

Artificial Intelligence: Back to the Future of Patent Law

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Each generation, no doubt, believes it is destined to remake the world. Mine, however, knows that it will not. But perhaps its task is greater. It is to prevent the world from falling apart.

Albert CAMUS, *Speech at the reception of the Nobel Prize for Literature*, Stockholm, December 10, 1957.

- §1. Is Patent Law able to protect AI?** — Many seem to think that any new technical development should necessarily be accompanied by law reform. Patent law has never been outdone on this side, while artificial intelligence (known as “AI”) is no exception to the rule, leading to the question: is patent law, as it stands, able to protect AI?
- §2.** Numerous scholars believe that patent law would be, *de lege lata*, unsuitable¹. One of them even asserts that it would be necessary to recognize the status of inventor to the AI who would “invent”, failing which one would exclude the patentability of all inventions in the realization of which AI intervenes². In any case the issue is of interest for policy makers. So much so that experts from the United States, through AIPPI³ and WIPO⁴, to the OECD⁵ and Great Britain⁶ are already being surveyed. The thesis has something to seduce (or worry depending on), so much it brings us back to our passionate reading of Isaac Asimov⁷. Unfortunately, the thesis is based on two biases that seem to be leading. A first bias (technological): this thesis foreshadows the future, an AI is not

* The author, who participates as an expert within the Global Partnership for Artificial Intelligence (known as “GPAI”), expresses in the present study only personal opinions, which have no official character and are therefore binding only on him.

¹ B. Hattenbach & J. Glucoft, “Patents in an Era of Infinite Monkeys and Artificial Intelligence”, 19 *Stan. Tech. L. Rev.* 32 (2015) ; S. Yanisky Ravid & X. Liu, “When Artificial Intelligence Systems Produce Inventions: An Alternative Model For Patent Law At The 3a Era”, 39 *Cardozo L. Rev.* 2215 (2017) ; L. Vertinsky & T. M. Rice, “Thinking About Thinking Machines: Implications of Machine Inventors for Patent Law”, 8 *B. U. J. Sci. & Tech. L.* 574 (2002).

² R. Abbott, “I Think, Therefore I Invent: Creative Computers and the Future of Patent Law”, 57 *B.C.L. Rev.* 1079, 1104 (2016).

³ AIPPI, Study Question Inventorship of inventions made using Artificial Intelligence, Study Guidelines, Q272-SGL-P-2020, 2020: <https://aippi.info/wp-content/uploads/2020/02/Q272-SGL-P-2020-Inventorship-of-inventions-made-using-AI.pdf>.

⁴ WIPO, “WIPO Conversation on Intellectual Property (IP) and Artificial Intelligence (AI)”, WIPO/IP/AI/2/GE/20/1, 13 December 2019: https://www.wipo.int/edocs/mdocs/globalinfra/en/wipo_ip_ai_ge_19/wipo_ip_ai_ge_19_2.pdf.

⁵ M. Dhenne, “Le Partenariat Mondial pour l’Intelligence Artificielle”, *Propr. industr.* 2020, alerte 65.

⁶ UKIPO, “Artificial intelligence and intellectual property: call for views”, 7 September 2020: <https://www.gov.uk/government/consultations/artificial-intelligence-and-intellectual-property-call-for-views>.

⁷ There are countless quotes from the famous science-fiction author, and in particular his Laws of Robots, which pave the literature on AI and law. See e.g. J. M. Balkin, “The Three Laws of Robotics in the Age of Big Data”, 78 *Ohio St. L.J.* 1217 (2017).

today, strictly speaking, likely to invent⁸. A second bias (legal): the status of inventor would be the legal pinnacle for AI, even though this status is of little interest in a system where the patent right belongs to the applicant, as is the case in the majority of countries in the world. Then, moreover, in law, shouldn't man, to use Protagoras' formula, be the "measure of all things"⁹?

As a jurist, it is this legal aspect, which, although it often remains neglected, draws our attention in particular because it seems to us that the spotlight on the wrong direction taken by events correlatively casts a shadow on the reality of the legal phenomenon and that this shadow could, in the medium and long term, prove to be detrimental to the reception of AI by patent law. In short, our premise consists in considering that we have taken a bad start: the myth of the autonomous AI blinds the lawyers so much that they have neglected the important problems actually raised by AI¹⁰, which require nevertheless thorough reflections; if we continue thus, on the false roads taken until now, we will go straight to the wall, towards reforms as premature as they are useless. So, we will try, with this study, to contribute to redirect the debate towards the questions raised by AI in the field of (patent) law.

§3. Background. — But, before looking at the two main actors of this new technical-legal episode, that is AI and law, here is the underlying background: it is the collision of two systems of Thought¹¹. The law¹² built on a rational logic¹³ aiming at societal goals¹⁴ in order to create its ideal reality¹⁵; it is a duty to be. The technique built on an empirical logic made of data verifiable through experiments; it is linked to the being of the fact¹⁶. Two profoundly antagonistic worlds, therefore; but they cannot ignore each other, totally at least, if only because of their reciprocal influences. Two worlds that have been gauged for a long time. Thought (Western thought at least¹⁷) remained until recently refractory, even hostile, to technology¹⁸. As regards jurists in particular, their reflec-

⁸ See especially D. Kim, "AI-Generated Inventions: Time to Get the Record Straight?", *GRUR Int.* 2020, p. 443.

⁹ This is the conception of natural law defended by Protagoras in Plato's *Theætetus*, while Socrates contrasts it with a more traditional conception, according to which law is in the nature of things and not in Man (Plato, *Theætetus*, 151(e) — 152(c)). Man should not be idealized, he remains "judge of all things, fool of all things, worm of the earth; depositary of truth, cloaca of uncertainty and error; glory and scum of the universe" (Pascal, *Pensées*, *Pensée* no 434).

¹⁰ With a few notable exceptions, where the authors questioned the patentability of subject-matter-IA: A. Ramalho, "Patentability of AI-Generated Inventions: Is a Reform of the Patent System Needed?", *IIP*, Japan, 2018: <https://ssrn.com/abstract=3168703>; N. Shemtov, *A study on inventorship in inventions involving AI activity*, European Patent Office, February 2019.

¹¹ On the relationship between technology and law see A. Supiot, *Homo juridicus. Essai sur la fonction anthropologique du droit*, Seuil, 2005, p. 100 et seq. and *La gouvernance par les nombres*, Pluriel, 2020 (réed. 2015), pp. 113 et seq.

¹² It is a modern and positivist acceptance of the law. Let us note that the most ancient conception of natural law invites, on the contrary, to seek the law in things, so that it tends to approach an empirical logic. Compare P. Amselek, "Le droit dans les esprits", in *Controverses autour de l'ontologie du droit*, P. Amselek et Ch. Grzegorzczak (eds), PUF, Questions, 1989, p. 27 and M. Villey, "Le droit dans les choses", in *ibid.*, p. 11.

¹³ On legal logic see G. Kalinowski, "Sur la spécificité de la logique juridique", in *APD. T. 11. La logique du droit*, Sirey, 1966, p. 7; "Logique et méthodologie juridique. Réflexions sur la rationalité formelle et non formelle en droit", in *APD. T. 23. Formes de rationalité en droit*, Sirey, 1978, p. 59.

¹⁴ On the societal purposes of law see H. Battifol, *Problèmes de base de philosophie du droit*, LGDJ, 1979, p. 289 et seq.; B. Oppetit, *Philosophie du droit*, Dalloz, Précis Dalloz, 1999, nos 17 et seq., pp. 28 et seq.

¹⁵ M. Virally, *La pensée juridique*, LGDJ, 1960, pp. 19 et seq., see especially pp. 19 and 20.

¹⁶ On the distinction between the duty to be of the right and the duty to be of the fact. See J. Carbonnier, *Sociologie juridique*, PUF, Quadrige, 1978, pp. 286 et seq.

¹⁷ Chinese Thought, on the contrary, does not envisage the transformation of Nature by the action of Man, but the capacity of Man to adapt to natural transformation and this Thought has always made this capacity one of its central aspects. See F. Jullien, *Traité de l'efficacité*, Grasset & Fasquelle, 1996, pp. 75 et 76.

¹⁸ It is in the middle of the 20th century, under the pen of Heidegger, that the technique became a "phenomenon" worthy of conceptualization. (M. Heidegger, "Die Frage nach der Technik", in *Vorträge und Aufsätze*, G. Neske, 1954, p. 14). Long before him, the thinkers of antiquity despised this *technè* of the craftsmen, simple negotiation with Nature unable to compete with *poiësis*, synonymous with creation. (Plato, *The Banquet*, 205(b)). In the Middle Ages, like Thomas Aquinas, no one would dare to challenge the monopoly of Creation to the divine. (Th. d'Aquin, *Pars Prima Summa Theologiae*, in *Opera Omnia*. T. 4, Romae, 1898, question 45, article 3, p. 467). This vision will endure until the seventeenth century when Descartes will enjoin

tions tend to neglect the study of the technique as an object of law¹⁹, preferring to approach it as a tool of law²⁰ more²¹ or less²² likely to influence the finality of the latter. In any case, it is today the first aspect that will interest us, that is to say, the way in which the legal system welcomes the technique as an object. On this level, two attitudes are opposed: one that can be described as "logistic", which consists in seeking how to integrate technology into the law according to the purposes of the law; the other that can be described as "technological", which consists, conversely, in starting from the technology in order to determine whether the law must be adapted to accommodate it²³. While the first approach is teleological, because it invites one to look at what the technique should be, but only with regard to the purposes of the norm, the second is ontological, because it invites one to focus on what the technique is. However, each of these methods leads to an excess: the first leads to underestimating the needs related to the technique, while the second leads to overestimating them. The present study will therefore favor a vision that is as nuanced as possible, halfway between these two poles, by trying to perceive what the technique is, but without losing sight of what it should be with regard to the societal aims of the legal system within which it is inserted. Our approach thus consists in considering that if the last word goes to the law, by regulating with a meaning and a language of its own, the fact remains that, in addition to its logic and its purposes, it cannot be abstracted from an in-depth analysis of the facts and their understanding. As far as AI is concerned, such an approach will require a careful examination of the technique itself before trying to understand it legally.

§4. Definitions. — The time has come to identify the actors of this new technical-legal episode. What is meant by "artificial intelligence"? First troubling observation: from a technical point of view, there is no definition of AI strictly speaking²⁴. Indeed, the notion, as such, can cover a more or less extensive technical field, depending on whether one considers that AI can be either "strong"

the Man to take possession of this Nature, without however judging necessary to identify, and thus even less to define, the essential tool for the proposed company (R. Descartes, *Discours de la méthode*, in *Œuvres et Lettres*, Gallimard, Bibliothèque de la Pléiade, 1987 (1637), p. 168).

¹⁹ See nonetheless E. Derieux, "Sciences et techniques et droits de l'Homme", in *Clés pour le siècle*, Dalloz, Université Panthéon-Assas (Paris II), 2000, p. 405 ; G. Hottis, "Droits de l'Homme et technique contemporaine : liberté responsable et liberté nihiliste", *Les études philosophiques* 1986, no 2, p. 201 ; V. Lasserre-Kiesow, "Droit et technique", JCP G 2011, I, 93 ; B. Edelman, "Sujet de droit et techno-science", in *APD. T. 34. Sujet de droit*, Sirey, 1989, p. 165 ; B. Warusfel, "Jacques Ellul et la construction ambivalente du droit des nouvelles technologies", in *Jacques Ellul, Penseur sans frontières*, P. Troude-Chastenet (ed), Seuil, Esprit du temps, 2005, p. 105.

²⁰ This is referred to as the "legal technique". See R. Encinas de Munagorri, "Qu'est-ce que la technique juridique?", *D.* 2004, chron. p. 711.

²¹ Gény, Demogue and Duguit believe that the technique could play an active role in the construction of the law in relation to a predetermined finality (F. Gény, *Science et technique en droit positif privé*. T. III, Sirey, 1921, no 188, p. 34 ; R. Demogue, *Les notions fondamentales du droit privé*, A. Rousseau, 1911, p. 203 ; L. Duguit, *Traité de droit constitutionnel*. T. 1. *La règle de droit. Le problème de l'État*, E. de Boccard, 3e ed., 1927, no 10, p. 106, no 14, p. 154, no 15, p. 161, no 16, p. 171, et no 21, p. 225). Perrot, François Terré and Prosper Weil, and more recently Christian Larroumet and Augustin Aynès, consider that the legal technique could, in itself, influence the purpose pursued by the standard. (R. Perrot, *De l'influence de la technique sur le but des institutions juridiques*, Sirey, 1953, nos 126 et seq., pp. 181 et seq. ; F. Terré, *L'influence de la volonté individuelle sur les qualifications*, LGDJ, Bibliothèque de droit privé, t. 2, 1955, nos 196 et seq., pp. 183 et seq. ; P. Weil, "La technique comme partie intégrante du droit international: à propos des méthodes de délimitations des juridictions maritimes", in *Mélanges offerts à C.-A. Colliard. Droit et libertés à la fin du XXe siècle*, A. Pedone, 1984, p. 347, see especially no 3 et 4 ; Ch. Larroumet et A. Aynès, *Introduction à l'étude du droit privé*, Economica, Corpus droit privé, *Traité de droit civil*, t. I, 6e ed., 2013, no 134, p. 80).

²² Kohler, Ihering and Dabin see it only as a tool for shaping the law, external to the purpose it pursues (J. Kohler, *Lehrbuch des Bürgerlichen Rechts. Band 1*, C. Heymann, 1906, no 42 et 43, p. 135 et seq. ; R. von Ihering, *L'esprit du droit romain*. T. III, trad. 3e ed. O. de Meulenaere, A. Marescq aîné, 1880, no 43 et seq., p. 15 et seq. ; J. Dabin, *La technique de l'élaboration du droit positif*, Bruylant/Sirey, 1935, p. 22 et 23).

²³ N. Petit, "Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications", Working Paper, 9 March 2017: <https://ssrn.com/abstract=2931339>. Opposition which brings us back to another one, less meaningful here, between respectively terminological and real definitions of words in law. See G. Cornu, "Les définitions dans la loi", in *Mélanges dédiés à J. Vincent*, Dalloz, 1981, p. 77, see spec. no 15.

²⁴ B. Casey & M. A. Lemley, "You Might Be a Robot", 105 *Cornell L. Rev.* 187 (2020).

(or general) or "weak" (or narrow)²⁵. Not to mention that the terms composing the expression are both subject to interpretation. It is difficult to grasp intelligence, because there is no absolute measure of it²⁶. Is it distinguished by a capacity for reasoning or by consciousness? As for the artificial character, the threshold with the natural remains to be fixed. Does any requirement of human intervention imply such artificiality? Or, on the contrary, must this intervention be indispensable to its survival²⁷? Is it a permanent intervention or can it only be temporary? At what point in time, for example, can a brain "augmented" with a chip be considered artificial rather than natural? No need to go further in this reflection to understand that it will be better to focus on what AI does if we want to perceive everything it can be instead of trying to describe everything it is. We will retain in this sense that it is a "set of techniques allowing machines to perform tasks and solve problems normally reserved for humans and certain animals"²⁸. Concretely, what we call "AI" is the processing of data by algorithms (i.e. mathematical formulas) via their computer implementation for given purposes. AI is therefore a "device made up of various elements and performing a specific function", in other words a system²⁹. The systems in question are capable of learning from data and processing it in a reasoned way, thus proving a form of "intelligence". In this sense, AI includes "neural networks, genetic algorithms, support vector machines, k-means, kernel regression and discriminant analysis"³⁰.

From a legal point of view, AI can constitute either a fact to which the law applies or a notion that is integrated within rules. In the first case, AI forms a category of the kind of computer-implemented inventions³¹. In the second case, the flexibility of the design of AI chosen will make it a standard, i.e. a "flexible notion intentionally indeterminate"³². Whether it is a question of understanding the said notion or the technical fact, one must keep in mind the purpose of the implemented standard. What is the purpose of patent law? Opinions diverge. A debate raged in the nineteenth century between those who saw it as a kind of natural right automatically returning to the inventor by virtue of his act of creation³³, and those who saw it rather as a reward from

²⁵ The first one would get closer to Man while the second only aims to perform specific tasks. See S. Russell & P. Norvig, *Artificial Intelligence: A Modern Approach*, Prentice Hall, 3e ed. 2010, p. 1020 et seq. La possibilité d'une IA forte est controversée. See R. Fjelland, "Why General Artificial Intelligence will not be realized", *Humanit. Soc. Sci. Commun.* 7, 10 (2020). <https://doi.org/10.1057/s41599-020-0494-4>.

²⁶ F. Câmara Pereira, *Creativity and Artificial Intelligence: A Conceptual Blending Approach*, Mouton de Gruyter, 2007, p. 10.

²⁷ In this sense see G. Simondon, *Du mode d'existence des objets techniques*, Aubier, RES "L'invention philosophique", 1958, p. 46 et 47.

²⁸ Y. LeCun, "Qu'est-ce que l'intelligence artificielle?":

<https://www.college-de-france.fr/site/yann-lecun/Recherches-sur-l-intelligence-artificielle.html>.

L'OMPI retient une définition proche : "branche de l'informatique qui a pour objet de concevoir des machines et des systèmes à même d'accomplir des tâches qui font appel à l'intelligence humaine":

https://www.wipo.int/about-ip/fr/artificial_intelligence/.

²⁹ Cette définition provient du Larousse.

³⁰ Directives relatives l'examen pratiqué à l'EPO, G-II, 3.3.1.

³¹ "L'expression inventions mises en œuvre par ordinateur couvre des revendications qui font intervenir des ordinateurs, des réseaux informatiques ou d'autres dispositifs programmables dans lesquels au moins une caractéristique est réalisée grâce à un programme." (Directives relatives l'examen pratiqué à l'EPO, F-IV, 3.9). Pour des commentaires de cette définition see B. Warusfel, "Les ambivalences de la notion d'invention mise en œuvre par ordinateur", in *Les inventions mises en œuvre par ordinateur : enjeux, pratiques et perspectives*, M. Dhenne and Ch. Geiger (eds), LexisNexis, CEIPI, 2019, p. 57.

³² *Vocabulaire juridique*, G. Cornu (ed), PUF, Quadrige, 12e ed., 2018, s. v. "standard". Professor Stéphane Rials defines standard as "a type of indeterminate disposition, rather used by the judge, whose normative character is the object of contestation and which brings into play certain fundamental values of normality, morality and rationality." ("un type de disposition indéterminée, plutôt utilisé par le juge, dont le caractère normatif est l'objet de contestations et qui met en jeu certaines valeurs fondamentales de normalité, de moralité, et de rationalité.", S. Rials, *Le juge administratif français et la technique du standard. Essai sur le traitement juridictionnel de l'idée de normalité*, LGDJ, Bibliothèque de droit public, 1980, no 2, p. 3).

³³ It is this conception that we find in the Rapport du chevalier de Boufflers preceding the adoption of the first French law on patents for invention based on the postulate that "if there is a true property for a man, it is his thought": "[...] Invention, the source of the arts, is still that of property; it is primitive property; all the others are merely conventions; & what brings these two kinds of property together and distinguishes them at the same time is that one is a concession from society, & the other is a true concession from nature" ("s'il existe une véritable propriété pour un homme, c'est sa pensée : l'arbre qui naît dans un champ

society for the disclosure of the invention³⁴. Although some continue to claim that the inventor would "naturally" appropriate his invention³⁵, the idea of a recognized patent right in return for disclosure is widely accepted³⁶; this discussion now seems to have evolved towards positions centered either on the social contract that the patent would constitute³⁷, or on the unilateral act of appropriation that the application constitutes³⁸. Here again, the question seems to have been settled in favor of the second trend³⁹. We can thus consider that patent law constitutes a system of rules guaranteeing the temporary reservation of the disclosed invention in order to promote research, so as to generate innovation and, ultimately, economic growth⁴⁰. These rules are, by nature, social, and therefore aim at regulating a human society.

§5. Problematic. — Precisely, human or non-human, this is the crux of the plot. We often tend, because we remain focused on recent technical developments, to see in AI a novelty. Its birth, however, dates back to the early 1950s. As early as 1950, Alan Turing, the founding father of computer science, prophesied as follows: "*I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machine thinking without expecting to be contradicted.*"⁴¹. The term "artificial intelligence", however, did not appear until a few years later at a congress held in Dartmouth in 1956⁴², in the wake of cybernetics⁴³, which was in vogue at the time. These early AI theorists conceived of symbolic systems — the

n'appartient aussi incontestablement au maître de ce champ [...]. L'invention, source des arts est encore celle de la propriété ; elle est la propriété primitive ; toutes les autres ne sont que des conventions ; & ce qui rapproche & distingue en même temps ces deux genres de propriété c'est que les uns sont des concessions de la société, & que l'autre est une véritable concession de la nature., Rapport sur la propriété des auteurs de nouvelles découvertes et inventions en tout genre d'industrie by M. de Boufflers to the National Assembly, December 30, 1790). For comments see A. Lucas, "L'arbre dans le champs, le brevet d'invention et le droit d'auteur", 10 juillet 2019:

<https://www.institutboufflers.org/larbre-dans-le-champ-le-brevet-dinvention-et-le-droit-dauteur-andre-lucas/>. In this sense also see E. Calmels, *De la propriété et de la contrefaçon*, Cosse, 1856, no 19, p. 29; A.-Ch. Renouard, *Traité des brevets d'invention*, Guillaumin et Cie, 1865, p. 5 et 6.

³⁴ H. Allart, *Traité théorique et pratique des brevets d'invention*, A. Rousseau, 3e ed., 1911, no 322, p. 284; F. Mainié, *Nouveau traité des brevets d'invention*. T. 1, Chevalier-Marescq et Cie, 1896, p. XI.

³⁵ See J. C. Fromer, "Expressive Incentives In Intellectual Property", 98 *Va. L. Rev.* 1745, 1790 (2012).

³⁶ See J. Azéma and J.-Ch. Galloux, *Droit de la propriété industrielle*, Dalloz, Précis Dalloz, 8^e ed., 2017, no 191, p. 129.

³⁷ J. M. Mousseron, *Le droit du breveté d'invention. Contribution à une analyse objective*, LGDJ, Bibliothèque de droit privé, t. 23, no 157 et seq. See also, from the point of view of the economic analysis of the law, R. P. Merges, "Of Property Rules, Coase, and Intellectual Property", 94 *Colum. L. Rev.* 2655 (1994).

³⁸ See notably A. Casalonga, *Traité de la brevetabilité*, Dalloz, 1939, no 57 et seq., p. 60 et seq. et no 86 et seq., p. 67 et seq.; J. Hugues, "The Philosophy of Intellectual Property", 77 *Geo. L. J.* 287, 296 (1988). See also, from the point of view of the economic analysis of the law, E. W. Kitch, "The Nature and Function of the Patent System", 20 *J. L. & Econ.* 265 (1977).

³⁹ See J. Passa, *Traité de droit de la propriété industrielle*. T. 2. *Brevets d'invention. Protections voisines*, LGDJ, Traité, 2013, no 12, p. 16.

⁴⁰ J. Calais-Auloy et J. M. Mousseron, *Les biens de l'entreprise*, Litec, Droit et Gestion, t. 8, 1972, no 99, p. 68 ; M. Franzosi, "Patentable Inventions: Technical and Social Phases: Industrial Character and Utility", 5 *EIPR* 251 (1997); F. Savignon, "Les brevets dans la propagation de l'invention", *Archives de l'I.S.E.A.* 1967, p. 585; "Inventions, innovations et brevets en France", in *Mélanges en l'honneur de D. Bastian*. T. 2. *Droit de la propriété industrielle*, Litec, 1974, p. 295; H. Ullrich, "Technologieschutz zwischen Wettbewerbs- und Industriepolitik", in *Geistiges Eigentum im Dienst der Innovation*, G. Schricker, Th. Dreier and A. Kur (eds), Nomos, 2001, p. 83; B. Warusfel, "Entreprises innovantes et propriété industrielle: les limites de la protection juridique du patrimoine industriel", in *Propriété industrielle et innovation*, B. Laperche (ed.), L'Harmattan, Économie et innovation, 2001, p. 49, see especially pp. 64 et seq.

⁴¹ A. M. Turing, "Computing Machinery and Intelligence", *Mind* 1950, vol. 59, pp. 433-160, see especially p. 460. See S. Bringsjord et al., "Creativity, the Turing test, and the (Better) Lovelace Test", 11 *Minds and Machines* 3 (2001). Norbert Wiener, le Père Fondateur de la cybernétique, considérait qu'il fallait faire remonter l'origine de cette histoire au XVII^e siècle, avec le *calculus ratiocinator* de Leibniz (une machine calculatoire théorique). V. A. Mattelart, *Histoire de la société de l'information*, La Découverte, Repères, 5e ed., 2018, p. 5.

⁴² J. McCarthy, et al., "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence", 31 août 1955: <http://www-formal.stanford.edu/jmc/history/dartmouth/dartmouth.html>.

⁴³ "Cybernetics", such as the "science of interactions between mechanisms, with the main application being the realization of programmable learning robots": <https://www.universalis.fr/dictionnaire/cybernetique/>. Norbert Wiener, author of *Cybernetics: Or Control and Communication in the Animal and the Machine* published in 1948, is considered the founder of this discipline.

organization of abstract symbols using logical rules — as the best path to thinking machines. The over-commitment to this "symbolic" AI, as well as its limitations in practice, led to the development of the so-called "connexionnist" current focused on the manipulation of real data⁴⁴. This current gave rise to machine learning, which consists in the capacity of a system to improve its performance in the accomplishment of a task over time⁴⁵. However, it is precisely this machine learning, with which AI is too often confused, and which has made a practical breakthrough in recent years, that is the source of current discussions⁴⁶. Two recent evolutions explain these last ones⁴⁷: one technical, the increase of computer power and the access to training data, Alpha Go, the program able to play the game of go, is certainly one of the best examples of this evolution⁴⁸; the other one is sociological and/or political, based on the attention that public authorities now pay to AI. Thus, if it is undeniable that science and technology have made considerable progress in recent years, it is necessary to demystify AI by rooting it in its historical and technical reality: these myths have been around for more than half a century and no AI is today, strictly speaking, as intelligent as Man, or even, according to Yann LeCun, as intelligent as a rat⁴⁹. And even if such an AI would exist one day, which no one can be sure of, a recent survey of leading industry experts suggests that about 90 % of them consider that we should not reach this stage before 2075⁵⁰. In the same vein, the European Parliament's proposal to create an e-person status⁵¹ has been strongly criticized by experts⁵².

§6. Plan. — How does patent law deal with AI? As often in the face of technical (r)evolution, the runaway, and/or haste, have created a myth tending to take precedence over reality. The discussions of jurists, especially in patent law as we will see, are thus largely focused on a future where machines would be intelligent, which could perhaps become reality, but at best only in more than half a century. The phenomenon may seem surprising: they claim to meet the needs of technology by guessing what it will be in the future. This angle of attack has the major disadvantage of directing the spotlight on false problems that AI would raise as the so-called subject of patent law (I) while leaving in the shadows those it actually raises about the subject matter of patent law (II).

I. Artificial intelligence and the subject of patent law

§7. The end of 2019 and the beginning of 2020 were marked, in patent law, by the resounding "DABUS" case, in which several industrial property offices refused to grant a patent to a machine called "DABUS" (A). Although the idea of an "AI-inventor" may strike one's mind, from a legal point of view, this perspective, which implies considering AI as a subject, does not present any proven usefulness while its possible realization seems particularly difficult (B).

⁴⁴ D. Memmi, "Connexionnisme, intelligence artificielle et modélisation cognitive", *Intellectica* 1990, p 41.

⁴⁵ P. Flach, *Machine Learning: The Art and Science of Algorithms that Make Sense of Data*, Cambridge, 2012, p. 3; S. Russell & P. Norvig, *op. cit.*, p. 693.

⁴⁶ See notably H. Surden, "Machine Learning and Law", 89 *Wash. L. Rev.* 87 (2014).

⁴⁷ R. Calo, "Artificial Intelligence Policy: A Primer and Roadmap", 3 *Bologna L. Rev.* 180 (2018).

⁴⁸ D. Larousserie & M. Tual, "Première défaite d'un professionnel du go contre une intelligence artificielle", *Le Monde*, January 27, 2016.

⁴⁹ Y. LeCun, *art. cit.*

⁵⁰ V. Müller & N. Bostrom, "Future progress in artificial intelligence: A Survey of Expert Opinion", in *Fundamental Issues of Artificial Intelligence*, V. Müller (ed), Springer, 2016, p. 553.

⁵¹ *Résolution du Parlement européen du 16 février 2017 contenant des recommandations à la Commission concernant des règles de droit civil sur la robotique (2015/2103(INL))*.

⁵² *Open Letter To The European Commission Artificial Intelligence And Robotics — Artificial Intelligence and Robotics Experts*: <http://www.robotics-openletter.eu>.

A. The "DABUS" Case

§8. Who/what is "DABUS"? — Few patent law cases have made the headlines like "DABUS"⁵³. "DABUS" is the name of a machine of creativity — AI of the connexionist type — resulting from the research of Stephen Thaler, a physicist specialized in AI⁵⁴. "DAGUI"⁵⁵ and "DABUI"⁵⁶, created respectively in 1994 and 2006, were the first two generations of this kind. These machines include a first neural network that first generates ideas from the information provided, in response to the self-disturbance of the connection weights between neurons and the neural networks constituting them. A second neural network, called "critical", then detects the ideas deemed sufficiently new in relation to the machine's database. The critical network then produces an affective response which, in turn, introduces or rejects disturbances in order to form and mature the most innovative ideas.

With the first two generations mentioned, it was up to the AI user to set the conceptual framework within which the system operated and to manage the reasoning steps. With DABUS, the user is no longer content to simply provide a conceptual space. The system consists precisely in a set of disconnected neural networks, each of which contains interconnected memories (linguistic, visual or auditory). These networks constantly combine and detach themselves episodically. Then, through cumulative cycles of learning and unlearning, a fraction of these networks interconnect into structures representing complex concepts. In turn, chains of concepts link to other chains representing the expected consequences of any given concept. Eventually, these ephemeral structures fade away, while others take their place⁵⁷. Let us note, finally, that Mr. Thaler claims that the detection of ideas by their rhythm, which is carried out by DABUS, would be equivalent to the rhythm of cognition, thus to a form of consciousness, obtained via a "master equation".

§9. Rejections of patent applications related to DABUS. — DABUS was used in particular to make two inventions: a food container with a fractal shape and a device for attracting attention based on a light signal. Several applications have been filed for these inventions with the United Kingdom Intellectual Property Office (known as "UKIPO")⁵⁸, the European Patent Office (known as "EPO")⁵⁹, the United States Patent & Trademark Office (known as "USPTO")⁶⁰, and the World Intellectual Property Organization (known as "WIPO")⁶¹.

The arguments developed by the applicant were systematically the same⁶². DABUS is the inventor and must therefore be designated as such⁶³, while the inventions belong to the applicant, who, as the owner of the AI, is also the entitled party likely to file the application. This solution would be justified essentially for two reasons: an opposite position would be tantamount to recognizing

⁵³ L. Kelion, "AI system *should be recognised as inventor*", *BBC News*, August 1st, 2019; F. Niedercorn, "L'IA n'est pas reconnue comme inventeur", *Les échos*, 13 janvier 2020 ; AJ Willingham, "Artificial Intelligence can't technically invent things, says patent office", *CNN US*, 30 avril 2020; J. Wolfe, "Case to Watch: Can AI be a patent inventor? Virginia judge asked to weigh in", *Reuters*, August 20, 2020.

⁵⁴ Stephen L. Thaler, Ph.D., http://imagination-engines.com/iei_founder.php.

⁵⁵ Patent no US5659666A, "Device for the autonomous generation of useful information" (application filed October 13, 1994).

⁵⁶ Patent no US7454388B2, "Device for the autonomous bootstrapping of useful information" (application filed May 8, 2006).

⁵⁷ or an explanation of the system see "What is Dabus?", http://imagination-engines.com/iei_dabus.php.

⁵⁸ Applications GB 1816909.4 et GB 1818161.0 filed respectively on Oct. 17 and Nov. 7, 2018.

⁵⁹ Applications EP no 18 275 174, « Food container », et EP no 18 275 163, "Devices and Methods for Attracting Enhanced Attention" filed under priority GB applications (i.e. Oct. 17, 2018 and Nov. 7, 2018, respectively).

⁶⁰ Applications US nos 16/524, 350, "Neural Flame", et 16/524,532, "Fractal Container" déposées le 29 juillet 2019.

⁶¹ Application WO2020/079499 A1, Récipient alimentaire et dispositifs et procédés pour attirer davantage l'attention, déposée le 23 avril 2020.

⁶² See, e.g., the appeal in the Court for the Eastern District of Virginia: Case No. 1 :20-cv-00903 (US District Court, Eastern District of Virginia).

⁶³ Precisely referred to as "Dabus — the invention was autonomously generated by an artificial intelligence".

an inventor who is not an inventor and thus to weakening the moral right of the inventor, since in this case a person would benefit from it without being an inventor; refusing to grant the IA the status of inventor would be tantamount to excluding the patentability of his achievements⁶⁴.

The UKIPO, the first office to render its decision, began by recalling Sections 7(2)(a) 7(3) of the British Patent Act 1977, which provide that a patent for an invention may be granted "primarily to the inventor" and that "in this Act 'inventor' in relation to an invention means the actual inventor of the invention"⁶⁵, as well as Section 13(2), which provides that the inventor must be mentioned in the application or that the applicant must produce a statement identifying the inventor or proving a transfer of his right⁶⁶. According to the Office, confirmed on appeal by the High Court, these texts imply, on the one hand, that the inventor is necessarily a natural person and, on the other hand, that in this case ownership could not be acquired either of the status of inventor or of a transfer of rights⁶⁷. The UKIPO adds, by way of final observations, that the fundamental function of the patent system is to encourage innovation by granting a temporary reservation in exchange for a disclosure, but a machine cannot be induced to innovate by the prospect of obtaining a patent, so that it will have to be charged with innovating by a human. Especially since AI cannot be a rights holder, the question arises as to how it could be encouraged to disclose the invention⁶⁸. In the appeal decision, Justice Smith states that, in his view, the argument that the owner of the AI would be the inventor of the invention would not, in his view, be inappropriate⁶⁹.

The USPTO retains a similar position. The USPTO notes that 35 U.S.C. § 101, which uses the pronoun "any person"⁷⁰, and 35 U.S.C. § 115, which uses the pronouns "himself" and "himself"⁷¹, imply that the inventor is a natural person. The U.S. Office further bases its decision on the jurisprudence of the Court of Appeals for the Federal Circuit that a state⁷² and a corporation⁷³ cannot be an inventor because the inventor must be an individual, particularly because the design, which is the touchstone of the act of invention, requires the performance of a mental act. It is recalled that the USPTO Examination Guidelines define conception as "the complete performance of the mental part of the inventive act"⁷⁴.

As for the EPO, it rejected both applications on the basis of Article 81 of the European Patent Convention (EPC), according to which the inventor must be designated in the application, as

⁶⁴ All these proposals were drawn from the work of Ryan Abbott, an author at the head of the Artificial Inventor Project, whose current "influence" is equaled only by the superficiality of the analysis in the field of patent law.

See <https://artificialinventor.com>. See also R. Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law", 57 B.C.L Rev. 1079, 1104 (2016) et "Hal the Inventor: Big Data and its use by Artificial Intelligence", in *Big Data is Not a Monolith*, sous dir. C. R. Sugimoto, H. R. Ekbia, & M. Mattioli, MIT Press, 2016, p. 187.

⁶⁵ Section 7(2): "A patent for an invention may be granted – [...] (a) primarily to the inventor or the joint inventors". Section 7(3): "In this Act inventor in relation to an invention means the actual deviser of the invention and joint inventor shall be construed accordingly.

⁶⁶ UKIPO, December 4, 2019, BL O/741/19. Upheld by Par High Court, September 21, 2020, *Stephen L. Thaler vs. The Comptroller-General*, [2020] EWHC 2412 (Pat).

⁶⁷ *Ibid.*, pt. 23.

⁶⁸ *Ibid.*, pt. 28.

⁶⁹ High Court, September 21, 2020, *Stephen L. Thaler vs. The Comptroller-General*, [2020] EWHC 2412 (Pat), pt. 52.

⁷⁰ "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."

⁷¹ Cet article constitue l'équivalent de la Section 13 du Patent Act britannique et prévoit ainsi que si l'invention n'est pas déposée par l'inventeur une déclaration peut être produite dans deux cas de figure : si "la demande a été faite ou a été autorisée à être faite par le déclarant ou l'affidavit" ("the application was made or was authorized to be made by the affiant or declarant") ou si "cette personne se considère lui-même ou elle-même comme l'inventeur initial ou le co-inventeur initial d'une invention revendiquée dans la demande" ("such individual believes himself or herself to be the original inventor or an original joint inventor of a claimed invention in the application") (nous soulignons).

⁷² *Univ. of Utah vs. Max-Planck-Gesellschaft zur Förderung der Wissenschaften e. V.*, 734 F.3d 1315 (Fed. Cir. 2013).

⁷³ *Beech Aircraft Corp. vs. EDO Corp.*, 990 F.2d 1237 (Fed. Cir. 1993).

⁷⁴ Manual of Patent Examining Procedure (dit "MPEP"), 2137.01 (II) : "the complete performance of the mental part of the inventive act".

well as Rule 19 of the Implementing Regulations, according to which the said designation requires the indication of the inventor's surname, first name and address⁷⁵. The Office considers that the indication of the name of a machine, "DABUS" in this case, does not meet these requirements. Indeed, the names given to things are not equivalent to those given to natural persons, since the latter are not only intended to identify the said persons, but also to enable them to exercise their rights⁷⁶. Thus, the legal framework of the EPC is intended for natural persons, legal persons and any body assimilated to a legal person⁷⁷. It is also recalled that the preparatory works constantly refer to natural persons and that the drafters of the Convention aimed at giving the inventor a strong position, in particular by granting him certain rights⁷⁸. In this case, in the absence of a personality comparable to natural and legal persons, an A.I. does not benefit from any right. Unlike the latter, no law or jurisprudence establishes a legal fiction in favor of the AI. However, not being holder of any right, the AI is not either able to yield rights to its owner, so that this last would be its successor in title⁷⁹. Finally, the applicant having maintained that refusing the status of inventor was tantamount to adding an exclusion of patentability within the meaning of Articles 52 and 57 of the EPC, the Office recalls that the designation of the inventor constitutes a formal requirement that does not prejudice in any way the examination of the patentability of the subject matter of the application⁸⁰.

All in all, beyond their media success, the filings made in the name of DABUS have resulted in failures, which certainly launch the debate, but which above all reveal the approximate argumentation of the applicant, who causes numerous confusions that seem to stem from an ignorance of patent law, or even of certain fundamental legal concepts (B).

B. Legal analysis of the DABUS case

§10. AI: subject of law? — Let us admit it at once: this question has, at first sight, what to leave pantois. How could a human, and therefore artificial, creation be a subject of law and not an object of law? The applicant's argument in the DABUS case, according to which DABUS is an inventor, nevertheless obliges us to question the nature — subject or object — of AI⁸¹.

Admittedly, on closer examination, the very term "intelligence" seems to be intimately linked to the person, in other words to a subject⁸², whereas AI aims at reproducing human behaviors, so that the system can act, or even behave, like a human being. Confronted with "intelligent robots"⁸³, perhaps we should recognize that the legal person is not an existential personality,

⁷⁵ EPO, January 27, 2020, applications nos 18 275 163.6 et 18 275 174.3, § 20. See Ch. Caron, "Les mésaventures de Dabus au pays des brevets", *Comm. com. électr.* 2020, repère 2.

⁷⁶ *Ibid.*, pt. 22.

⁷⁷ *Ibid.*, pt. 23. See art. 58 de la CBE.

⁷⁸ *Ibid.*, pt. 24 à 26.

⁷⁹ *Ibid.*, pt. 32.

⁸⁰ *Ibid.*, pt. 36.

⁸¹ However, this question is not specific to patent law. On the whole question see S. Merabet, *Vers un droit de l'intelligence artificielle?*, Dalloz, Nouvelle Bibliothèque des Thèses, 2020. For other examples in other branches of law see notably X. Delpech, "Intelligence artificielle : le droit (des contrats) a aussi son mot à dire", *AJ Contrat* 2018, p. 145; S. Dormont, "Quel régime de responsabilité pour l'intelligence artificielle ?", *Comm. com. électr.* 2018, étude 19; G. Hallevy, *Liability for Crimes Involving Artificial Intelligence Systems*, Springer, 2015; X. Labbée, "Épouser une femme robot", *Gaz. Pal. déc.* 2014, no 352, p. 5.

⁸² Systems can be classified according to whether they are: controlled, which implies a level of human intervention; automatic, which then performs fixed functions; autonomous, systems that can learn and make their own decisions. V. Royal Academy of Engineering, *Autonomous Systems: social, legal and ethical issues*: <https://www.raeng.org.uk/publications/reports/autonomous-systems-report>.

⁸³ Let us note here that the term "robot" can be defined, according to the Larousse dictionary, as a "machine with a human aspect, capable of moving, executing operations, speaking". Robotics is a sub-category of AI. *Cf. supra*.

irreducibly linked to Man, but rather a functional personality, conceived as a technique intended to benefit from legal capacity? The said capacity would then be adapted, as for legal persons, to the realization of their object, so that one could recognize a "person-IA"⁸⁴. This is what the plaintiff in the DABUS case suggests: a fiction modelled on that of the legal person⁸⁵.

However, the usefulness of this proposition remains to be demonstrated: why recognize a personality with a machine when, as the applicant himself acknowledges, the owner of the said machine could claim the fruits of it, including in particular the inventions? Without forgetting that this proposal of an electronic personality comes up against not insignificant obstacles, even dirimant ones. The fiction of the legal person, which is the example often put forward, is based on a patrimony. What could be the foundation of the AI personality? The patrimony of its owner? In this case, one should admit that the fiction would be useless: it would simply be a frugal thing whose fruits already participate in the said patrimony⁸⁶.

And then what would be the criterion of this electronic personality? If we were to retain autonomy⁸⁷, AI should be able to set its own law, i.e. to behave in the way that it universally judges the best⁸⁸, unless it sets the required degree of autonomy. In other words, autonomy consists, positively, in a self-determined will and, negatively, in the absence of external constraints⁸⁹. It is necessary to distinguish the mythological autonomy attributed by some jurists to AI from the real automation of tasks such as a part, more or less important, of an inventive process. While automation implies that a task is executed without human participation during the accomplishment of a function⁹⁰, autonomy implies, moreover, that the machine can decide how to execute the task, in other words, that it can of its own accord, by escaping human control, choose a different path from the one given to it by the latter upstream. Concretely, only the capacity of AI to make decisions without human intervention or, more precisely, to orient its decisions independently of such an intervention, in particular so that it can emancipate itself outside the framework that this intervention will have previously given it, could give way to a minimum of free will synonymous with autonomy⁹¹. In terms of patent law, the AI is constrained by the input data provided to it and/or the technical problem posed by its user and is thus not free to pose the technical

⁸⁴ E. J. Zimmerman, "Machine Minds: Frontiers in Legal Personhood", <https://ssrn.com/abstract=2563965>. "Personne-IA" à rapprocher de la "personne-robot". Pour la reconnaissance de cette dernière v. A. Bensoussan, "Droit des robots : science-fiction ou anticipation?", *D.* 2015. 1640 et "La personne robot", *D.* 2017, p. 2044 and EuRobotics : The European Robotics Coordination Action, "Suggestion for a green paper on legal issues in robotics", December 31, 2012. See *contra* "Des robots et des hommes", *D.* 2015, p. 2369; "Personnalité juridique des robots: une monstruosité juridique", *JCP* 2018, 597; G. Loiseau et M. Bourgeois, "Du robot en droit à un droit des robots", *JCP* 2014. 1231; A. Mendoza-Caminade, "Le droit confronté à l'intelligence artificielle des robots: vers l'émergence de nouveaux concepts juridiques?", *D.* 2016. 445.

⁸⁵ This idea is also found in the proposals to recognize a legal personality for robots. See P.-J. Delage, "Les androïdes rêveront-ils de personnalité juridique?", in *Science-fiction et science juridique*, IRJS, 2013, p. 165.

⁸⁶ C'est ce que prévoient les articles 547 à 550 du Code civil. V. W. Dross, *Droit d'accession sur ce qui est produit par la chose*, *JCL. Civil Code*, art. 547 à 550, fasc. unique.

⁸⁷ En ce sens v. *Résolution du Parlement européen du 16 février 2017 contenant des recommandations à la Commission concernant des règles de droit civil sur la robotique* (2015/2103(INL)). En ce sens égale. J.-M. Deltorn, "Le robot, entité autonome? Entre norme et technique, contextes et limites de l'autonomie cybernétique", *RFPI*, numéro spécial, mars 2020, p. 41.

⁸⁸ C'est la définition qu'en donne Kant. V. M. Foessel, "Kant ou les vertus de l'autonomie", *Études* 2011/3 (Tome 414), p. 341. En ce sens égale. R. Le Coadic, "L'autonomie, illusion ou projet de société?", *Cahiers Internationaux de Sociologie*, 2006/2 (no 121), p. 317; *Rapport de Vocabulaire juridique*, ss. dir. G. Cornu, PUF, Quadrige, 12e éd., 2018, s. v. "autonomie" : "Pouvoir de se déterminer soi-même ; faculté de se donner sa propre loi."

⁸⁹ S. Goering, "Autonomy", in *Encyclopedia of Science, Technology, and Ethics*, Macmillan Reference 2005, sous dir. C. Mitcham, p. 155.

⁹⁰ S. Nof, "Automation: What It Means to Us Around the World", in *Springer Handbook of Automation*, sous dir. S. Nof, Springer 2009, p. 14 : "L'automatisation implique des machines, des outils, des dispositifs, des installations et des systèmes qui sont tous des plateformes développées par des humains pour effectuer un ensemble donné d'activités sans intervention humaine au cours de ces activités." ("Automation involves machines, tools, devices, installations, and systems that are all platforms developed by humans to perform a given set of activities without human involvement during those activities.") (traduction libre).

⁹¹ M. Scheutz & Ch. Crowell, "The Burden of Embodied Autonomy: Some Reflections on the Social and Ethical Implications of Autonomous Robots", in *Workshop on Roboethics* (IRCA), Rome, 2007, p. 1.

problem. Fundamentally, AI is dedicated to accomplish tasks entrusted by humans, it is therefore consubstantially linked to the solution, posing a problem independently of the human is not only impossible, but also goes against its very essence. To sum up, AI cannot invent because: i) it does not benefit from the self-determination that would authorize it to direct its decisions; ii) its user benefits from the control of these decisions in that he imposes the framework. We could certainly nuance the concept of autonomy, taking into account the degree of autonomy, but it would remain the case that, in the end, Man would retain control of the system⁹², in particular through the power to stop its operation at any time⁹³. Not to mention that the analysis here has been restricted to the inventive process, but autonomy during the inventive process would not imply that the system has the will to file a patent application and can file it. What benefit would it derive from it, moreover? In any case, today's AI is still far from the mythological autonomy that some jurists believe it to be and it is not certain that it will ever live up to the myth.

At the same time, there is little doubt that this A.I. can also be a thing that can become a property right. As a reminder, a thing does not exist because of its intrinsic nature, its substance, but because of the purpose that a person attributes to it⁹⁴. "In the absence of spirit", the thing does not exist⁹⁵, it is "everything whose existence is put forward"⁹⁶, in other words, "any object of free will which is not itself endowed with freedom"⁹⁷. It is its absence of an intrinsic end, its dependence on the person, that essentially distinguishes it from the latter. How, then, could one reconcile the right of ownership of the "good-IA" with the capacity of the "person-IA"?

§11. AI: inventor of *lege lata*? – If the DABUS affair was such a media success it is probably because the question it raises strikes the imagination: can a machine be an inventor? Faced with this question, the temptation to make a connection with copyright or royalties is great. All the more so since the case of the selfie of the monkey Naruto also struck the imagination when it came to determining whether the monkey could be the copyright owner of a series of photographs he had taken thanks to a trigger installed by a human. The animal rights organization People for the Ethical Treatment of Animals (PETA) challenged the authorship of photographer David Slater and filed a copyright infringement suit in the United States District Court for the Northern District of California, which dismissed the plaintiff's claim that the animal did not have the capacity to file such a suit. The same logic applies by analogy to AI⁹⁸. Beyond the more or less hazardous assimilation of an animal with a machine⁹⁹, this comparison stops where copyright and patent rights arise¹⁰⁰. While the first is born from an act of creation, the second requires the filing of an application, which alone will be able to make it produce all its effects. In this sequence, worthy of 30 million friends, the regulars of patent law risk being all the more disoriented since in the biotechnology sector it is not uncommon for living organisms to occupy a significant place in the

⁹² "Mastery" is defined, according to Le Larousse, as "the fact of dominating technically, intellectually and scientifically".

⁹³ G. Loiseau, "Personnalité juridique des robots: une monstruosité juridique", *art.cit.*

⁹⁴ Hegel, *Grundlinien der Philosophie des Rechts*, Nicolaischen Buchhandlung, 1821, no 44, p. 106.

⁹⁵ J. Carbonnier, "Les choses inanimées ont-elles une âme?", in *Mélanges P. Braun. Anthropologies juridiques*, PULIM, Cahiers de l'Institut d'anthropologie juridique, 1998, p. 135.

⁹⁶ A. Lalande, *Vocabulaire historique et critique de la philosophie*, PUF, 10e ed., 1968, s. v. "chose".

⁹⁷ Kant, *Rechtslehre*, Akademie-Verlag, 1988 (1797), p. 29: "Ein jedes Objekt der freien Willkür, welches selbst mag der Freiheit ermangelt, heißt daher Sache [...]". (our traduction).

⁹⁸ *Naruto v. Slater*, No. 15-cv-04324-WHO, 2016 WL 362231 (N. D. Cal., 2016). Upheld by *Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018). Sur l'ensemble de la question v. D. Gervais, "Machine Authors", 105 *Iowa L. Rev.* 2053 (2020).

⁹⁹ Especially in the light of contemporary studies on the boundary between animality and humanity. See *Aux origines de l'humanité*. T. 2. *Le propre de l'homme*, ss. dir. P. Picq et Y. Coppens, Fayard, 2001.

¹⁰⁰ See A. Lucas, A. Lucas-Schloetter, et C. Bernault, *Traité de la propriété littéraire et artistique*, LexisNexis, Traité, 5e ed., 2017, no 147, p. 171. Thus, for intellectual property, the creative act constitutes a fourth mode of acquisition of property in addition to the traditional modes of acquisition of occupation, accession and possession. See. S. Alma-Delette, *Unité ou pluralité des propriétés intellectuelles?*, th. dactyl. Université de Montpellier, 1999, no 36 et seq., pp. 38 et seq. ainsi que S. Becquet, *Les biens industriels*, LGDJ, Bibliothèque de droit privé, vol. 448, 2005, nos 47 et seq., pp. 115 et seq.

inventive process. What about transgenic microorganisms, animals and other plants? Wouldn't their claim to the status of inventor be at least as justified as that of a machine?

To the first confusion, according to which the protection of the AI product would require an AI "subject", a second one was thus added: the inventor would be the subject benefiting from the patent right. This second confusion comes this time from an assimilation of the modes of acquisition of copyright and patent rights. It is true that the U.S. Constitution incites such confusion when, on the broken naturalist of Locke, according to whom property is first of all the property of each person on his work and the products resulting from it¹⁰¹, the U.S. text puts authors and inventors on an equal footing by charging Congress with "To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries". However, the comparison between copyright and patent rights goes no further than that, and now the first-to-file system – which guarantees ownership of the invention to the applicant and not to the inventor – is widely recognized throughout the world, including across the Atlantic¹⁰². Moreover, the U.S. Constitution also refers to inventions as "discoveries", which has long been inappropriate¹⁰³. With regard to the EPC, Article 81 provides that "the right to a European patent belongs to the inventor", while in France, Article L. 611-6 of the Intellectual Property Code (hereinafter "IPC") takes up the substance of this provision by stating that "the right to industrial property rights [...] belongs to the inventor". This right to a patent or a title¹⁰⁴, and is not to be confused with the right to a patent¹⁰⁵, which recognizes the ownership of the invention resulting from the filing of the application. These texts immediately relativize the scope of the assertion of their first paragraph by stating, on the one hand, that if several persons have made the invention independently of each other, the right to the patent will belong to the person whose European patent application has the earliest filing date, and, on the other hand, by presuming that the applicant is entitled to exercise the right to the patent. Thus, according to Mousseron, the patent application constitutes a unilateral legal act of appropriation of property without master¹⁰⁶. The fact remains that the inventor benefits from an action claiming ownership of the application or the patent if the invention has been taken away from him in violation of a legal or conventional obligation (art. L. 611-8 of the IPC). Moreover, article 62 of the EPC, reproduced in article L. 611-8 of the CPI, further provides that the inventor must be named in the patent application.

¹⁰¹ J. Locke, *Two Treatises of Government*, A. Millar, 6e ed., 1764, nos 25 et seq., p. 215 et seq. See especially, in fine, the doctoral thesis of professor Thierry Revet, *La force de travail*, Litec, Bibliothèque de droit de l'entreprise, t. 28, 1992, see especially nos 451 et seq., pp. 511 et seq. V. égale. S. Becquet, *op. cit.*

¹⁰² Depuis le *Leahy-Smith America Invents Act* du 16 septembre 2011. See J. Rantanen & L. Petherbridge, "Toward a System of Invention Registration: The Leahy-Smith America Invents Act", 110 *Mich. L. Rev. First Impressions* 24 (2011). The argument for harmonization with the rest of the world was put forward in favor of adopting the "first-to-file" system. See M. A. Lemley & C. V. Chien, "Are the U.S. Patent Priority Rules Really Necessary?", 54 *Hastings L. J.* 1299, 1299 (2003); R. K. Dickey, Note, "The First-To-Invent Patent Priority System: An Embarrassment to the International Community", 24 *B.U. Int'l L. J.* 283, 292 (2006).

¹⁰³ Originally, no distinction was made between discovery and invention, both in common language and in patent law. Thus, according to encyclopedists, the term "discovery" could only be used for scientific discoveries, because "less significant discoveries are only called inventions". (D. Diderot et J. D'Alembert, *Encyclopédie ou dictionnaire raisonné des sciences des arts et métiers*, vol. 16, F. Frommann, 1967 (1751-1780), s. v. "découverte"). As far as patent law is concerned, the first legislations evoked the two concepts indistinctly. The French law of January 7, 1791 is "relative to useful discoveries and the means of ensuring the ownership of the authors". Its article 1 states that "any discovery or new invention, in any kind of industry, is the property of its author". Article 1 of the French law of July 5, 1844 also refers to "any invention or discovery".

¹⁰⁴ J. Passa, *Traité de droit de la propriété industrielle*. T. 2. *Brevets d'invention. Protections voisines*, LGDJ, Traité, 2013, no 204 et seq., p. 257 et seq.

¹⁰⁵ J. Raynard, E. Py, et P. Tréfigny, *Droit de la propriété industrielle*, LexisNexis, Manuel, 2016, no 181, p. 89.

¹⁰⁶ J. M. Mousseron, *Le droit du brevet d'invention. Contribution à une analyse objective*, LGDJ, Bibliothèque de droit privé, t. 23, no 157 et seq.

A second argument also stems from a copyright logic: the invocation of the inventor's moral right¹⁰⁷. Recognizing a person as an inventor when the invention would have come from a machine would be tantamount to weakening the inventor's moral right by granting it to a person who should not benefit from it. It can also be argued, conversely, that admitting AI as an inventor would be detrimental to the inventor's prerogative, since it would also be granted to a "non-human" person. But above all, beyond this simple counter-argument, let us note that what is referred to as the moral right of the inventor is in reality only the right to be mentioned in the patent application and then in the patent. The formula "moral right" is misleading in that it suggests that the inventor would benefit from several such rights, even though he holds only one, which is his right to a name. The expression also seems inappropriate insofar as moral rights protect the personality of an author in his work, whereas the inventor does not express himself in his invention¹⁰⁸. In the end, we find it difficult to see how the argument based on the "moral right" of the inventor could seriously justify the recognition of the status of inventor in AI.

In a first-to-file system, the person of the inventor does not ultimately matter, because the subject of law is the applicant and not the inventor. This explains the little attention paid to this person by the Munich Convention, which does not contain any definition of the inventor. However, the legal systems proposing such a definition all emphasize the requirement of a human contribution consisting in a conception involving creativity and intelligence, two qualities that have remained until now specific to man¹⁰⁹.

§12. The AI: inventor of *lege ferenda*? – The DABUS case undoubtedly highlights the need for protection for companies with an AI-based business model. One could then imagine helping these new actors either by naming this AI as inventor¹¹⁰ or by not naming any inventor¹¹¹. But would such a measure actually encourage innovation in the AI sector? It is doubtful. One could argue that putting the role of AI forward would encourage its development, but the argument seems unfounded, since specifying the high-performance tools used in the inventive process has never encouraged or discouraged the development of these tools. Especially since if patent law aims to promote innovation it is by protecting inventions and not by focusing on the tools needed to invent. To our knowledge, no one has ever argued that one should omit to designate the inventor in order to favor the development of such or such microscope whose effectiveness would be proven for the development of biotechnologies. In the end, we find it difficult to see how to admit the protection of an invention that would result from the mere implementation of an AI itself would promote innovation. Moreover, French jurisprudence has rightly refused to recognize an inventive activity where a tool was predominant¹¹². To take the opposite position would probably be more akin to promoting a race for equipment than research in itself¹¹³. As Pamela Samuelson rightly remarked in 1986 about copyright and computer-generated creation: "*it simply does not make any sense to allocate intellectual property rights to machines because they do not need to be given incentives to generate output. All it takes is electricity (or some other motive force) to get the machines into production. The whole purpose of the intellectual property system is to grant rights to*

¹⁰⁷ R. Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law", 57 *B. C. L. Rev.* 1079, 1104 (2016).
V. égale. N. Bronzo, "Le droit moral de l'inventeur", *Propri. industr.* 2013, étude 5.

¹⁰⁸ F. Pollaud-Dulian, *Propriété intellectuelle. La propriété industrielle*, Économica, Corpus droit privé, 2e ed., 2010, no 331, p. 213.
See contra J. C. Fromer, "Expressive Incentives In Intellectual Property", 98 *Va. L. Rev.* 1745, 1790 (2012).

¹⁰⁹ N. Shemtov, *A study on inventorship in inventions involving AI activity*, European Patent Office, February 2019, pp. 11 et seq.

¹¹⁰ R. Abbott, *art. cit.*, p. 1104.

¹¹¹ B. Sautier, "L'inventeur : Humain trop humain?", *Propri. industr.* 2020, étude 16.

¹¹² TGI Paris, 19 janv. 2005, *PIBD* 2005, no 807, III, p. 254.

¹¹³ V. néanmoins J. Azéma et J.-Ch. Galloux, *Droit de la propriété industrielle*, Dalloz, Précis Dalloz, 7e ed., 2012, no 345, p. 247, considering that this jurisprudence "is open to criticism insofar as the inventive activity is based on intellectual and non-economic criteria".

creators to induce them to innovate"¹¹⁴. This remark is very similar to the UKIPO's conclusion in the DABUS case more than thirty years apart¹¹⁵.

Mentioning AI as inventor would be misleading at the time of writing, since no AI can invent without human intervention. Then it would be necessary to be able to qualify the AI as a person, which, as we saw previously, seems far from being obvious. Moreover, if the inventor remains the poor relation of patent law, he nevertheless holds prerogatives: holder of the right to the patent, he can in particular institute a claim action if the invention is stolen from him. What about such a right with an A.I.?

As for the pure and simple omission of the mention of the inventor, it would be more of a problem than a solution: how could one appreciate the inventive activity if Man was not precisely up to the activity deployed by the AI? What status would AI have in this context? Would neither thing nor person become the hermaphrodite of patent law?

Before embarking on such sinuous paths, it would be prudent and opportune to think twice, remembering beforehand that the magnitude of the task seems disproportionate compared to its potential usefulness in the future and today, at least, not proven. This being said, if the debate on the possible inventor status of AI seems futile when approached from the point of view of the subject matter of patent law, it turns out on the contrary to be particularly serious when approached from the point of view of the subject matter of patent law (II).

II. Artificial intelligence and the subject matter of patent law

§12. A thing can only be an object of property if it represents a value¹¹⁶; it must therefore be useful and rare¹¹⁷. These criteria of usefulness and rarity have been adapted to immaterial realities, through the establishment of special conditions of protection, because their immateriality has traditionally been judged to make them resistant to appropriation. Thus, in patent law, the requirements of technical character and inventive step correspond respectively to the utility and rarity of the common law of goods¹¹⁸. However, it is precisely with these two poles of appropriation by a patent right that AI raises difficulties. It is thus a question of determining how AI can present a technical character (A) and whether its use in the inventive process is likely to influence the appreciation of the inventive step (B).

A. Artificial intelligence and technical character

§14. **Technical character.** — As a first step, we need to clarify what we mean by the requirement of "technical character". With respect to the character of what is technical, the underlying issue is the definition of technique. It is commonly and traditionally accepted that technology involves a transformation of Nature, so that it should be translated into material production¹¹⁹. Rather,

¹¹⁴ P. Samuelson, "Allocating Ownership Rights in Computer-Generated Works", 47 *U. Pitt. L. Rev.* 1185, 1199 (1986). See also J. C. Ginsburg, "The Concept of Authorship in Comparative Copyright Law", (January 10, 2003), pp. 9 et 10: <https://ssrn.com/abstract=368481>.

¹¹⁵ Cf. *supra* no 8.

¹¹⁶ J. M. Mousseron, "Valeurs, biens, droits", in *Mélanges en hommage à A. Breton et F. Derrida*, Dalloz, 1991, p. 277.

¹¹⁷ Th. Revet, "Les nouveaux biens", in *Travaux de l'association Henri Capitant*. T. LIII, *Société de législation comparée*, 2003, p. 271.

¹¹⁸ On the whole issue see M. Dhenne, *Technique et droit des brevets, L'invention en droit des brevets*, LexisNexis, Bibl. dr. entreprise, 2016, nos 389 et seq., p. 235 et seq. ainsi que nos 425 et seq., p. 253 et seq.

¹¹⁹ See, e.g., É. Blanc, *L'inventeur breveté*, Cosse, 3e ed., 1852, p. 39, According to Blanc, "any invention that does not have a material result cannot serve as a basis for a patent". Similarly, Klostermann, a German author of the same period, asserts that "industrial inventions have as their object the search for new means of satisfying vital material needs". (R. Klostermann, *Die Patentgesetzgebung*, I. Guttentag, 1876, no 1, p. 16).

we see in it, with reference to the common law of property, the requirement of a form of utility specific to patent law: what we have called "operational utility"¹²⁰.

In any case, the examination of the technicality will constitute the *sine qua none* condition for the recognition of the good, since without utility the thing itself does not exist¹²¹. This explains why this requirement, which is not expressly laid down in the texts, is reflected in several conditions of patentability (conditions of invention, industrial application and sufficiency of description). The requirement of technical character seems all the more important concerning AI since, with the algorithmic underlying it, it flirts with science and therefore with the exclusions preserving the freedom of science (i.e. mathematical methods and computer programs)¹²².

§15. AI and condition of invention. – Directive G-II, 3.3.1, adopted by the EPO in November 2018, classifies AI among the mathematical methods excluded from patentability under Article 52(2) of the EPC¹²³. Two further clarifications have been made concerning the said classification. Firstly, only a purely abstract mathematical method, i.e. one that does not involve any technical means, is excluded within the meaning of Article 52(2) of the EPC. Secondly, this method may contribute to the technical character of the inventive contribution, provided that it is applied to a technical field or adapted for a specific technical implementation. In other words, in order to be patentable, AI must be technical, thus satisfying the condition of invention. The latter results from an *a contrario* reading of the exclusions laid down in Article 52(2)¹²⁴. However, except in the case of computer programs, technicality is only really examined at the stage of the examination of inventive step (Art. 56 EPC) through an analysis of the nature of the inventive contribution¹²⁵. Let us note here a possible redundancy in the assessment of technicality that could result for an AI if the application includes a claim of the type of program-product: on the one hand, the computer program will have to produce an additional technical effect at the stage of Article 52 and on the other hand, the inventive contribution will have to reside either in an application of the AI to a technical field or in its adaptation with a view to a specific technical implementation¹²⁶.

¹²⁰ En ce sens, see *Rapport du Groupe français de l'AIPPI sur la brevetabilité des inventions mises en œuvre par ordinateur en vue du Congrès de Sydney* (2017): available on the website www.aippi.fr, which essentially takes up a definition proposal made in the book resulting from our doctoral thesis published in 2016. See M. Dhenne, *op. cit.*, no 530 et seq., p. 308 et seq. On the whole issue see M. Dhenne, "Caractère technique : définition et appréciation de l'exigence de caractère technique en Europe", *JCl. Brevets*, fasc. 4270.

¹²¹ Heidegger considers it to be a tool ("Zeug") characterized by its usability ("Zuhandenheit"). M. Heidegger, *Sein und Zeit*, in *Gesamtausgabe. I. Abteilung: Veröffentlichte Schriften 1914-1970. Band 2*, V. Klostermann, 1976 (1927), no 67 et seq., p. 90 et seq. See nevertheless E. Levinas, *Totalité et infini*, M. Nijhoff, 1961, p. 106, according to whom the being of the thing is not exhausted in its usability, but is characterized rather by the enjoyment that its user derives from it.

¹²² See M. Dhenne, "De l'intelligence artificielle au caractère technique: chemin menant à un changement de paradigme?", "Inventions mises en œuvre par ordinateur : jurisprudence 2018-2019", *Prop. industr.* 2020, étude 4. This fundamental importance of the requirement of technical character, which is common to all computer-implemented inventions, resurfaced with the IA at the time of the G1/19 referral to the EPO's Enlarged Board of Appeal, which is still pending. (EPO, TBA. 3.5.07, 22 févr. 2019, T 489/14, *Connor*, saisine G1/19 de la Grande chambre de recours, *JOEPO* 5/2019 A50. V. A. Jimenez, "L'appréciation de l'activité inventive des méthodes de simulation assistée par ordinateur", in "Inventions mises en œuvre par ordinateur : jurisprudence 2018-2019", préc. This problem is not specific to Europe, we find it notably on the other side of the Atlantic. See USPTO *Public Views on Artificial Intelligence and Intellectual Property Policy*, October 2020, p. 8: https://www.uspto.gov/sites/default/files/documents/USPTO_AI-Report_2020-10-07.pdf. Sur l'ensemble de la question v. M. Dhenne, "L'arrêt Alice de la Cour suprême des États-Unis: l'adieu au pays des merveilles?", *Prop. industr.* 2016, étude 9.

¹²³ M. Dhenne, "Quand l'intelligence artificielle s'invite dans les directives d'examen de l'EPO", *Prop. industr.* 2009, alerte 1. Rapp. EPO, TBA. 3.5.01, T 1227/05, *Simulation de circuit I / Infineon Technologies*.

¹²⁴ M. Dhenne, "L'évolution du concept juridique d'invention dans la jurisprudence européenne", *Légicom* no 53, 2014/2, p. 43.

¹²⁵ On the whole issue see S.-V. Steinbrener, "L'appréciation de la brevetabilité des inventions mises en œuvre par ordinateur par l'OEB", in *Les inventions mises en œuvre par ordinateur : enjeux, pratiques et perspectives*, Lexisnexis, CEIPI, 2019, p. 89.

¹²⁶ Directive G-II, 3.3.

§16. IA and condition of industrial application. — The clarifications provided by Directive G-II, 3.3.1 are commendable, all the more so as case law continues to regularly reject claims for a defect of a technical nature, wrongly basing itself either on the condition of industrial applicability¹²⁷ or on the condition of sufficiency of description¹²⁸. The first trend stems from a widespread confusion between the industrial character of yesteryear, which effectively required the attainment of a technical result, and industrial application as it has been known since the Munich Convention, which only requires manufacture or use in industry in the broad sense of the term. The condition of industrial application does not call for an examination of the nature of the result: it does not matter whether it is industrial, in the restricted sense of the term, in other words, whether it is technical or not. Since the entry into force of the EPC, in the silence of the texts, the requirement of a technical result has been deduced from the "condition" of invention which comes from an *contrario* reading of Article 52(2)¹²⁹.

§17. IA and condition of sufficiency of description. — The second tendency, which confuses technical character and sufficiency of description, is the result of another confusion just as widespread as the first, which consists in seeing in the executable character, which the said sufficiency requires, the requirement of a technical result¹³⁰ — understood as material — which it does not require¹³¹. More rarely, the confusion between sufficiency and inventive step nevertheless arises from the same path: if a teaching is insufficient, it cannot be technical and therefore cannot be the basis for a technical inventive contribution¹³². Without forgetting that there is always only one step separating the description deemed sufficient to reproduce the invention and the invention deemed obvious.

Nevertheless, beyond these confusions, the sufficiency of the description is, *per se*, not negligible and it raises real difficulties in the presence of an AI. As a reminder, the latter includes both an algorithm and data, which are often essential¹³³, to such an extent that one may wonder whether the reproducibility of the invention depends on the supply of the said data. In a decision

¹²⁷ Directive G-III, 1 : "The term industry should be taken in a broad sense, as including the exercise of any physical activity of a technical nature". For a case concerning an CII see EPO, TBA. 3.5.01, T 204/93, 29 oct. 1993, *System for generating software source code components/AT&T*. For other technological fields see EPO, TBA. 3.3.08, 10 mai 2007, T. 1452/06, *Serine protease/Bayer*; EPO, TBA. 3.3.08, 9 nov. 2006, T 641/05, *GPCR-like receptor/Pharmacia* et EPO, TBA. 3.3.08, 7 juill. 2006, T 898/05, *Hematopoietic/Zymogenetics*; EPO, TBA. 3.4.1, 11 févr. 2014, T 533/09, JCP E 2015, 1232, obs. M. Dhenne; *Prop. intell.* 2014, no 52, p. 322, obs. B. Warusfel. Cette confusion n'est pas propre à la CBE. V. l'article 33(4) du Traité PCT qui dispose ceci : "For the purposes of the international preliminary examination, the invention for which protection is sought is considered industrially applicable if, according to its nature, it can be produced or used (in the technological sense) in any kind of industry."

¹²⁸ See *in fine* EPO, TBA. 3.5.06, 12 févr. 2019, T 1849/17, *Search engine with user feedback c/ Pinterest* et nos commentaires in "Inventions mises en œuvre par ordinateur : jurisprudence 2018-2019", *Prop. industr.* 2019, étude 4.

¹²⁹ M. Dhenne, "L'évolution du concept juridique d'invention dans la jurisprudence européenne", préc. Authors at the time evoked on this subject a distribution of the requirements of the technical result and the industrial application contained by the former condition of industrial character. See J. M. Mousseron et A. Sonnier, *Le droit français nouveau des brevets d'invention*, Litec, CEPI, 1978, no 36, p. 39.

¹³⁰ CA Paris, 16 mars 1978, *PIBD* 1978, no 226, III, p. 424, DB 1979. II ; CA Paris, 10 juillet 1979, *PIBD* 1979, no 247, III, p. 404 ; Cass. com., 8 juillet 1981, *PIBD* 1981, no 290, III, p. 236 (dispositif d'aménagement d'un moteur à combustion en vue de son alimentation avec un carburant additionné d'eau) ; TGI Paris, 3 juillet 1981, *PIBD* 1982, no 293, III, p. 5 (verrou de direction pour automobile) : "Attendu enfin qu'à juste titre les défenderesses allèguent que la première variante de la première forme de réalisation correspondant à la figure 1 ne peut fonctionner et n'a donc pas de résultat industriel". ; TGI Paris, 21 janvier 1993, *PIBD* 1993, no 544, III, p. 308 ; CA Paris, 30 mai 1997, *PIBD* 1997, no 639, III, p. 489 (procédé de production d'un vecteur de clonage) ; CA Rennes, 7 octobre 2003, *PIBD* 2004, no 777, III, p. 7 (dispositif de traitement et de gestion dans le temps de données sur un site de courtage en ligne).

¹³¹ M. Dhenne, *op. cit.*, no 534 et seq., p. 310 et seq.

¹³² M. Dhenne, "De l'intelligence artificielle au caractère technique: chemin menant à un changement de paradigme?", "Inventions mises en œuvre par ordinateur : jurisprudence 2018-2019", *Prop. industr.* 2020, étude 4.

¹³³ Sur cette question v. J.-M. Bruguère, "Intelligence artificielle et droit d'auteur. Sortir de la science-fiction des machines/auteurs, entrer dans la réalité du droit des données", *Comm. com. électr.* 2020, étude 11 et T. Hoeren, "Big Data and the Ownership in Data : Recent Development in Europe", 36 *EIPR* 751 (2014).

T 161/18, the Board of Appeal 3.5.05 of the EPO thus rejected an application relating to a neural network, judging that the application contained little information on the input data used to train the neural network, limiting itself to specifying that the said data must cover a wide range of patients¹³⁴. However, according to the Chamber, without knowledge of the data used to train the network, the person skilled in the art could not carry out the invention, and the disclosure of the latter was therefore insufficient. If the reasoning followed by the Chamber has the merit of specifying the path followed in the face of the learning machine, the solution found should not, in our opinion, amount to requiring applicants to systematically provide the input data. The neural network targeted in this case was described in a very general way, without specifying the characteristics allowing its interaction with the other characteristics claimed: no indication on the structure of the input data or on the output. It is therefore not surprising that this network was judged to be unusable with regard to the elements provided.

Remember that the description must provide intellectual access to the invention, without necessarily guaranteeing industrial access¹³⁵. This means that it is not a question of providing details of the realization of the invention, but only of allowing the person skilled in the art to understand the invention, so that some trial and error may be necessary in order to carry out and then reproduce the teaching. This issue of input data for AI is similar to that once raised by computer-implemented inventions when determining whether to provide the source code of a program¹³⁶. In the same way that an obligation to provide the code seems excessive¹³⁷, the extent to which this data may be necessary for the reproduction of the invention must be assessed on a case-by-case basis. In the end, the underlying problem remains the same whether it is a question of providing the source code or the input data: determining whether the invention exists or whether the applicant is seeking to protect a mathematical method, which falls within the domain of science, and whose appropriation would unduly infringe on freedom of competition because of its excessive scope. Finally, in practice, we will describe the implementation of AI in the invention, with possibly the input data, the output data, the type of AI (neural network, genetic algorithm, support vector machine, etc.), as well as its internal architecture and its possible learning¹³⁸. But, in fine, the risk, with a description judged sufficient for the person skilled in the field, is that the invention will be in the same vein judged obvious (B).

B. Artificial intelligence and inventive step

§18. Inventive step. — The condition of inventive activity corresponds to the scarcity of common property law. This means both its importance and the difficulty of its appreciation, since this rarity will justify, in fine, the appropriation by making a thing a good, whereas utility aims only at establishing the existence of the thing itself.

Since the mid-nineteenth century, attempts have been made to objectify as much as possible the appreciation of inventive activity in order to distance it from a subjective appreciation of the inventor's flash of genius¹³⁹. In other words, it is a question of considering that, in the sense of

¹³⁴ EPO, TBA. 3.5.05, 18 juin 2020, T 161/18, *Äquivalenter Aortendruck/ARC SEIBERSDORF*.

¹³⁵ J. Schmidt, *L'invention protégée après la loi du 2 janvier 1968*, Litec, CEIPI, t. 6, 1972, no 10, p. 17.

¹³⁶ M. Dhenne, *op. cit.*, no 716, p. 411.

¹³⁷ See contra S. Drillon, *La protection des logiciels par brevet d'invention. Contribution à l'étude du domaine de la brevetabilité*, th. dactyl. Université de Strasbourg, 2012, no 1263, p. 411.

¹³⁸ O. Rocher, "3 questions — Propriété industrielle et IA", *JCP E* 2020, 18.

¹³⁹ V. F. K. Beier, "Inventive Step in Its Historical Development", *JIC* 1986, vol. 17, p. 3 1; J. F. Duffy, "Inventing Invention: A Case of Legal Study", *Tex. L. Rev.* 1987, vol. 86, p. 1. La notion de non-évidence, qui se situe au cœur de la condition moderne d'activité inventive, est précisément apparue dans le Traité publié par Phillips en 1837. V. W. D. Phillips, *The Law of Patents for Inventions*, American Stationers' Co/Gould, Banks & Co, 1837, pp. 125 et 126.

patent law, the invention constitutes a realization resulting from an inventive step¹⁴⁰ that can be examined objectively, and not from an inventive act (i.e. act of genius)¹⁴¹, which would imply a subjective examination. As a reminder, *de lege lata*, the invention proceeds from an inventive step when it does not result obviously from the state of the art. Thus, non-obviousness constitutes the criterion authorizing the comparison between the state of the art, on the one hand, and the person skilled in the art, on the other hand. Under the prism of the problem-solution approach, its examination should thus make it possible to grasp the inventive step objectively¹⁴². Nevertheless, in practice, this objectivity often seems to remain rather a façade argument obliterating the subjectivity that any legal qualification necessarily implies. The could-would approach, which requires one to look for what the inventor would have done and not what he could have done, or the secondary indices of inventive activity, which are subjective by nature, are all elements that bring to light the subjectivity inherent in the assessment of inventive activity.

§19. IA and the criterion of non-obviousness. — It has been argued with respect to AI that the computer scientist designing the machine learning system should not be recognized as the inventor of AI-assisted production, who should himself be considered as the inventor¹⁴³. However, the argument is based on the erroneous assumption that an AI system is autonomous and produces a patentable result not envisaged by the computer scientist. However, such a system does not currently exist and does not seem likely to exist in the short or medium term¹⁴⁴.

In the current and foreseeable state of the art, AI does not perform the entire inventive process, because human intervention remains necessary to identify the problem, to translate it into a format understandable to the system, to form the AI and to select the relevant results. Some authors have thus argued that the inventive process then resides either in the design of the AI system¹⁴⁵ or in the use made of it to obtain the invention¹⁴⁶. Others are of the opinion that this point of view should be qualified by taking into account a multi-player model, which would characterize the inventive process in which AI intervenes, which includes many actors, both related and independent: software programmers, data providers, the data trainer, system owners and operators. It is argued that this complexity of the process patent law, which focuses on the identification of a single inventor, would be inadequate and these inventions should be rewarded outside this system by other means¹⁴⁷.

However, as far as data providers are concerned, they are unlikely to make a contribution beyond the financial, organizational, administrative or mechanical aspects. Such contributions are not

¹⁴⁰ A concept according to which the invention results from the genius of the inventor. See e.g. J. Mokyr, *The Lever and the Riches*, Oxford University Press, 1990, *passim*, see especially p. 291 et seq.; *The Gifts of Athena*, Princeton University Press, 2002, *passim*, see especially p. 2 et 3. This approach was particularly widespread in the nineteenth century see G. Galvez-Behar, *La République des inventeurs*, PUR, Carnot, 2008, p. 53 et seq.

¹⁴¹ A concept according to which the invention is part of a given social context and is the result of a specific inventive process unrelated to any genius. See S. C. Gilfillan, *Sociology of Invention*, Follett Publishing Co, 1935; *Supplement to The Sociology of Invention*, San Francisco Press, Inc., 1971, see especially p. 11 et seq.; "The Prediction of Technical Change", *The Review of Economics and Statistics* 1952, vol. 34, p. 368; W. G. Ogburn, *Social Change with Respect to Culture and Original Nature*, B. W. Huebsch, 1922, *passim*; *Technological trends and National Policy*, 1937, *passim*; Th. Ribot, *Essai sur l'imagination créatrice*, L'Harmattan, 2007 (1900), p. 117 et seq. On the genesis of this approach see L. Hilaire-Pérez, *L'invention technique au siècle des lumières*, A. Michel, L'évolution de l'humanité, 2000, pp. 147 et seq.

¹⁴² Directive G-VII, 5.

¹⁴³ R. Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law", 57 *B. C. L. Rev.* 1079, 1095 (2016).

¹⁴⁴ In this sense see also M. Summerfield, "The Impact of System Learning on Patent Law, Part 1: Can a Computer Invent?": <https://blog.patentology.com.au/2018/01/the-impact-of-machine-learning-on.html>.

¹⁴⁵ M. Summerfield, "The Impact of System Learning on Patent Law, Part 2: System-Assisted Inventing": https://blog.patentology.com.au/2018/01/the-impact-of-system-learning-on_21.html.

¹⁴⁶ P. Bock, "The Inventor's New Tool: Artificial Intelligence — how does it fit in the European Patent System?", 39 *E.I.P.R.* 69 (2017).

¹⁴⁷ S. Yanisky Ravid & X. Liu, "When Artificial Intelligence Systems Produce Inventions: An Alternative Model For Patent Law At The 3a Era", 39 *Cardozo L. Rev.* 2215 (2017).

considered likely to provide a basis for the inventive step¹⁴⁸. The same will apply to the system operator if he does not select the relevant result, in which case he may possibly be a co-inventor.

On the other hand, both the programmer and the data trainer are potential co-inventors. Although the margin enjoyed by the programmer remains narrow. One tends indeed to consider that the programming operation alone, as such, is part of the general knowledge of the man of the trade, so that it cannot form the basis of an inventive activity¹⁴⁹. Programming may nevertheless be part of the inventive activity if it is related to the objective of the invention. This may be the case if it is carried out with a view to providing a technical solution to a technical problem: if it requires a specific implementation of the algorithm (i.e. specifically adapted to the internal workings of the computer) or if it is a question of applying the said algorithm to a given technical field¹⁵⁰.

In any case, it is the data trainer who is most likely to be qualified as an inventor, since it is his responsibility to orient the AI system towards the desired result: he can select the data, the algorithm, and the parameters, check the system's performance, make the necessary corrections if necessary, in order to produce the most optimal performance, while keeping in mind the objective of the invention¹⁵¹. In short, it is most often the data trainer that will pose the problem. Knowing that said, it is likely that, by analogy with the businessman, we retain that non-technical aspects such as the orientation of the AI cannot constitute a technical inventive contribution¹⁵². However, the parameterization of AI seems destined to play a central role in the assessment of the inventive step. Indeed, AI seems to constitute a kind of invention of selection of parameters, a type of well-known realizations, in particular in the biotechnology sector¹⁵³. But, if the activity of the data trainer often proves to be decisive when an AI is involved, it is no less important to assess its role on a case-by-case basis, in particular because the programmer can sometimes prove to be decisive, especially if the technical problem lies in the implementation of an algorithm.

§20. AI: in search of the lost genius? — AI has the potential either to reinforce the tendency to objectify the inventor to the point of negation or, on the contrary, to allow a return to a search for genius. In this sense, the issue raised by the DABUS case is ultimately fundamental. If we recognize that AI can "be" an inventor, or that an invention can do without a human inventor, this is tantamount to denying the very existence of a certain human genius in favor of a logic that objectivizes to the last detail. One would then come to question the very philosophy of patent

¹⁴⁸ They are provided by the businessman. See M. Dhenne, "L'homme d'affaires fictif", in "Droit des brevets et nouvelles technologies", *Propriété industrielle* 2018, chron. 12.

¹⁴⁹ The EPO thus considered that the programming of an Internet auction method was a "routine programming measure perfectly within the reach of the man in the trade". (EPO, TBA. 3.5.1, 21 avril 2004, T 258/03, *Méthode d'enchères/Hitachi*, JO EPO 2004, p. 575, *RTD com.* 2006, p. 341, obs. J.-Ch. Galloux; *Propriété intellectuelle* 2005, no 16, p. 352, obs. B. Warusfel). In the same way, the programming of a graphic interface has been described as a "design routine" worthy of the man in the business and requiring no inventive effort (about a computerized stock exchange system: EPO, TBA. 3.5.1, 19 juillet 2006, T 359/03, *Computerized trading system/Belzberg*, point 20). It was also decided that, in the case of a monitoring device for electronic computing elements including a power-on-reset circuit, the competent professional was "an electronics technician of a particular type, i.e. an electronics technician with sufficient knowledge of programming or a team composed of both electronics technicians without knowledge of programming and programmers with such knowledge". (EPO, TBA. 3.5.01, 29 avril 1993, T 164/92, *Éléments de calcul électronique/Robert Bosch*, pt. 3.5). The use of a certain program language (in this case unassembled language) could be the basis for an inventive activity: EPO, TBA. 3.5.1, 15 novembre 1988, T 379/86, *A sequence controller for a machine tool and a method of preparing and executing sequence program and sequence controller used in machine tool control/Fanuc Ltd.*, pt. 4.2 (contrôleur de séquence). Rapp. EPO, TBA. 3.5.1, 31 mai 1994, T 769/92, *Système de gestion universel/SOHEL*, pt. 3.7 considering that the implementation of the interface was technical because it was not a "simple act of programming".

¹⁵⁰ Directive G-II, 3.3.1. et nos commentaires, "Quand l'intelligence artificielle s'invite dans les directives d'examen de l'EPO", *Propriété industrielle* 2009, alerte 1.

¹⁵¹ In this sense see also N. Shemtov, *A study on inventorship in inventions involving AI activity*, European Patent Office, February 2019, p. 31.

¹⁵² See M. Dhenne, *art. cit.*

¹⁵³ Directive G-VI, 8. V. J. Passa, *op. cit.*, no 153, p. 295.

law, its purpose, by considering that the law no longer rewards an inventive activity, but rather an inventive step in which the equipment used could make the difference. Conversely, AI could also lead to refocusing on human activity at the heart of the inventive process, in order to continue protecting inventions resulting from an inventive step, thus avoiding that the recognition of a patent right depends on the equipment available. The importance taken by AI tools in certain inventive processes coupled with the rejection of its status as an inventor suggests that, at the present time, the second way is the most likely¹⁵⁴. In other words, the growing importance of AI leads, for the time being, to emphasize the inventor's contribution while limiting the objective aspect of the appreciation of the inventive activity. This is evidenced by the decisions rendered in the DABUS case when they focus on the definition of the inventor by recalling the creativity and intelligence specific to the latter.

§21. Conclusion. — If patent law does not seem to require any reform to accommodate AI¹⁵⁵, the fact remains that the latter could, in the more or less long term, lead to an evolution of the approach to the subject matter, in particular the reduced place given to the inventor in the assessment of the inventive step. More generally, it seems to us that AI is part of the great technical (r)evolutions of the last fifty years with computing as a whole and biotechnologies. However, there is little doubt that certain aspects of patent law would deserve to be rethought in the light of these mutations, for example with a European directive devoted to patent law as a whole¹⁵⁶. It remains to be seen whether Europe will be able to address these fundamental issues for the future of its innovation.

¹⁵⁴ See nevertheless J. Larrieu, "Robots et propriété intellectuelle", *Dalloz IP/IT* 2016, p. 291; M. Vivant, "Intelligence artificielle et propriété intellectuelle", *Comm. com. électr.* 2018, étude 18.

¹⁵⁵ In this sens see also A. Ramalho, Patentability of AI-Generated Inventions: Is a Reform of the Patent System Needed?, *IIP*, Japan, 2018, <https://ssrn.com/abstract=3168703>; N. Shemtov, *A study on inventorship in inventions involving AI activity*, European Patent Office, February 2019.

¹⁵⁶ In this sens see also Association Henri Capitant et Institut Stanislas de Boufflers, *Feedback on the Intellectual Property Action Roadmap of the European Commission*, Éditions de Boufflers, 2020, §G et §H.