Essays

Copyright of artificial intelligence autonomous production: some reflections around the concepts of mind and intelligence

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ABSTRACT: The research problem of the present article consists of two questions: can an Artificial Intelligence (IA) be considered an author? Who owns the copyrighted material produced by IA? The first topic gives a brief deductive and theoretical approach to the ontology of mind and artificial intelligence. Subsequently, the compatibility between these guidelines for the legal concept of author contained in some Copyright Laws. In the end, it is proposed the ontological impossibility of an AI holds intellectual property rights, even if derived from autonomous acts, attributing them to its programmer/creator.

KEYWORDS: Artificial intelligence; copyright; intellectual property

SUMMARY: 1. Introduction – 2. Brief considerations on mind's ontology – 3. "can the digital computer, as it has been defined, think?" – 4. AI considerations: brave new rights in the law by the technology – 5. Final considerations.

1. Introduction

Artificial Intelligence (AI)[1], one of the fruits of the scientific-technological advance, provokes unprecedented practical and legal debates. On April 5, 2016, a group of museums and research institutions in the Netherlands, together Microsoft, unveiled a painting called *The Next Rembrandt*. It is not a discovery of production from renowned painter Rembrandt Harmenszoon van Rijn, but an artwork reproduced by an AI, inspired by the works of the Dutch author.

To perform this work, artificial intelligence's responsible for the reproduction of The Next Rembrandt used the machine learning and deep learning methods. The first is understood as the ability to accumulate own experiences of repeated tasks using an algorithm to extract learning[2]. In the second (an

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[1] «We define AI as the study of agents that receive percepts from the environment and perform actions. Each such agent implements a function that maps percept sequences to actions, and we cover different ways to represent these functions, such as reactive agents, real-time planners, and decision-theoretic systems», S. RUSSELL, P. *NORVIG, Artifcial Intelligence. A Modern Approach,* Edimburgo, 2014, VIII.

[2] D. GOLDBERG, J. HOLLAND, *Genetic algorithms and machine learning*, in *Machine learning*, 3, 1988, 95-99.

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extension of the first) computer scientists describe it as a process analogous to human brain functioning. Here, AI contextualizes real situations for transcend their initial programming[3].

The initial task of AI consisted in examining all Rembrandt's work, pixel by pixel. AI used a range of 3D digitized materials and high-resolution digital files provided by the team involved. This primary examination was enhanced by deep learning algorithms to maximize the resolution and quality of the works. In total there were almost 150 gigabytes of rendered data.

Then, AI dissected Rembrandt's work on statistical data. Of the 346 works analyzed, a large number of self-portraits painted by the author were found. Of these, about 51% were men and 49% women. With these primary data, AI was able to determine Rembrandt's physiognomy parameters, from the facial design and colors to light and shadows. In approximately 500 hours of geometric analysis and composition of paint materials, AI was able to master Rembrandt's style, making possible a precise replication of depth and texture, shadows and light, contours and dimensions, to reproduce a work with the data and experiences inserted and acquired by the machine and deep learning.

However, this case is not unique in AI world. Mark Riedl and some scientists at the Georgia Institute of Technology have developed an AI called Scheherazade. With an extensive pre-reading of content addressing bank robberies and nightly movie encounters, Scheherazade can produce science fiction stories in short excerpts.[4]

Another example is The Obvious group. Composed by three French students, Hugo Caselles-Dupré, Pierre Fautrel and Gauthier Vernier, in order to "expand and democratize" AI through art, used the open source code written by Robbie Barrat, a 19-year-old programmer which publishes its algorithms in GitHub, to program an AI capable of producing artistic pictures similar to The Next Rembrandt. The Obvious group's AI analyzed some 15,000 works of art produced between the 14th and 20th centuries to create a collection of eleven paintings, including Edmond de Belamy, sold for $ 432,500.

The main question is the Obvious group did not credit Barrat. Without Barrat's works, the results would not be the same. The members of Obvious didn't denied that they appropriated and used Barrat's algorithm. But until shortly before the sale of the work they even published this fact. Barrat was not at all pleased with what happened. He said on his Twitter:

«I had no idea what you were doing with it - "democratized "sounds like you were doing some open source project. Conveniently cutting out the part where I ask you to credit a few weeks later after I see you posting the images for the first time for sale»[5].

The Obvious group felt compelled to credit Barrat because the hacker community attacked their Twitter with offenses. Moreover, when asked about the copyright of the pieces produced by its AI, the Obvious group said:

«We believe that the legal framework is not ready yet and that the technology is not advanced enough to grant the authorship of an artwork to a virtual person. An AI doesn't have an intention and

[3] P. Čerka; J. Grigienė; G. Sirbikytė, *Liability for damages caused by Artificial Intelligence*, *Computer Law & Security Review*, 3, 2015, 376-389.

[4] D. Heaven, *Told by a robot: fiction by storytelling computers. New Scientist. Oct. 2014,* in: <https://www.newscientist.com/article/dn26377-told-by-a-robot-fiction-by-storytelling-computers/> (last visited 25/05/2019).

[5] https://twitter.com/DrBeef_/status/1055360024548012033 (last visited 25/05/2019).

is far from having one, as opposed to what we tend to see in science-fiction. We believe that the authorship should go to the entity holding the artistic approach»[6].
So far, there is no administrative or judicial process requiring the copyright of any of the works produced by AI's (The Next Rembrandt and Edmond de Belamy). But who titles it? Here the research problem of the present article: can an Artificial Intelligence (AI) be considered an author? Who owns the copyright of material produced by AI? The first topic gives a brief deductive and theoretical approach to the ontology of mind and artificial intelligence. Subsequently, these guidelines are compatible with the legal concept of author contained in some Copyright laws. In the end, it is proposed the ontological impossibility of an AI holds intellectual property rights, even if derived from autonomous acts, attributing them to its programmer/creator.

2. Brief considerations on mind's ontology

In The relation between mind and body begins in the Cartesian conception at a historical moment of profound changes affected by physics and astronomy[7]. Substantial dualism erupts in this scenario by proposing mind and body as ontologically distinct substances. Here, substance is something material or immaterial that exists in such a way that it only needs its own to exist, containing a main attribute: that of the soul is thought, and that of the body is the extension[8]. This dual relation would be equivalent to the metaphysical comparison of a bridge connecting the subject and God[9].
In the description of the rational soul in Cartesian thought, distinctly from other substances, the soul is unable to be abstracted from the power of matter, not merely being hosted in the human body, as a pilot on its ship, but necessarily subject to the bond and union to he, to have feelings and appetites similar to those of the human being, thus characterizing himself as a true man[10]. The existence of vital spirits, expressed in the soul residing in the pineal gland of being, is deduced in Cartesian metaphysics. Here, there is the soul-body interaction. Inspired in the total and constant quantity of the motion of the universe discovered in the physics and astronomy of the time, Descartes presupposes that the soul could not affect the body, but only the direction in which the vital spirits move and indirectly the direction of other body parts[11].
The Cartesian assumptions, however, did not persist. With the discovery of the conservation of the linear movement translated in the ratio that the total amount of movement in the world in any given direction is constant, Geulincx, Malebranche and Spinoza abandoned the Cartesian passage[12]. By seeing matter as something that can only be intelligible – if it can – by an inference from what is known about that spirit, Descartes declines in subjectivism, and does not provide an adequate response to mind-body relationship. So far, there is no guarantee and proof of the assumption that the pineal

[6] http://www.clotmag.com/insight-obvious-digital-objects-and-the-first-ai-generated-artwork-auctioned-by-christies (last visited 25/05/2019).
[7] B. RUSSELL, *História da Filosofia Ocidental: a filosofia moderna*, 1, Rio de Janeiro, 2015, 91.
[8] R. DESCARTES, *Princípios da filosofia*, Lisboa, 2004, 46.
[9] J. COTTINGHAM, *Descartes: a filosofia da mente de Descartes*, São Paulo, 1999, 33. DESCARTES, *Princípios da filosofia*, Lisboa, 2004, 45.
[10] R. DESCARTES, *Discurso do método*, São Paulo, 2001, 6.
[11] B. RUSSELL, *op. cit.*, 95.
[12] B. RUSSELL, *op. cit.*, 95.

gland is the ultimate essence of the mind. Descartes still completes with the metaphysical hypothesis of the possibility of bodies without souls, while ontologically distinct substances.[13] However, the substantial dualism does not solve the problem of how a non-physical substance can influence something physical.

Cottingham[14] disputes the substantial Cartesian dual perspective under the argument of the impossibility of the phatic existence of a mind analogous to a brain, just as apparently it is not possible to have digestion without stomach. Although distinct and can be separated conceptually, they remain strictly related[15]. Ryle (2009), in the same guideline, but with divergent argumentation, metaphorizes the substantial Cartesian dual theory as the dogma of the Ghost in the Machine[16]. In his theory, the body is equivalent to a machine and the soul is equivalent to a phantom capable of controlling it. Both existence and ontology are distinct and independent. Ryle's criticism of Descartes is concerned with the Cartesian conceptual confusion between mind-body, arising from the mixture of Cartesian skepticism and its bases of Aristotelian philosophy and Christian philosophy together with the development of contemporary science and the scholastic philosophy assimilated in La Flèche[17]. The hypothesis apparently more acceptable as true in the contemporary scientific field is to describe the mind as a biological product, a minority position in the field of analytic and mind's philosophy. Among its supporters are Thomas Nagel and John Searle.

Nagel[18] defends a kind of dual aspect theory: «If points of view are irreducible features of reality, there is no obvious reason why they should not belong to things that have weight, occupy space, and are composed of cells and, ultimately, of atoms». Nagel, describing mind-body, does not treat them as two ontologically distinct substances, but a single one; nonphysical property of the brain. In order to arrive at this particular theoretical insertion, Nagel[19] states that there are things about the world, about life and about ourselves that cannot be adequately understood from a point of view of maxi-

[13] J. COTTINGHAM, *op. cit.*, 35.
Russell notes that St. Agostinho defended something similar to Descartes's ideal. The subjectivist stance of St. Agostinho allowed him to anticipate the Kantian theory of time and the Cartesian cogito. B. Russell, História da Filosofia Ocidental: a filosofia moderna, vol. 3, Rio de Janeiro, 2015. In some passages in the St. Agostinho's Soliloques, this position is clearly seen. «... we are composed of two parts, that is, of soul and body, of which the first part - the soul - is better, and the worst part is the body [...] Is it evident to each one of you that we are composed of soul and body?». S. Agostinho, *Solilóquios e a vida feliz*, São Paulo, 1998, 42-124.

[14] J. COTTINGHAM, *op. cit.*, 3.

[15] J. COTTINGHAM, *op. cit.*, 35.

[16] «Such in outline is the official theory. I shall often speak of it, with deliberate abusiveness, as 'the dogma of the Ghost in the Machine [...] My destructive purpose is to show that a family of radical category mistakes is the source of the double-life theory. The representation of a person as a ghost mysteriously ensconced in a machine derives from this argument», G. RYLE, *The concept of mind*, London, 2009, 5 e 8.

[17] «The differences between the physical and the mental were thus represented as differences inside the common framework of the categories of 'thing', 'stuff', 'attribute', 'state', 'process', 'change', 'cause' and 'effect'. Minds are things, but different sorts of things from bodies; mental processes are causes and effects, but different sorts of causes and effects from bodily movements. And so on. Somewhat as the foreigner expected the University to be an extra edifice, rather like a college but also considerably different, so the repudiators of mechanism represented minds as extra centers of causal processes, rather like machines but also considerably different from them. Their theory was a para-mechanical hypothesis». G. RYLE, *op. cit.*, 8-9.

[18] T. NAGEL, *Visão a partir de lugar nenhum*, São Paulo, 2004, 46.

[19] T. NAGEL, *op. cit.*, 8.

mum objectivity, because this would lead to false reductions or the categorical denial of the existence of phenomena whose reality is obvious. This means that there is an irreducibly subjective character in conscious mental processes. Whatever their objective connections with the functioning of the brain, a priori theorical assumptions would be impossible for objective description by physics, since the subjectivity of consciousness is irreducible characteristic of reality. Without this, neither physics nor anything would be possible, and it should occupy a place as fundamental as matter, energy, space, time and numbers.

The main problem in the Nagel's theory is that he postulates an additional non-physical substance without explaining how it supports subjective mental states while the brain does not. Thus, postulating such a substance does not render intelligible how it can be subject to mental states. Moreover, if he can find a place in the world for mental states associating them with a non-physical substance, there is as yet no reason to think that one cannot find a place for them in anything other than physical properties.

This statement can be directed to the indefinite character of the mental processes raised by Wittgenstein[20]. To assume the irreducible subjectivity of the mental to make it seem radically independent of all the rest, rejecting psychophysical reductionism, force us to deny any necessary connection between the mental and the physical[21]. But reduction is not the only mechanism of attachment. Some things that can give the impression that the mental is independent are illusory. Nagel lists two problems: the first reveals the attribution, to entities and mental events, of properties that are not entangled by mental concepts. The second refers to the properties seems like incompatible with the mental concepts.

Nagel then says: mental concepts, like all others, have their own form of objectivity, which allows them to be applied in the same way by different people in different situations, different subjects. This is because mental phenomena belong to the world, and a subject or mental state can be identified from different positions in the world. Although subjective, they are in the objective order. Mental concepts, therefore, directly describe the subjective aspect of objectively observable circumstances. Although Nagel describe mental states as non-physical properties of the brain, he is not a reductionist physicalist. His vision of mental objectivity still contains indispensable traits of subjectivity[22]. For Nagel, the experiences are inside our mind with a kind of inwardness. This is different from the way your brain is inside your head.

[20] «How do we come to the philosophical problem of psychic processes and states and behaviorism? - The first step is totally imperceptible. We speak of processes and states, and leave their nature indefinite! Maybe someday we'll know more about her - we weigh. But it is precisely because we think that we are committed to a certain way of considering things. It is that we have a certain concept of what it means: to know a process more closely. (the decisive step in the trick of the conjurer is given, and he rightly seemed innocent to us.) - and now the comparison that should make our thoughts understandable to us collapses. Therefore, we have to deny the process not yet understood of the medium not yet explored. And in this way we seem to have denied the spiritual processes. And of course we do not want to deny them», L. WITTGENSTEIN, *Investigações filosóficas*, Petrópolis, 2014, 141.

[21] T. NAGEL, *op. cit.*, 47-48.

[22] «Physicalism is the doctrine that everything that exists in the spacetime world is a physical thing, and that every property of a physical thing is either a physical property or a property that is related in some intimate way to its physical nature. Stated this way, the doctrine is an ontological claim, but it has important

Thus, mind can be a biological product, property of the brain with subjective characteristic. A position that the world simply is not the world that reveals itself to a single highly abstract point of view, since reality is not just objective reality, and any objective conception of reality must include recognition and its own incompleteness. This position is not the major opinion. We have another side: the functionalism and the biological naturalism.

The first one was inspired in Turing's essay *Computing Machinery and Intelligence*[23]. The theory of functionalism says: a mental state is any intermediate causal condition between input and output. Under functionalist theory, any two systems with isomorphic causal processes would have the same mental states. Therefore, a computer program could have the same mental states as a person. Of course, we have not yet said what *isomorphic* really means, but the assumption is that there is some level of abstraction below which the specific implementation does not matter[24].

Here, mental states are in fact functional states, but not of any kind. They are, rather, logical states of a computer and so are intrinsic states, at least at the level of computer program description. In this philosophical conception, the mind is a kind of software, which is being executed on hardware represented by the brain[25].

Just as Nagel's theory lacks sufficient response[26], functionalism also fails to prove that the mind is not biological. Assuming that this may be the possible truth, we will consider the mind as a biological product. This first approach in philosophy of mind serves to introduce the questioning if machines can think. If they can be holders of intellectual materials. Or, in the most verifiable hypothesis, only instruments used to do so[27].

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epistemological and methodological corollaries»". J. KIM, *Physicalism*, in R. WILSON, F. KEIL (ed.), *The MIT Encyclopedia of the Cognitive Sciences*, Cambridge, 1999, 645-647.

[23] A. M. TURING, *Computing Machinery and Intelligence*, in *Mind*, 236, 1950, 433-460.

[24] S. RUSSELL, P. NORVIG, *op. cit.*, 1029.

[25] «Among the authors who support this axis, Dennett is relevant to this argument. Dennett postulates that beliefs, desires, pains, mental images, experiences - as commonly understood – are not good theoretical entities. For him it is not easy to convince someone that pain or belief does not exist, and reinforces I am denying that any entity could have the features of a pain or thought, so much the worse for the ontological status of such things. Dennett assumes that if the entity is conscious, the act of being that entity exists; if not, no. The act of being an entity that instantiates in a flowchart depends on a certain type of functional organization». D. DENNETT, *Brainstorms*, Cambridge, 1981, XX. Putnam also defended the functionalism until near 1970's: H. PUTNAM, *Reason, truth and history*, Cambridge, 1981, 49-50.

[26] «On Nagel's view, what is the relation between old-me and me the series-person? It may help to remember a mythical being: a phoenix. On the criterion of the identity of birds, a bird ceases to exist if it is burnt to ashes. If a phoenix existed, it would not be a particular bird. It would be a series ofbirds, or a series-bird. A phoenix would at any time have the body of a particular bird. But when this bird is burnt to ashes, only the bird ceases to exist. The phoenix comes to life again in the body of a new bird, rising from the ashes. Like a particular series-person, a particular phoenix would thus have a series of different bodies». D. PARFIT, *Reasons and Persons*, Oxford, 1984, 290-291.

[27] Levine's explanatory gap, inspired in Nagel essay what is like to be a bat, descirbes the relation between physical process and mental process. This explanatory gap has led some philosophers to conclude that humans are simply incapable of forming a proper understanding of their own consciousness. Its an elementary essay. J. LEVINE, *Materialism and qualia*, in *Pacific Philosophical Quarterly*, 64, 1983, 354.

3. "Can the digital computer, as it has been defined, think?"

Although J. Searle supports his theory of biological naturalism in a slightly different guideline from Nagel's dual aspect theory, they agree with the idealization of mind as a biological property of the brain. For Searle, mental states are features of the brain and have two levels of description - a higher level in mental terms and a lower level in physiological terms. Thus, four characteristics of mental phenomena make it impossible for the mind-body relationship to enter into a scientific conception of the world as made of material things. Consciousness is the first and most important of them. It is a real property of the brain that can cause things and their occurrence; a central fact of specifically human existence, without it all the other specifically human aspects of existence would be impossible.[28] Intention[29] (defined as the property of many states and mental events by which they are directed toward, or about, objects and states of affairs in the world[30]) is the second intractable feature of Mind. The difficulty of inserting the subjectivity of mental states in the objective conception of reality is the third characteristic. The fourth is that of mental causation. It's the pretense that all thoughts and feelings are really important to the way humans behave and that they actually have some causal effect on the physical world. Thus, the foundations of biological naturalism are consciousness, intentionality, subjectivity, and mental causation[31].

As thoughts are about something, then the series or thought processes must have a meaning. Minds, therefore, are semantic. They transcend a formal structure. They have content. Otherwise, computers operate only in syntax. It is assumed that computer programs cannot have minds because they are only syntactic.

Searle exemplifies this with the Chinese room. Imagine there is someone closed in a room with baskets filled with Chinese symbols. A subject is initially unable to understand a word in Chinese, but is given a book containing rules in his native tongue to manipulate the symbols in the basket.

The specifications of the rules are purely formal manipulations of symbols in terms of their syntax rather than their semantics. It is assumed that the programming quality of humans and the subject's expertise in manipulating the symbols obeying the rules does not make it possible to learn Chinese. From the point of view of an outside observer, by virtue of the completion of a formal computer program, that person behaves exactly as if he understands Chinese. But he does not even understand a single word. If the subject does not understand Chinese, no other computer can understand it, because no digital computer has something that we do not have. It is assumed, therefore, that a computer has neither mind nor semantics, but simple syntax[32].

The syntax, by itself, is incomplete in the semantics. Digital computers, as they are computers, there are no ways the system transcends syntax for semantics[33]. Causal interactions between the computer and the world are therefore irrelevant, unless these interactions are represented in some or other naturally biological mind. If all that consists in the so-called Mind is only a set of purely formal and

[28] J. Searle, *Mente, Cérebro e Ciência,* Lisboa, 2017, 21.
[29] G. Anscombe, *Intention*, Cambridge, 2000.
[30] J. Searle, *Intencionalidade,* São Paulo, 2002, 1.
[31] J. Searle, *op. cit.*, 22-23.
[32] J. Searle, *op. cit.*, 42-43.
[33] J. Searle, *op. cit.*, 45.

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syntactic operations, there is no possibility of it being so. It is worth emphasizing that the nature of this refutation is independent of any state or evolutionary stage of computer technology. It has to do with the just definition of digital computer, with what it is[34]. This attempt to explain the mind in a physical objectivity in analogy to computers was refuted by Nagel[35].

We believe that current attempts to understand the mind by analogies with man-made computers, which can perform with excellence some of the same external tasks performed by sentient beings, will ultimately be recognized as a huge waste of time.

So, can a machine think? In a certain sense, we are machines. A machine is defined as a physical system capable of performing certain types of operations. So, humans are machines and they can think. Trivially, therefore, there are thinking machines. Searle reforms: Can an Artifact Think? Can a man-made machine think? It will depend on its type. In a hypothetical situation, if the machine had the same structure as a human, then it would be possible to presume thoughts to that machine.

The questioning is rephrased: can a digital computer think? It is described, from the mathematical point of view, as digital computer anything. A simple book, in turn, would describe itself as a digital computer. In this insight, the question also gets "yes" in its answer. For Searle, the precise question is: can the digital computer, as defined, think? The author denies. As designed, the computer program is just syntactic terms. The act of thinking transcends the simple question of manipulating symbols without meaning; significant semantic content. These semantic contents, to Searle, are what we indicate by meaning. The computational operation is simple simulation. No matter how advanced technology is, it will be unable to duplicate Mind, a natural part of the biological world and nature.

The difference between syntactic and semantic lies in the contextualization of meaning in a background. In the Searle guidelines, a digital computer, as designed, can understand the meaning and concept of photosynthesis; including simulating it, just like the digestive process, but he will never know what a photosynthesis or what digestion is. In other words, even if a digital computer simulates pain, apparently it does not understand the semantic meaning of pain. He cannot feel it, even reproduce, just simulate it. Therefore, an AI, although programmed in the guidelines of deep learning and machine learning, only simulates situations for which it was initially constructed, without understanding the real semantic meaning of its attitudes.

Thus, Searle says: 1) brains cause minds - the mental processes that make up the mind are caused by processes that occur within the brain; 2) Syntax isn't enough for semantics - here there is the articulation and distinction of what is purely formal and what has content; 3) computer programs are entirely defined by their formal or syntactic structure; 4) Minds have mental content; specifically, have semantic content.

The ontological discussion held so far is important. For Edsger Dijkstra the question of whether *Machines Can Think* is about as relevant as the question of whether Submarines Can Swim[36]. The main difference is: submarines don't have rights; AI may have it. As we are talking about copyright (or intellectual property), apparently, we cannot affirm the existence of intellectual property produced by

[34] J. SEARLE, *op. cit.*, 48.

[35] T. NAGEL, *op. cit.*, 21.

[36] E. DIJKSTRA, *The threats to computing science*, In *ACM South Central Regional Conference*, 1984. In: https://www.cs.utexas.edu/users/EWD/transcriptions/EWD08xx/EWD898.html (last visited 05/07/2019).

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a being who has no intellect. The law protects the immaterial production of the subject capable of thinking and producing something immaterial (to materialize – or not – it later). If we start from the premise that an artificial entity produces a song or a story, can we say that this production came from its intellect? How can the law solve this situation?

4. AI considerations: brave new rights in the law by the technology

When John McCarthy made the term *Artificial Intelligence*, the scientist said that even machines as simple as thermostats have beliefs. When asked by Searle *What beliefs does your thermostat have?* McCarthy replied, *Thermostat has three beliefs* «it's too hot here, it's too cold here and it's right here».[37] When asked what an AI is, McCarthy[38] says: «It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable». McCarthy[39] also defines *intelligence* as «the computational part of the ability to achieve goals in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines». The author himself recognizes the current non-existence of a definition of intelligence that does not depend on its ontological relation and comparison to the human mind. In its guidelines anyone would attribute intelligence. There is no conceptual and philosophical conceptual precision in McCarthy's words, making them easily refuted under the above assumptions.
Under these guidelines, there are two strands: Strong and Weak AI. According to Searle, weak AI, or cautious, tends only to simulate intentional phenomena and human cerebral causal power. Already the strong AI, intends to reproduce these phenomena in a similar way to the human brain operations. In the first case, the computer is only an intermediary instrument capable of performing functions of the mind; in the second case it is the mind itself[40].
Hallevy describes five attributes that identify an AI: communicative ability; internal knowledge (of itself); external knowledge (about the world); goal driven behavior; and creativity[41]. Yanisky-Ravid and

[37] J. SEARLE, *op. cit.*, 34.
[38] «It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable». J. MCCARTHY, *What Is Artificial Intelligence?* in <http://www-formal.stanford.edu/jmc/whatisai.pdf> (last visited 25/05/2019).
[39] «Intelligence is the computational part of the ability to achieve goals in the world. Varying kinds and degrees of intelligence occur in people, many animals and some machines». J. MCCARTHY, *op. cit*.
[40] «I find it useful to distinguish what I will call "strong" AI from "weak" or "cautious" AI (Artificial Intelligence). According to weak AI, the principal value of the computer in the study of the mind is that it gives us a very powerful tool. For example, it enables us to formulate and test hypotheses in a more rigorous and precise fashion. But according to strong AI, the computer is not merely a tool in the study of the mind; rather, the appropriately programmed computer really is a mind, in the sense that computers given the right programs can be literally said to understand and have other cognitive states. In strong AI, because the programmed computer has cognitive states, the programs are not mere tools that enable us to test psychological explanations; rather, the programs are themselves the explanation». J. SEARLE, *Minds, brains, and programs,* in *Behavioral and Brain Sciences,* 3, 1980, 417-424.
[41] «There are five attributes that one would expect an intelligent entity to have. The first is communication. One can communicate with an intelligent entity. The easier it is to communicate with an entity, the more intel-

Velez-Hernandez list ten attributes to identify an AI: innovation; autonomy[42]; unpredictability; independence; rationality; increasing learning capacity; efficiency; precision; objectives; and free will ability to make choices[43].

Calo, Froomkin and Kerr[44] distinguish the concept of robots from that of AI. Robots consist of (1) some sort of sensor or input mechanism, without which there can be no stimulus to react to; (2) some controlling algorithm or other system that will govern the responses to the sensed data, and (3) some ability to respond in a way that affects or at least is noticeable by the world outside the robot itself.

Richards and Smart[45] direct their concept to a non-biological agent, treating the robot as an autonomous agent coming from a constructed system capable of presenting physical and mental activity, but which is not alive in the strictly biological sense.

In the same sense, Yanisky-Ravid and Liu describes eight attributes inherent to it. The first is creativity, expressed in the capacity to create new products and processes and on the basis of significant improvement of existing things. The second is the unpredictable results. For the authors, AI should be constructed by an algorithm capable of incorporating random mutations that result in unpredictable choices to optimize the desired result. AI must also be independent and autonomous in its basic operation. As independence and autonomy, the authors agree on the idea of performing tasks by AI without a high degree of human interference. Moreover, AI has to be a rational intelligence[46]. The evolution through deep learning and machine learning is found as the fifth attribute. The ability to learn, collect, access, and communicate with data outside those included in the base and initial AI program is the sixth characteristic. Lastly, efficiency and precision, coupled with free will to choose and fulfill goals, characterize the seventh and eighth attributes[47].

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ligent the entity seems. One can communicate with a dog, but not about Einstein's theory of relativity. One can communicate with a little child about Einstein's theory, but it requires a discussion in terms that a child can comprehend. The second is internal knowledge. An intelligent entity is expected to have some knowledge about itself. The third is external knowledge. An intelligent entity is expected to know about the outside world, to learn about it, and utilize that information. The fourth is goal-driven behavior.14 An intelligent entity is expected to take action in order to achieve its goals. The fifth is creativity. An intelligent entity is expected to have some degree of creativity»

[42] «It means that, within certain limits, machines ought to be able to take "decisions" autonomously and independent of external (e.g., remote) control on how to proceed with a given task should new conditions arise unexpectedly». N. KROES, *Robots and Other Cognitive Systems: Challenges and European Responses,* in *Philosophy & Technology*, 3, 2011, 357.

[43] «The AI systems of today can best be described as sharing a number of tem characteristics: they are (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—all features that make these systems inherently intelligent (in this paper: the ten features»

[44] R. CALO, A. M. FOOMKIN, I. KERR, *Robot Law*, United Kingdom, 2016, 1.

[45] N. RICHARDS, W. SMART, *How should the law think about robots*? in R. CALO, A. M. FOOMKIN, I. KERR, *op. cit.*, 11.

[46] «An "intelligent machine" means a rational system that perceives data from the outside world and decides which activities to engage in or avoid to maximize its probability of success in achieving a certain goal»: S. YANISKY-RAVID., X. LIU, *When artificial intelligence systems produce inventions: an alternative model for patent law at 3a era,* in *Cardozo Law Rev.*, 39, 2224-2227.

[47] S. YANISKY-RAVID., X. LIU, *op. cit.*, 2224-2227.

There are alternative definitions that incorporate the notion of weak AI in the concept of Technological Agency (TA). This would be «*a system situated within and a part of an environment that senses that environment and acts on it, over time, in pursuit of its own agenda and so as to effect what it senses in the future*»[48]. However, the characteristics attributed to TA are similar to those of AI, such as: autonomy, social skills, proactivity, interactivity, adaptability, mobility, temporal continuation and achievement of objectives[49].

The subsequent analysis of the writings in which the elements and attributes of artificial intelligence described have been removed leads to the utopian conclusion of attributing to AI the ownership of intellectual property derived from works of its autonomous authorship, and even to attribute it criminal liability[50].

These features allow AI systems to create and invent products and processes which would be worthy of patent protection if they had been developed by humans. Therefore, Human ownership over these AI creations is questionable. Once we understand the features of AI systems and that AI systems create outcomes independently, we realize that humans alone are not entitled to the rights to these products. Thus, traditional patent law is not applicable in the 3A era[51].

Developing the concept of AI without greater philosophical rigors in the field of the philosophy of mind demonstrates a lack of knowledge about the subject. Although the theories of mind discussed here are supposedly false, the authors quoted simply ignore them as if they were nothing. That is, at the very least, intellectual ingenuity. The belief that an AI may be the object of rights and duties, such as copyright and criminal responsibility, is a reflection of a fictitious pretense that can only be built up to date in a literary and cinematic setting. Bringing this argument to the philosophical and juridical sphere only tends to increase the degree of complexity of relations arising from these spheres.

Fortunately, the few legal constructions that protect the intellectual production coming from the autonomous act of AI are opposing the ideals mentioned above. The UK legislation[52] on copyright, patents and design provides the following:

«*In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken*».

[48] S. FRANKLIN, A. GRAESSER, I*s it an agent, or just a program? A taxonomy for autonomous agents. Proceedings of the Third Intl Workshop on Agent Theory, Architetures, and Lenguages*, New York, 1996 (http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.52.1255&rep=rep1&type=pdf, last visited 25/05/2019).

[49] L. FLORIDI, J. SANDERS, *On the morality of Artificial Agents*, in *Minds and Machines*, 3, 2004, 349-379.

[50] «The relevant question concerning the criminal liability of AI entities is: How can these entities fulfill the two requirements of criminal liability? This paper proposes the imposition of criminal liability on AI entities using three possible models of liability: The Perpetration-by-Another liability model; the Natural-Probable-Consequence liability model; and the Direct liability model. Following is an explanation of these three possible models». G. HALLEVY, *The Criminal Liability of Artificial Intelligence Entities - from Science Fiction to Legal Social Control*, in *Akron Intellectual Property Journal*, 2, 2010, 10.

[51] S. YANISKY-RAVID, X. LIU, *op. cit.*, 2228.

[52] UNITED KINGDOM, *Copyright, Designs and Patents Act.* 1988, in: <https://www.legislation.gov.uk/ukpga/1988/48/part/I/chapter/I/crossheading/authorship-and-ownership-of-copyright?view=plain> (last visited 25/05/2019).

The U.S. also follow these guidelines. The National Commission on New Technological Uses of Copyrighted Works (CONTU), which was created to advise Congress on whether then-emerging technologies necessitated a change in copyright laws, concluded that computers were merely tools for facilitating human creativity.

In a similar position, the European Parliament's resolution of 16 February 2017, with recommendations to the Civil Law Commission on Robotics[53], in its first paragraph, characterizes robot and artificial intelligence together as: «the acquisition of autonomy through sensors and/or by exchanging data with its environment (inter-connectivity) and the trading and analyzing of those data; self-learning from experience and by interaction (optional criterion); at least a minor physical support; the adaptation of its behavior and actions to the environment; and lack of life in the biological sense of the term».

From this legal incursion, robots cannot be held responsible for the actions or omissions that cause damage to third parties. A specific human agent, such as the manufacturer, the operator, the owner or the user, will be held responsible. The agent could have predicted and prevented harmful behavior from the robot. This position is summarized in product liability, since the latter entities may be considered strictly responsible for the actions or omissions of a robot[54].

In the same sense, the United Nations Convention on the Use of Electronic Communications in International Contracts recognizes the existence and validity of contractual legal relationships in which person and machine appear as parties, and does not the execution and the responsibility of the autonomous acts of the virtual entity. In addition, the legislator comments on and reinforces the justification for that position in Section 213:

> «*Article 12 of the Electronic Communications Convention is an enabling provision and should not be misinterpreted as allowing for an automated message system or a computer to be made the subject of rights and obligations. Electronic communications that are generated automatically by message systems or computers without direct human intervention should be regarded as "originating" from the legal entity on behalf of which the message system or computer is operated. Questions relevant to agency that might arise in that context are to be settled under rules outside the Convention*»[55].

Otherwise, this discussion is not new and the arguments are analogous to the above[56]. This is because if one takes pride in the defense of AI as an autonomous entity and subject of rights and duties, it can be used as a pillar tool for the practice of illicit activities. Moreover, there is no evidence that an AI, even if fully developed, understands the concept of authorship.

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[53] European Union, *Resolução do Parlamento Europeu, de 16 de fevereiro de 2017, com recomendações à Comissão de Direito Civil sobre Robótica (2015/2103(INL)).* 2017, in: http://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.html?redirect (last visited 25/05/2019).

[54] European Union, *op. cit.*

[55] Apparently the correct position conforms to the hypothesis that the operator of an AI is responsible for eventual results arising from its conduct, since AI does not express will and has no intentionality.

[56] T. Butler, *Can a computer be an author? Copyright aspects of Artificial Intelligence*, in *Hastings Comm. & Ent.L.J.*, 707, 1982. K. Milde, *Can a Computer be an 'Author' or 'Inventor'' Journal of the Patent Office Society*, 6, 1969, 378-405.

Now, we will take a comparative look in the copyright law. The 1884 Supreme Court case of Burrow-Giles Lithographic Co. v. Sarony first extended copyright protection to photography[57]. The camera used to capture the image of writer Oscar Wilde by photographer Napoleon Sarony was considered by the court as a tool which aided the *author* in *creating an original work of art*[58]. Thus, computer-generated creations that were deemed mechanical were not thought worthy of protection.

In this way, Yanisky-Ravid and Moorhead[59] try to distinguish between the rights of artificial intelligence software and the rights of works produced by automated ai systems and the rights of programmer. «Legally, the rights of an AI software program and the rights of artworks can be distinguished from one another. Software is usually protected not only by copyright laws, but also by the Constitution of the United States which grants exclusive rights to "Authors and Inventors" in their respective "Writings and Discoveries" However, the discourse about software ownership is distinct from the question of ownership of products (and services) produced by AI systems. One question that remains is whether the works produced by AI systems should or could be entitled to copyright protection. Can AI-generated works be regarded as proper "works of authorship" pursuant to § 102[60] of the Copyright Act by virtue of AI's sufficient nexus to human creativity»[61]?

This is an important discussion. If AI was used only just a tool, why set him the copyright of the work? It doesn't make sense. The distinction between programming the AI software itself and authoring the works the automated AI machine creates can be better understood by thinking about a piano and the author of the melodies created by using the piano. Imagine a melody that is created by Z playing a piano that was programed and designed by A, manufactured by B, and owned by C. Is the piano (or the ownership of the piano) as the musical instrument, serving as the platform for the creation, relevant to the question of ownership of the melody[62]?

Besides that, the copyright law interpretation can be a problem. In the Brazilian Copyright code, the concept of author is strictly tied to the existence of a person[63]. There is no way of a legal entity of

[57] Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53 (1884).

[58] K. HRISTOV, *Artificial Intelligence and the Copyright Dilemma, IDEA: The Journal of the Franklin Pierce Center for Intellectual Property*, 57-3, 2017, 431-454.

[59] S. YANISKY-RAVID, *Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era—The Human-Like Authors are Already Here—A New Model,* in *Mich. St. L. Rev*., 659, 2017.

[60] «§102 · Subject matter of copyright: In general28 (a) Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device. Works of authorship include the following categories: (1) literary works; (2) musical works, including any accompanying words; (3) dramatic works, including any accompanying music; (4) pantomimes and choreographic works; (5) pictorial, graphic, and sculptural works; (6) motion pictures and other audiovisual works; (7) sound recordings; and (8) architectural Works (b) In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work».

[61] S. YANISKY-RAVID, L. VELEZ- HERNANDEZ, *Copyrightability of Artworks Produced by Creative Robots and Originality: The Formality-Objective Model,* in *Minn. J.L. Sci. & Tech*., 1, 2018.

[62] S. YANISKY-RAVID, *op. cit.*, 38.

[63] «Art. 11: Author is the person creator of literary, artistic or scientific work».
The same in the U.S. Copyright law. §901 - (6) the "owner" of a mask work is the person who created the mask work, the legal representative of that person if that person is deceased or under a legal incapacity, or a party to whom all the rights under this chapter of such person or representative are transferred in accordance with sec-

private law being an author. In the Australian law it's the same. Copyright Act 1968 (Australia) defines the author of a photograph as "the person who took the photograph". By being generated by a computer program, its originality was compromised and it could not have copyright. The author of a computer-generated work is the programmer or the final user.

We have two situations and two ways to go. The first is adopt the legal concept *stricto sensu* of author/authorship/originality. In this way, if the copyright law considers an author as a natural person, there is no way to set copyright to a machine. Here we have a legal limit to be an author: be a person.

The second one is the opposite. If the copyright law doesn't set the term "person" as an author, we could think have a machine as author. The German copyright law says "Art 7 "author is the creator of the work". It does not specify what is to be a person. Besides that, Art 11 declares that copyright "protects the author in his intellectual and personal relationships to the work".

If we choose the second option, we may have a problem. How can we set rights to a thing without personality/legal personhood? At least legal entities of private law have personality. Thus, a legislative change is needed to consider machines as a subject of law. But, is it viable? Under the philosophical and sociological approach this does not seem feasible. Attributing personality to an artificial entity can increase social complexity. Humans may use the machine's legal personhood for committing crimes. In this case people would not be held responsible, since the machine could be liable for his acts.

Therefore, materials produced by artificial intelligence cannot be copyrightable because they do not fit the legal concept of author. This is only a legal approach. Under the philosophical approach, because a machine does not think and cannot produce original content, it is unjustifiable to attribute copyright to it.

5. Conclusions

1) The analysis of the difference between man and machine is important for the concept of originality. If biological naturalism is right, machines cannot think. The mind is supposedly biological. As AI cannot synthesize or use semantics to produce authentic materials, it is understood that their production is the result of an automated process. In thesis, AI did not have a choice in whether or not to do so as it was designated for this.

2) Assuming that AI cannot produce original content, who owns the copyright of these products? AI is used as tool. to the materials produced by it is attributed ownership to the programmer or developer who made and made the artificial intelligence's algorithm. There are two things to consider.

2.1) When copyright law designates the author as a natural person, under no circumstances may we attribute ownership to an artificial entity. The concept of natural person has its connection to the biological aspect; *to be a person*.

tion 903(b); except that, in the case of a work made within the scope of a person's employment, the owner is the employer for whom the person created the mask work or a party to whom all the rights under this chapter of the employer are transferred in accordance with section 903(b)».

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2.2) If the copyright law does not specify anything about the category of person, it is apparently possible to attribute copyright to the autonomous acts produced by AI. In this case (2.2) and in the previous (2.1) the analysis is focused on the linguistic aspect of copyright law. However, in this topic we find a problem: how can an intelligent entity artificially acquire rights without having legal personhood?

2.2.1) In order to respond to this questioning, it would be possible to create legal personality for AI, such as legal entity of private law.

2.2.2) This analysis would justify the attribution of copyright to an IA. But from the philosophical and sociological point of view, there are problems.

2.2.2.1) Under the philosophical view, considering that biological naturalism is correct, an entity without semantic ability has no aptitude to produce original content, perhaps personality (legal concept linked to the philosophical concept of person)

2.2.2.1) From a sociological point of view, the increase in contingencies may occur. As previously described, the use of machines with personality may be distorted to the illicit consent of humans, in order to avoid liability.

Therefore, although the law may do, under the philosophical focus of the mind, we understand that it is not feasible to attribute copyright to an AI, otherwise it will significantly increase social and legal contingencies.