅτι ἀδιαιρέτον πρὸς αὐτὸ ἕκαστον, τοῦτο δ’ ἦν τὸ ἐνὶ εἶναι: ἀλλὰ τοῦτο κοινόν γε κατὰ πάντων καὶ σύντομον.” He gives his interpretation *In Metaph.* 7, l. 17, §1654: “unumquodque est indivisibile ad seipsum. «Et est quod breve [σύντομον],» idest se habet ad modum principii, quod est parvum quantitate et maximum virtute.” *In De div. nom.*, c. 9, l. 1: “unde et principia in omnibus generibus sunt parva quantitate, sed magna virtute.” *In Sent.* 2, d. 3 q. 3 a. 2 co.: “principia sunt parva quantitate, et maxima virtute.” This is undoubtedly how we ought to interpret his famous saying in *De ente*, pr., 1–2: “parvus error in principio magnus est in fine secundum Philosophum in I Celi et mundi.” Cf. *In De caelo* 1, l. 9 n. 4: “principium quod est minimum quantitate, facit magnam differentiam in sequentibus.”

As seen from ATOP, it is no wonder if ZERMELO proposed to use  $\{\{\emptyset\}\}$  to signify one; for the first subject is somehow contained under the first form; and the first form is likewise contained under the second form. In turn, VON NEUMANN proposed the conventional symbol  $2 = \{0,1\} = \{\emptyset, \{\emptyset\}\}$  because the subject and the first form are somehow contained under the second form.

The “accidental” properties of VON NEUMANN’s alternative that “actually will be convenient at times” are easily accounted for as well. For, as we have said, any number somehow contains or “includes” all of its predecessors.

It is evident that what both ZERMELO and VON NEUMANN are trying to signify is the same. However, they do not attempt to understand what the common principle is.

4. The question of whether “zero” or *one* should be the first “natural number” is also easily resolved from ATOP. To be first is to be a principle (►8.3): privation is a material principle in any genus, while the measure in any genus is an indivisible formal principle.

Undoubtedly, the objection of those who reject “zero” to be the first “natural number” is that they conceive “zero” to be *nothing*: that is, a negation without a subject, and therefore outside of any genus (►42.1). Conceived in this way, it would seem that “zero” is not found among the things of nature; hence, the name “natural number.” Indeed, we do not begin to count any multitude from “zero.” This objection is partly true and partly false. It is true in that “zero” is constituted by negation, and *nothing*, in nature, corresponds to *pure negation*. It is false in that it is not a negation outside of any genus: it is a negation concerning a subject that is naturally apt to possess that of which it is deprived. Matter and privation are the same in subject, but are distinguished according to *ratio*: the subject-matter is real, while the privation is real only insofar as the subject (of quantity) is real.

On the other hand, “zero” and *one* are in the genus of quantity only by reduction. They are called “numbers” metaphorically. Set theory is unable to account for this evident truth.

5. Examined from ATOP, the definition of *successor* is no wonder either: in any genus, there is a first, while others follow from it in some mode.

The first that we consider in this genus is the subject, from which the affections are caused. Then follows the first affection, which is that of measure: the form of one. Thereafter, the form of two follows, which moreover makes the subject divisible into equal parts.

Set theory is clueless when it comes to determining *on account of what* this order should exist. Indeed, set theory is not based on a robust theory of principles. From ATOP, on the

other hand, it is evident that set theory is following the order of imperfection, potency, and matter. According to this order, privation (the “number zero”) is first. *One* (also a “number”) adds the perfection of measure, but is still materially imperfect because it is indivisible.

That the “natural numbers” should be first, before the “negative,” “rational,” and “irrational,” is also evident from ATOP. For the multitude-number that is a species of quantity, which is also the subject of arithmetic, has for its principle the *one* that is the first measure of quantity (►62.5); and the first distinction—and plurality—is found in such multitude-numbers (►62.7). “Negative numbers” are posterior because act is naturally prior to potency, and so-called “negative numbers” are potential quantities. “Rational numbers” are posterior because they are relations that depend on measurable multitudes, which are their subjects and termini. “Irrational numbers” are posterior because they depend on rational ratios for their definition: indeed, those quantities are said to be irrational which are not related as multitude-numbers are related.

That the first quantities should be had by succession and not in continuity is no wonder either: continuity depends upon contiguity; and contiguity, upon consequence (►39.5). Therefore, the consequent is prior to the continuous. And those are **consequent** of which *there is no mean of their genus*. For example, there is no mean between two and three.

All of these self-evident truths (self-evident *in se*, though not necessarily *quoad nos*) are fully articulated in the Aristotelian-Thomistic Teaching on Principles. Yet, they are a complete mystery to the highest authorities of modern so-called mathematics.

### 69.6. The Infinity Axiom

In order to define “what it means in general for something to be a natural number,” set theory requires that there be a definition of “the set of all natural numbers,” which, as noted above, is an “inductive set.” Again, an inductive set is a set that contains a first set and also contains the successor of any already contained set. Although, as ENDERTON says, “we can see informally that any inductive set will be infinite,” we still need “formally” to establish this.<sup>32</sup> Hence, the “infinity axiom.”

**Infinity Axiom.** There is an inductive set.<sup>33</sup>

$$(\exists A)[\emptyset \in A \ \& \ (\forall a \in A) \ a^+ \in A]$$

And thus, endowed with his authority as high priest, on July 30, 1907, ZERMELO created an infinite set by sheer fiat (*Ist Z eine... Unendliche Menge*; or, we could say, *fiat infinitum*

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<sup>32</sup> ENDERTON, *Elements of Set Theory*, 68.

<sup>33</sup> *Ibid.*

= γενηθήτω ἄπειρον = יהי אינסופי = كن لانتهائي =  $\exists \infty$ ).<sup>34</sup> Alas, such an infinite, like DEDEKIND's "successive creation of the infinite series of positive integers in which each individual is defined by the one immediately preceding" (► 68.2), cannot *simultaneously* and *actually* be created precisely because it requires *succession*. Any infinite that requires succession is a *potential* infinite (► 25.4, ¶2; 25.5). Lacking the foundational distinction between act and potency, set theory is forced absurdly to claim that such an infinite set *actually* exists.

What is worse, the "definition of what it means in general for something to be a natural number" is based on just such nonsense:

Armed with this axiom, we can now define the concept of natural number.

**Definition.** A *natural number* is a set that belongs to every inductive set.<sup>35</sup>

The set of all natural numbers is denoted by a lowercase Greek omega:

$x \in \omega \quad \Leftrightarrow \quad x \text{ is a natural number}$   
 $\Leftrightarrow \quad x \text{ belongs to every inductive set.}$ <sup>36</sup>

Thus, to know what a "natural number" is we must first know "infinite natural numbers." There is some truth to this statement, though. Examined from ATOP, to know something "in general" is to know it indistinctly or indefinitely, which is to know it infinitely. Indeed, a genus is taken from some matter or potency; and matter or potency is infinite insofar as it can take any form in that genus. The genus itself is just such matter with an indeterminate form (► 41.13; 41.19). But it is not an infinite *in act*, which could only exist without matter.

## 69.7. Order and Relation

1. Before we look into the "creation" of more "numbers," we must direct our attention to the way in which ZF signifies **order**. As ENDERTON explains,

The pair set  $\{1,2\}$  can be thought of as an unordered pair, since  $\{1,2\} = \{2,1\}$ . We will need another object  $\langle 1,2 \rangle$  that will encode more information: that 1 is the first component and 2 is the second. In particular, we will demand that  $\langle 1,2 \rangle \neq \langle 2,1 \rangle$ .<sup>37</sup>

As with many other parts of set theory, various modes of signifying the same order have been proposed.

The first successful definition was given by Norbert Wiener in 1914, who proposed to let<sup>38</sup>

$$\langle x, y \rangle = \{ \{ \{ x \}, \emptyset \}, \{ \{ y \} \} \}$$

<sup>34</sup> ZERMELO, "Neuer Beweis für die Möglichkeit einer Wohlordnung," 267. Though published in 1908, ZERMELO signs "Chesières, den 30. Juli 1907" (ibid., 281).

<sup>35</sup> ENDERTON, *Elements of Set Theory*, 68.

<sup>36</sup> Ibid., 69.

<sup>37</sup> Ibid., 35.

<sup>38</sup> Ibid., 37.

A simpler definition was given by Kazimierz Kuratowski in 1921, and is the definition in general use today:

**Definition.**  $\langle x, y \rangle$  is defined to be  $\{\{x\}, \{x, y\}\}$ .

This latter definition is, indeed, simpler. Examined from ATOP, what is being signified by it is the relative or relation (► 37), whose *ratio* essentially includes *being towards* (*esse ad*); and, insofar as it is an accident, it also includes *being in* (*esse in*). The latter is signified by  $\{x\}$ , which is the terminus *in which* the relation exists, while the former is somehow signified by  $\{x, y\}$ , which tells us between which termini the relation exists.

2. Based on the definition of *ordered pair*, ZF defines its “relation”:

**Definition.** A *relation* is a set of ordered pairs.<sup>39</sup>

This would seem to correspond more closely to what we call *order* (► 8.5). From ATOP, an order is, generically speaking (i.e., inside a genus), a relation of prior and posterior; and a relation need not have a priority (► 37).

ENDERTON uses the following depiction as an introductory example of  $2 < 3 < 5$ , which can give us a clearer picture of what is meant by an “ordering relation” (► Figure 22):

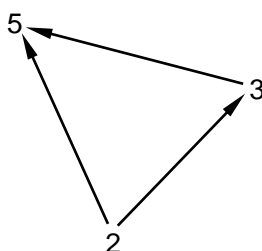


Figure 22: The ordering relation  $<$  on  $\{2, 3, 5\}$ .

He also explains how such a “relation”  $R = \{\langle 2, 3 \rangle, \langle 2, 5 \rangle, \langle 3, 5 \rangle\}$  is commonly understood:

At one time it was fashionable to refer to the set  $R$  as the *graph* of the relation, a terminology that seems particularly appropriate if we think of  $R$  as a subset of the coordinate plane. But nowadays an even simpler viewpoint has become dominant:  $R$  is the ordering relation on  $\{2, 3, 5\}$ . It consists of the pairs tying each number to the larger numbers; a relation is this collection of “ties.”<sup>40</sup>

As seen from ATOP, it is evident why such a set would be considered a graph: the first order that we come to know is the order according to position that is found in magnitudes (► 8.11). It is also clear why the new viewpoint is simpler: precisely because it abstracts (or separates) from position, leaving only the undetermined *ratio* of *order*.

<sup>39</sup> Ibid., 40.

<sup>40</sup> Ibid., 39.

3. Before we proceed to our analysis of how “integer numbers” are “created,” we must consider a kind of relation that is used for that purpose: the **equivalence relation**. Note that, as a shorthand, “For a relation  $R$ , we sometimes write  $xRy$  in place of  $\langle x, y \rangle \in R$ .”<sup>41</sup>

**Definition.**  $R$  is an *equivalence relation* on  $A$  iff  $R$  is a binary relation on  $A$  that is reflexive on  $A$ , symmetric, and transitive.<sup>42</sup>

1.  $R$  is *reflexive* on  $A$ , by which we mean that  $xRx$  for all  $x \in A$ .
2.  $R$  is *symmetric*, by which we mean that whenever  $xRy$ , then also  $yRx$ .
3.  $R$  is *transitive*, by which we mean that whenever  $xRy$  and  $yRz$ , then also  $xRz$ .

4. The **equivalence class** is defined based on the definition of the equivalence relation:

**Definition.** The set  $[x]_R$  is defined by

$$[x]_R = \{t \mid xRt\}$$

If  $R$  is an equivalence relation and  $x \in \text{fld } R$ , then  $[x]_R$  is called the *equivalence class* of  $x$  (*modulo*  $R$ ). If the relation  $R$  is fixed by the context, we may write just  $[x]$ .<sup>43</sup>

### 69.8. The “Construction” of the “Integer Numbers”

In addition to “natural numbers,” modern so-called mathematics requires “negative numbers,” which are also “constructed” using sets. We get the “integer numbers” when both kinds of “numbers” are put together. Here is how ENDERTON describes the process:

First we want to extend our set  $\omega$  of natural numbers to a set  $\mathbb{Z}$  of integers (both positive and negative). Here “extend” is to be loosely interpreted, since  $\omega$  will not actually be a subset of  $\mathbb{Z}$ . But  $\mathbb{Z}$  will include an “isomorphic copy” of  $\omega$ .

A negative integer can be named by using two natural numbers and a subtraction symbol:  $2 - 3$ ,  $5 - 10$ , etc. We need some sets to stand behind these names.

[...] we can define an equivalence relation  $\sim$  such that  $\langle 2, 3 \rangle \sim \langle 0, 1 \rangle$ . (Imposing such an equivalence relation is sometimes described as “identifying”  $\langle 2, 3 \rangle$  and  $\langle 0, 1 \rangle$ .) Then we will have one equivalence class

$$[\langle 2, 3 \rangle] = [\langle 0, 1 \rangle]$$

and we can take  $-1$  to be this equivalence class. Then for the set  $\mathbb{Z}$  of all integers, we can take the set of all equivalence classes:

$$\mathbb{Z} = (\omega \times \omega) / \sim$$

This is in fact what we do. Call a pair of natural numbers a *difference*; then an integer will be an equivalence class of differences.<sup>44</sup>

<sup>41</sup> Ibid., 40.

<sup>42</sup> Ibid., 56.

<sup>43</sup> Ibid., 57. Note that  $\text{fld } R = \text{dom } R \cup \text{ran } R$ ;  $x \in \text{dom } R \Leftrightarrow \exists y \langle x, y \rangle \in R$ ; and  $x \in \text{ran } R \Leftrightarrow \exists t \langle t, x \rangle \in R$ .

<sup>44</sup> Ibid., 90–91;  $\times$  symbolizes the *Cartesian product*, such that  $A \times B = \{\langle x, y \rangle \mid x \in A \ \& \ y \in B\}$  (ibid., 37).



In other words, a “negative integer” such as  $-1$  is defined as a class that contains all the differences between particular “natural numbers” that result in  $-1$ . Examined from ATOP, this seems superfluous. Instead of reducing all the particular differences to a simple principle, which would be the first subject in which the difference is found, ZF resorts to “creating” an “infinite” set for every “integer number.” Thus,

**Definition.** The set  $\mathbb{Z}$  of *integers* is the set  $(\omega \times \omega)/\sim$  of all equivalence classes of differences.<sup>45</sup>

For example, the integer  $2_{\mathbb{Z}}$  is the equivalence class

$$[(2, 0)] = [(2, 0), (3, 1), (4, 2), \dots]$$

and the integer  $-3_{\mathbb{Z}}$  is the equivalence class

$$[(0, 3)] = [(0, 3), (1, 4), (2, 5), \dots]$$

The differences used in ZF are, of course, accounted for from ATOP (►41.28) as part of the theory of contrariety, which is foundational for science. In contrast, ZF has nothing to say about any of the modes of contrariety—not even what a difference is.

### 69.9. The “Construction” of the “Rational Numbers”

The “rational numbers” are “created” in a way that is analogous to the “creation” of the “integers.” Ratios (literally, “fractions”), instead of differences, are used as “relations.”

**Definition.** Define  $\sim$  to be binary relation on  $\mathbb{Z} \times \mathbb{Z}'$  for which

$$\langle a, b \rangle \sim \langle c, d \rangle \Leftrightarrow a \cdot d = c \cdot b$$

The set  $\mathbb{Q}$  of *rational numbers* is the set  $(\mathbb{Z} \times \mathbb{Z}')/\sim$  of all equivalence classes of fractions.<sup>46</sup>

This method is similar to DEDEKIND’s (►68.2), except that he does not use equivalence classes, which have become generalized.

The ratios or relations used in ZF are also accounted for from ATOP (►37.2).

### 69.10. The “Construction” of the “Real Numbers”

Unsurprisingly, we encounter a multiplicity of opinions when it comes to the “creation” of “real numbers.”

Actually there are several methods that can be used successfully to construct the real numbers.

One approach is to utilize decimal expansions, so that a real number is determined by an integer and an infinite sequence of digits (a function from  $\omega$  into  $10$ ). [...]

A more common method of constructing a suitable set  $\mathbb{R}$  is to utilize the fact that a real number can be named by giving a sequence of rationals (a function from  $\omega$  into  $\mathbb{Q}$ ) converging to it. So

<sup>45</sup> Ibid., 92.

<sup>46</sup> Ibid., 102. Replacing iff with  $\Leftrightarrow$  for clarity.

one can take the set of all convergent sequences and then divide out by an equivalence relation (where two sequences are equivalent iff they converge to the same limit). [...]

An alternative construction of  $\mathbb{R}$  uses so-called *Dedekind cuts*. This is the method we follow henceforth in this section.<sup>47</sup>

We have already examined DEDEKIND's method (►68.2). Here, we will only quote what is essential to ENDERTON's account of it:

The idea behind Dedekind cuts is that the real number  $x$  can be named by giving an infinite set of rationals, namely all the rationals less than  $x$ . We will in effect define  $x$  to be the set of all rationals smaller than  $x$ . To avoid circularity in the definition, we must be able to characterize the sets of rationals obtainable in this way. The following definition does the job.

**Definition.** A *Dedekind cut* is a subset  $x$  of  $\mathbb{Q}$  such that:

(a)  $\emptyset \neq x \neq \mathbb{Q}$

(b)  $x$  is "closed downward," i.e.,

$$q \in x \ \& \ r < q \Rightarrow r \in x$$

(c)  $x$  has no largest member.

We then define the set  $\mathbb{R}$  of real numbers to be the set of all Dedekind cuts. Note that there is no equivalence relation here: a real (i.e., a real number) is a cut, not an equivalence class of cuts.

If we examine this "definition" form ATOP, it is evident that it is not a true definition: to define is to determine, and an infinite sequence is not determined. Indeed, the "real number" that we are seeking is analogous to the terminus of some motion; yet, the set  $x$ , by which such a quantum is "defined," is not terminated because it does not have a largest element. Even the "real number zero" becomes an infinite (that is, an undetermined) set in this method.

Moreover, it is superfluous to require that all the rationals less than  $x$  enter the "definition" of a single "real number." And while it is easy to determine when any such "real number" is greater than another, performing "real number arithmetic" or demonstrations in this way is awkward at best—impossible at worst. It is not surprising that examples of how specific "real numbers" should be produced by "Dedekind cuts" (which is still the preferred method) are almost nonexistent even in advanced mathematics textbooks. This remains a mere "theoretical" device that is learnt to have an illusory sense of security and is then forgotten.

### 69.11. Russel's Paradox Untangled

ENDERTON relates the circumstances in which *Russel's Paradox* appeared a century ago:

About the turn of the century, attempts were made to present the principles of set theory as being principles of logic—as self-evident truths of deductive thought. The foremost work in this direction

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<sup>47</sup> Ibid., 112.

was done by Gottlob Frege. Frege was a German mathematician by training, who contributed to both mathematics and philosophy. In 1893 and 1903 he published a two-volume work in which he indicated how mathematics could be developed from principles that he regarded as being principles of logic. But just as the second volume was about to appear, Bertrand Russell informed Frege of a contradiction derivable from the principles (Russel's Paradox).

Russel's paradox had a tremendous impact on the ideas of that time regarding the foundations of mathematics.<sup>48</sup>

ENDERTON defines the set at the basis of this paradox using what is called in set theory "the method of abstraction." Note, however, that this has little to do with what we have been calling *abstraction* (► 49.8).

A very flexible way of naming a set is the method of *abstraction*. In this method we specify a set by giving the condition—the entrance requirement—that an object must satisfy in order to belong to the set. In this way we obtain the set of all objects  $x$  such that  $x$  meets the entrance requirement. The notation used for the set of all objects  $x$  such that the condition  $\_ x \_$  holds is<sup>49</sup>

$$\{x | \_ x \_ \}$$

Using this notation (which is quite common and has already been utilized in the definition of the equivalence class; ► 69.7, ¶4), ENDERTON presents *Russel's Paradox*:

It is exemplified by

$$\{x | x \notin x\}$$

this is, by the set of all objects that are not members of themselves. Call this set  $A$ , and ask "is  $A$  a member of itself?" If  $A \notin A$ , then  $A$  meets the entrance requirement for  $A$ , whereupon  $A \in A$ . But on the other hand, if  $A \in A$ , then  $A$  fails to meet the entrance requirement and so  $A \notin A$ . Thus both " $A \in A$ " and " $A \notin A$ " are untenable. The phrase "is not a member of itself" appears to be an illegal entrance requirement for the abstraction method.<sup>50</sup>

Here is how ENDERTON avoids the "disaster" of this paradox following ZF:

The [...] disaster will be avoided by the distinction between *sets* and *classes*. Any collection of sets will be a *class*. Some collections of sets (such as the collections  $\emptyset$  and  $\{\emptyset\}$ ) will be sets. But some collections of sets (such as the collection of all sets not members of themselves) will be too large to allow as sets. These oversized collections will be called *proper classes*.<sup>51</sup>

Thus, at first it seemed that the "disaster" of *Russel's Paradox* would be caused by some defect in the "entrance requirement," which is that, for any member  $x$  of  $A$ ,  $x \notin x$ . However,

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<sup>48</sup> Ibid., 15. See also *ibid.*, 6: "It was communicated by Bertrand Russell in 1902 to Gottlob Frege, and was published in 1903. The example was independently discovered by Ernst Zermelo."

<sup>49</sup> Ibid., 4.

<sup>50</sup> Ibid., 6.

<sup>51</sup> Ibid.

it then turns out that this “entrance requirement” is quite valid, but not for all “collections.” It is valid for “proper classes,” which are “oversize collections.” Sets are classes; but they are not “proper classes” because they are not “oversize collections.”

Fair enough. But what exactly causes a *class* to be an “oversize collection”? Consider the example of creating the set  $A = \{x | x \notin x\}$  by succession. We begin with  $A = \emptyset$ . It is evident that, for any member  $x$  of  $A$ ,  $x \notin x$ ; for  $A$  has no members. However, it is also evident that  $A \notin A$  because  $\emptyset \notin \emptyset$ . Therefore, we must add  $A$  to our set, producing  $A = \{\emptyset\}$ . Again, it is evident that for any member  $x$  of  $A$ ,  $x \notin x$ ; for  $\emptyset \notin \emptyset$ . However, again, it is also evident that  $A \notin A$  because  $\{\emptyset\} \notin \{\emptyset\}$ . We therefore add  $A$  to our set, producing  $A = \{\emptyset, \{\emptyset\}\}$ . It is again evident that for any member  $x$  of  $A$ ,  $x \notin x$ . Indeed,  $\emptyset \notin \emptyset$ , and  $\{\emptyset\} \notin \{\emptyset\}$ . However,  $A \notin A$  because  $\{\emptyset, \{\emptyset\}\} \notin \{\emptyset, \{\emptyset\}\}$ . Therefore,  $A$  should be added to itself. And we do this infinitely: after all, ZF establishes—as a dogma of faith—that there exist some sets produced by succession that are actually infinite, such as  $\omega$  (► 69.6). In fact, these are the same set,  $A = \omega$ , since  $\emptyset \in A$  &  $(\forall x \in A) x^+ \in A$ . Why could we not dictate by fiat that this infinite class contains *all* the sets that do not contain themselves? Because it is not “oversize”?

The true reason becomes evident if we examine *Russel’s Paradox* from ATOP. Indeed, we have already established the priority of a set over its members or elements; for there can be an actual set that contains no members, but there can be no actual member that is not contained in a set (i.e., it belongs to the *ratio* of *member* to be actually contained, while it belongs to the *ratio* of *set* to be naturally apt to contain). Therefore,  $x \in x$  would signify that  $x$  is actually contained in itself, which is impossible (► 29.7), even by accident (► 29.8). For  $x$  would have to be simultaneously prior (insofar as it is the container) and posterior (insofar as it is contained). In other words, it would have to be a principle of itself, which is impossible and absurd (► 8.2). On the other hand, it is possible for  $x \in x^+$ , as in our example; but, at any given step,  $x \notin x$ , and  $x^+ \notin x^+$ .

Still, contraries belong to the same genus. It would, therefore, seem that  $x \in x$  and  $x \notin x$  should be contraries. After all, we have the same subject: the member  $x$ . We are merely affirming or negating some affection  $x$  of this subject. Are these not immediate contraries, just like *even* and *odd* are immediate contraries because we affirm of the former subject *the divisibility into two equal parts*, while we negate of the latter the same affection? Not quite: *even* and *odd* are affections of a subject genus, which is *the measurable multitude*. But to what subject genus does  $x$  belong? And how can the subject be also the affection?

Evidently,  $x \in x$  and  $x \notin x$  are not opposed as the even and the odd, but as the impossible and the possible. For there would have to be a subject that is naturally apt to be both prior

and posterior to its affection—and this is impossible. Indeed, to assume that there is some genus of things that are naturally apt equally to contain themselves and not to contain themselves is contradictory. The matter of one and of the other cannot be the same. Therefore, *class* and *set* must be diverse in subject genus, as are the incorruptible and the corruptible (► 14.3; 14.5; 19.8; 21.10, ¶1; 21.11; 21.12, ¶2; 27.4; 31.13; 43.2; 43.22; 43.25; 43.26; 43.27).

Yet, not all is lost for the promoters of a genus of “collection,” called *class*, that is divided into *proper class* and *set*. For there is no obstacle to having two contradictory propositions as a principle, as long as we remain in the realm of dialectic (► 52.4, ¶2; 52.13; 52.14). And, in set theory,  $s \in P$  is the affirmative proposition, while  $s \notin P$  is the negative. It is, therefore, possible to have class dialectics—no pun intended—in which we can logically consider objects such as “the collection of all sets not members of themselves,” or “the collection of all collections.” Wherefrom, as ENDERTON explains, there are two alternatives:

[T]here is some mild inconvenience that results if we forbid ourselves even to speak of the collection of all sets. The collection cannot be a set, but what status can we give it? Basically there are two alternatives:

*The Zermelo-Fraenkel alternative.* The collection of all sets need have no ontological status at all, and we need never speak of it. When tempted to speak of it, we can seek a rephrasing that avoids it.

*The von-Neumann-Bernays alternative.* The collection of all sets can be called a *class*. Similarly any other collection of sets can be called a class. In particular, any set is a class, but some classes are too large to be sets.<sup>52</sup>

Thus, in this respect, the difference between ZF and NBG is the difference between the analytic and the dialectic parts of logic (► 52.4). But the “sizes” of the “collections” have absolutely nothing to do with this distinction—unless by “oversize” we understand the infinite distance between the possible and the impossible.

We must, therefore, conclude that neither ZF nor NBG is able to account for its own first principles. Whence, the creators of these “set theories,” and those who blindly follow them, may be wise in their particular art, but are not wise simply (► 51.24).

### 69.12. Gödel’s Incompleteness Theorems Reconsidered

In his celebrated paper “On formally Undecidable Propositions of Principia Mathematica and Related Systems” (*Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme*), Kurt Friedrich GÖDEL devises an ingenious way of assigning a

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<sup>52</sup> Ibid., 10.

unique number—a *Gödel number*, we would say today—to any expression (“whether it is an elementary sign, a sequence of signs, or a sequence of such sequences”)<sup>53</sup> that can be produced using the basic arithmetical part of a logical system such as that defined in Alfred North WHITEHEAD and Bertrand RUSSELL’s *Principia Mathematica*.<sup>54</sup> Given any such logical expression, a unique *Gödel number* can be obtained. Conversely, given any number, it can be determined whether it is a *Gödel number*; and, if it is, it can then be determinately “decoded” into the unique logical expression that corresponds to it.

With this encoding method, logical expressions can be treated as arithmetical expressions in such a way that their properties can be investigated analogically as the properties of the corresponding numbers. For example, it is possible to construct an expression that, based on the properties of the numbers produced by GÖDEL’s encoding method, determines—through calculation—whether the first sign in any given logical expression is the negation  $\neg$ .<sup>55</sup> Moreover, this new expression that determines the property of beginning with the sign  $\neg$  can, in turn, be encoded using a unique *Gödel number*.

Using this method, GÖDEL encodes a formula that—in a sense—says of itself that it is not provable.<sup>56</sup> He then proves that, even though the formula is true, neither it nor its negation is provable within the system. Hence, it is “formally undecidable” (Theorem VI).

Having shown that an undecidable formula can be found in such a simple system, GÖDEL shows that the system is incomplete. In other words, we cannot deduce all arithmetical truths from its axioms and rules. Not only is it incomplete with respect to some formula, but it is essentially incomplete: even if new axioms were added to account for an undecided formula, it would be possible to find other undecidable formulas (Theorem XI).<sup>57</sup> These findings had an immediate demolishing effect on David HILBERT’s program.

The immediate effect of Gödel’s theorem, and in particular, of his second theorem, was that the assumptions of Hilbert’s program were challenged. Hilbert assumed quite explicitly that arithmetic

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<sup>53</sup> Ernest NAGEL, James Roy NEWMAN, and Douglas R. HOFSTADTER, *Gödel’s Proof*, Rev. ed. (New York: New York University Press, 2001), 77–78. Since GÖDEL’s article is quite involved (it has no less than five pages containing 46 definitions that must be grasped to make any sense of his reasoning), we follow this much-simplified explanation. A mathematically savvy reader may prefer to read an account such as that of Richard ZACH, “Kurt Gödel, paper on the incompleteness theorems (1931),” in *Landmark Writings in Western Mathematics 1640–1940*, ed. Ivor Grattan-Guinness (Amsterdam: Elsevier, 2005), 917–925.

<sup>54</sup> Kurt GÖDEL, “Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme,” *Monatshefte für Mathematik und Physik* 38 (1931), 173–198. The article was finished in “Eingelangt: 17.XI.1930” (*ibid.*, 198). The edition of *Principia Mathematica* used by GÖDEL is Alfred North WHITEHEAD and Bertrand RUSSELL, *Principia Mathematica*, 2nd. ed. (Cambridge: Cambridge University Press, 1925).

<sup>55</sup> This is the example used by NAGEL and NEWMAN, *Gödel’s Proof*, 81–83. They, like GÖDEL, “Über formal unentscheidbare Sätze...,” 176, following WHITEHEAD and RUSSELL, use  $\sim$  instead of  $\neg$ . We did not want to introduce a change of notation at this point.

<sup>56</sup> GÖDEL, “Über formal unentscheidbare Sätze...,” 187–191.

<sup>57</sup> *Ibid.*, 196–198.

was complete in the sense that it would settle all questions that could be formulated in its language—it was an open problem he was confident could be given a positive solution.<sup>58</sup>

Beyond HILBERT's program, GÖDEL's theorems were received as very bad news for set theory and the foundations of mathematics.

[U]p to 1930 it was widely assumed that arithmetic, analysis, and indeed set theory could be completely axiomatized, and that once the right axiomatizations were found, every sentence of the theory under consideration could be either proved or disproved in the object-language theory itself. Gödel's theorem showed that this was not so, and that once a sharp distinction between the object- and metatheory was drawn, one could always formulate statements which could be decided in the metatheory, but not in the object theory itself. The first incompleteness theorem shows that object-level provability is always outstripped by meta-level truth. Gödel's proof, by example as it were, also showed how carefully object- and meta-language have to be distinguished in metamathematical considerations. [...]

Gödel's results had a profound influence on the further development of the foundations of mathematics. One was that it pointed the way to a reconceptualization of the view of axiomatic foundations. Whereas a prevalent assumption prior to Gödel—and not only in the Hilbert school—was that incompleteness was at best an aberrant phenomenon, the incompleteness theorem showed that it was, in fact, the norm.<sup>59</sup>

GÖDEL's influence is felt today even beyond these specialized fields. His theorems have been used to argue for and against the most diverse philosophical positions (e.g., for the existence and for the non-existence of God).

Perhaps more than any other recent result of mathematics, Gödel's theorems have ignited the imagination of non-mathematicians. They inspired Douglas Hofstadter's bestseller *Gödel, Escher, Bach* (1979), which compares phenomena of self-reference in mathematics, visual art, and music. They also figure prominently in the work of popular writers such as Rudy Rucker. Although they have sometimes been misused, as when self-described postmodern writers claim that the incompleteness theorems show that there are truths that can never be known, the theorems have also had an important influence on serious philosophy. John Lucas, in his paper 'Minds, machines, and Gödel' (1961) and more recently Roger Penrose in *Shadows of the mind* (1994) have given arguments against mechanism (the view that the mind is, or can be faithfully modeled by a digital computer) based on Gödel's results. It has also been of great importance in the philosophy of mathematics: for instance, Gödel himself saw them as an argument for Platonism.<sup>60</sup>

Analyzed from ATOP, however, GÖDEL's findings are not at all surprising. They merely take us back to what we have already said when analyzing *Russel's Paradox*. Accepting a

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<sup>58</sup> ZACH, "Kurt Gödel, paper on the incompleteness theorems," 924.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid., 924–925.

formula that affirms or negates something about itself—whether the predicate is *per se* or *per accidens*—is analogous to claiming that something is first in itself, which is absurd and impossible (►29.7; 29.8). And speaking *per se* (►17), the subject is—in some mode—a cause of the being of the predicate—and nothing can be a cause of itself. Although the predicate does add something to the subject, there must be something in the subject that causes the being of the predicate, just like the elements of a set cannot actually be elements unless there is a set; and yet, the elements themselves secondarily determine the set.

We must, therefore, conclude that GÖDEL's findings belong to dialectic, which is—by its very nature—undecidable because it is based on an undecidable proposition (►52.13; 52.14): a proposition that is not really *one*, but *many* (►19.2, ¶2). And, of course, any dialectic “system” will always be incomplete, no matter how many axioms are added.

It is easy to fall into all forms of sophistry once ARISTOTLE's theory of the subject genus is ignored. And, indeed, it has long been forgotten. Today, it is unknown to most.



## Conclusion

### The First Principles of Mathematics Summarized

Summarizing our findings, we have determined that mathematics is an intellectual virtue; for it makes whomever possesses it to be intellectually good in some mode (i.e., a good mathematician); and it renders the mathematician's intellectual operations good (►51.1, ¶1). Mathematics is intellectual—as opposed to practical—because it theorizes about necessary things (►51.3; 9.9). However, mathematics is not just any intellectual virtue; it is a science: that is, a habit of conclusions attained through foreknowledge of proximate causes that is had through induction, abstraction, and demonstration (►51.2; 51.7; 51.9); hence, mathematics is teachable. As all sciences, mathematics is not about singular or particular things, but about universals (►51.8; 62.3). And, as all intellectual knowledge, mathematics has its **(1)** principle (►Table 4), according to the order of cognition (►49.3, ¶1), in the apprehension of sense.

Table 4: The first principles of the speculative sciences according to the order of cognition.

<b>(1) Principle</b>	Apprehension of Sense		
<b>(2) Mean</b>	Apprehension of Imagination		
<b>(3) Mode of Abstraction</b>	Total Abstraction	Formal Abstraction	Total Separation
<b>(4) Abstraction From</b>	Individual Matter	Sensible Matter	Intelligible Matter
<b>(5) Matter after Abstraction</b>	Sensible Matter	Intelligible Matter	No Matter
<b>(6) Mode of Proceeding</b>	Reasonably	Disciplinarily	Intellectually
<b>(7) Terminus</b>	Sense	Imagination	Intellect
<b>Speculative Science</b>	<b>Physics</b>	<b>Mathematics</b>	<b>Metaphysics</b>

The apprehension of **(2)** imagination proceeds from the apprehension of the external sense faculty as some motion produced from it (►58.14). Intellective apprehension proceeds from the apprehension of imagination through **(3)** the abstraction of the intellect (►49.8; 58.13). Since, in the diverse speculative sciences (i.e., physics, mathematics, and metaphysics; ►58.15), the mode of abstraction is not the same, their **(7)** terminus is not the same, even if they have they the same **(1)** principle and **(2)** mean.

**Physics** (►Table 4, left column), like all the sciences, **(3)** abstracts the whole from the part (►49.11); that is, it abstracts a universal **(4)** from the individual matter of singular or

particular things (►13.12). Unlike the other speculative sciences, however, it does not abstract from (5) sensible matter (►13.13). Whence, (6) proceeding from thing to thing (►63.3), physics judges about the things of nature as they are shown by (7) sense.

**Mathematics** (►Table 4, middle), by (3) abstraction of form from matter (►49.10), also abstracts (4) from sensible matter (e.g., color, heat), leaving only (5) intelligible matter (►13.13; 18.18; 35.6; 49.12, ¶1a; 61.13; 62.3; 65.1, ¶3). It (6) proceeds according to the mode of learning (►65.5, ¶2; 66.5, ¶2) from principles known through another to principles known by themselves; and judges things as (7) imagination presents them (►58.15, ¶2).

**Metaphysics** (►Table 4, right), immediately through (3) separation, or abstraction through intellectual division, instead of external and/or internal sense apprehension (►49.8, ¶2; 49.12), abstracts (4) from intelligible matter, leaving (5) no matter whatsoever (►58.15, ¶3). It (6) proceeds according to the mode of the intellect insofar it gathers one simple truth from many (►59.7); and judges things (7) as the intellect presents them.

Insofar as they are habits (►58.1; 58.2), the sciences are not diversified according to the material diversity of scientifically knowable objects, but according to their formal diversity (►58.3; 58.9). Indeed, the *ratio* of a thing is taken from its principles (►8.1); and just like the formal *ratio* of *visible* is taken from light, whereby color is made visible, so the formal *ratio* of a scientifically knowable object is taken according to the principles from which something is scientifically known (►Table 5). Hence, mathematics is not a single science, but two sciences: arithmetic and geometry. For science is had through demonstration, and demonstration is had from a definition by the proper principles of a subject genus (►56).

Table 5: The first principles of the speculative sciences according to the natural order of being and *ratio*.

Speculative Science		Subject Genus	Ratio Added	Principle
<b>Metaphysics</b>		Being	<i>Non-Division</i>	(Metaphysical) One
<b>Mathematics</b>	<b>Arithmetic</b>	Number, (Measurable) Multitude, Discrete Quantity	<i>Measure</i>	(Arithmetical) One, Unit
	<b>Geometry</b>	(Measurable) Magnitude, Continuous Quantity	<i>Position</i>	Point
			<i>Length</i>	Line
			<i>Width</i>	Surface
		<i>Depth, Height</i>	(Geometrical) Body, Solid	
<b>Physics</b>		Mobile Being	<i>Motion</i>	(Natural) Body

Thus, subject is related to science like object is related to habit; and the unity of a science is had from the unity of its subject genus (►58.6; 56). Hence, those things that are composed from the same principles belong to the same science (►58.7, ¶1).

Following the principles of knowing quantities (►62.7; and Table 5), number belongs to arithmetic because it is composed from indivisible units. These units are the parts by themselves of number (►58.7, ¶2). Its affections by themselves (i.e., its properties) are, for example, odd or even, prime or composite. Likewise, lines are composed from lines; surfaces, from surfaces; and bodies from bodies. These are the parts from which they are composed as from first principles. But all of these magnitudes belong to the science of geometry because they can be reduced to the same subject genus (►14.3). Thus, bodies are reduced to surfaces; surfaces, to lines; lines, to points (i.e., *a line is produced and measured from point to point—not that a line is composed from points*; ►39.7; 39.9, ¶1).

We ought not to confound the subject genus with the predicable genus (►14.1). The subject genus is the genus used by the scientist, while the predicable genus is the genus used by the logician (►21.11). The highest genera (►33) are univocal to the logician, but *pros hen* (πρὸς ἓν) equivocal / analogous to the scientist (►21.12). This is true not only of substance (►21.11), but also of quality (►36.1; 36.2) and of quantity (►35.4). This is also why there is no mathematical science of quantity insofar as it is a quantity (►60.4).

The scientific study of common quantity belongs to metaphysics, not to mathematics. For example, it is the metaphysician who determines that **measure** is *that whereby a quantity is known* (►28.1); and that this measure is something one (►27.8) according to analogy (►38.1). Therefore, quantity, too, is analogical (►38.1). And if *quantity* is analogical, it must be divided according to its modes (►20.12, ¶3). Wherefrom, *quantity* is divided as something common according to prior and posterior (►27.2, ¶2). Thus, quantity is divided by the metaphysician into *virtual* and *dimensive* (►22.1). Dimensive quantity is found only in material things, while virtual quantity is found in all forms. Metaphysics determines, too, that number is prior to magnitude (►62.7) because of the order of dependence (►47.2).

Logic can treat of quantity in common, too; for its subject is, in some mode, the same as that of metaphysics (►52.6, ¶1). But logic can prove something only from intellectual intentions (►21.1, ¶2a), which are the common works of reason (e.g., as algebra/analysis proves—through common principles—something about quantities; ►67.2), and not from certain, necessary, real principles. Indeed, logic is not a speculative science (►58.18).

The principles of the speculative sciences are had by addition (►18.5). Thus, the unit is the “formal light” whereby number is knowable in arithmetic; for it adds to the metaphysical

one the *ratio* of *measure*, whereby we come to know the quantity of a multitude. Likewise, the point is the formal *ratio* whereby all magnitudes are ultimately known in geometry.

Since these principles are had by addition, the subject and the principles of mathematics are virtually contained in the principles of physics (► 64.1, ¶2), just like the subject and principles of metaphysics are contained in those of mathematics. Wherefrom, physics can use the principles of mathematics in demonstration (► 64.7). When the physical sciences apply mathematical species to sensible matter, they somehow agree in a genus, and, analogously, can even be said to be mathematical (► 64.6).

The more principles are added, the less a science has certitude (► 65.1, ¶3). Thus, mathematics is more certain than physics because it abstracts from motion (► 65.5); however, in respect of us, it is also more certain than metaphysics because it is closer to sense-cognition, whence our knowledge takes its principle (► 49; Table 4).

### **Status Quaestionis Updated**

Having determined the first principles of mathematics, we turn our attention to how these findings advance our knowledge beyond what other Aristotelian/Thomists have said about first principles in common and about the first principles of mathematics in particular.

There are many works that treat of first principles in common (indeed, all the Thomistic manuals on metaphysics should do precisely that). The list is daunting, but we have examined at least some of the most important classical and recent works, including those of Edouard HUGON, James Bacon SULLIVAN, Henri Chanoine COLLIN, Henri GRENIER, Santiago Maria RAMÍREZ, Joseph OWENS, Jesús GARCÍA LÓPEZ, John F. WIPPEL, William Norris CLARKE, Eudaldo FORMENT, Edward FESER, and Peter A. REDPATH.<sup>1</sup>

While all of these works have something important to say about first principles in common, only the most recent, those of Peter A. REDPATH, treat about the subject genus (that is,

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<sup>1</sup> Edouard HUGON, *Cursus Philosophiae Thomisticae*, vol. 3 (Paris: Lethielleux, 1935); James Bacon SULLIVAN, *An Examination of First Principles in Thought and Being in the Light of Aristotle and Aquinas* (Washington, D.C.: The Catholic University of America Press, 1939); Henri Chanoine COLLIN, *Manual de Filosofía Tomista*, 2 ed., 2 vols., vol. 1 (Barcelona: Luis Gili, 1950); Henri GRENIER, *Cours de Philosophie*, vol. 1 (Québec: Les Presses Universitaires de Laval, 1953); Santiago (aka Jacobus) María RAMÍREZ, *De ordine placita quaedam thomistica* (Salamanca: San Esteban, 1963); Joseph OWENS, *An Elementary Christian Metaphysics* (Milwaukee: The Bruce Publishing Company, 1963); Jesús GARCÍA LÓPEZ, *Lecciones de Metafísica Tomista. Ontología: Nociones Comunes* (Pamplona: EUNSA, 1995); John F. WIPPEL, *The Metaphysical Thought of Thomas Aquinas* (Washington, D.C.: The Catholic University of America Press, 2000); William Norris CLARKE, *The One and the Many: A Contemporary Thomistic Metaphysics* (Notre Dame, Indiana: University of Notre Dame Press, 2001); John F. WIPPEL, *Metaphysical Themes in Thomas Aquinas II* (Washington, D.C.: The Catholic University of America Press, 2007); Eudaldo FORMENT GIRALT, *Metafísica* (Madrid: Palabra, 2009); Edward FESER, *Scholastic Metaphysics: A Contemporary Introduction* (Piscataway: Editiones Scholasticae, 2014); Peter A. REDPATH, *A Not-So-Elementary Christian Metaphysics*, 2 ed., vol. 1 (St. Louis: Enroute, 2015); vol. 2 (St. Louis: Enroute, 2016).

the genus of the philosopher-scientist rather than the logician), of virtual quantity, and of the metaphysical (rather than logical) theory of opposition, on which the whole of St. Thomas's doctrine on first principles stands. Let us, therefore, briefly examine how our findings relate to his. According to REDPATH's thorough definition,

Generically considered (considered according to its genus), science/philosophy is mainly a maximally-perfected habit of the soul of a rational animal: *a perfectly-formed, psychological habit of wondering* chiefly concerned about pursuing (loving) and achieving (having) maximum perfection (highest virtue) in exercising individual and cultural, generational and transgenerational, leadership excellence (wisdom/prudence) in organizational psychology: understanding the proper principles and causes that multitudes use essentially to harmonize among themselves to become parts that cause organizational wholes to exist and operate the way they do.<sup>2</sup>

Indeed, as we have determined, philosophy is a psychological habit that exists in the human intellect (►58). It has wonder as its principle (►50.15).<sup>3</sup> It pursues virtue (►51), which is a maximum perfection (►22.15; 22.2; 23) in the exercise of an operation of excellence (►22.9) in leadership (i.e., because it behooves the wise and prudent to order; ►8.12; 51.20). This operation is not merely individual, but—as REDPATH adds—also cultural and transgenerational (a key characteristic that we did not explore in depth in this work, but which is clearly present in ARISTOTLE and St. Thomas);<sup>4</sup> for it can be taught (►51.2). This is a leadership that involves an understanding of proper principles and causes (i.e., the proper principles of a genus; ►56) of organizational wholes (i.e., because a genus is a whole that is harmonically composed from many parts; ►14). These principles cause the unity of such wholes both in existence and in the specific operations they perform (►22.3).

Thus, the subject genus is what ultimately determines the nature of its properties. For example, it is because the number two is a multitude composed from indivisible units that it can be divided into two equal parts that are, in turn, indivisible; and, since the parts of the number two are all units, it is a prime number; for the indivisible unit is what first measures any number. This is the principle that makes a number diverse in genus from any magnitude: no line, surface, body or angle is indivisible; nor can any of them be prime (►3.2; 3.4). As REDPATH adds:

Specifically considered (considered according to its specific difference), science/philosophy is a maximally-perfected psychological habit chiefly interested in *wondering in a qualitatively unique way* about this or that *qualitatively organized multitude* according to a *qualitatively unique*

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<sup>2</sup> Personal communication, but all contained at least implicitly in his *A Not-So-Elementary Christian Metaphysics*, as will become clear presently.

<sup>3</sup> REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 2, 20–28.

<sup>4</sup> See, for example, *In Metaph.* 2, l. 1, §§273–288 (cf. ARISTOTLE, *Metaphysica* α.1, 993a30–b19).

*harmonic, or organizational, unity that causes a qualitatively unique organizational whole to come into being and operate the way it does.*<sup>5</sup>

It would seem, contrary to what REDPATH says here, that the wholes that mathematics studies do not operate in any way—indeed, mathematics abstracts from motion. However, we must consider that mathematics is a science; and that all sciences use motion in some mode (►48.10, ¶2). This motion, too, is determined by the subject genus, as is evident from the constructive postulates in EUCLID’s *Elements* (i.e., to draw a straight line from any point to any point; to produce a finite straight line continuously in a straight line; and to describe a circle with any center and interval; all of which use the principles of a genus).

Thus, of all the authors we examined, only REDPATH distinguishes between this genus and the genus of the logician (►21.11).<sup>6</sup> Only he shows the relation between the nature of philosophy and virtual quantity (►22), opposites (►42), first principles (►45), and the problem of the one and the many (►40; 44).<sup>7</sup> He even goes beyond CROWLEY in showing how the latter problem relates to that of being a measure (►28).<sup>8</sup> He alone correctly identifies the origin of all species (in the Aristotelian sense of the word), being a measure, and analogous predication in the relation of the metaphysical principles of unity, virtual quantity, and privation (►16.7).<sup>9</sup> And he alone accurately relates the divisions and methods of the human sciences (►58) to equal and unequal qualitative measurement, contrary opposition (►44), and analogous predication (►20).<sup>10</sup>

In view of REDPATH’S work, we could hardly claim to have made much progress when it comes to establishing St. Thomas’s teaching on first principles in common. Perhaps our only “merit” has been to vindicate his findings using exclusively the words of St. Thomas. If so, analogously, this would equal the merit REDPATH claims for himself: to have vindicated the research of CROWLEY and MAURER.

Let us, therefore, turn to the first principles of mathematics—in particular—to determine whether those authors who have treated about them (as summarized in the *Status Quaestionis* section of our Introduction) do in fact agree with St. Thomas and ARISTOTLE.

1. According to WHITTAKER, modern “pure” mathematics is “consonant with the principles of St. Thomas.” Clearly, this is in part true and in part false. It is true analogically and

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<sup>5</sup> Personal communication, but also contained in his *A Not-So-Elementary Christian Metaphysics*.

<sup>6</sup> REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 2, 30–43.

<sup>7</sup> *Ibid.*, 70–80.

<sup>8</sup> *Ibid.*, 82–95. See Charles Bonaventure CROWLEY, *Aristotelian-Thomistic Philosophy of Measure and the International System of Units (SI)* (Lanham, New York, London: University Press of America, Inc., 1996).

<sup>9</sup> REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 2, 99–108.

<sup>10</sup> *Ibid.*, 70–80.

universally speaking; for, in this mode, the principles of all things are the same (►45.9). On the other hand, if we compare—not universally, but in particular—the principles of ancient Greek mathematics to the principles of modern so-called “mathematics,” it is clear that they are not “consonant.” Indeed, the *ratio*, or definition, of a thing is taken from its principles (►8.1). Therefore, those things that agree only in the name of *mathematics* but differ in their definition cannot have common principles. Since *mathematics* is said in multiple modes, it will be impossible to find its proper principles unless the multiplicity of things signified is divided (►20.12, ¶2); and it is impossible to assign distinct principles to those things that have in common only the name of *mathematics* unless principles are assigned necessarily to the things that are diverse. We know what the principles of ancient Greek mathematics are, but no one is able to tell us with any certainty what the principles of modern so-called mathematics are. Even if we take the axioms of set theory to be the proximate principles of modern so-called mathematics, then it is evident that they are not “consonant with the principles of St. Thomas” in particular, as we have shown (►69).

According to WHITTAKER, the first criterion for the division of speculative science is *total abstraction*, whereby intelligible being (*esse intelligibile*) is divided into being (*ens*), quantitative being (*ens quantum*), and qualitative being (as he translates *ens mobile*). Alas, this is impossible. The *ratio* of *being*, like all first principles, is not had through total abstraction, which is the abstraction of a universal from its particulars. Indeed, strictly speaking, *being* is not a genus (►30.11), and total abstraction abstracts the universal from particulars in some genus; for it abstracts from individual matter (►49.11), which is common to all things that are of the same genus (►41.30); hence, total abstraction preserves common matter. Moreover, *being* is what the intellect knows first (►49.7, ¶1) and without matter (►58.15, ¶3). Indeed, since *being* is a first principle, it must be known through intellectual division: that is, through total abstraction, total separation, from sensory assistance (►49.12), following the order of dependence (►47.2).

According to WHITTAKER, the second criterion for the division of speculative science is *formal abstraction*, whereby knowable being (*esse scibile*) is divided into three formalities: as immutable (*ut immutabile*), as mutable (*ut mutabile*), and as changing (*ut mobile*). Again, this division is completely foreign to St. Thomas. Through formal abstraction, the intellect abstracts from sensible matter, but not from intelligible matter (►49.10). However, the *ratio* of *motion* is not added or removed by this mode of abstraction: this intelligible principle is added by physics and is what constitutes the formal—as opposed to the material—object of that science, which studies both the *mutabile* and the *mobile* (►48.2).

Based on his peculiar account of the theory of total and formal abstraction, WHITTAKER claims that mathematics treats of *quantitative being as mutable*, while the philosophy of

mathematics treats of *quantitative being as immutable*, clearly advocating the modern separation of philosophy and science—including mathematics. This is utterly alien to St. Thomas, who clearly states that the mathematical sciences are philosophical, and that there is no mathematical science of quantity insofar as it is a quantity (► 60.4). Evidently, although WHITTAKER claims that his hierarchy of the speculative sciences is based on the fifth and sixth questions of St. Thomas's commentary on BOETHIUS's *De Trinitate*, he is actually "guided" more by MARITAIN's *The Degrees of Knowledge*.

2. ÁLVAREZ LASO claims that all sciences have in common the "third stage": the stage of "deductive theorems." What would set mathematics apart is the rigor of its demonstrations, making it the most certain of the sciences.

Alas, this is clearly false. Deductive reasoning, even if it should be formally valid, is not enough for there to be science. Science is had only through demonstration, which further requires some material conditions (► 53.6). Prominent among these material conditions, is the subject genus (► 56.1, ¶3), which, together with its principles, is what distinguishes the sciences (► 58.6; 58.9). "Rigor" in demonstration has nothing to do with this distinction. Mathematics has more certitude (in respect of us) because it has fewer principles than physics, on the one hand, and because it is closer than metaphysics to sense-cognition (► 65), on the other.

3. SMITH is right in saying that EINSTEIN's view about the nature of geometry is "over-empirical." The space that the physicist and the geometer consider is not the same in respect of the mode of consideration: the physicist—unlike the mathematician—does not abstract from sensible matter. If it should be the same, mathematics would have to be both prior and posterior in respect of physics, making all particular sciences impossible.

SMITH is also right in saying that, on the other extreme, the opinion of logical empiricists, such as HILBERT and RUSSEL, is "over-formal," turning mathematics "into a kind of logic." Indeed, the genus of the logician is not the subject genus of the scientist-philosopher.

SMITH's account of the order of dependence among substance and accidents is, also, correct (i.e., substance is first; then, quantity; then, the qualities). This is, ultimately, the metaphysical foundation of mathematical abstraction.

However, SMITH is wrong in arguing that the form considered by geometry is *sui generis*, "neither substantial nor accidental." He claims to base this conclusion on St. Thomas: the geometer does not abstract from intelligible matter, which is substance. However, strictly speaking, the subject matter of the geometer is not substance, but magnitude, which is a



continuous quantity. The form that the geometer first considers is the qualitative figure constituted by the terminus or termini of a magnitude (►14.1, ¶1). Therefore, the geometer presupposes dimensive quantity (►35), but need not go any deeper, since this is the ultimate subject that is considered by geometry. In other words, the qualitative form that the geometer first considers is any affection of magnitude.

It is true that intelligible matter is ultimately to be identified with substance. However, the same order that SMITH has correctly underscored must be considered: first, substance; then, quantity by reason of matter; then, figure, which is like the form of dimensive quantity (►36.1, ¶2; 36.5), and which depends on a substantial form (►36.14), rather than on first matter (►36.17). Thus, the form that the geometer considers is, like all other proper affections, some accident that results from the principles of the subject. Therefore, it is not *sui generis*, “neither substantial nor accidental.”

4. HOENEN is quite right in pointing to ARISTOTLE’s *Posterior Analytics* as key to resolving the problems of the moderns. It is in this work that the Stagirite treats at greater length about the material conditions of demonstration—notably, the subject genus. More doubtful is his claim that the problems of the moderns are a means to interpreting ARISTOTLE. Quite the contrary, the problems of the moderns have been created by misunderstanding, misrepresenting, or ignoring the principles that he discovered (►67.5). However, HOENEN rightly states that a hypothetic-deductive system (such as that sought by the moderns) is not enough for there to be a science of geometry.<sup>11</sup>

What we should never undervalue is HOENEN’s unrelenting call to pursue this part of philosophy.<sup>12</sup>

5. ANDERSON, like many others, is mistaken in claiming that “the general object of mathematics is quantity.” In fact, this is the “original sin” of modern so-called mathematics (►67.4). Again, according to St. Thomas, there is no mathematical science of quantity insofar as it is a quantity (►60.4). Nor is mathematics “a science in the highest sense” because “it uses definitions as its middle terms,” as ANDERSON claims. It is not enough to define the middle term: the definition must be done from the principles (*primo et per se*) of the subject genus (►53.11). Indeed, the definition of the affection cannot be perfected without the definition of the subject; and it is manifest that the principles that the definition of the subject contains are the principles of the affection (►55.12).

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<sup>11</sup> HOENEN, *De noetica geometriae*, 24: “Geometria enim classica non *solum* per systema hypothetico-deductivum reinventa est.”

<sup>12</sup> See, for example, *ibid.*, 25: “Ex brevi hoc conspectu concludere licet: in hac parte philosophiae magno cum dolore videmus absentiam inquisitionum scholasticorum.”

Both of these errors are, once more, a defect caused by ignorance concerning the subject genus. ANDERSON makes other mistakes that can be explained by the unfaithful versions he is reading; so we shall not hold him accountable for them (as already noted, recent translators of ARISTOTLE—and St. Thomas—can get very creative; ► 7.4, ¶1).

To ANDERSON's question concerning "the freedom of the mathematician," we answer, following ARISTOTLE, that this is like asking about the whiteness of the musician. Again, this doubt arises from ignorance of the subject genus. Human freedom is partly a property of the will that essentially and proximately causes such freedom to exist. The mathematician—as such—is determined in his operations to the properties of the subject genus about which he wonders: either those of measurable multitude or those of measurable magnitude. The mathematician-philosopher becomes happier when he determines the cause of the property in the subject: the higher the cause, the happier he will be (► 66.3). In short, the question of "the freedom of the mathematician" smells of Kantianism (► 68.2, ¶7) more than Aristotelianism.

6. RIOUX rightly notes that, according to St. Thomas, "there is no general mathematical science apart from the sciences of arithmetic and geometry (which have their own distinct subjects), no universal mathematics which studies quantity considered in itself." However, he is wrong in concluding that the subject of arithmetic is not number, but the unit. Indeed, this conclusion is hardly faithful to St. Thomas, who clearly states that both the unit—i.e., the one that is the principle of number—and number—i.e., numerical multitude, which is a species of quantity—posit something in creatures: an accident added over *being*.<sup>13</sup>

It seems to us that there are two pitfalls that RIOUX is trying to avoid with his position. The first one is that—otherwise—number would have to be an accident common to many individual substances, which seems metaphysically impossible (indeed, accidents cannot even "migrate" from subject to subject, so how could they simultaneously be in many?). To this, we answer that quantity is the first accident that inheres in substance, and that it inheres by reason of matter. Therefore, this accident affects only first matter; and this very same matter is common to all things that are generable in respect to each other. Hence, there is no contradiction in positing an accident that divides matter into many. In fact, without such an accident there would be only one, indivisible substance (► 35.17).

The other difficulty that RIOUX seems to be circumventing is what he calls the "frame of reference" when determining the number of physical things, such as "cows in a field": for

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<sup>13</sup> *In Sent.* 1, d. 24 q. 1 a. 3 ad 3: "multitudo numeralis, quae est species quantitatis, ponit aliquid in creaturis." *STh* I, q. 30 a. 3 co.: "Numerus autem qui est species quantitatis, ponit quoddam accidens additum supra ens, et similiter unum quod est principium numeri."

“depending upon which frame of reference we choose, the number of cows will change.” Again, this question has to do with the subject genus; but let us deal first with the problem of how number can truly exist, and then with what RIOUX calls “physical numbers.” Thus, as St Thomas says, the unit adds an accident over *being*, which is *to be a measure* (►28). Of course, since *being* is analogical, the measure itself is analogical: it is diverse in diverse genera. However, a multitude of beings is numerable at least in potency; hence, there is a number at least in potency (►62.6). Now, **measure** is *that by which the quantity of a thing is known* (►28.1). Hence, for there actually to be a number, there must be something capable of numbering. And actual number depends on an intellect only if it is the cause of the things numbered (►62.6); otherwise, the intellect that numbers is not what measures, but what is measured (►28.12). This resolves the problem of *number* absolutely taken; for the first “frame of reference” in every genus is the cause of the numerable multitude.

Let us, therefore, take the first *physical* genus in which there can be number: corporeal substance. Again, this genus is univocal to the logician, but *pros hen* (πρὸς ἓν) equivocal / analogous to the philosopher;<sup>14</sup> so let us suppose that we are referring to *corruptible substance* alone. Thus, since there are many—but not infinite—corruptible substances, there is a number of corruptible substances at least in potency (insofar as they are *numerable*). Again, only the intellect that causes these substances knows the number in act. But we, too, can come to know this number by counting; when we do so, we are measured by the things we count. And the same can be said of any genus—even cows. Indeed, number is a multitude *measurable* by the unit; and the number of cows is a numbered number (►34.4, ¶2)—not the number of the arithmetician.

All this should also answer another question raised by RIOUX but prompted by FREGE: “Why should we call the unit a property of a thing when it appears to be interchangeable with being?” The answer is simple. As St. Thomas explains, the *one* that is convertible with being is not the same *one* or *unit* that is the measure of number (►38.1, ¶1, ¶2).

Finally, there is no need for an “art of arithmetic,” which RIOUX posits to elude the problems of *zero*, *negative*, and *irrational* “numbers”: *number* is here said analogically (►68).

7. MAURER, too, rejects the position that “the objects of mathematics are real entities.” According to him, numbers are “concepts” that have their “proximate foundation” in “a constructive act of the mind.” Evidently, from what has just been said (see footnote 13), this goes against the teachings of St. Thomas. However, MAURER believes he is faithfully

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<sup>14</sup> *In Physic.* 7, l. 7, n. 9 (cf. ARISTOTLE, *Physica* H.4, 248b15–19): “quantitatem et unitatem, quae est principium numeri, non secundum eandem rationem contingit invenire in corporibus caelestibus et in igne et in aere et aqua.”

following him, suggesting that St. Thomas changed his mind later in life. If this were true, the implications would be far reaching. For example, we would have to conclude that time is not real either (►62.6). Even more troubling, all the particular sciences would be destroyed, since their principles are had by addition to the principles of mathematics.

On closer inspection, however, the key to MAURER's argument is his interpretation of one word: *adinvenit* (i.e., *finds out; devises*),<sup>15</sup> "which has the double meaning of discovering and inventing," as he graciously admits. Yet, MAURER does not even attempt to harmonize his interpretation of *adinvenit* with other texts that are evidently incompatible with *inventing* (e.g., the discovery of real order; ►21.7, ¶1). Instead, he dismisses both earlier and later texts: earlier texts, as though they had been silently abrogated; later ones, as though they are only stating someone else's opinion. Therefore, his interpretation can only hold true if such texts had been considered null and void by St. Thomas—who never says as much.

This illustrates very clearly how dangerous is the assumption of those who presuppose a heterogenous evolution of the doctrine of St. Thomas. In our days, there is even a Thomist (otherwise deservedly celebrated) who claims, following the same method, that St. Thomas changed his mind *twice* in his life concerning the principle of individuation. In what way is this different from the Islamic doctrine of koranic abrogation (نسخ *nash*), according to which a later verse supersedes an earlier one whenever they are thought to be contradictory because of difficulties in harmonizing them?

Indeed, this is the same "archeological" method that Werner Wilhelm JAEGER applied to ARISTOTLE's works, leading to fantastic results without support in any solid evidence. We have already seen some of the ridiculous results that similar presuppositions have had in the history of mathematics (►5.7). And there are many other examples. As Ken SAITO says concerning the approach of Oskar BECKER and his followers to (the fiction of) the "foundational crisis" in ancient Greek mathematics as "reflected" in EUCLID's *Elements*,

Such a historiography also seems to have encouraged the "archeological approach," another characteristic of the historiography of the twentieth century: if you find some idiosyncrasy in the *Elements*—roundabout arguments, avoidance of the use of proportion, etc.—you should assume it to be a reflexion of some earlier stage in the development of Greek mathematics. In short, the *Elements* were regarded as if it were an archeological site where one could excavate the remnants of earlier mathematics.<sup>16</sup>

For our part, instead of "excavating the strata" of the *Corpus Thomisticum*, we prefer to follow the true method of St. Thomas, who rejects analogous claims about St. AUGUSTIN:

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<sup>15</sup> See LEWIS and SHORT, *A Latin Dictionary*, entry for *ādinvenīo*.

<sup>16</sup> Ken SAITO, Introduction to Part 3 of *Classics in the History of Greek Mathematics*, 188.

“some say all such expressions are false and retracted [...]; but this seems unbefitting, since Augustine especially expressed those [positions] that he wanted to retract.”<sup>17</sup> Indeed, we cannot expect from St. Thomas less than he expects from St. AUGUSTIN: let others produce evidence that St. Thomas did, in fact, especially express his retraction.

Still, MAURER tries to reconcile the real with the mental by claiming that the mathematician “visualizes mathematical notions,” which “exist in reality as natural and visual quantitative features of bodies” by “reconstructing them in an ideal way.” To us, this seems like an insufficient attempt at backpedaling. It is true that mathematical things do not exist in reality as they are in the mind; but the reason for this is to be found in formal abstraction. Indeed, everything is received according to the mode of the receiver (►26.3).

We find it very hard to believe that MAURER should have held such views after his 1953 translation of (and superb commentary on) Thomas AQUINAS, *The Divisions and Methods of the Sciences: Questions V and VI of his Commentary on the De Trinitate of Boethius*.

**8.** We entirely agree with Alberto STRUMIA in his call to return to a realism in mathematics “informed by the Thomistic theory of analogy.” His approach to “formalizing” Aristotelian-Thomistic metaphysics and epistemology using “formal ontology” is impeccable. Indeed, analogical predication must be reduced to univocal predication, as STRUMIA does in his “formalization” of the  $\in$  symbol based on the eight modes in which “to be in” is said of something (►29.1). We have already explained why this should be the case (►69.1).

However, univocal predication must, in turn, be reduced to one, first, non-univocal, analogical principle, which is *being* (►46.21). This is where we think the “formalization” of *being* using the NBG *class* is doomed. Indeed, the genus of the logician (on which set theory is based) is not the genus of the philosopher-scientist (►21.11); and, consequently, the analogy of the logician is not the analogy of the philosopher-scientist (►21.12).

At the end of this Conclusion, we shall offer our own proposal, which is not based on set theory, but on ancient Greek geometry—which is foundationally realist and analogical.

**9.** To those who, like APOSTLE, claim to follow ARISTOTLE in saying that quantity is the unifying subject of mathematics, we reply that, according to ARISTOTLE, the diversity of sciences is not had from the diversity of subjects, but from the diversity of principles (►58.9). Moreover, no mathematical science can demonstrate from common principles alone (►56.5); and such demonstration is in one subject genus (►56.2).

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<sup>17</sup> *In Sent.* 1, d. 32 q. 1 a. 1 co.: “Quidam enim dicunt omnes hujusmodi locutiones esse falsas [...]. Sed hoc non videtur conveniens; quia Augustinus ea quae retractare voluit, specialiter expressit.”

That quantity is a common principle is evident. It is this common quantity that is supposed in common notions (i.e., axioms) such as “those which are equal to the same are also equal to one another,” “if equals be added to equals, the wholes are equal,” and “if equals be subtracted from equals, the remainders are equal.” ARISTOTLE clearly shows how the demonstrative sciences should use such common principles only in as much as they pertain to the subject genus that is contained under that science (►56.6).

In fact, the whole idea that quantity should be the subject of mathematics is a modern fabrication with roots in the Renaissance, and not really in ARISTOTLE, as we have already shown (►67.4; 67.5; 67.6; 7.4).

**10.** We agree entirely with the Sydney School in the Philosophy of Mathematics in that “mathematics is not about other-worldly entities like numbers [i.e., the modern fabrication] or sets, nor a mere language of science, but a direct science of structural features of the real world like symmetry, continuity and ratios.”

However, we disagree with FRANKLIN’s claim that the study of “structure,” as exemplified by Leonhard EULER’s pioneering solution to the problem of the seven bridges of Königsberg,<sup>18</sup> would be a completely new subject matter. True, this part of mathematics was not developed before the eighteenth century; but that does not mean that it belongs to a new subject genus that cannot be reduced to the subject genus of an existing mathematical science. In fact, it is reduced to the subject genus of geometry: magnitude.

To understand why the problem of the seven bridges of Königsberg, for example, should be a problem of geometry, let us first consider an analogous case. Thus, we find that the properties of *square* and *cubic* numbers were studied by early Pythagorean arithmetic; ARISTOTLE even talks about *triangular* numbers (►4.7). Yet, it would seem that these properties do not pertain to numbers; for the principle of number is the unit, which does not have a position (indeed, position is altogether extrinsic to number), while figures such as squares and triangles require a positioned unit—that is, a point.

However, as we have already observed (►4.7), numbers have specific properties that determine the geometric-like configurations they are apt to take (►15.23) when their units are positioned relative to each other. For example, the number three—unlike the number four—cannot be configured in the shape of a square. Thus, although these properties do not belong to number as such, we can study the arithmetical properties of numbers to determine whether they can be extrinsically configured into some geometrical shape.

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<sup>18</sup> See Leonhard EULER, “Solutio problematis ad geometriam situs pertinentis,” *Commentarii Academiae Scientiarum Imperialis Petropolitanae* 8 (1736), 128–146.

Something analogous happens in the case of the seven bridges of Königsberg. For the problem is to find a path through the city that would cross each of the bridges only once. Hence, just like geometry adds position and order to the unit of arithmetic, so physics adds motion over the magnitude of geometry. And just like the arithmetician can determine which extrinsically produced shapes a specific finite multitude can take, so can the geometrician determine which paths can be practiced by moving over a magnitude, even if *motion* does not belong to the definition of *magnitude*. Indeed, such motions depend on the specific properties of a magnitude—and magnitude is the subject genus of geometry.

### The “Evolution” From Ancient Greek to Modern Mathematics

We are now in a position to resolve the questions raised in the Background section of our Introduction. We begin back to front with the evolution of modern so-called “mathematics” from ancient Greek mathematics. Thus, as NETZ and many others have observed, Greek mathematics—unlike Babylonian, Mesopotamian, and Chinese so-called mathematics—is deductive.<sup>19</sup> In fact, more than deductive, it is demonstrative—that is, scientific (► 53.2). Thus, *mathematics* is said analogously of the former and of the latter. In its original, ancient Greek signification, this name referred primarily to the mathematical sciences: arithmetic and geometry; and secondarily, to the mean or subaltern sciences, such as harmonics and perspective (► 1), which are called *mathematical* insofar as they apply the principles of the purely mathematical sciences to some physical matter (► 64.7; 64.6).

Nonetheless, the arts of calculation were also called *mathematics* by the ancient Greeks. When ascribing the origins of mathematics to the Egyptians, ARISTOTLE is speaking of the *mathematical arts* or techniques (αἱ μαθηματικαὶ [...] τέχναι; ► 50.12).<sup>20</sup> He is evidently implying that there is no demonstration in them, but that the Egyptians knew at least some properties of numbers and magnitudes, even if they ignored their causes. In other words, there was art before there was science. Indeed, only after we discover *that* something is so, can we come to wonder *on account of what* it is so—which is the principle of science.

Thus, *mathematics* was already said in multiple modes among the Greeks. On the one hand, they had the mathematical *arts*, logistic (λογιστική) and geodesy (γεωδαισία), by which they performed calculations with multitudes, and measurements on magnitudes, respectively. On the other hand, they had the mathematical *sciences*, by which they demonstrated the properties of multitudes and magnitudes. Only two of them, arithmetic (ἀριθμητική) and geometry (γεωμετρία), are purely mathematical: they demonstrate the properties of their respective subject genera using their proper principles. The others, in

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<sup>19</sup> Reviel NETZ, *The Shaping of Deduction in Greek Mathematics*, 311.

<sup>20</sup> See ARISTOTLE, *Metaphysica* A.1, 981b23–24.

contrast, demonstrate by applying the principles of the purely mathematical sciences to some physical multitude or magnitude (► 64). Thus, the ancient Greeks were quite aware that each of these arts and sciences deal with a proper subject genus—a subject that is the cause of its properties and of the corresponding operations: you do not count cows with a yardstick-unit; you do not measure a field with an ounce-unit.

Of course, the ancient Greeks used logic in all of these operations. Indeed, we owe logic, above all, to ARISTOTLE; and he clearly lays out the logical form and material conditions necessary for demonstration. Demonstration consists in analyzing, resolving a whole into the first proper principles of a subject genus; and this process is performed with the help of logic. Sometimes, however, this process cannot be completed because we ignore those very first principles. When two opposing suppositions are possible, we cannot carry out a perfect analysis precisely because the first principle in any genus must be *one*—not many. When this happens, we are in the realm of dialectic. However, our wonder cannot be put to rest until we find out what the principles of the subject genus necessarily should be.

At some period in history, however, the ancient Greek compass was lost, and the subject genus forgotten. More and more, science became logic. The breaking point in the case of mathematics was the Cartesian identification of algebra—an art of calculation introduced in the West through the Arabs—with the scientific method (► 67.6). As REDPATH says,

Descartes was no philosopher. Like Italian renaissance humanists before him, strictly speaking, he was a sophist. His sophistic method consisted of an elaborate reduction of philosophy to systematic logic (a logical system of supposedly clear and distinct ideas) as a means of separating mathematics and physics from the influence of metaphysics and revealed theology, while, simultaneously, identifying mathematics and physics with the whole of science, understood as a rational, logically-systematic, knowledge of sense reality.<sup>21</sup>

Indeed, algebra, as we have shown, is nothing but *the analytic part of formal logic that treats of quantity* (► 67.2). And this analysis is not scientific, since it does not resolve into the principles of a real subject genus, which is the genus of the scientist. Instead, it resolves into a genus that is merely predicable: the genus of the logician.

Wherefrom, due to ignorance concerning the distinction between the genus of the scientist and the genus of the logician, the name *number* came to signify an *abstract quantum* (which is a predicable genus to the logician) instead of a *multitude measurable by a unit* (which is the subject genus of the arithmetician). Likewise, algebra, or analysis, came to be identified, first, with mathematics as a whole; and thereafter, as the universal science

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<sup>21</sup> REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 1, 14. For a detailed account, see his *Cartesian Nightmare: An Introduction to Transcendental Sophistry* (Amsterdam - Atlanta: Rodopi, 1997).



of mathematics (which is nothing short of an oxymoron). Consequently, quantitative analysis (►52.6, ¶1) became “pure mathematics,” while quantitative dialectic (►52.6, ¶2) became “applied mathematics.” And whatever could be reasonably proven by quantitative logic (whether analytic or dialectic) came to be called *mathematics*.

With this Cartesian revolution, true science was destroyed. Indeed, the abstract quantum is but an unreal product of reason that has no inherent causal power. The subject genus, in contrast, is a proximate and proper cause of the existence of its real properties and operations. Truly scientific mathematics determines the formal causes of real multitudes and magnitudes. Truly scientific physics determines the formal, material, efficient, and final causes of real, natural subjects. Modern so-called “physics” consists, instead, in the purely rational exercise of dialectically proving that some logical, abstract quantitative relations are analogous to some empirical phenomena. Whence, the endless cycle of experimentation, formation of dialectical hypotheses, and verification that we ludicrously call “the scientific method.”

We must, therefore, conclude that SASAKI is right in crediting DESCARTES with a “paradigm shift” (if by *paradigm* we understand *that in the likeness of which something comes to be as from a principle*; ►9.6), and a “revolution.” However, it is not a “scientific revolution,” as he claims, following KUHN: it is a logical one. Modern so-called mathematics was not “raised to the level of Archimedean mathematics, the highest achievement of classical Greek mathematics,” but degraded from demonstrative science to mere dialectical proof.

We also agree with KLEIN in his claim that modern algebra stems from reinterpretations of ancient concepts—particularly that of *number*—, if by “reinterpretations” we understand *equivocations*. Indeed, it is not that the concept of *number* was “reinterpreted.” Rather, the name *number* came to signify something that already had another name since ancient times: *quantity* (what ARISTOTLE calls ποσόν), which is first divided into *multitude* and *magnitude* (►34.2), and into *virtual* and *dimensional* (►22.1). Thereafter, it would acquire other significations already known to the ancients: a *ratio between quantities* in NEWTON (►68.1; 37.1, ¶1); a *specifying terminus* in DEDEKIND (►68.2; 48.21; 16.6). Nothing new.

On the other hand, the so-called “historical” accounts that LEWIS mentions, which “have generally taken the extension of the number concept as a key indicator of the growth of the whole of mathematics,” are nothing but fantasy: the ancient Greeks did not “recognize irrational numbers” (►5.6); and “concept extension” is self-contradictory (►68.2, ¶7).

### **The Relation between Ancient Greek and Modern Mathematics in Historiography**

Next, we turn our attention to how the relation between ancient Greek and modern so-called mathematics affects the historiographical method used for these disciplines. Thus,

the controversy concerning the methodological approach revolves around the distinction between *form* and *content*. If by *content* we are to understand what is being signified (and by *form*, the mode of signifying), then the content of ancient Greek mathematics (science) is not the same as the content of modern so-called mathematics (logic).

Against ZEUTHEN, then, it is false that the “ideas” of ancient and modern mathematicians are really the same, and that only the language has changed. The science that the ancient Greeks were building has little to do with the logical systems of the Cartesians. But this does not mean that UNGURU, his critic, is right. Although ancient Greek mathematics, like any art or science, is a cultural product, it is also universal; and the same can be said of the analytic part of formal logic that treats of quantity, even if it is not materially scientific.

On the other hand, there is nothing wrong with studying arts and sciences from the point of view of the analytic part of formal logic that treats of quantity. For example, as long as we understand what we are doing, it is perfectly fine—very convenient, in fact—to use modern algebraic notation to express in a purely logical way the discoveries of the ancient Greek mathematicians—or of the practitioners of any other art or science, for that matter.

### **The Ancient Greek Algebra Myth**

It is evident that the ancient Greeks were proficient in the analytic part of formal logic that treats of quantity—what we modernly call algebra. However, the fact that they have left very little trace of it is an indication of how lowly it was esteemed in comparison to science.

Therefore, against NESSELMANN, ZEUTHEN, TANNERY, VAN DER WAERDEN, and all the other proponents of the “ancient Greek algebra” myth who claim, like the latter, that the ancient Greeks “thought algebraically even though they put their reasoning in a geometric dress,” we retort that this is nothing but Cartesian sophistry. Indeed, DESCARTES claimed that arithmetic and geometry are “the outer husk” of algebra (► 67.6); and his heirs are merely repeating the same deceptive “content” using a different “form.”

### **On Teaching Ancient Greek Mathematics Using Set Theory**

Having reached this point, it should be evident to the reader why it is harmful to teach ancient Greek mathematics from the tenets of the set-theoretical creed. As FOWLER implied, this widespread practice is nothing short of brainwashing.

Indeed, ancient Greeks would have the student discover by themselves, but with the help of the teacher, the *causes* that explain *on account of what* a subject necessarily possesses some *real* property that produced wonder before the demonstration came to be discerned. We have a splendid example in PLATO’s *Meno*, where a slave boy demonstrates, guided

by Socrates, the Pythagorean theorem that, given any square, a square drawn on its diagonal is double the size of a square drawn on its side (logically, that  $c^2 = 2a^2$ , where  $c$  is the length of the diagonal; and  $a$ , that of the side). These are subjects and properties that can be found in real things, even if they are not found in the same mode as they are considered by the geometer: that is, universally, and abstracted from sensible matter.

In contrast, the modern so-called “mathematician” uses unreal sets logically to prove some reasonable-but-unreal properties. Indeed, even if the process should be deductive and analytical, it begins from some so-called “axioms” that are less known than the conclusion itself; and it uses a mean that is not a definition in some subject genus. All this goes against the material conditions that are necessary to produce true scientific demonstration (► 53.6). Wherefrom, no real causes can be discovered. All that can be found by this method is some logical relation between concepts. If there should be some analogy with real things, the cause of this analogy remains a mystery to the so-called “mathematician.”

### **The Relation between Mathematics and Philosophy**

From what was just said, RUSSELL’s definition of so-called mathematics as “the subject in which we never know what we are talking about, nor whether what we are saying is true”<sup>22</sup> should not come as a surprise; for his conception of mathematics is purely logical: “If our hypothesis is about *anything*, and not about some one or more particular things, then our deductions constitute mathematics.”<sup>23</sup>

Indeed, the subject of logic is—in some mode—the same as the subject of metaphysics: *being*. However, logic and metaphysics use common principles diversely (► 59.6). First philosophy considers the parts of *being* and the properties that follow upon *being*. Logic considers, instead, those of the *being* that is a product of reason (► 30.5). Hence, it cannot demonstrate anything about the *real things* that are the subjects of the other sciences.

The analytic part of logic is what RUSSELL calls “pure mathematics,” as opposed to “applied mathematics.” And he believes that the common principles of “pure mathematics” cannot be said to be true; only when they are “applied” to something does their truth become determined (this is a dogma of faith that we have already found in set theory; ► 69.1).

Pure mathematics consists entirely of assertions to the effect that, if such and such a proposition is true of *anything*, then such and such another proposition is true of that thing. It is essential not to discuss whether the first proposition is really true, and not to mention what the anything is, of which it is supposed to be true. Both these points would belong to applied mathematics.<sup>24</sup>

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<sup>22</sup> RUSSELL, *Mathematics and the Metaphysicians in Mysticism and Logic*, 75.

<sup>23</sup> Ibid. Emphasis in the source.

<sup>24</sup> Ibid. Emphasis in the source.

Indeed, logic cannot determine the truth of its own principles; this belongs to metaphysics. This is why IRVINE is uncertain “about what mathematical knowledge is knowledge *of*.” Yet, what RUSSELL calls “applied mathematics” is not a subaltern science, but a dialectical application of common principles to the probable—but undetermined—principles of some other art or science (► 52.6, ¶2; 52.13; 52.14; 59.6). What is worse, “applied” so-called mathematics proceeds from propositions that are less known than the things to which it is applied; whence, its conclusions are even less known (► 53.6, ¶4; 53.10; 57).

Strictly speaking, then, it is true that modern so-called “mathematics” has been separated from philosophy; for philosophy must demonstrate from propositions that are known to be necessarily true (► 53.6, ¶1; 53.7). However, it is false that this separation has benefitted mathematics. In fact, it has destroyed true, scientific mathematics.

On the other hand, it is false that modern so-called “mathematics” has been *thoroughly* separated from philosophy; for logic is *rational philosophy*, the *rational science* (► 52.1), even if it is not a speculative science (► 58.18). Thus, properly speaking, what has seen a vertiginous development in the last century is *the analytic and dialectical parts of logic*—not *mathematics*. Yet, they have not been developed scientifically. Indeed, insofar as logic is an art, logicians are only required to know *that* it works—not *on account of what* it works.

Thus, modern so-called “mathematicians” do not know where they are going; but they are, at least, getting there fast. And we need not take PUTNAM’s system of mathematical philosophy seriously when he tries to convince us that “the various systems of mathematical philosophy, without exception, need not be taken seriously.” If mathematics and logic are to become scientific again, they must return to the fold of wisdom. As REDPATH says,

[A]bsent philosophical metaphysics, strictly speaking, no coherent philosophy of education can exist; and no rational means exists to explain how (1) arts and sciences can integrate with each other to produce a common culture or civilization; or (2) how any art or science can exist at all. In fact, absent an essential connection to philosophical metaphysics, [...] strictly speaking, no art or science can exist.<sup>25</sup>

### **The End of the Crisis**

As we have shown (► 69.12), GÖDEL’s incompleteness theorems refer to dialectic, and do not affect the principles of metaphysics. Therefore, Western thought can be restored using its true, original foundations—the Aristotelian realism that was wholly ignored by QUINE. All the arts and sciences can be harmonically united again under its principles.

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<sup>25</sup> REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 1, 11. In italics in the original.

## Restoring the Principles

As noted in our Introduction, modern so-called “mathematics” is but a logical consequence of the progressive dismissal of long-held principles that have purportedly been shown to be false. To restore these principles, we must, therefore, resolve the objections.

1. A common claim is that mathematics, in modern times, is not fundamentally about *quantity* or *number*, but about *order* (what others controversially prefer to call *structure*). RUSSELL explains this as follows.

Mathematics has, in modern times, brought order into greater and greater prominence. In former days, it was supposed (and philosophers are still apt to suppose) that quantity was the fundamental notion of mathematics. But nowadays, quantity is banished altogether, except from one little corner of Geometry, while order more and more reigns supreme. The investigation of different kinds of series and their relations is now a very large part of mathematics, and it has been found that this investigation can be conducted without any reference to quantity, and, for the most part, without any reference to number.<sup>26</sup>

As we have shown (► 67), it is in renaissance and modern times that quantity or “number” came to be associated with mathematics as a whole. Therefore, this claim does not affect Aristotelian-Thomistic philosophy/science, or any “philosophy/science” properly so-called! Moreover, that “series and their relations” should pertain now to “a very large part of [modern so-called] mathematics” is no wonder to us: logic treats about relations of *ratio*, which consist in an order of understandings (► 21.7).

Still, it is amusing to be “illuminated” by modern logicians posing as mathematicians and to “learn” from them that *order* should be more fundamental than *quantity*. Indeed, the *ratio* of *order* (► 8.5) includes the *ratio* of *prior* (i.e., *that which is nearer some determinate principle*; ► 8.6), which depends on the signification of *principle*; now, the principle in every genus is *that which is first in the genus*: that is, its *measure* (► 8.3; 27; 28); and measure is *that by which the quantity of a thing is known* (► 28.1). Whence, in any genus, *quantity* (whether virtual or dimensive; ► 22.1) necessarily depends on some *order*. In fact, since quantity—properly speaking—makes its subject a divisible whole (► 35.17; 35.15; 35.6; 35.11), the *ratio* of every *quantity* contains an *order of parts*, as St. Thomas says.<sup>27</sup>

Modern so-called “mathematicians” are in awe at this priority of *order* in respect of *quantity*, but are unable to account for it because they are not guided by metaphysics (the science of first principles). Therefore, in claiming that their discipline is about order in general, they are assuming the guise of the philosopher, but are not true philosophers. In

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<sup>26</sup> RUSSELL, *Mathematics and the Metaphysicians in Mysticism and Logic*, 91.

<sup>27</sup> *De veritate*, q. 2 a. 9 co.: “omnis autem quantitas de sui ratione habet ordinem partium.” *STh* I, q. 14 a. 12 ad 1: “De ratione autem quantitatis est ordo partium.”

fact, they are either dialecticians seeking principles or sophists pretending to know them (►52.7). We may wonder how to classify RUSSELL, who alleges that “Geometry, like Arithmetic, has been subsumed, in recent times, under the general study of order.”<sup>28</sup>

2. Another claim is that not every whole is greater than any of its parts, as was thought since ancient times. Purportedly, CANTOR demonstrated that this principle is true only in the case of finite collections, but false in the case of infinite collections. We have already noted in our “Introduction” how RUSSELL explains this allegedly-wonderful discovery: “A collection of terms is infinite when it contains as parts other collections which have just as many terms as it has.”

We have already shown, too, that this claim is based on multiple equivocations (►68.2, ¶3). Above all, *whole* and *infinite* have contrary definitions, as ARISTOTLE had already shown more than two millennia ago. Indeed, *infinite* is defined as *that of which there is always something outside* (οὐ ἄει τι ἔξω ἐστί; ►24.1). On the contrary, *whole* is defined as *that of which nothing is outside* (οὐ μηδέν ἐστί; ►13.2, ¶1).

Therefore, the infinite, according to its proper *ratio*, is a whole in potency; and it is imperfect (►23.1), just like matter is imperfect. Indeed, since it is proper of a whole to contain, and of matter to be contained, the infinite—as such—does not contain. Instead, it itself is contained insofar as that which is in act of the infinite is always contained by something greater; for it is always possible to take something outside. Wherefrom, *part* is said equivocally of *whole* and of *infinite*; for the infinite has the *ratio* of *part* (►25.16, ¶2).

How is it that CANTOR and RUSSELL failed to notice this? Did they not read ARISTOTLE? Did they read him, but failed to understand what he says? Did they read him, but decided to hide what he says? Regardless of how we answer these questions, it is evident that CANTOR and RUSSELL do not seek the principles—they only pretend to know them. In other words, they are nothing but sophists. And like all sophists, they use equivocal predication. What is worse, RUSSELL perverts with his equivocations the history of true philosophy:

The subject of formal logic, which has thus at last shown itself to be identical with mathematics, was, as every one knows, invented by Aristotle, and formed the chief study (other than theology) of the Middle Ages.<sup>29</sup>

3. Another claim is that the principles of Euclidean geometry are not necessarily true. RUSSELL bases his arguments, first, on the rejection of the erroneous belief that geometry should be considered to be a part of the study of nature.

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<sup>28</sup> RUSSELL, *Mathematics and the Metaphysicians in Mysticism and Logic*, 92.

<sup>29</sup> *Ibid.*, 76.

It was formerly supposed that Geometry was the study of the nature of the space in which we live, and accordingly it was urged, by those who held that what exists can only be known empirically, that Geometry should really be regarded as belonging to applied mathematics. But it has gradually appeared, by the increase of non-Euclidean systems, that Geometry throws no more light upon the nature of space than Arithmetic throws upon the population of the United States.<sup>30</sup>

Of course, the idea that geometry is “the study of the nature of the space in which we live” and that “what exists can only be known empirically” is a modern fabrication and has nothing to do with the Aristotelian conception of mathematical science, which is based on the abstraction of form from sensible matter and motion. As to the appearance of so-called “non-Euclidean geometries,” we have already exposed this ludicrous fiction (► 68.3).

Thereafter, the claim that EUCLID’s principles are not necessarily true is ultimately based on supposing that so-called “geometry” is a logical system. As RUSSELL says,

Geometry is a whole collection of deductive sciences based on a corresponding collection of sets of axioms. One set of axioms is Euclid’s; other equally good sets of axioms lead to other results.<sup>31</sup>

No one has explained this “whole collection of deductive sciences” better than MARX, the greatest twentieth-century philosopher to have studied dialectics. Of course, we are not referring here to Karl MARX, the nineteenth-century sophist and author of *The Communist Manifesto*, but to Groucho MARX, the coauthor of *Duck Soup*, who reportedly said, “Those are my principles, and if you don’t like them... well, I have others!” Well, if you do not like EUCLID’s principles, modern so-called mathematicians have as many as you like.

Whether Euclid’s axioms are true, is a question as to which the the [sic] pure mathematician is indifferent; and, what is more, it is a question which it is theoretically impossible to answer with certainty in the affirmative.<sup>32</sup>

RUSSELL believes that it is impossible to determine whether EUCLID’s principles are true because he ignores that the proximate, first measuring principle in every subject genus is qualitatively diverse from that which exists in another subject genus. In fact, he assumes that measurement is reduced to physical quantities, which belong to “science.”

It might possibly be shown, by very careful measurements, that Euclid’s axioms are false; but no measurements could ever assure us (owing to the errors of observation) that they are exactly true. Thus the geometer leaves to the man of science to decide, as best he may, what axioms are most nearly true in the actual world.<sup>33</sup>

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<sup>30</sup> Ibid.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

<sup>33</sup> Ibid., 92–93.

4. There are other principles that must be restored for science to be reunited with wisdom. We close this section merely noting that, for example, if GALILEO Galilei showed that the Sun, which ARISTOTLE believed to be incorruptible, is in fact corruptible, this does not prove that ARISTOTLE's principles are wrong. In fact, it confirms the correctness of his definitions of *corruptible* and *incorruptible*—otherwise, we would not be able to know whether anything is corruptible. Something similar could be said about the elements (e.g., fire, air, water, and earth against the list compiled by Antoine-Laurent de LAVOISIER) and the definition of *element* (► 12.9). Such universal, analogical principles are indestructible.

### Science Has Not Been Mathematized

From what we have said so far, it is evident that science has not been “mathematized.” Instead, it has been turned into a logical system, as REDPATH says. What goes today by the name of “science” is, therefore, completely detached from reality—and is no science at all. For example, modern geometry falsely-so-called is not the science of magnitude, but the art of whatever “dimensional order” a logician can fancy, as RUSSELL admits.

The geometer takes any set of axioms that seem interesting, and deduces their consequences. What defines Geometry, in this sense, is that the axioms must give rise to a series of more than one dimension. And it is thus that Geometry becomes a department in the study of order.<sup>34</sup>

Not only *pure* mathematics falsely-so-called, but also so-called *applied* mathematics, is a logical system—a dialectical one, as we have said. If “the geometer leaves to the man of science to decide, as best he may, what axioms are most nearly true in the actual world,” then the “man of science” is merely using analogies between a logical system and the real world. And it is impossible for him to find a necessary, causal connection between the two.

In fact, since the principles of mathematics have been removed from science, the whole of science has been de-mathematized and turned into an art of reasoning—which is sheer madness. Indeed, as Gilbert Keith CHESTERTON says, “The madman is not the man who has lost his reason. The madman is the man who has lost everything except his reason.”<sup>35</sup>

### Teaching Scientific Mathematics

It is due to the policies suggested by sophists such as RUSSELL that EUCLID came to be abandoned and that mathematical education ceased to be scientific a century ago or so.

As he [i.e., EUCLID] is certainly not an easy author, and is terribly longwinded, he has no longer any but an historical interest. Under these circumstances, it is nothing less than a scandal that he should still be taught to boys in England.<sup>36</sup>

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<sup>34</sup> Ibid., 93.

<sup>35</sup> Gilbert Keith CHESTERTON, *Orthodoxy* (London & New York: John Lane, 1909), 32.

<sup>36</sup> RUSSELL, *Mathematics and the Metaphysicians in Mysticism and Logic*, 94–95.



The consequences of such policies have been disastrous. As RUSSELL himself admitted in a note added in 1917, “Since the above was written, he [i.e., EUCLID] has ceased to be used as a textbook. But I fear many of the books now used are so bad that the change is no great improvement.”<sup>37</sup> At last, we agree with RUSSELL in something: the sorry state of mathematical education in our days.

In view of the present state of things, we conclude, following St. Thomas, that there is nothing wrong with logic being taught before mathematics—as long as by *logic* we understand not only its formal part, but also its material part, the mode of science (► 66.5; that is, demonstration in a subject genus); and by *mathematics*, the truly mathematical sciences. Only by reuniting the particular sciences to wisdom, as REDPATH suggests, will we be able to improve education and, thereby, renew Western civilization.

### **Proposing New Principles for Mathematical Logic**

We have proven the first two positions in the Hypothesis section of our “Introduction”: that the Aristotelian-Thomistic Teaching on Principles (ATOP) is perfectly capable of accounting for: (1) the first principles of ancient Greek mathematics; and (2) the first principles of modern so-called “mathematics,” including algebraic analysis and set theory; and also of accounting for the transition from the ancient to the modern discipline. All that remains is for us to show that it is also perfectly capable of (3) proposing truly scientific principles for mathematical logic, and of replacing set theory with something substantially better.

Of course, the madman may still want to cling to set theory; to continue developing all manner of artifacts that suit his fancy (such as “surreal numbers”), and to discover their fantastic properties. He can revel in his whims, for all we care. This proposal is not for him, but for the realist who seeks wisdom.

Thus, the problem at hand is to produce some artifact that can be used by mathematical logic universally and analogically to signify scientifically the principles of any subject genus (and whatever follows from such principles). Indeed, as ARISTOTLE says, the principles of all things are the same analogically and universally speaking (► 45.9). Wherefrom, we can come to understand the principles of a genus that is less known to us by analogically signifying them through the principles of a genus that is better known to us.

Now, if we consider the speculative sciences, the subject genus that is most knowable to us is *magnitude*, the subject genus of geometry. Indeed, it is closest to sensible things, which makes it more knowable according to the order of cognition. It is also naturally more knowable than *mobile being* (the subject genus of physics), precisely because it abstracts

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<sup>37</sup> Ibid., 95, footnote 1.

from natural motion. Granted, *magnitude* is naturally less knowable than *number*, the subject genus of arithmetic; but number abstracts (or, speaking more strictly, *separates*) from *position*, which takes it farther from sense and imagination; and our artifact must be quite imaginable if it is to be better known in respect of us.

Hence, analogically to signify the first principle of a subject genus, we shall use the first principle of magnitude: the point. And to signify what proceeds from it, but not in the likeness of a species (►46.22, ¶2), we will use the line; then, the surface; and finally, the body. This will allow us to use some important analogies that have already been studied by ARISTOTLE and explained by St. Thomas (►48.27; 48.28; 48.29).

Let us, therefore, imagine—as geometers do—that **a moved point, by its own motion, produces a line**. Indeed, imagination is like a motion that springs from sense; and we not only can preserve the images that we have sensed, but we can also generate new ones. Among these images, the ones that make us know more differences are visual images, the images of sight.

It may be objected that the proper object of sight is *color*, and that the proper subject of color is *surface*. Strictly speaking, therefore, we cannot see or imagine a point: what we can see or imagine is a colored surface. The boundary of a surface is a line, so we only see or imagine a line insofar as we see or imagine a bounded surface. And if the line itself should be bounded, then we can see or imagine a point—that is, its boundary—only insofar as we see or imagine a line that terminates a surface.

To this, we reply that we can, nonetheless, see or imagine something that is a minimum perceptible by sense (i.e., a dot) and analogically to call it a *point*.<sup>38</sup> For example, a pixel in a screen or a speck in a sheet of paper can serve as a minimum that analogically signifies an indivisible point. If we use our imagination in this way, it will not make any difference for our purpose, as long as we understand that the smallest element imaginable signifies a point: that is, the principle of a line that has no parts, since it is deprived of dimensive quantity. And we can do something analogous with the line.

Moreover, we will need to make use of formal abstraction. Indeed, for such “picture elements” to be imaginable, they must have some color; but we are not interested in hue or intensity. And we could not care less whether such imaginable things are hot or cold; soft or hard; sweet or sour. As far as we are concerned, they are made of an indeterminate material that is, nonetheless, imaginable—intelligible matter.

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<sup>38</sup> ARISTOTLE and St. Thomas do just that. *In De caelo* 1, l. 25, n. 6 (cf. ARISTOTLE, *De caelo* A.11, 281a22): “videre *punctum* [ἰδεῖν στίγμα], idest aliquod minimum sensu perceptibile.”

We will also be making use of total abstraction—the abstraction of the whole universal from the particulars: we are not interested in individual points—*this* or *that* point (► 62.3). When we speak of *the point*, we are speaking universally of any point. Of course, every point must have some position; but the point we understand has an indeterminate position. It is only when comparing one point to another that we will need to establish a distinction of position: if one point is not another point, it must have a diverse position.

Again, strictly speaking, mathematical things (such as numbers, points, and lines) cannot be moved—nor can they move other things. Indeed, mathematics abstracts from motion. However, all sciences and arts use motion; and mathematics is no exception. Not only do EUCLID's postulates require motion, but so do all mathematical operations such as squaring or multiplying.

Thus, what we are adding to our mathematical point is: **(a)** the passive potency of being moved; and **(b)** the active potency of producing a line by its very motion. If we were only to imagine that the point can be moved from one position to another, the result of such a motion would be merely to find the point elsewhere. Instead, we will imagine that the moved point, precisely insofar as it is moved, should produce a line (much like moving the tip of a pen, or the end of a stick in the sand, draws a line).

With this in mind, let us turn to the application of ATOP to the imaginary genus that we are artificially producing.

Considering the moved point, we should note that there is some composition. There is a *point* that is apt to be moved and there is in it a *motion* that makes it a *moved point*. This is not only a composition of potency-and-act, but also of matter-and-form. Yet, this matter is not a matter *from which* or a matter *about which*—it is a matter *in which*; for motion is *in* the mobile. Therefore, the mobile point is the subject of this motion (► 14.8).

When we say that the subject of this motion is the mobile point, we are speaking of a subject genus. Indeed, the movable point deprived of motion is the subject that receives the act of motion. It is from this privation that the genus is taken (► 14.11), not from the point alone, which is matter alone.

Our genus, then, is taken from the mobile point, which is our proper matter, by adding a common form (► 14.12), which is an indeterminate motion. In other words, there may be more or less motion, but we abstract from a determinate quantity of motion to obtain the genus. This quantity is, of course, a virtual quantity (► 22), since it is a form. Moreover, motion is what produces the line: not like an efficient cause, but like an intrinsic formal

cause (►9.5) that causes the line to exist and to be shorter or longer, depending on its virtual quantity. The more the motion, the longer the line. In other words, for the mobile point to be moved is for the line to be produced as an effect of that motion. Greater length in the line signifies greater virtual quantity in motion: we know that there is a greater virtual quantity because we see a greater length; indeed, causes can be known from their effects (►57.7). Evidently, the mobile point participates in motion (►26.2, ¶3) proportionately as much as the line participates in the motion of the moved point (►26.2, ¶4).

With this in mind, we can signify each of the four genera of opposition (►42.1); and opposition consists in an elongation of potency from act:

**1. Contradiction** consists in altogether removing potency. Thus, contradiction removes not only the mobile point, but even the point itself, which is more remote to the act of motion than the mobile point. If there is no point, there can be no line. This is the opposition between *line* and *non-line*; and there is no mean between them, since there is nothing in common to both—they are not even in the same genus.

**2. Privation** consists in altogether removing motion from the mobile point. When there is no motion, there is no line; but there is still a point that has not been removed. This is the opposition between a mobile point deprived of motion and a line produced by the motion that a moved point possesses. The only thing in common between them is the subject—that is, the mobile point, which is as their common subject-matter. However, the point is not, properly speaking and thus considered, in the same genus as the line.

**3. Contrariety** consists in removing some of the motion from the mobile point. The first contrariety is the distance between privation (insofar as the point is placed in the genus of the line by reduction, and privation in the genus of possession; ►43.9; 43.14; 29.10; 29.11) and maximum possession. Of course, since there is no mobile point that can be infinitely moved, there is no species of line that is infinite in length. Here, we take the first contrariety as the maximum distance between the unmoved point and the terminus of some finite line, as long as we might need it, such that we can subtract from it whatever we want (►25.13). Mean lines are composed from these contraries (►43.17). Contraries have in common both the subject and the genus.

**4. Relation** consists in the opposition between two mobile points that possess some motion—but not in the same quantity, since, in this genus, to be one in quantity is to be the same. For example, if we have two lines,  $OA < OB$ , we obtain a real difference  $AB$  according to the less, and a corresponding difference  $BA$  according to the greater. Relatives have in common only the genus, but add mutual dependence.

## Mathematical Metaphysics

Let us, therefore, apply our analogy of the moved point to metaphysics: for “just as motion is the act of the mobile itself insofar as it is a mobile, so being (*esse*) is the act of the existent insofar as it is a being” (► 32.4, ¶1a). Whence, we can produce geometric images that proceed in the likeness of metaphysical principles. The only convention we will add to these images is that priority and posteriority will be signified using an arrow (the nock being prior to the head).

The subject of metaphysics is *being* (► 30), which is divided, speaking by itself, into common being and being of reason or *ratio*. Common being is prior, so we begin with it. Now, common being is divided according to the ten categories, the first of which is substance. The principles of substance, as in any genus, are act and potency; and the first act is the act of being, to which corresponds essence. Therefore, we can depict the first substance as follows (► Figure 23).

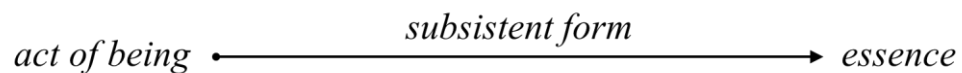


Figure 23: A subsistent form.

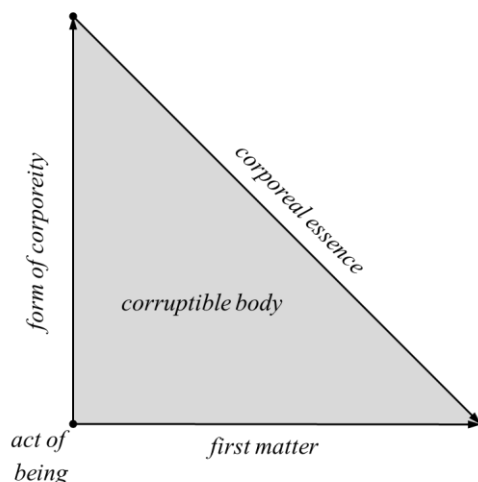
The incorruptible body is next, following the order of being. Thus, just like a moved point produces a line, so a moved line produces a surface (► 46.22, ¶2). However, since an incorruptible body cannot be generated, we would signify it using a circle, such that “when, one point of a line remaining fixed, the line is carried round and restored again to the same position from which it began to be moved, the figure so comprehended is a circle.” Thus, it is the figure comprehended (and not the figure produced) what signifies the incorruptible body: the center of the circle would signify the act of being; the circumference, the matter of the incorruptible body; the circle itself, the incorruptible body; and the radius-line, the form of corporeity, which is a perfect act that completes the whole potentiality of matter, such that there remains no potency to other forms.<sup>39</sup> Since we do not know of any incorruptible bodies in modern physics, we leave this case without a graphical illustration.

The corruptible body follows in the same order. This can be represented as a triangle (► Figure 24). Thus, if the point that signifies the act of being remains fixed, and the line is moved “instantaneously,” a triangle is produced. The line is conceived as being moved instantaneously because there is no mean between form and matter. Thus, the relation that is produced by the union of form and matter is altogether indivisible. The surface of

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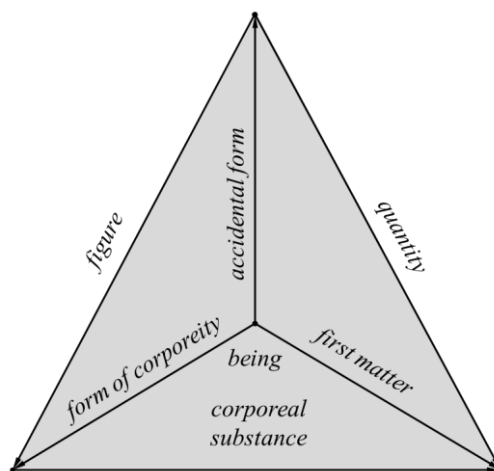
<sup>39</sup> *De sub. sep.*, c. 8, 23–29: “materia caelestium corporum est in potentia ad actum perfectum, id est ad formam quae complet totam potentialitatem materiae ut iam non remaneat potentia ad alias formas; materia autem elementorum est in potentia ad formam incompletam quae totam potentiam materiae terminare non potest.”

the triangle signifies the corruptible body; the line that is moved, the form of corporeity of the corruptible body.



**Figure 24: A corruptible body.**

Accidents follow from the principles of the substance: quantity from matter, quality from form. We signify this with the next procession: just like a moved line produces a surface, a moved surface produces a body—in this case, a tetrahedron (► Figure 25).

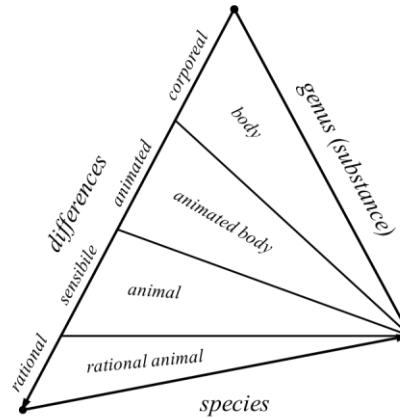


**Figure 25: A corruptible suppositum.**

Using these figures, we can depict all kinds of metaphysical principles. For example, to multiply corruptible substances, we merely need to have two diverse points where matter terminates. Indeed, species is to substantial form what individual is to first matter. Therefore, such multiple substances are of the same species if the line that signifies the substantial form terminates at the same point.

Likewise, using diagrams, we could depict all kinds of metaphysical relations, such as equality and likeness. Such depictions also make analogies evident. For example, that form is to matter as accident is to substance.

Moreover, by applying the same kind of analogy in the order of logic, we can show how a predicable genus differs from a subject genus. For example, it is evident that the predicable genus of substance is univocal to the logician (►Figure 26).



**Figure 26: The predicable genus of substance.**

This comes to show how geometry can analogically be used to elevate our understanding of any subject—even that of metaphysics. Indeed, as REDPATH says, commenting on the same quote with which we opened (in Greek) this work (PLATO, Republic 7, 527b):

So, because the science of geometry inclines us to think abstractly and theoretically about sensible objects, Socrates concluded, “it would tend to draw the soul to truth, and would be productive of a philosophical attitude of mind, directing upward the faculties that now wrongly are turned earthward.” In short, wittingly or not, it inclines us to become more philosophical and metaphysical about the way we consider the things around us.<sup>40</sup>

<sup>40</sup> REDPATH, *A Not-So-Elementary Christian Metaphysics*, vol. 1, 105.





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