3. ARTIFICIAL INTELLIGENCE AND A NEW CORNERSTONE FOR AUTHORSHIP

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'What is the heart but a spring; and the nerves but so many strings; and the joints, but so many wheels'
- Thomas Hobbes, 1651

ABSTRACT

The 20th century's digital technological revolution has transformed our world in ways once thought almost impossible. What was once deemed mere science fiction, has now become reality. Of these developments, one of the most controversial is that of the growing dependence on robots and Artificial Intelligence (AI). AI development has led to a scenario in which non-human entities generate scientific, artistic, and industrial outputs that meet the requirements to be protected as intellectual property (IP). However, it also faces various theoretical and practical obstacles hindering such protection. This paper aims to address the question of the role of art created by AI; and to offer certain theoretical solutions that, in the future, could resolve the legal problem that represents the creation of art by an AI entity.

Keywords: *artificial intelligence, copyright, e-citizen, intellectual property, originality, rationality, legal personhood*

1. INTRODUCTION

To date, a universal definition for Artificial Intelligence (AI) does not exist. Many have tried to define it, such as John McCarthy, who conceptualized it as: 'The science and engineering of making intelligent machines, especially intelligent computer programs.'[1] The humanitarian thought in the voice of Haugeland, on the other hand, describes it as: 'The exciting new effort to make computers think … machines with minds, in the full and literal sense.'[2] Poole, as the representative of rationalism, expresses that 'Computational Intelligence is the study of the design of intelligent agents.'[3] While each individual definition has its merits, most, like these three, fall under one of the four historical approaches used in its study: humanist thought, humanist action, rational thought, and rational action. Humanist thought and action have their roots in behaviorism and are sustained in empirical knowledge. Rational thought and rational action, on the other hand, are held on a combination of mathematics and engineering.

Uniting the four approaches is the search for 'autonomous intelligence' in machines. Understanding this key concept is vital to solving AI's intellectual property (IP) problems. One such emerging problem stems from the creation of copyrightable works by automated beings. In turn, answers to the applicable preconceived and new legal mechanisms must be implemented.

AI will soon face the fundamental IP problem of authorship. Authorship and other legal issues, such as the exploitation of AI works and their entry into the public domain, will likely arise soon and are in dire need of legal treatment.

The recognition of authorship rights for non-human entities would mean a significant change in the way we interpret the law. Legal subjects such as personal and fundamental rights, and the creation of new normative structures to allow the coexistence of humans and machines in society would have to be approached in a completely different way. In some legal systems, steps towards the creation of these structures have already been undertaken. The European

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[1] John McCarthy ,'What is AI?/Basic Questions' (Professor John McCarthy, 12 November 2007) <http://jmc.stanford.edu/artificial-intelligence/what-is-ai/index.html> accessed 06 May 2019.

[2] John Haugeland, *Artificial Intelligence: The Very Idea* (2nd edn, MIT Press 1987).

[3] David Poole and Allan Mackworth, *Artificial Intelligence: Foundations of Computational Agents* (1st edn, Cambridge University Press 2010).

Parliament, for example, recently proposed a motion with recommendations for the civil regulation of the aptly named 'electronic citizens'[5] The proposal is complex, requiring the consonance of other branches of the law. This is a result of the impact of AI on discrete branches of law such as the law of persons in particular legal personality, legal capacity and civil liability, among others. Its proposal presents an opportunity to define areas in IP law that have yet to be regulated.[6]

The purpose of this paper is to provide clarity on the 'AI-generated work' dilemma. It will start with some basic concepts of artificial intelligence, for a better understanding of the concept of 'authoring'. The core of this paper will then focus on the authorship of AI-generated works of art. Some solutions will then be proposed, since current legislation does not cover some of the most important aspects of AI system authorship. Related topics like originality, morality and exploitation will be addressed as well.

Most of this paper approaches its concepts through the perspective of the civil law system, as it is considered to best align with the new required dynamics of IP protection.

2. ARTIFICIAL INTELLIGENCE: 60 YEARS OF DEVELOPMENT

The term 'Artificial Intelligence' was coined by John McCarthy during the summer of 1956 at Dartmouth College.[7] Like all new branches of science, it faced heavy criticism and many obstacles until 1982, after a program called System Trade Expert R1 (STE-R1) began operating at Digital Equipment Corporation.[8] By 1986, the system was saving the company $40 million a year, sparking the growth of the AI industry.[9]

After the success of STE-R1 in 1986, interest in AI boomed. Development in neural networks, originally carried out in 1962 by Frank Rosenblatt, was revived. This allowed for the application of the three major learning paradigms: supervised, unsupervised, and reinforced. Reinforced learning incorporates stochastic models, which are implemented into rational agents that are capable of perceiving 'sensorial' information of their surrounding environment.[10] This is done for the purpose of developing the optimal outcome to the requested task—or the best possible, when operating under uncertainty.

The rationality achieved by these agents was, and still is, misunderstood by non-experts as infallible. For the purpose of this paper, it must be considered that rationality is not defined as omniscience. It maximizes the expected performance and therefore supports, and in fact conceives,

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[5] European Union Draft Report with Recommendations to the Commission on Civil Law Rules on Robotics [2017] INL 2015/2103 (Robotics Draft Report 2017).

[6] ibid.

[7] John McCarthy, 'A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence' (Professor John McCarthy, 31 August 1955)
<http://jmc.stanford.edu/articles/dartmouth/dartmouth.pdf> accessed 11 May 2019: 'We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can

be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve the kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.'

[8] Digital Equipment Corporation, 'Records' <https://oac.cdlib.org/findaid/ark:/13030/c8t72p80/entire_text/> accessed May 7, 2019.

[9] Stuart J Russell and Peter Norvig, *Artificial Intelligence, A Modern Approach* (3rd edn, Prentice Hall 2013).

[10] ibid.

the existence of errors in the proceeding.[11] It is of vital importance to assume throughout this paper that perfect rationality in complex environments is, to date, unattainable.

In 1988, Judea Pearl coined the term 'Bayesian networks.'[12] This refers to a method that solved many of the problems of probabilistic reasoning of the 1960s and 1970s. To this day, it is the dominant AI research approach in expert systems and uncertain reasoning.[13] Through the work of many scientists like Allen Newell and John Laird, the emergence of intelligent agents have provided for the continued development of AI.

By 2001, the rapid spread of the internet gave rise to a new issue in AI development — the amount of information received. Modern trends explain that when developing neural networks and intelligent agents, the amount of information these agents perceive must be prioritized over the algorithms to be used on them.[14]

Nowadays, the scope of AI stretches into the functions of everyday life. AI can be found in robotic vehicles to self-employed planners, through video games and even intelligent vacuum cleaners.

3. CAN MACHINES BE CONSIDERED AUTHORS?

AI research falls under two main schools of thought: Rationalistic, rooted in logical reasoning and mathematics; and Humanistic, which seeks to emulate the cognitive model of emotional beings - namely, the actual operation of the human brain. This paper addresses the humanistic perspective, and is premised on the idea that the closer the agent creation process is to humans, the easier it will be to extrapolate and apply the current forms of human-structured copyright protection to those agents.

1950 saw the first and most important application of the humanistic approach by Alan Turing. His work resulted in a test to assess the intelligence of machines. It provides that an agent passes the test if after facing a human interrogator, he himself is unable to determine if the answers are from a person or a computer.[15] To do this, the computer must present the following capabilities:

- Natural Language Processing to communicate effectively;
- Representation of knowledge that allows it to store what it hears or knows;
- Automatic reasoning to use the information that it stores and from there, answer questions and reach new conclusions; and
- Machine learning to adapt to new circumstances and extrapolate and detect patterns.

In passing the test, the machine is considered 'capable of thinking'. This test, in turn, provided a new form of classification in AI systems. Per this classification, a weak AI is one where an AI machine acts as if it could 'think', while a strong AI is one where the machine actually 'thinks'. In modern practice, many researchers, prefer a 'weak' AI, only choosing to pursue a 'strong' AI, if the problem is not initially resolved by the former.[16]

From a legal standpoint, the determination of a machine's 'thinking capacity' raises a number of questions regarding the recognition of authorship. The ability to think is what often leads to true innovation and creation. Therefore, it follows that authorship is only legally recognized when its creator possesses the capacity to think. It is for this reason that humans were the sole recipients of authorship. Thus, in order to recognize authorship in a machine, it is not enough for it to merely 'act' like it is thinking (having a weak

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[11] The inclusion of such mathematical models would allow the machines to solve problems with variable factors, in other words, establish conjectures.

[12] Judea Pearl, *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible inference* (1st edn, Morgan Kaufmann Publishers 1988).

[13] ibid.

[14] Adam Kilgarriff and Gregory Grefenstette, 'Introduction to the Special Issue on the Web as Corpus' (2003) 29 Computational Linguistics 333.

[15] Alan M. Turing, 'Computing Machinery and Intelligence' (1950) 59 Mind 433.

[16] Russell and Norvig (n 9).

AI), it must 'actually' think (have a strong AI). In a weak AI, authorship belongs to the machine's programmer, rather than the machine itself, as the creation of work is simply a realized expression of the programmer's codes. Thus, in a weak AI, the machine's work it is not its own, but rather that of the programmer behind it.

Hence, when looking for attributable copyright for machines, the premise of a strong AI is a *sine qua non* condition. Classifying a machine as a strong AI, however, is difficult, as the capacity to think for oneself is hinged on the premise of being able to perform a task in different ways. For example, certain agents have proven their capacity to create a copyrightable work. Yet, they are often limited to the performance of tasks of specific artistic nature. They lack the necessary ability to create works of arts of a nature different to that for which they were programmed. This raises doubts as to whether the machine truly possesses the capacity to consciously create something.

Those that reject the idea that machines can really think, often turn to the phenomenology of Jefferson.[17] In 'The Mind of the Mechanical Man', Jefferson questioned the direct experience of machines when performing a particular task, asking 'can machines think?'[18] In comparison, to defend his position, Turing pointed to his test of behavioral intelligence (Turing Test), then citing his famous dialog about Mr. Pickwick.[19]

Some scholars, like Stuart Russell and Peter Norvig, agree with Turing, alleging that answering the question of if a machine can think would 'humanize' the agent.[20] They further argue that there is no reason to impose higher standards for machines than we do for humans, as there is no evidence to support the internal state of the human mind.[21]

Dutch AI scholar, Edsger Dijkstra, offers another approach to the question of whether machines can think, arguing that in order to 'think' there is no need for a brain or its parts.[22] He explains how the question of 'can machines think?' is equivalent to asking 'can submarines swim?' The Oxford English Dictionary defines the word *swim* as, 'propel the body through water by using the limbs, or (in the case of a fish or other aquatic animal) by using fins, tail, or other bodily movements.'[23] Thus, in applying this definition to submarines, it follows that submarines cannot swim, as they are limbless. Dijkstra's approach thus holds that recognizing 'thinking' attributes to machines, is more attached to the definition of the word, rather than to the real significance of the concept.

The way AI has developed is directly related to the perception of intelligence, as conceived by scientists of this field. Such perception has had a direct impact on the legal treatment AI has received. Since science within the AI field has been directed to emulate the human brain, it is only logical that the law tends to homologate the creation of

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[17] Geoffrey Jefferson, 'The Mind of Mechanical Man' (1949) 1 BMJ 1105.

[18] ibid.

[19] Alan M. Turing (n 15): HUMAN: In the first line of your sonnet which reads 'Shall I compare thee to a summer's day,' would not a 'spring day' do as well or better?
MACHINE: It wouldn't scan.
HUMAN: How about 'a winter's day.' That would scan all right.
MACHINE: Yes, but nobody wants to be compared to a winter's day.
HUMAN: Would you say Mr. Pickwick reminded you of Christmas?
MACHINE: In a way.
HUMAN: Yet Christmas is a winter's day, and I do not think Mr. Pickwick would mind the comparison.

MACHINE: I don't think you're serious. By a winter's day, one means a typical winter's day, rather than a special one like Christmas.

[20] Russell and Norvig (n 9).

[21] ibid.

[22] Edsger Dijkstra, 'The Threats to Computer Science' (Speech at the ACM 1984 South Central Regional Conference, 16 November 1984) <https://www.cs.utexas.edu/~EWD/transcriptions/EWD08xx/EWD898.html> accessed 20 October 2018.

[23] 'Swim' (*OED Online*, OUP 2019) <https://en.oxforddictionaries.com/definition/swim> accessed 7 May 2019.

machines as if they were those of humans. However, this is not necessarily right or effective.

Copyright law was designed to protect the works of humans, excluding other beings, regardless of their ability to think. This is most likely a result of the intrinsic characteristics that authorship has in the civil law system.

Delia Lipszyc states that the moral rights embedded in authorship protect the personality of the author in relation to his work.[24] This same line of thought stands as the foundation of the civil system, attributing a set of extra-patrimonial rights to the author deeply linked to his personality. That personality is the same one that gives rise to creative abilities and its reflection in the work serves as a measure of the level of originality. Yet it also functions as a barrier so that only human beings can be considered authors, since creativity is an exclusive feature of humanity.

Despite its complexities, the civil law division of rights into moral and economic facilitates the creation of a legal fiction. It follows that a non-human subject holds moral rights while assigning his economic rights over the work to a human being for effective exploitation. Thus, a legal fiction is necessary to restructure copyright law for recognizing non-human authorship. The attribution of legal personality to rational agents is the foundation for further recognition of authorship rights, which is why the law is moving towards this kind of recognition.

4. WHEN LAW REACHES SCIENCE: THE E-CITIZEN

The European Parliament recently passed a motion to regulate the coexistence between robots and humans. Among other issues, the motion includes aspects related to IP and the legal status these robots could acquire.[25]

The European Parliament's recognition of the legal personality of robots is the first step to universal acknowledgment of AI authorship. Paragraph 59 of the motion expresses the need for:

… creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.[26]

This means that the European Parliament aims to recognize robots that meet certain requirements as subjects of the law and consider them as authors.

Law has conferred legal personality in a fictitious way before (e.g., corporations), but the exercise of personality for legal entities is done through natural persons, facilitating the process of creating a legal fiction in such cases. Robots, on the other hand, would have their legal personality vested in an artificial entity and would also be exercised directly by it. This implies a capacity for understanding and awareness, which the Parliament's motion attributed exclusively to 'intelligent robots'. It is to these 'intelligent robots' that the State will grant legal personality. An additional proposition in the motion seeks to create a registry for intelligent robots, similar to the civil registry for natural persons, or to the Mercantile Registry for legal persons.[27] This registry will most likely have a constitutive character, given the nature of the entities, so only rational agents registered can be granted legal personhood. For this purpose, these 'intelligent robots' will have to show, in general:

- an autonomous capacity to acquire information through sensors and/or by exchanging data with its environment (inter-connectivity), as well as trading and analyzing such data;

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[24] Delia Lipszyc, *Derecho De Autor Y Derechos Conexos* (CERLALC 2017).

[25] Motion for a European Parliament Resolution with Recommendations to the Commission on Civil Law Rules on Robotics [2017] INL 2015/2103 (Robotics Motion Resolution 2017).

[26] ibid.

[27] ibid.

- self-learning ability, from experience and by interaction (optional criterion);
- that it has at least a minor physical support;
- it can adapt its behavior and actions to the environment; and
- absence of life in the biological sense.[28]

A. ARE ROBOTS WORTHY OF LEGAL PERSONHOOD?

To what extent should legal capacity be conferred to robots? Scholars like Lawrence Solum approach this question from the perspective of the traditional attributes of legal personhood – intelligence and will – and propose two theoretical scenarios to prove such attributes.[29]

The first scenario explores an attribute of intelligence, the capacity to solve complex issues, by answering the question of 'Could an artificial intelligence serve as trustee?' We consider the question to be ill-defined, as entities that are granted a legal personhood do not necessarily exercise all their rights, and in this case, their rights as trustees. For example, humans acquire legal personality as soon as they are conceived, yet most of us do not serve as a trustee during our lifetime. Thus robots could be awarded legal personhood and only use it to the extent of their capacities, just as humans do.

Solum also raises the question of judgment, arguing that AI could not embrace drastic changes and deviate the terms of the trust in case of need.[30] Although modern rational agents can receive input from their environment and act consequently, granting legal personhood should not be conditioned on the performance of extremely complex tasks. Under copyright law, that would be the equivalent to only granting authorship to those with highly creative capacities and skills. Not every human can, for instance, paint like Rembrandt, yet all humans have the legal personhood to potentially be recognized as authors for anything they may create. Robots, on the other hand, have

reached a level of deep learning where they are capable of emulating Rembrandt's work, without being granted authorship recognition.[31]

In his second scenario, Solum discusses the possibility of a robot that demands its constitutional rights, such as the right to freedom of expression, or opposition to involuntary servitude.[32] This scenario poses a much more complex issue than the previous one. Constitutional rights are inseparable, and the right to authorship over IP is one of them. A considerable number of constitutions within the civil system include the regulation of this right. Thus, the recognition of the right to authorship would imply the inescapable need to recognize other rights. The proposal of the European Parliament, however, only mentions the issue of constitutional rights by explaining that engineers and robot designers must create and program them so that they demonstrate the maximum respect for the fundamental rights of human beings.[33]

The solution for this second scenario appears simple. The law has created legal persons with legal personality before - 'corporations', for example, without the need to recognize fundamental rights. The problem is that robots have a particular nature that differentiates them from corporations. While the latter depends on organic representation to attend legal acts, robots may be able to perform such acts perfectly by themselves to the extent that their cognitive development allows it.

Regardless, the potential to solve this problem exists through combining certain situations and legal solutions. Take, for example, the practice of legal representation. A rational agent could hold all the rights that arise from the recognition of legal personality including authorship, and a human — probably the programmer or his employer — would be responsible for the representation and exercise of those rights. Obviously, this would require more exhaustive

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[28] ibid.

[29] Lawrence B. Solum, 'Legal Personhood for Artificial Intelligences' (1992) 70 NC L Rev 1231.

[30] ibid.

[31] J Walter Thompson Amsterdam, 'The Next Rembrandt' (ING, 24 January 2018) <https://www.nextrembrandt.com/> accessed 5 May 2019.

[32] Solum (n 29).

[33] Robotics Motion Resolution 2017 (n 25).

legal regulation, but within the current legal parameters and given the separation between moral and pecuniary rights, it is a possible solution.

The primary arguments against granting legal personality to artificial intelligence systems are all anthropocentric based. These arguments revolve around the idea of robots not being human, lacking a soul, or not showing feelings, interests, desires, intentionality, etc. They are all derived from social constructs created by humans, and therefore, are modifiable. It is not the purpose of this paper to exhaust the doctrinal positions regarding the granting of legal personality to robots. However, it is necessary to understand that without such recognition, granting copyright to rational entities seems impossible.

As Dijkstra proposed, perhaps the error lies in the narrowness of the concept. Instead of trying to force reality into a legal concept created centuries ago, we should be expanding the concept so that reality fits on its own. After all, the greatest advantage offered by mental constructs is the possibility of changing them when necessary.

5. THE CREATION OF A CREATION: WHO OWNS IT?

The scenario where non-human entities give rise to creations of artistic or scientific nature has now become a reality. Many doctrinal and practical categories now cover possible scenarios where 'electronic people' are involved. However, a direct application of the categories and concepts existing in IP, do not solve all potential conflicts arising from the creation of works of art by robots.

The European Parliament's motion includes a portion dedicated to IP, covering sections 18-21.[34] This includes a call for the specific regulation of the ownership of artistic works created by intelligent agents, the flow of large amounts of data, and protection of personal information. However, this paper will focus exclusively on paragraph 18, which provides that:

18. … there are no legal provisions that specifically apply to robotics, but that existing legal regimes and doctrines can be readily applied to robotics, although some aspects appear to call for specific consideration; calls on the Commission to support a horizontal and technologically neutral approach to IP applicable to the various sectors in which robotics could be employed.[35]

In the explanatory statement of the draft for 'IP rights, data protection and data ownership,' the Commission is asked to:

… come forward with a balanced approach to IP rights when applied to hardware and software standards and codes that protect innovation and at the same time foster innovation. Moreover, the elaboration of criteria for 'own intellectual creation' for copyrightable works produced by computers or robots is demanded.[36]

When talking about authorship in cases of AI-generated works, there are three possible scenarios:

1. The work belongs to no one (because AIs are not subjects of law), so it falls into public domain, and authorship is lost.

2. The work belongs to the programmer or his/her employer, therefore granting authorship to someone who did not create the work, which is, in short words, a violation of authorship rights regardless of the legal system in which such situation prevails.

3. The work belongs to the rational agent who created it, a division of rights prevents the work from falling into the public domain while still be morally defendable by a human/legal entity with legal capacity to do so.

The third option is the most viable, but it is attainable within the civil system with its better-structured division of author's rights into moral and pecuniary. But why grant

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[34] ibid.

[35] ibid.

[36] Robotics Draft Report 2017 (n 25).

rights to an agent that is not capable of exercising or defending them? Because by making authorship attributable to 'someone,' the work is prevented from falling into the public domain. Should rights be granted to these entities, three questions follow:

1. Once the agent is granted rights, is it going to enforce them?

2. Is it necessary to enforce authorship rights in order to regard such works as worthy?

3. What does this have to do with the ownership of an AI generated work?

In the civil system, moral rights contain two kinds of prerogatives: positive, which allows the owner to use the rights as it sees fit; and negative or *ius prohibendi,* which allows the author to keep third parties from infringement of exclusive rights.

The enforcement of moral rights more often than not is displayed in its negative form because of the ubiquitous character of intangible assets. If no infringement is perpetrated, then there is no need for the enforcement the moral rights. Does this mean that moral rights depend on their exercise to exist? Not at all. The separation of the right's existence and its exercise is supported by scholar Georg Jellinek, and his theory on AI authorship.[37] This theory argues that the ownership and exercise of these rights should rest on different persons. Such a premise is the clearest example that moral rights do not depend on their exercise to exist. They arise once the work is created, can remain dormant without being used even once and are there whenever they are needed, outliving both the author and the work itself.

Agents should not have to exercise moral rights only because they exist. But even if they do, there is a possibility

for such rights to be defended by a third party. This third party can be a person or a legal entity. This is supported by the law of many civil systems that stipulate the defense of moral rights by a legal (often governmental) entity for works which fall into the public domain, and have no author or author's descendants to protect them.[38] The rational agent and the public domain situation are the same. The author in both situations cannot protect their/its own rights, requiring someone do it for them/it.

In the civil system, moral rights are un-renounceable. Thus, there is no authorship without moral rights. This means that in order to grant authorship to agents, moral rights should be detected and enforced by a third party. It is this relationship that bridges the gap between the possibility of exercising moral rights — by a person other than the author — and authorship of rational agents.

Pecuniary rights, on the other hand, are simpler. Since they could be subject to transference, an *ex-lege* cession would be in order so the programmer, or their employer accordingly, may exploit them.

A. GRANTING AUTHORSHIP

In order to transfer rights of any kind to a third party, the relationship between the agent and the third party must be determined. Several authors have expressed the need for awarding protection to AI creations in order to prevent them from falling into the public domain. AI scholar Kalin Hristov, for instance, argues for the necessity of keeping the incentives system that allows innovation to keep growing, without awarding authorship to the AI itself, but rather, to the human behind it. He states, 'Non-humans are not natural persons and may not be held legally responsible in a court of law'.[39] In support of this statement, he cites cases of both *Naruto v. Slater*[40] and *People v.* Frazier,[41] which entail the pertinence of a non-human, in both cases an

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[37] Georg Jellinek, *Teoría General Del Estado (*2d edn*,* Editorial Fondo de Cultura 2012).

[38] Italy, Law no. 633 of 22 April 1941 art. 23, 2º paragraph; Portugal, DL n.o 63/85 art. 57, §3; Perú, DL 822art. 29; Colombia, Law 23/1982 Art. 30, paragraph 3

[39] Kalın Hristov, 'Artificial Intelligence and the Copyright Dilemma' (2017) 57 IDEA 431.

[40] *Naruto v. Slater*, No. 16-15469, 2018 WL 1902414 (9th Cir. 2018).

[41] *People v. Frazier*, 2009 WL 1842666 (Cal Ct. App. 2009).

animal, lacking legal standing.[42] However, animals cannot be compared to rational agents, because the latter's rationality comprises some of the traits scientists have deemed to be essential in the human mental process that distinguishes it from other creatures.

Hristov's solution is based on the premise of inevitably granting authorship to humans alone, so as to not disrupt the current legal stance on authorship. He focuses on using the labour relationship, employing a relative interpretation of the terms 'employee' and 'employer' within the made-for-hire doctrine as a solution for the current problem of authorship in AI.[43] This solution has been adopted in the U.K. Copyright, Designs and Patents Act, 1988, c. 48, § 9 (3) as a relatively effective way to transfer AI generated work to humans.[44] But the comfort of not changing the current legislation may dissipate when AI systems achieve a level of logic that exceeds the precepts of English law.

His approach, however, is contradictory. By stating that the employee-employer dynamic can be reinterpreted to 'accommodate the existing legal limitations of AI,' Hristov argues that an employee, and thus an author, can only be a physical person.[45] He incorrectly argues for a more lenient definition of an employee/employer instead of a more lenient definition for an author.

If legal personhood were to be granted to machines, two possible scenarios arise: one where the robot creates something with direct influence from humans; and a second one where its programming includes variables that are impossible to foresee by the programmer, and on the basis of these variables it has generated a creation that was not initially 'intended.'

In the first case, authorship should vest in the human author. This is because while the work itself is born from a machine, the composition, structure, and other

characteristics are the result of the intentions and actions of the subject that has programmed, financed or operated the agent for composing such work. Namely, the programmer envisioned and designed a machine with the resultant characteristics, and the software used for this purpose is no more than a tool, lacking the necessary autonomy to modify or alter in any way the results intended by the programmer. So, without the action of the programmer, the machine is unable to generate anything. This is best expressed through AI used in video games, which is the result of a previous program which comprises a series of changing behaviors for each situation. Such artificial intelligence will never get out of the parameters for which it was programmed. Hence, attributing authorship to the software that generates these behaviors for the non-playable characters in a game would be a mistake.

In the second case, it might be possible that two authorships exist: that of the programmer and that of the AI.

In their paper about the copyrightability of works of art made by robots, Yanisky-Ravid and Velez-Hernandez propose that all AI systems capable of creating original works of art, must share, at their core, ten characteristics: (1) innovative, (2) autonomous, (3) unpredictable, (4) independent, (5) rational - intelligent, (6) evolving and capable of learning, (7) efficient, (8) accurate, (9) goal-oriented, and (10) capable of processing free choice.[46] They allege that such characteristics are what make AI systems inherently intelligent.

While helpful in their determination, the requirement that all ten of these characteristics be satisfied, is flawed. Only some of these characteristics are necessary as an effective filter in the determination of the eligibility of rational agents for legal personhood. For example, although we consider autonomy and rationality enough to generate protectable

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[42] *Naruto*, 2018 WL 1902414; *Frazier*, 173 Cal. App. 4th 613.

[43] Hristov (n 39).

[44] Copyright, Designs and Patents Act 1988 (CDPA 1988).

[45] Hristov (n 39).

[46] Shlomit Yanisky-Ravid and Luis Antonio Velez-Hernandez, 'Copyrightability Of Artworks Produced by Creative Robots, Driven By Artificial Intelligence Systems And The Concept Of Originality: The Formality - Objective Model' (2017) 19 Minn J L Sci & Tech 1.

works of art in a non-programmer-dependent way, efficiency is not necessary in the creation of art.

Once the machine is capable of learning at a deep level, one could think that it fulfills the requirements to be an author. However, a gap still exists between being a subject of the law and being an author. According to the Real Academia de la Lengua Española, an author is a 'person who has created any scientific, literary or artistic work'.[47] A work is defined as any creation that can be included in the parameters referred by article 1, paragraph 2 of the Berne Convention.[48] Under these terms, there is no doubt that AI creations can be categorized as works of art. However, in order to get protection, it is not enough that the work comes from an author; it must also comply with certain criteria in order to achieve protection, for which the foundations of originality present a problem.[49]

6. THE NEW CORNERSTONE OF AUTHORSHIP

Originality is a concept that has been heavily discussed, yet it still lacks a precise definition. This makes it difficult to apply it to a non-human legal subject. Originality as a *sine qua non* requisite for achieving copyright protection assumes a subjective form within the civil system.

This subjective form within the civil author system, as opposed to the copyright system,[50] assumes the criteria of originality as the stamp of the author reflected on his work, and the non-requirement of novelty as a requisite for the

works of art.[51] Lipszyc explains that the work, instead of novelty, has to have its own distinguishing characteristics.[52]

Under the copyright system, originality is directly related to novelty, and lower and higher standards have been placed by the courts for second generation works and original works respectively. This has made AI jurisprudential approaches to originality erratic, which is why the need for a specialized legislation on the subject is crucial. However, given the amount and nature of the factors to be considered, the development of such regulation promises to be an arduous task.

When addressing the issue of originality for AI generated works, both the civil author and the copyright system fall short, because both raise the question of whether we can apply the same criteria of originality to robots and humans. This is because, the 'inspiration' from which many creations are born, is said to derive from emotion. Machines do not have emotions, as their intelligence is rational. Although they can emulate the brain and its operations, it does not involve the chemical processes that generate human emotions. Therefore, any creation born from an AI will be the result of a rational 'thinking' process, understood as the continuous search for the best possible outcome.

Under the civil system, when assessing the originality of human-made works of art, there must be a correlation between the artist's intention and the resulting creation. This is because the closer the intention is to the resulting

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[47] 'Autor' (*Diccionario de la Lengua Española*, Real Academia Española 2019) <https://dle.rae.es/?id=4UGeohY> accessed 7 May 2019.

[48] Berne Convention for the Protection of Literary and Artistic Works (adopted 9 September 1886, effective 5 December 1887) 828 UNTS 221 (Berne Convention 1886).: The terms ' literary and artistic works ' comprise all the productions in the literary, scientific and artistic, whatever the mode or form of expression, such as books, pamphlets and other writings, conferences, speeches, sermons and other works of the same nature; the dramatic or dramático-musical works; choreographic works and pantomimes; musical compositions with or without letter; cinematographic works, to which they assimilate the works expressed by a process

analogous to cinematography; the works of drawing, painting, architecture, sculpture, engraving, lithography; photographic works to which they assimilate the expressed by means of a process analogous to photography; works of applied art; The Illustrations, maps, plans, sketches and plastic works relating to geography, topography, architecture or science.

[49] 1. The protection of the form and not to ideas. 2. Originality. 3. Merit and destination of the work. 4. No formalities.

[51] Alfredo Vega Jaramillo, *Manual de Derecho de Autor* (DNDA 2010).

[52] Delia Lipszyc, *Nuevos Temas De Derecho De Autor Y Derechos Conexos* (CERLALC 2004).

work, the better it reflects the personality of the author, and as a result, the attribute of individuality is more clearly evidenced. However, when it comes to rational agents, both the intention and consequently the personality, stop being relevant factors, leaving a huge vacuum, which we believe, can only be filled by rationality.

This is the turning point when acknowledging originality in works of art by AI systems. Conveying art and rationality may sound impossible, but not from a machine learning standpoint. In order to create a new originality standard, the same rules for persons and agents should not apply, and this new originality standard should only be applicable to rational agents.

'Intention', under the scope of originality, is a permanent state of the machine programmed to create a work of art. The agent has no real (human) intentions, but at the same time is incapable of performing a task of a different nature than that for which it was programmed. Given that originality is founded on two pillars, intention and the resulting work, the lack of intention may pose an obstacle for meeting the requirement of originality. Intention should be substituted with rationality, a feature that agents not only possess, but which is also crucial when performing complex tasks like the autonomous creation of a work of art.

A rational agent is generally understood as one that does the right thing, not from its codification perspective, but rather, from the consequences of its actions. For this purpose, the agent performs a series of actions based on the perceptions it receives. If the actions are desirable, then the agent has performed well.[53] The notion of desirability is captured by a specifically fixed performance measures, created by the programmer, according to the task to be performed, the environment, etc.[54]

Russell and Norvig have outlined four conditions to determine what can be understood as rational at any given time.[55] An extension of these conditions to authorship allows for the establishment of parameters for an originality

standard exclusively applicable to rational agents that takes rationality instead of intention as a base.

1. A performance measure that defines the criterion of success. This measure is formed by the parameters imputed by the programmer which define whether the agent is performing satisfactorily or not. When applied to the creation of a work of art, such parameters should include limitations regarding the amount and nature of the elements to be reproduced in the works generated by the agent. This way, the situation where the agent uses the essential elements of third parties' works is avoided. This would pose a huge repercussion not only in the plagiarism field but also when evaluating the originality of the work, where the use of new elements could be used as a determinant.

2. The agent's prior knowledge of the environment. This means that the more the agent knows, the better it can perform. An agent fed with a substantial amount of information pertaining to IP laws, art concepts, cultural information and so on, is more prone to perform as expected. If the agent understands the requisites of originality, and its performance is deemed as desirable when such requisites are achieved, the chances of adding original elements to the work are greater.

3. The actions that the agent can perform. This factor is dependent on the resulting work. An agent's previous knowledge of the environment and performance measures can be finely implemented, yet the possibilities of the agent acting accordingly are the ones defining the gap between the agent's expected performance and the actual performance. In terms of originality, 'abilities' of the agent are determinant to fulfill requested tasks according to the performance measures. Thus, failure in achieving a specific objective as a result of a lack of abilities results in the underperformance of actions. This can directly affect the originality of the work if such originality depends on

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[53] Russell and Norvig (n 9).

[54] ibid.

[55] ibid.

elements that cannot be added, because the agent lacks the required ability to do so.

4. The agent's percept sequence to date. This can be translated as the capability of the agent to change its previous knowledge and consequently take necessary actions. In other words, to show autonomy. Autonomy in agents allows them to adapt to ever-changing scenarios, but more important, to distance them from their initial programming. Hence, autonomy is vital for achieving originality, because it gives agents freedom to operate on their own, separating their creations from the programmer's, and therefore making them more than simple tools but rather creators worthy of authorship acknowledgment.

The proposed originality standard would then be applicable when AI generated work emerges as the reflection of the agent's rationality with the use of novel elements. Novel elements could be manifested in both the composition and/or expression of works. It can be classified as such by using the same procedure as with human creations, through a comparison between the work and the current state of art that evaluates the 'separation degree' between the latter and a generated work.

As for rationality, I make Russell and Norvig's words my own by stating that rationality could be defined as: '… for each possible percept sequence, a rational agent should select an action that is expected to maximize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.'[56] If the performance measures are designed in a way that agents must create new works of art based on the state of the art, and its performance desirability is directly proportional to the 'separation degree' of the state of art by using new or additional elements, then the agent should generate a perfectly original work.

Therefore, the originality standard requires that all four criteria must be met, in an inclusive way. They must function cohesively, such that both, rationality and originality can be achieved for the purpose of authorship recognition. This way, the proposed standard also works as a filter, so only the agents with certain capacities will be able to create protectable works of art.

This standard has potential to resolve any discrepancy between the law and the reality of originality in AI works of art. While copyright is conferred exclusively on those works that include originality, the same should not be based on extraordinary character. That is, the level of rupture with the prevailing status of the arts does not necessarily have to be representative of radically different criteria.

The next step should be to implement the new originality standard in legislation. But, in reality, state and country legislation processes significantly differ, making universal implementation more difficult. Paradoxically, copyright law has made a more practical approach to the subject than civil system law. The Andean Decision 351/1993, provides in Article 3 - 'For the purposes of this Decision, an Author is a person who performs the intellectual creation.' [57] This implies that authorship is exclusive to human beings within our legal system. This provides that only a physical person is capable to generate, under the law, protectable creations.

However, internationally, more subtle and less exclusive definitions are used for the purpose of allowing protection for subjects other than humans. In this sense, WIPO defines IP as referring to 'creations of the mind such as inventions; literary and artistic works; designs; and symbols, names, and images used in commerce ', making room for the electronic artificial mind.[58]

This leniency can also be seen in the U.K. Copyright, Designs, and Patents Act, 1988, which (ill) regulates authorship for AI creations under the work for hire doctrine,

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[56] ibid.

[57] Andean Community, 'Decision No. 351 Establishing the Common Regime on Copyright and Neighboring Rights' (21 December 1993) 145 Official Gazette of the Andean Community.

[58] WIPO, 'What is IP?' (WIPO 2019) < https://www.wipo.int/about-ip/en/ > accessed 5 May 2019.

and despite all the flaws this solution poses, it takes a step towards the regulation of such matters. [59]

However, the current state of laws is still not sufficiently complete to protect AI creations. A common effort must be made to create specialized laws on the matter. Situations like the attribution of legal personhood to rational agents, subsequent granting of rights relating to authorship and economic exploitation must be regulated with necessary precision. Until then, the legal and economic vacuum surrounding such creations will continue to exist, restraining the development of the AI industry as a result of a lack of economic motivation.

7. CRITICAL ASPECTS DERIVED FROM THE AUTHORSHIP BY AI

Attributing authorship to a rational agent involves addressing profound philosophical questions that would shake the foundations of longstanding legal systems. Doing so implies a deep reform of various legal situations adjacent to the issue of authorship of a work. Some of those situations include the current approach to the legal regulation of the subject in some legal systems: economic exploitation and moral rights exercise; duration of exclusive rights for rational agents; and a considerable amount of ethical issues and fundamental rights related to the acknowledgment of authorship to AI systems. The next section of the paper will address some of those issues and their immediate legal consequences.

a) We will begin by tackling the 'derivative work' school of thought which has been developed within the copyright system. It aims to solve the legal regulation of authorship in rational agents by using the current state of law. First, there is no chance for an AI generated work to be considered, *a priori*, a derivative work, because derivative works are those derived from preexisting works, not 'made' by a preexisting work. It would be oxymoronic to state that AI generated work is derivative and that AI *per se* is pre-

existing work because by doing so, we would be unfairly denying the AI authorship and granting it to the programmer. This implies that the AI cannot be the author and the work itself at the same time.

When making a derivative work of art, the primal work remains unaltered while a new work is created. Therefore, derivativeness in works of art revolve around origin, not originality. A derivative work can be original or not, though never originative. In this sense, originality in an AI system artwork may be questioned because of its content, but never because it was created by an AI, which in turn was created by a human.

On the other hand, the copyright system uses a double standard for originality. This adds another level of complexity, because if AI generated works were to be taken as derivatives, then an even higher, yet extremely subjective, standard of originality would be applied. It has already been explained, how the concept of originality should be applied differently to AI systems, so no extra standard should be added in order to grant authorship or conferring copyright protection, at least not if the purpose is to 'save' AI creations from the public domain.

b) As for the duration of economic rights, Berne's standard should apply. The division of rights used within the civil system is compatible. Pecuniary rights born from an AI generated work and held by the programmer / employer arise once the work is created. Their duration can be less than that of human authors and can last a term to be counted from the date of publication, creation or communication of the work.[60] The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), stipulates in Article 12, that pecuniary rights for a subject different than a natural person, will last for a period of 50 years counted from the making of the work, which I believe is perfectly applicable to those works carried out by agents.[61]

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[59] U.K. Copyright, Designs, and Patents Act 1988.

[60] Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, as revised at Paris on July 24, 1971 and amended in 1979 S. Treaty Doc. No. 99-27 (1986).

[61] Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World

As to moral rights, given their *intuito personae* character and the fact that they are virtually perpetual, only their exercise can be transferred to third parties. This works within the scenario where a rational agent lacking the capabilities to understand and defend a violation of moral rights, should leave such defence and exercise to a human being with the capabilities to do so. In these cases, the division of rights of the civil system represents a considerable perk in the authorship attribution process. It allows for the recognition of some rights to the agent, avoiding the work to falling into public domain.

These critical aspects and some others like exhaustion of rights may be further developed in another paper.

8. CONCLUSIONS

In the final section of this text, I explain that there are many aspects to emerge from the recognition of rational agents as subjects of law. The doctrine in IP has a lot of ground to cover *ad portas* in this field which promises to make a significant change to the way in which the industry works and the way it is regulated by law.

We believe that no significant progress can be made in IP, especially regarding the attribution of authorship, so long as the civil regulation of so-called 'electronic citizens' is not solved. The categories and concepts that exist today, solve only in a palliative way the problems faced by AI systems.

In this sense, it is necessary to develop specific legislation containing theoretical-legislative solutions for the treatment of these subjects and their creations. Especially considering that globalization prevents it from being an exclusive topic for countries with great technological development and extends it to less developed countries.

With the current state of law, most creations derived from programmable agents fall directly into the public domain

and not into the patrimonial sphere where they can be defended and furthermore exploited.

Thus, rest of the aspects briefly mentioned in this paper should not be overlooked. Issues such as exhaustion of rights, or ethical and moral implications resulting from protecting AI based creations must be carefully regulated. To finalize, the *íter* followed along the paper lead us to the following short conclusions:

1. AI from a humanistic perspective must be taken as a premise in order to recognize authorship of AI systems. Primarily because only within a human perspective can we talk about strong AIs, which are the ones that can truly 'think' and therefore carry out meaningful, autonomous creations.

2. Even if human level of thinking is achieved by machines, the law still offers protection only to human-made creations, so the recognition of AI systems as legal subjects —which comply with certain criteria—is also necessary.

3. Legal personhood should be recognized regardless of the form (physical or not) of the AI.

4. Once legal personhood is recognized, the division of rights of the civil system is required in order to concede moral rights to the machine. This avoids the work falling into the public domain, and the pecuniary rights to a (legal) person who can exploit them.

5. Moral rights can still be defended by a third party, probably the programmer.

6. Only an independent human-agent relationship or a combination of this with a labour relationship can work in order to concede and exploit the author's rights.

Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994): 'When the duration of the protection of a work that is not photographic or applied art is calculated on a basis other than the life of a natural person, such term shall be no less than 50 years from the end of the calendar year of authorized publication, or in the absence of such authorized publication within a period of 50 years from the making of the work, 50 years from the end of the calendar year of its implementation.'

7. Authorship can only be granted when the AI system creates a work of art containing features intended but not controlled by the programmer.

8. Since originality in its formal concept is unachievable by rational agents because they lack intention, we propose to substitute intention with rationality, a feature that machines not only possess, but that is their modus operandi.

9. AI generated works of art should not be considered a derivative work, for that would be contradictory regarding the recognition of authorship towards AI.

10. An analogy as to the duration of pecuniary rights for legal entities can be applied when it comes to rational agents that generated rights which are held by third parties.

11. Ethical aspects must be carefully taken into consideration when contemplating to grant legal personhood to rational agents.

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