Robots and Artificial Intelligence. New challenges of journalism

Los robots y la Inteligencia Artificial. Nuevos retos del periodismo

Idoia Salazar has a PhD in Journalism and is a lecturer in International Degrees in the School of Communication and Humanities at San Pablo CEU University. Principal investigator of SIMPAIR Group (Social Impact of Artificial Intelligence and Robotics), specializing in ethics in Artificial Intelligence. Career development in digital media of PRISA Communication Group in which she was responsible for the area of R & D, participating in competitive projects of the European Union related to semantic web technologies. Author of the book: *The depths of Internet: Accessing information that conventional search engines do not find and discovering the brilliant future of the Web,* as well as numerous articles in the mass media.
San Pablo CEU University, Madrid, Spain
idoiaana.salazargarcia@ceu.es
ORCID: 0000-0002-9540-8740

ISSN: 1696-019X / e-ISSN: 2386-3978

Received: 05/06/2018 - Accepted: 24/09/2018

Abstract:

This study analyses the remarkable social impact of Artificial Intelligence (AI) and Robotics in all areas, focusing on journalism. The evolution of these concepts and the influence that science fiction literature and cinematography has had on them is also studied. Different current initiatives of development and implementation of these new technologies in the communication media are collected, and details regarding the advantages and disadvantages of these have been pointed out from a professional and ethical point of view. Likewise, several studies have been taken into account at the international level on the subject dealt with and experts in the field have been consulted on the real viability of these technologies in the area in question. The results allow us to envision a new way of carrying out journalism based on direct human-machine collaboration in which the journalist must redefine him or herself to adjust to the new situation.

Keywords:

Artificial intelligence; robots; journalism; technology; ethics.

Recibido: 05/06/2018 - *Aceptado*: 24/09/2018

Resumen:

Este estudio analiza el destacable impacto social de la Inteligencia Artificial y la Robótica en todos los ámbitos, centrándose en el periodismo. Se recogen distintas iniciativas actuales de desarrollo e implantación de estas nuevas tecnologías en medios de comunicación y se detallan ventajas e inconvenientes de las mismas desde un punto de vista tanto profesional como ético. Asimismo, se han tenido en cuenta diversos estudios, a nivel internacional, sobre el tema tratado y se ha consultado a expertos en la materia sobre la viabilidad real de estas tecnologías en el área que nos ocupa. El resultado permite vislumbrar una nueva forma de hacer periodismo, basada en la colaboración directa hombre-máquina, en la que el periodista deberá redefinirse para ajustarse a la nueva situación.

Palabras clave:

Inteligencia Artificial; robots; periodismo; tecnología; ética.

How to cite this article:
Salazar, I. (2018). Robots and Artificial Intelligence. New challenges of journalism. *Doxa Comunicación*, 27, pp. 295-315.
https://doi.org/10.31921/doxacom.n27a15

ISSN: 1696-019X / e-ISSN: 2386-3978

1. Introduction

March 17, 2014. An earthquake, 4.4 degrees makes Los Angeles (USA) tremble. So far nothing is out of the ordinary. Although, the world of journalism that very day, and for that very reason, was going to be shaken by a profound reflection on the prospects for the future of journalism. The incredible difference with this news event was that the first news emitted, just three minutes after it happened, did not come from a human journalist, but from an algorithm from the American newspaper the Los Angeles Times, created by the programmer Ken Schwencke, which is able to generate its own short articles. This AI feeds on reliable and official pre-programmed sources and is not only able to publish news of earthquakes, but also about crime in the city, among other topics, although always under the supervision and hierarchy of those responsible for the newspaper. This simple news went around the world and made those media that had not yet bet on this type of technology, begin to seriously consider it.

It is a fact that AI and robotics are provoking an unprecedented revolution that affects all social and professional spheres. In the near future this impact will increase at an exponential rate and provoke what many call the Fourth Industrial Revolution. Robots and AI will help in the automation and improvement of many of the manual processes we do today. However, these technologies bring with them fears and bewilderment arising from their rapid emergence and disinformation. The field of Communication will not escape this global trend. Forms of AI will help the communicator to improve processes and provide the public with more personalized, content-rich news (Jaemin, 2017).

Firstly, before starting to analyse the main questions of this article, it is necessary to explain what an algorithm is. The AI that is currently writing news. It is a set of rules that, applied systematically to appropriate input data, solve a problem in a finite number of elementary steps (Berlanga de Jesús, 2016). More specifically, it would be defined as a series of simple instructions that they carry out to solve a problem. With this in mind, one might ask why this mathematical algorithm, apparently lacking in creativity and consciousness, is creating this social impact. This fear of society in general to face this kind of technology. The answer is to be found not only in science, but also in the historical evolution of the Human Being and in the literature and cinematography of the 20th century, classified as Science-Fiction.

1.1. Science Fiction as a premonitory scenario for current technologies

Robots are no strangers to us, even the most evolved. They have been present in our literature and cinematography for some time (García, 2014). These images, the ones imagined from books, or the explicit ones reproduced through television or cinema, have caused the Society to acquire certain prejudices -both negative and positive- when facing the great challenges of its future.

Science-Fiction was part of the culture of the 20th century. Some of his unreal predictions are already possible, such as the three-dimensional hologram of Princess Leia in Star Wars. Now, in the 21st century, the ambition of this type of art escapes even the most ingenious imaginations. Yet, as we will see below, who knows if in the future they could be palpable and part of our daily routine.

Let us go back to 1917, the year in which the Czech Joseph Capek wrote the *Opilec* tale in which he already imagined the first automatons (López Pellisa, 2013). Three years later, his brother Karel Capek wrote the Science Fiction play *Rossum's*

Universal Robots (RUR) in which, for the first time, the term robot was coined, derived from the Czech word *robot*, meaning servant or worker (Saiz Lorca, 2002). In it, the company that gives its name to the work built high-capacity artificial humans that took on the heavy workloads of its regular workers. Although they had been created with good intentions, the revolt against humans finally broke out.

The precedent was created, and its apparent feasibility led other authors to follow this line in their Science Fiction stories.

In 1950 the Russian writer and scientist Isaac Asimov, used the word "Robotics" in his work *Runaround* (Asimov, 1942) and began to become popular from short stories called *I Robot*. His vision at the time foresaw the possible ethical implications of those machines that were beginning to take shape in the imagination of Asimov readers. Consequently, he established the three inviolable laws of robotics that, today, are still in force in the minds of the scientists who develop them:

– A robot cannot harm a human being or, by inaction, allow a human being to be harmed.
– A robot must comply with the orders of human beings, except if such orders conflict with the First Law.
– A robot must protect its own existence to the extent that it does not conflict with the First or Second Law.

With time, and by introducing more and more evolved robots into his stories, Asimov completed his three laws with a "Zero Law", which is a generalization -or rather a qualitative leap- of the First Law, since it says that a robot cannot harm Humanity nor, by inaction, allow humanity to suffer harm.

Since then, robots have been widely represented in literary and cinematographic fiction (González-Jiménez, 2018). The *Star Wars* saga left us friendly R2 D-2 and C-3PO (Kurtz and Lucas, 1977), always ready to help the *Jedi*. Their director, George Lucas, endowed them with reasoning, defects and virtues that resembled humans, which created a certain sympathy with the massive audience of these films.

Terminator, however, flooded the viewer's mind with reasonable doubts as to whether the evolution of robots and artificial intelligence in general will be favorable to humans. There will be some good ones, like the *Terminator* (Hurd and Cameron (1984), starring Arnold Schwarzenegger, and others even more evolved and harmful like the *cyborg* able to change shape. How to fight against this? This saga presents us with a predictable holocaust for giving "too much intelligence" to machines. One more dilemma to think about when leaving the cinema.

I Robot, inspired by Asimov's book of the same title (Asimov, 1950) introduces the robot Sonny. The film is set in the year 2035, a time when artificial intelligence, and all that it entails, is already part of the everyday reality of life on Earth. Detective Spooner (Will Smith), who hates robots –although he himself admits to having robotic implants in his joints– is in charge of investigating the possible murder of a scientist at the hands of a robot –Sonny–. In spite of the 3 laws of robotics implanted in the positronic brains of each robot, it seems that Sonny is able to evolve in his reasoning, even over passing these apparently unbreakable laws. As the film progresses we see how the machines begin to reason for themselves, protected even by their 3 laws: VIKI, the positronic brain that directs this whole highly mechanized world, sets in motion a revolution of the robots, under a firm purpose: to protect Humanity from itself and from its instinct of self-destruction.

Another cinematic work that definitely makes you think is *AI (Artificial Intelligence*) (Spielberg, 2001), directed by Steven Spielberg. In the middle of the 21st century, the American company *Cybertronics* creates the prototype of a robot-child capable of showing love for its human possessors. A robot son, called David, who even has a robot teddy bear, who watches

ISSN: 1696-019X / e-ISSN: 2386-3978

over his safety and always accompanies him. David develops his feelings and this even leads him to existential dilemmas: Why can't he become a real child? Walt Disney's famous *Pinocchio* got it, thanks to the Blue Fairy, why not him? The wide barrier that currently differentiates us from machines is beginning to narrow in David's mind. Rather, the barrier continues and he is not able to face it, the feelings and what makes us human. Will there come a day when robots can feel?

Similarly, this occurs in the *Bicentennial Man*, starring Robin Williams and based on Asimov's book of the same name (Asimov, 1976). Andrew enters the Martin family home to help with household chores. They soon realize that their robot is capable of interpreting and even corresponding to emotions, even though it was not pre-programmed for it. Andrew is evolved, with the help of his human family, whom he sees grow old, even die. Thanks to its updates, it makes its organs and functions resemble humans. He marries Portia and makes every effort to have his humanity, despite its origins, publicly recognised at the World Congress. Before attending, Andrew manages to contaminate his system so that he can begin to degrade and someday die.

Additionally in Congress, the following conversation takes place with the president of Congress (Barnathan and Columbus, 1999):

> *—I've always tried to make sense of things. There must be some reason for me to be the way I am. As you can see, Madam President, I am no longer immortal.*
>
> *— Have you arranged everything to die?*
>
> *— In a sense, yes. I am aging and my body is deteriorating and, like yours, it will eventually stop working. As a robot, I could have lived forever. But today I say to you, that I would rather die as a man than live all eternity as a machine.*
>
> *— Why do you want it?*
>
> *—To be recognized. Just because of who I am and what I am. No more, no less. I'm not looking for acclamation or approval. But the simple truth of such recognition. This has been the basic objective of my existence and I must achieve it whether I want to live or die with dignity.*
>
> *— Mr. Martin. What you are asking for is tremendously complex and controversial, it will not be an easy decision. I'm asking you to be patient.*
>
> *— Then I shall await your decision, Madam President.*

It will be on his deathbed when, finally, the World Congress recognizes his long-awaited humanity.

Furthermore, in *Her's* world (Ellison and Jonze, 2013) feelings between machines and humans are the order of the day. Set in the near future, the plot focuses on a man who falls in love with Samantha, an operating system –with a sweet female voice– based on the Artificial Intelligence model, designed to meet all the needs of the user. Between them will arise a strange and passionate relationship in which the virtual and real world are combined continuously.

The future of genetic engineering is the basis of the famous science fiction film *Blade Runner* (Deeley and Scott, 1982), set at a time when artificial humans are manufactured, called "replicants", mainly to be used in work considered dangerous or to be sent as slaves to Earth's outer colonies. These are physically similar to humans, although they have greater agility and physical strength, but lack the same emotional response and empathy. The replicators were declared illegal on planet

ISSN: 1696-019X / e-ISSN: 2386-3978

Earth after a bloody mutiny on Mars, where they worked as slaves. A special police force, *Blade Runners*, is responsible for identifying, tracking and removing from circulation fugitive replicators still on Earth.

Therefore, the examples described above represent the countless science fiction films, often based on books of the same genre, which have permeated the culture of the twentieth century and continue to do so in the twenty-first. Some of his imaginary predictions are now a reality. Indeed, the latest advances in technology herald a near future in which many others would not be unlikely to become palpable.

1.2. The line between Science Fiction and reality begins to blur

At the renowned Massachusetts Institute of Technology (MIT) in the United States, this is clear. Imagination, based on scientific data, is the key to progressing into the future. This great incubator of today's great inventions does not hesitate to recommend to its students the reading of Science Fiction books to inspire them when creating prototypes. In one of their laboratories, physics teachers have recreated the sabers of the Jedi of Star Wars (Gent, 2017), inducing photons to unite to form molecules. They did it simply to prove that Science could do it, at least in a laboratory. Subsequently, they're not the only ones.

This time evoking the moment when Star Trek's Enterprise spacecraft enters *warp* speed, surpassing the speed of light, NASA's Johnson Space Center physicist Harold "Soony" White believes it is possible to do so without violating the laws of physics (Chitwood, 2016). This theory had already been investigated before, however, it had been discarded as not considered plausible. It was about building an oval spaceship with a big ring around it. This ring, made of 'exotic' matter, must have had the ability to modify the space-time around the spacecraft, creating a region of compressed space-time in front of another of expanded space-time backwards, all without modifying the space-time of the spacecraft itself. This would allow the spacecraft to theoretically move at 10 times the speed of light, without breaking the laws of physics, as long as we could generate 10^45 Joules of energy. Considering that this figure is scientifically unattainable, the project had been abandoned. Yet, White thinks he's found the solution. The new method would be to replace the shape of the ring with a toroidal shape, which would reduce the energy needed to propel the spacecraft to the mass equivalent of Voyager 1, launched in 1977. In addition, he says that the amount of energy could be reduced even further by swinging the intensity of the space-time modification around the spacecraft. Importantly, these statements make imaginary theory plausible and open an interesting field of scientific research.

Following these scientific developments, initially only imaginary, at the University of Delaware (USA), professor and chemical engineer Norm Wagner developed a substance capable of repelling knife attacks and absorbing vibrations. Something similar to the fictitious material covering Captain America's shield, the *Vibranium*. In addition, chemical engineering students at Stanford University (USA) generated an elastic synthetic skin that conducts electricity, can feel the touch, like human skin, and heals itself. It cannot be used to instantly heal wounds, like a mutant, but this revolutionary

skin would have applications in high-tech bandages and would help control the patient's health. It could also be used in products such as smart watches, where electronics have to fit a curved surface (Fussell, 2013). Likewise, the American professor, James Kakalios, author of the book *The Physics of Superheroes* (Kakalios, 2006), supports this theory and recalls that

ISSN: 1696-019X / e-ISSN: 2386-3978

ISSN: 1696-019X / e-ISSN: 2386-3978

scientific research and Science Fiction begin with the same words: 'What would happen if...' , so they have common principles that must be taken into account. Kakalios explores in his book, through these characters, a multitude of physical concepts, from energy to thermodynamics to quantum mechanics. In addition, it proves how *comics* have often been ahead of science by explaining relatively recent topics in quantum mechanics (with Kitty Pryde of the X-Men) and string theory (with the Infinite Earth Crisis). This is also true of the current discoveries concerning mind control and telekinesis that we saw in *Carrie*, in several X-Men, or even in Iron Man. "When Iron Man uses his X-rays or his propulsion boots, he doesn't use any voice commands or press any buttons. Just think about it," explains Kakalios. This goal, the power to encourage our mind to limits only hitherto suspected by Science Fiction, is one of the great challenges that scientists pursue today. More and more progress is being made in this field. Extremely useful innovations in the area of medicine, which, among other things, could help people with prosthetic limbs to control them more precisely and intuitively.

Accordingly, dreaming with imaginary worlds of the future does not have to be just dreams impossible to realize. It is in our hands to drag them into our reality. The big question is, how far do we want to go?

1.3. The first robots

Robots are not a technology of the present, nor of the future, but a logical evolution of past ideas generated centuries ago. Since antiquity, Man has been fascinated by machines capable of imitating human movements or reactions. Already in ancient Greece mythology claimed a giant creature, called Talos, which Zeus gave to the goddess Europe, as a sign of his love. According to this myth, Talos' blood was lead, the same divine fluid that, with regards to mythology, ran through the veins of the gods. The only vein of this immense bronze man went from the neck, through his body, to one of his heels, and there a bronze nail closed it. This was his only weak spot. With respect to legend, Talos protected Crete from possible invaders. In order to do this, every day he made three turns around the perimeter of the island, preventing foreigners from entering it and leaving its inhabitants who did not have the permission of the king. If anyone was surprised, he would get into the fire until it became red-hot and hugged his victim until it was calcined. Many theorists see Talos as a vision of future robot soldiers (Mazlish, 1995).

Since then, many scientists throughout history have collaborated in this process of evolution of robotic technology, many of them even from unconsciousness. Archimedes (287-212 B.C.) did not invent robots, but he did invent mechanical systems that are used today in robotics, such as the cam, the pulley, the spring or the screw. Additionally, in the 1st century BC, Heron of Alexandria described in his *Automata* Treaty (translated from the Greek "He who moves alone") a collection of artificial devices capable of moving autonomously. Among them were those who imitated birds that gurgled, flew and drank. The movement was articulated by the force of water, gravity or a system of levers (Sáez Vacas, 1981).

Taking a leap in time and moving to the Medieval Age, human figures with hidden mechanisms were the order of the day. Many were used in churches to impress the faithful peasants and increase their faith in a higher power. For example, it was common to see figures of mechanical men who could give the time on their own by hitting a bell with their axe.

The Arab engineer Al-Jazari (1136-1206) described and illustrated in his '*book on the knowledge of ingenious mechanisms*', mechanical devices, including a large counterweighted water clock and a humanoid-shaped automaton capable of serving drinks.

The great inventor and painter Leonardo da Vinci even designed, around 1945, a humanoid automaton that emulates a warrior dressed in medieval armor, capable of moving arms, neck and jaw in an anatomically perfect form. As described by Antoni Escrig in his book, *The Miraculous Clock* (Escrig, 2014):

> "*Of anatomical proportions following the established vitruvian canon, the android had the external appearance of an armor. A set of pulleys, cables and gears activated the members of the mechanical knight allowing him to walk, sit, move his hands, move his head and jaw. It had two independent control systems. The one in charge of operating the legs, allowing the hips, ankles and knees to move independently, was external; an operator transmitted the movement by means of cables. On the other hand, the control of the upper limbs, which included shoulders, elbows, wrists and hands, was programmable by means of a camshaft".*

Already in the first half of the 16th century, in Spain, the engineer Juanelo Torriano, Watchmaker of the Court of Charles I, built an automaton called "El Hombre de Palo", capable of crossing one of the streets of Toledo. Today it has become a legend, but its historical existence is proven. A little over a century later, French engineer Jacques de Vaucanson devised a series of automatons that acted as flutists and drummers. Although, its most famous mechanism was the so-called "Duck with Digestive System", a device equipped with more than 400 moving parts capable of flapping wings, eating, digesting and defecating, just as a live duck does. It was the 18th century and the first complex automatons began to become a reality (Sanchez-Martin *et al*, 2007).

We continue on our path through history, this time taking giant steps during the Industrial Revolutions. Both were not only a breakthrough in engineering, science and mathematics, but also in the evolution of society in general. Many of the arduous manual tasks began to be replaced by increasingly complex and efficient steam engines and machines. These were able to do in a few minutes and effortlessly, which for several people could even take days. Therefore, factories began to use machines to increase workload or precision in the production of many products. It was the first confrontation between Man and machines. The process was long. A slow evolution and social awareness, in most cases, which resulted in an acceptable adaptation on the part of the workers. Most of them adapted to the new jobs that arose, took advantage of their advantages and continued their way hand in hand with evolution. That life was easier, it allowed them to enter a comfort zone, very different from the harsh conditions of their previous stage, for example, in the field work (Terrén, 2000).

Charles Babbage (1791-1871), who worked to develop the basics of computer science in the 19th century, was among the most prominent figures of this era who contributed to the drive towards modern robotics. One of his most successful projects was the difference engine and the analytical engine. Although never completed due to lack of funds, these two machines established the basis for mechanical calculations.

Likewise, the pioneer Ada Lovelace (1815-1852) developed a series of instructions that allowed calculations to be made in a rudimentary version of what is now known as a computer. She was the daughter of the great English Romantic poet Lord Byron, and a faithful follower of Charles Babbage, with whom she worked from the age of 18. The analytical machine they both worked on was thought to run different algorithms and solve any kind of problem. During this period of working

ISSN: 1696-019X / e-ISSN: 2386-3978

ISSN: 1696-019X / e-ISSN: 2386-3978

together, Ada Lovelace conceived the idea that the machine devised by her tutor could be reconfigured to calculate Bernoulli numbers through the use of punched cards. At present, this project, which is attributed to her, is considered the first computer program, so Ada Lovelace is recognized as the first person to describe a programming language, even a hundred years before the first computer was manufactured (Pazos, 2010).

These are just some of the most prominent inventions related to robotic technology, prior to the twentieth century. Undoubtedly, we demonstrate a process of evolution with a solid foundation forged many centuries ago. The 20th century was an exponential technological revolution based, without a doubt, on the foundations laid centuries ago. The growing imagination about what those machines that solved part of our work could come to do, began to combine, continuously, with the real possibilities of scientific evolution. Literature fed science. The term "robot" appeared in the hands of the Czech playwright Karl Capek and Isaac Asimov coined and made known the concept of "robotics" worldwide through his famous "3 laws", to which we have previously mentioned.

The evolution of scientific thought in this field during this period was overwhelming (Echevarría, 2015). The rapid development of great technological inventions made it possible to start thinking about the real possibility of endowing "machines", "automatons", with something intrinsic until then only in the human being: intelligence, the capacity to think and reason following a logic. Alan Turing, considered by many to be the father of Artificial Intelligence, mentioned this concept in his historic article, published in 1950, in which he posed the question: Can machines think? To concretize it, he proposed his "Game of imitation", later known as "The test of Turing". For this game, an interrogator (person) was necessary, located in an isolated room, and in another room a person and a computer. Both should respond to the questions asked by the interrogator in a random manner. The machine should manage to impersonate a human being; if the interrogator could not distinguish between the individual and the computer, the machine was considered to have reached a certain level of intelligence. For Turing, artificial intelligence began to exist when we humans were unable to distinguish, in a blind conversation, whether our interlocutor was also human or machine (Longo, 2010).

Since then, many people have tried to get their software to pass the 'Turing Test'. In 1990 the Loebner Prize competition was created in which they tried to overcome it, which was not possible until 2010 when Bruce Wilcox's Suzette robot succeeded. Suzette, had 16,000 rules of conversation and was able to maintain 40 hours of uninterrupted conversation. He had a coherent personality and responded emotionally. Today, Turing's theories continue to apply to the fundamentals of robotics and artificial intelligence.

Also, the American Marvin Minsky revolutionized this field during the 20th century and his discoveries and thoughts were a before and after. In 1956 he constructed the term "Artificial Intelligence" -already devised by Turing- and established its foundations guided by the visionary dream of endowing computers with the capacity to reason. He defined as "the science of making machines do things that would require intelligence if they had been made by a human" (Minsky, 2010). Two years later, he joined the Massachusetts Institute of Technology (MIT) in Boston, where he worked for more than four decades and where he created his Artificial Intelligence Laboratory, incubator of many current robotic inventions. He created the first prototype of a machine capable of learning autonomously 'Snarc', designed the first hands with tactile sensors and was part of the team that designed ARPAnet, the precursor of what we now know as the Internet.

Minsky spent much of his time studying the brain and its behavior. He felt that transmitting those features to a computer "was only a matter of time. In 1987, he wrote the book *The Society of the Mind*, in which he explains the functioning of the human mind as small units or agents that interact until they develop specific tasks. According to the author, these agents lack their own 'intelligence', and it is not until they interact and communicate when they shape the mind, with an evolutionary learning. He was one of the greatest defenders of transhumanism, a philosophical and intellectual movement that considers it necessary to use technology to enhance our capabilities, avoid suffering and old age and ultimately achieve immortality.

> *"Someday we will be able to attain immortality. We'll make copies of our brains. We may believe them in a laboratory or simply download their contents onto a computer"* (Minsky, 1986).

Minsky's influence was also reflected in Science Fiction. Stanley Kubrick, one of the greatest film directors of the 20th century, visited him in 1968 while preparing *2001: An Odyssey in Space*, to advise him on the design of the virtual assistant that would betray the crew of his ship, HAL 9000. He also advised on films such as *Jurassic Park*, *Terminator*, *Artificial Intelligence* and *The Bicentennial Man*.

The industry gradually embraced these advances in robotics. In 1961, General Motors introduced the first industrial robot 'Unimate' to assist in the production of automobiles. It was developed by Joseph Frederick Engelberger, considered the father of industrial robotics and founder of Unimation, along with his partner, inventor George Devol. Unimation worked with General Motors to expand the universal use of robots in industry and prevent operators from performing potentially hazardous work. Engelberger's machine became very popular internationally, and he even starred in one of Johnny Carson's legendary television *shows*, in which he demonstrated that his robot was capable of serving beer, conducting an orchestra and playing the accordion. In short, the Unimate was a before and after in terms of the implementation of robotic technology in the industry and made a valuable contribution to the technological advances of the twentieth century. Since then, robots have been used in a variety of applications likely to be harsh or dangerous to humans, including space exploration, military use and even search and rescue missions (Valencia, 2004).

Over the next two decades, the Japanese took the initiative with a strong investment in robotics. Meanwhile, in the United States and, above all, in Europe, it was viewed with concern how heavy investments in ambitious projects related to these technologies took time to produce tangible and, most importantly, profitable results. In 1973, after a controversial debate in the United States Congress on the subject, the British mathematician James Lighthill delivered a[1] very negative report on the state of Artificial Intelligence and its possibilities in the near future, pointing out that the promised expectations and the discoveries made until then had not been fulfilled yet. Many research funds were suppressed and, in this way, what became known as 'the winter of Artificial Intelligence' (Lighhill, 1973) began.

During the 1990s, some of the abandoned projects began to be taken up again, especially at MIT and Stanford (USA), and in private companies such as Microsoft and IBM. Personal computers had become popular and "visionaries" in robotic technology and Artificial Intelligence were beginning to multiply. One of the milestones in this field was reached in 1997. The supercomputer created by IBM 'Deep Blue' faced and won against world chess champion Gary Kasparov. It was the first time a machine had beaten a human being in a competition.

ISSN: 1696-019X / e-ISSN: 2386-3978

Since then, the competition between man and machine has not ceased. In fact, it is currently growing at an exponential rate, both this and the ethical issues arising from this comparison.

2. State of Art

ISSN: 1696-019X / e-ISSN: 2386-3978

Notably, AI is a reality today. The global economic recovery in recent years has led to increased investment in this field and its exponential development.

We are currently at the beginning of what is already called the Fourth Industrial Revolution (Granell, 2016). A new and transcendent step in history. The interconnected world provided by the Internet, Artificial Intelligence and Robotics will soon change the routine of our lives, if it is not already doing so. Research in these fields is advancing at great speed, dazzling us with discoveries that, until now, were part of Science Fiction. The scientific community is dedicated to its mission and dreams of an increasingly noticeable future world. Nonetheless is the Society, the real field of experimentation of this Revolution, those who will eventually have to live with robots and is AI ready for such a drastic change?

Recent studies (Hawksworth, J. *et al.*, 2017) indicate that those sectors whose tasks are more mechanical will be the most affected. Easily any AI, or even a robot without IA, can supplant this work, reduce costs, and exponentially increase productivity. A robot doesn't stop to eat; a robot doesn't sleep; a robot doesn't take vacations; and a robot doesn't protest if it isn't paid properly. More and more companies are betting on this investment.

As can handle *Big Data* and draw conclusions with extreme speed and precision in the results.

What all experts agree on is that those sectors in which an emotional component is involved are going to be those that are later altered by IA (Sirvent, 2017). That component of closeness, of human psychology that we value so much in many occasions, for now, it is not foreseeable that the machines can do it (García, 2017).

With respect to regions, there are countries more prone to the successful implementation of new technologies (Hawksworth, J. *et al*, 2017). For example, in Japan, AI and Robots already coexist and continue with great perspectives of business the investigations in the matter. Also, greater implementation is expected in the US than in Spain for the social acceptance that historically tends to have the access to technology. There they are already testing autonomous cars and the potential buyer is overwhelming.

Journalism is being one of the sectors most clearly affected by this technology, given the fact that it generates greater productivity and efficiency in content production (Papadiminiou, 2016). Nowadays, there is a lot of news generated by machines, mainly in North American media such as *The Washington Post, The Wall Street Journal, Forbes and CNN*.

According to the latest report of the Reuters Institute *Journalism, Media, and Technology Trends and Predictions* (Newman, 2018) once again the world of journalism is destined to embrace emerging technology, just as it once was with radio, television, and the Internet. Although, we are still at the dawn of this new time of journalism dominated by Artificial Intelligence, the end is clear. There is a trend toward automation of tasks and so-called 'augmented journalism,' as defined in its latest Associated Press report, entitled: How Artificial Intelligence Will Impact Journalism: A Guide to Newsrooms in the Age of Intelligent Machines. (Marconi, 2017).

The advantages of the implementation of AI are already being considered. The journalist delegates documentation and analysis to the machine, which is capable of resolving accurately and quickly. It is even capable of writing simple news from data from information sources pre-set by the programmer. However, clear limitations are being found. One of the main ones derives from the field of ethics. The often questioned ethics of the journalist takes on a new dimension when it is supposedly a 'machine' that makes the decisions. This is an issue for future research to explore. The objective: to try to integrate AI into journalism without distorting the profession, mainly from an ethical point of view.

3. Objectives

The overall objective of the research for this article is to analyse the impact that new technologies and, in particular, Artificial Intelligence and robotics have in the field of journalism. Secondly, it tries to predict, based on the historical evolution of the concept studied and the influence of Science Fiction on social consciousness, what the future of journalism and its professionals will be once it definitively embraces the technologies related to Artificial Intelligence.

Specific objectives

1. Analyse the historical evolution of robots and Artificial Intelligence, with the aim of understanding the evolution of thinking about this technology.
2. To know the main works, both literary and cinematographic, that have contributed to create the current idea that society has of robots and AI.
3. Identify the point of connection between reality and fiction in reference to the new technologies of IA and robotics.
4. Know the current attempts to implement AI technologies in the field of journalism.
5. Identify the advantages and disadvantages of the implementation of this technology. To know the role of journalists in this new stage in which they will have to live professionally with 'the machine'.
6. To unveil the future perspectives of AI in the field of journalism.

The aim of this study is to identify the main research trends and relevant known aspects, serving as a reference and orienting the reflection among the scientific community about the new opportunities that IA technologies are bringing at present, and will bring in greater proportion in the near future, to the field of journalism. The aim is to publicise the current situation and to suggest aspects or topics for future research that have yet to be defined.

ISSN: 1696-019X / e-ISSN: 2386-3978

ISSN: 1696-019X / e-ISSN: 2386-3978

4. Methodology

In line with the objectives set, a review of scientific articles, books and reports that have been carried out that address some of the different dimensions of the social impact of technology in general, and of Artificial Intelligence and robotics in particular. The identification and compilation of academic documents have been carried out following the methodology of Systematized revision, which is characterized by four dimensions very well determined by the philosophy from which it proceeds (systematic reviews), which provide rigour to the consultation and which are specified in the following table (Codina, 2017):

SYSTEMS	COMPLETE	EXPLICITLY	REPRODUCIBLE
It is not arbitrary: neither biased nor subjective; on the contrary, it examines the best available scientific output using the best sources of information.	Information systems have been used that are presumed to provide virtual access to the entire quality production of a discipline.	It implies that both the sources used and the search and inclusion criteria and (where appropriate) exclusion of articles are made known.	Allows other researchers to check the work and, if they wish, follow the steps and contrast the results to determine their accuracy or degree of success.

For systematic bibliographic research, the bibliographic database Scopus has been accessed, which guarantees the quality of these publications (De Granda-Orive et al., 2013). It is the largest database of abstracts and peer-reviewed literature and has intelligent tools to monitor, analyse, and visualize academic research. Given its wide geographical and thematic coverage, it is considered ideal to be used for bibliographic revisions, including those of a systematized type in any area, but in a very special way in Human and Social Sciences (Codina, 2018). The main search criteria has been delimited by keywords including Boolean inclusion (AND) or exclusion (NOT) operators. Date range filters have also been used. This same search criteria has also been applied to the *Web of Science*, which details the references of the main scientific publications in any discipline of knowledge, both scientific and technological, humanistic and sociological since 1945. Dialnet has also been consulted, a portal for the dissemination of Hispanic scientific production, created by the University of La Rioja (Spain), specialising in human and social sciences. We consider its database of great value, since it not only includes the indexes of the scientific and humanistic journals of Spain, Portugal and Latin America, as well as books (monographs), doctoral theses, tributes and other types of documents, but also gives access, free of charge, to the full text of many of them (Magriñá Contreras, 2007).

In addition, the author's collaboration in the International Ethically Aligned Design (EAD) online forum, in which internationally relevant professionals present their point of view on how to create the best ethical code for Artificial Intelligence, has been of great help in acquiring the knowledge necessary for this research. As well as in the discussion forums of the European AI Alliance, a body dependent on the European Commission, of which the author is also a member.

This research has also been based on the conclusions of the author's participation, as an active speaker, in the 9th International Seminar on Language and Journalism held in San Millán de la Cogolla, entitled "El español del futuro en el periodismo de hoy", with a paper on the role of machines in the journalistic process. In this event, the author was able to define the

hypotheses put forward in this work, aided by the well-founded opinions of experts in the field, from both the academic and business worlds.

In addition, the overall vision of the research has been completed thanks to the author's attendance at numerous congresses, seminars and conferences related to the impact of AI on jobs and society in general, among them.

The author's knowledge necessary for this article also derives from the various investigations related to other areas of the social impact of Artificial Intelligence, acquired as a principal investigator of the SIMPAIR group (Social Impact of Artificial Intelligence and Robotics). Also the author's knowledge develops from a professional experience of 17 years working in the digital media of the PRISA group, where the author was able to observe, understand and analyse, first hand, the great influence of technology in journalism in general, and in journalists in particular.

5. Analysis and research results

The history of the evolution of robotics and Artificial Intelligence, significantly influenced in recent times by literature and the cinematographic world, has undoubtedly propitiated the moment we are living today, as evident in the first sections of this article.

The science fiction showing AI scenarios has created social prejudices that are now highly visible at all levels when talking about these technologies. We tend to offer these algorithms human characteristics, including awareness of good and evil. Also, in our imagination the line with reality, in this aspect, is very blurred. There are many gurus who predict the revolution of robots, the so-called technological Singularity, in which the latter will surpass humans in intelligence and become the "dominant race" on Earth", including potential 'malicious' uses of this technology that could lead to considerable disasters. (Brudage *et al*, 2018).

Although this Technological Singularity still seems like an unattainable utopia, given the rapid advance of technologies at present we cannot situate the issue as something unattainable. As has been demonstrated throughout history, any invention that today looks like science fiction tomorrow can be a tangible reality.

According to Massachusetts Institute of Technology (MIT) cyborg anthropologist Amber Case, one of the main problems we face today is that technology is advancing too fast, and we have a hard time assuming so much change. "In just a few years, a computer has gone from occupying a room to fit in our pocket and connect us with everyone" (Ventura, 2018). It is the so-called 'technological shock', in which fear of the unknown is combined with a vague awareness of its advantages and disadvantages.

In this sense, Robert Ornstein, a psychologist, comments in his book *The Evolution of Consciousness* on a fact highlighted by many current researchers in these technologies: "*From the appearance of human beings until my birth in 1942, a very long period was necessary for humanity to reach a population of 2650 million human beings. However, the few years of my life were enough to add to living humanity an equal number of people... If the production of the first billion human beings took approximately one million* years, for the next billion 14 years were sufficient... and the pace is accelerating (Ornstein, 1991).

ISSN: 1696-019X / e-ISSN: 2386-3978

ISSN: 1696-019X / e-ISSN: 2386-3978

For his part, Fernando Iglesias also highlights in his book *Global Modernity: A Copernican Revolution in Human Affairs* this accelerated rhythm in which we find ourselves: "*Since accelerated phenomena impacted social processes, futurology has become a science of scarce certainty but of growing importance. With the next day's diary in hand it is easy to mock the erroneous prophecies of their gurus. In a world of slow change, the near future was foreseeable and the far future unpredictable. But in a world undergoing rapid change, the near future is unpredictable, and the distant incomprehensible, as incomprehensible as if we had to explain to our great-great- grandparents the concept of cloud computing.* "(Churches, 2011).

This accelerated change has also significantly affected the world of journalism. Not to the basic principles of journalism, which remain the same, but rather to the way journalists do journalism. Likewise, the short transition is not being easy for these professionals.

5.1. The rapid evolution of journalism

The last decades of the twentieth century and, more recently, has been a great revolution in journalism. For journalists, the Internet is a source of infinite information and documentation (Salazar García, 2003). Since the birth of the World Wide Web in 1991, which facilitated the access of all types of users to the Internet; the growth of unstructured data in the Network of networks has been exponential. Prior to its appearance, it was journalists who provided the information that they considered relevant to readers. Now the latter can extract from the Internet what they find most interesting, through thematic websites, digital newspapers, blogs and forums, among others. The possibilities are many and not always reliable, considering the fact that anyone with an Internet connection can publish anything without necessarily being truthful.

It could be said that the journalist's work, as such, is no longer necessary. However, it is precisely in this last point that its new task lies: to structure the 'chaos' of data, to provide reliability to the news it counts on, based on the brand and prestige of its medium, to provide links to other websites relevant to the news, to provide multimedia resources available on the Internet that complement it; and not let it die there, but also to provide resources that are automatically updated in real time: type of news from the Stock Exchange and the Weather. Also to give its readers the option of contributing their opinions on the matter by marking their own editorial line.

All this is the work of the digital journalist today, but what is the trend of this profession? The tremendous potential of the Internet for journalists has only been glimpsed in Spain. In 1999, at the time of the *boom* of Internet portals, everyone trusted and dreamed of the great possibilities it offered and tried to make the most of it. However, the new support required something more important: a change of mentality, not only social, but also entrepreneurial. Introducing new technologies implied heavy investments in research, confidence in projects in the medium to long term, less bureaucracy that involves slowing down something that requires continuity and mental agility of those involved. Something that, as we have explained before, is complicated due to the rapid evolution of technology. The crisis in journalism today is largely the result of this lack of adaptation, motivated by too rapid a change within a single generation. (Martinez Sánchez, 2012).

Despite these drawbacks, the evolution of technology has continued to mark the profession and currently the great challenge is to impregnate the newsrooms with 'artificial intelligence' (Daewon and Seongcheol, 2018).

According to the latest report by Associated Press *How Artificial Intelligence will impact journalism* (Marconi, 2017), more and more media are supporting AI to get out of the crisis, incorporating this technology into their different departments from marketing to writing and design; managing to automate many of their tasks with great efficiency.

In fact, the American newspaper *The New York Times* has incorporated *machine learning* techniques to search for patterns in the financing data of its advertising campaigns, with the aim of optimising its results. In addition, they use AI to produce and manage content. Also, the *Los Angeles Times* has its IA called "Bot Quake" which is responsible, without human intervention, to publish *online* news at the time an earthquake is detected in the city and its surroundings.

For its part, Associated Press has been using *Automated Insights* (IA tool that allows the use of natural language) for several years to generate presentations of any type: from reports of profits of public companies to classifications of baseball leagues. His last report states that the automation of these works has allowed the media staff to have 20%

more time, which is being invested in the preparation of more extensive and in-depth reports (Marconi, 2017).

Likewise, in this same study, Marconi states that AI will completely transform the newsroom and the work of journalists, creating a demand for new technical skills among these professionals, and the need for new and better workflows. "The changes aren't drastic, but it's important to keep them in mind when implementing AI in a newsroom," he refers. Newsroom roles such as "Automation Editor" and "Computational Journalist" arise along with increased interest in digital and data journalism courses, which means that soon it will no longer be enough for journalists to conduct interviews or write articles.

Marconi exposes a change in the journalist's workflow (Marconi, 2017).

Traditional Workflow	Workflow with incorporation of AI
– Reporter – Editor of the news – Head of Section – Proofreader	– Reporter – Reporter +IA – Editor of the news + IA Editor – Head of Section – Proofreader

In addition, the Associated Press report argues that changes in the newsroom will not only have a big impact on the way journalists report a story, but also on the way news is presented and delivered to readers. Marconi explains that today the content of the single newspaper for everyone: a journalist writes a story in the hope of reaching as many people as possible," he says. "The problem with this approach is that any given article will only generate interest from a very specific subset of readers; those who have affinity with the ideas and context presented by the journalist. Marconi argues that this is changing rapidly as media companies rush to identify ways to leverage AI to generate many versions of the same story. "Someday," he says, "content will adapt to individual personality, tone, location, time of day and more, ultimately resolving the crisis in content engagement. The report clearly shows the trend in journalism today, once incorporated, IA technologies: the customization of information, depending on the demand of each user.

ISSN: 1696-019X / e-ISSN: 2386-3978

ISSN: 1696-019X / e-ISSN: 2386-3978

5.2. Data ethics and privacy, main risks

Despite the unquestionable advantages that these new technologies bring not only to the field of journalism, but to other areas, there are also important risks that are currently under debate derived from the ethics of AI programmers and, in the near future, from AI itself, and from the privacy of user data. It must be borne in mind that algorithms have the ability to "learn" from what they do (*machine learning*) of what they find in the development of their work, their context, so there may come a time when some disassociation arrives with respect to their initial programming. For this reason some control, some standards and rules, some monitoring is necessary. In this sense, more and more institutions are advocating for an international body to regulate the so-called *Big Data* and the actions of AI (Lopez de Mantarás, 2017).

In this regard, the European Parliament (EP), after a draft proposal (June 2016) and a reasoned report (February 2017) has approved a report on Robotics which establishes an Ethical Code of Conduct (European Parliament, 2017).

The EP motion for a resolution states that it is necessary to establish "an ethical guidance framework for the design, production and use of robots" to complement the various purely legal recommendations that are made. That is to say, to deepen in a new discipline, the "robotic". The underlying idea is that ethical standards should be directed at humanity –that is, the designers, producers and users of robots– and not so much at the robots themselves. Nathalie Nevejans, responsible for the report, says that ethics in robotics should not be confused with ethics in machines, that is to say, an ethics that obliges the robots themselves to adhere to ethical rules. There are several fundamental principles that have been included in the resolution, including the protection of human dignity, privacy, freedom, equal access or social effects, among others:

- To protect humans from harm caused by robots: human dignity.
- Respect the refusal to be cared for by a robot.
- To protect human freedom from robots.
- Protect privacy and data use: especially when autonomous cars, drones, personal assistants or security robots are advancing.
- Protection of humanity against the risk of manipulation by robots: Especially in certain collectives –elderly, children, dependents– that can generate artificial empathy.
- To avoid the dissolution of social ties by making robots monopolize, in a certain sense, the relations of certain groups.
- Equal access to progress in robotics: Like the digital divide, the robotic divide can be essential.
- Restriction of access to improvement technologies regulating the idea of transhumanism and the search for physical and/or mental improvements.

As evident throughout this research work, robotics and AI will profoundly affect all areas of knowledge and social relations, and there are still many unanswered questions, including: What will AI be like in the near future? Will we have an International Code of Ethics for AI? These questions create uncertainty, but the fact is clear: AI will continue to develop at an exponential rate and we must think quickly about how to manage this change.

6. Conclusions. A moment of change for the journalist, not for journalism

In conclusion, journalism is an area that will be significantly affected by the evolution of technologies related to AI, which will definitely change the way we face the profession. The key is to move forward together. Robots and humans.

On this subject, the journalist's profile changes. This professional should be trained not only in the knowledge of how to properly transmit information, but also in how to collaborate properly with IA machines to obtain the best result.

It is the duty and task of the journalist, both now and in the immediate future, to transmit and 'translate' in intelligible language the technological advances in AI that are so shocking certain sectors of society, that could be considered weaker and less predisposed to change. It must also convey its advantages and disadvantages in anappropriate manner.

We are going through a moment in history of exponential technological advances. The fact that they are occurring without generational change is causing some rejection, for lack of understanding of a part of society more accustomed to stability.

IA and the rapidly evolving technologies of the future are expected to bring some instability brought about by this rapid evolution. This will mean that the information professional, as well as that of any other area, will have to be learning and recycling throughout his or her professional life. It is and will be even more as we move into the future, a necessary condition of any worker's profile. Anyone who doesn't accept it will be left out of the system.

Society must accept AI as yet another technology that will help improve its lifestyle. As with any technology, its inappropriate use can lead to dangers, mainly arising from the misuse of data.

In this sense, AI entails ethical considerations that other technologies do not have. Providing a machine with 'intelligence' is in direct conflict with the concept of man and the philosophical and religious definitions of the term. Likewise, society, as a mass, tends, by its preconceived idea derived from the imaginary worlds of Science Fiction, both in novels and in cinema and television, to identify AI with negative connotations. There is a need for an international code of ethics to regulate conveniently the ethical implications that, both now and in the immediate future, will derive from AI. Otherwise, the intrusion of this technology into society will be very scarce and of little impact, as it will generate rejection.

7. Bibliographic references

Asimov, Isaac (1942): Runaround. New York: Street & Smith.

Asimov, Isaac (1950): I, Robot. Barcelona: Edhasa.

Asimov, Isaac (1976): The Bicentennial Man. Madrid: Ediciones MR.

Barnathan, M and Columbus, Chris (1999) Bicentennial Man. United States, Touchstone Pictures.

Berlanga de Jesus, A. (2016) "The road from Artificial Intelligence to Big Data". Statistics and Society magazine. n. 68, pp. 11.09.

Brockman, John (1996): The third culture. Beyond the scientific revolution. Barcelona: Tusquets.

ISSN: 1696-019X / e-ISSN: 2386-3978

Brudage, M. *et al.*(2018): "The Use of Artificial Intelligence Malicious: Forecasting, Prevention, and Mitigation "Future of Humanity Institute of Oxford University [Retrieved from https://img1.wsimg.com/blobby/go/3d82daa4-97fe-4096-9c6b-376b92c619de/downloads/1c6q2kc4v_50335.pdf] [Accessed : 01/05/2018].

Campbell, Jeremy (1990): The improbable machine. What new discoveries in artificial intelligence reveal how the mind really About Works. New York: Simon & Schuster.

Chitwood, Adam (2016): Designed to have NASA Ship Warp Inspired by 'Star Trek's Enterprise. Collider. [Retrieved from: http://collider.com/star-trek-warp-ship-nasa-images/#ixs-enterprise] [Accessed: 04/14/2018].

Codina, Lluís (2017): systemized Reviews and how to perform them with guarantees: systematic reviews and SALSA Framework. [Retrieved from: https://www.lluiscodina.com/revision-sistematica-salsa-framework/] [Accessed: 09/14/2018].

Codina, Lluís (2018): Scopus: characterization and advanced use guide Preparation, and export search results. [Retrieved from: https://www.lluiscodina.com/scopus-analisis-guia-utilizacion/] [Accessed: 09/14/2018].

Garcia, M (2014): "Artificial Intelligence in film: terribly human". Criticism, n.993, pp. 72-76.

Granell, F (2016): Challenges of the fourth industrial revolution. economic versus social, financial and business change perspectives: formal academic ceremony with the University of La Rioja and San Millán de la Cogolla Foundation / coord. by Royal Academy of Economics and Finance, pp. 57-74.

Daewon, k. and Seongcheol, K (2018) Newspaper Journalists' attitudes towards journalism robot. Telematics and Informatics. Vol. 35. pp. 340-357.

Deeley, M and Scott, R (1982): Blade Runner. United States: Blade Runner Partnership.

Granda-Orive, JI; Alonso-Arroyo, A .; Garcia River; Solano Reina, Jimenez-Ruiz, CA; Alexandre-Benavent, R (2013): Some advantages of Web of Science Scopus on a bibliometric analysis of smoking, Spanish Journal of Scientific Documentation, 36 (2), E011.

Diakopoulo, Nicholas (2014): Algorithmic Accountability. University of Maryland, USA [Retrieved from: http://www.nickdiakopoulos.com/wp-content/uploads/2011/07/algorithmic_accountability_final.pdf] [Accessed: 05/01/2018].

Echevarria, J (2015): "From the philosophy of science to philosophy of techno-science and innovations". Revista Iberoamericana science and technology. vol.10 no. 28.

Ellison, M and Jonze, S: Her. United States: Annapurna Pictures.

Escrig, Antoni (2014): The Miraculous clock, and other scientific stories about robotics, automatic and Prodigious machines. Barcelona: Almuzara.

ISSN: 1696-019X / e-ISSN: 2386-3978

European Parliament (2017): Report with Recommendations to the Commission on Civil Law Rules on Robotics. [Retrieved from: http: //www.europarl.europa.eu/sides/getDoc.do type = REPORT & reference = A8-2017-0005 & language = EN?] [Accessed: 07/03/2018].

Fussell, J (2013). Science fiction inspires Real-world innovation. The Bulletin. [Retrieved from: https://www.bendbulletin.com/news/1284143-151/science-fiction-inspires-real-world-innovation] [Accessed: 02/12/2018].

Garcia, C. (2017). Principles for Cognitive Era. Days I, Robot: jobs that will disappear. Madrid: ESIC.

Gent, E (2017): "Star Wars Tech 8 Sci-Fi Inventions and Their Real-Life Counterparts". Live Science. [Retrieved from: https://www.livescience.com/58943-real-life-star-wars-technology.html].

Gonzalez-Jimenez, H. (2018): "Taking the fiction out of science fiction: (Self-aware) robots and What They Mean for society, retailers and marketers". Futures n.98, pp. 49-56.

Hawksworth, J .; Berriman, R and Goel, S. (2017): Will Robots really steal our international jobs ?: An analysis of the potential long term impact of automation. Price Water House. [Retrieved from: https: //www.pwc.co.uk/economic-services/assets/international-impact-of-automation-feb-2018.pdf] [Accessed: 17/01/2018].

Hurd, GA and Cameron, J (1984): Terminator. United States: Hemdale Film.

Iglesias, Fernando A (2010): The global modernity: a Copernican revolution in human affairs. Editorial Sudamericana.

Jaemin, J .; Haeyeop, S .; Hyunsuk, I. (2017): "Intrusion of software robots into journalism: The public's and Journalists' perceptions of news written by algorithms and human Journalists". Computers in Human Behavior. n. 71, pp. 291-298.

Jubak, Jim (1993): The thinking machine. The human brain and artificial intelligence. Barcelona: Ediciones B.

Kakalios, J. (2006): The physics of superheroes. Madrid: Ma Non Troppo.

Kurtz, G and Lucas, G (1977): Star Wars. United States: Lucasfilm.

Lighthill, J.: Artificial Intelligence: a paper symposium. [Retrieved from:: http://www.chilton-computing.org.uk/inf/literature/reports/lighthill_report/contents.htm] [Accessed: 02/04/2018].

Longo, G. (2010): The Turing Test: "history and meaning" Novática: Journal of the Association of Computer Technicians, n.206, pp. 63-74.

Lopez de Mantaras, R. (2017) Ethics in artificial intelligence. Research and Science. n. 491. pp. 49-49.

Lopez Pellisa, T (2013): "Automata and robots: fantoches technological Karel Capek in RUR and The of Lord of Pygmalion Jacinto Grau". Annals of contemporary Spanish literature, n.38, pp. 137-159.

Magriñá Contreras, M (2007): The spread of Spanish scientific production through the DIALNET project. ANABAD Bulletin, Volume 57, No. 4, pp. 9-22.

ISSN: 1696-019X / e-ISSN: 2386-3978

Marconi, F., Siegman, A. and Machine Journalist (2017): The Future of Augmented Journalism: A guide for Newsrooms in the age of smart machines. Associated Press. [Retrieved from: https://insights.ap.org/uploads/images/ap_insights_the_future_of_augmented_journalism.pdf] [Accessed: 04/20/2018].

Marconi, F (2017): "Report: How artificial intelligence will impact journalism". . Associated Press [Retrieved from: https://insights.ap.org/industry-trends/report-how-artificial-intelligence-will-impact-journalism] [Accessed: 15/03/2018].

Martinez Sanchez, O: "Journalism in the Digital Age: The media, including rearrangements, crises and opportunities." Mexican Journal of Communication, Vol 25, n.131, pp. 44-47.

Mazlish, B (1995): "The man-machine and Artificial Intelligence". Stanford Electronic Humanities Review, n.4, pp: 21-45.

Minsky, M. (1986): The Society of Mind: human intelligence in light of artificial intelligence. Galápago editions.

Minsky, Marvin (1994): Will the robots who inherit the earth ?. Research and Science, pp. 86-92.

Minsky, M. (2010): The machine of emotions: Common Sense, artificial intelligence and the future of the human mind. Barcelona: Random House Mondadori.

Moravec, Hans (1993): The mechanical man. The future of robotics and human intelligence. Barcelona: Salvat.

Newman, N. (2018): Journalism, Media, and Technology Trends and Predictions. Reuters Institute. [Retrieved from: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2018-01/RISJ%20Trends%20and%20Predictions%202018%20NN.pdf] [Accessed: 01/04 / 2018].

Ornstein, Robert (1994): The evolution of consciousness: the limits of rational thought. Salamander.

Papadimitriou, A: The Future of Communication: Artificial Intelligence and Social Networks. Media & Communication Studies. Mälmo University. [Retrieved from: https: //muep.mau.se/bitstream/handle/2043/21302/The%20Future%20of%20Communication.pdf sequence = 2] [Accessed: 02/02/2018].

Pazos, J (2010): "Augusta Ada Byron, Countess Lovelace, and (in) deserved reputation". ACTA training manual, n.55, pp. 93-111.

Olabuénaga Ruiz, JL, Aristegui, I. and Melgosa, L. (2002): Developing a social research project. ICE monographic notebooks. Bilbao: University of Deusto.

Martín Sánchez-FM, Schlegl P. Jimenez Millan F. Rodriguez, Salvador Bayarri J., Monllau Font V., J. Palou Redorta, Mavrich Villavicencio H. (2007): "History of Robotics: From Archytas of Tarentum to da Vinci robot. Urol. Vol.31 n. 3.

Sáez Vacas, Fernando (1981). "Twilight of some sort of Robots (one historical perspective - scientific robotics)". Bit. Newsletter telecommunications, n. 19, pp. 34-41.

Saiz Lorca, D (2002): "RUR Capek: nearly a century of robots". Statistics Complutense, n.2, pp. 211-218.

ISSN: 1696-019X / e-ISSN: 2386-3978

Sirvent, J. (2017). YoTubeTrabajo: Digital Transformation; shock or death. Days I, Robot: jobs that will disappear. Madrid: ESIC.

Spielberg, S. (2001): AI: Artificial Intelligence. United States: Warner Bros.

Terrén, E (2000): Development and implications of the Industrial Revolution. Science Technology and Society. pp. 57-69.

Salazar Garcia, I (2003): Internet as a source of information: the deep network analysis and journalistic utility (doctoral thesis). San Pablo CEU University. Madrid.

Valencia Giraldo, A. (2004): From the art to modernity technical constructions, science, tecnologían and modernity. Colombia: Editorial University of Antioquia, p. 228.

Ventura, D (2018): Amber Case: "It is absurd to be afraid of the revolution of robots, as has already happened". Huffingtonpost. [Retrieved from: https://www.huffingtonpost.es/2018/01/05/amber-case-es-absurdo-tener-miedo-a-la-revolucion-de-los-robots-puesto-que-ya- ha-ocurrido_a_23297858 /] [Accesed 01.06.2018].

ISSN: 1696-019X / e-ISSN: 2386-3978