Original Research Article

Legal personhood and robotics: birth of the smart android and of the biodroid

ABSTRACT

The adoption of legal resolutions or legislative proposals concerning the legal personality of Information Technology entities by the highest decision-making bodies has led to a significant increase in scientific studies on the subject in all disciplines. This sudden interest is a real necessity since, for example, the attribution of the legal status of electronic person to an artificial entity involves a multitude of multidisciplinary issues with potentially significant consequences. One of the legal issues addresses the concept of the birth of such an entity and its definition. As a corollary, the issue refers to that of the consciousness and death of such an entity. This article aims to make a contribution on this issue based on the French legal system. The analysis is illustrated by the application to two robotic entities, one real, the smart android, and the other fictional, the biodroid. By analogy with the case of humans, the birth of such entities corresponds to their first activation, and subsequently, whether they are turned on or off for its synthetic part, their birth is not questioned as long astheir evolution is the result of their own development in complete autonomy. Similarly, any modification of their system of thought (including the destruction of this system) that is not due to their own autonomous development must be considered as the production of a new entity and therefore means the death of the previous version and the birth of the new version.These two main proposal are complemented by others that should clarify the issue,especially by defining how smart android and biodroid may be considered viable and dead. It also specifies the link with the status of electronic person..

Keywords: Android, Artificial Intelligence, Biodroid,Electronic person, Emotional intelligence, Personhood, Smart Robot.

1. INTRODUCTION

In 2017, the Parliament of European Union adopted a resolution on civil law [1] and proposed to grant robots with a legal status of “electronic person”, highlighting the need of a legislation addressing the machines’ responsibilities. Paragraph AB of the resolution states that “the more autonomous robots are, the less they can be considered to be simple tools in the hands of other actors (such as the manufacturer, the operator, the owner, the user, etc.)” and asks the commission to consider “creating a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently” (§59f). More recently, the Parliament of European Union discussed and approved proposals addressing Artificial Intelligence (AI) issues [2] and pointed the need to develop a legal framework for the conception, implementation and use of Artificial Intelligence robotics.

It is a good thing that the Parliament of European Union considers these issues because they are worrying the common people in Europe: 9 persons over 10 think it is necessary to regulate developments in the robotics and AI area [3]. In addition, current biotechnological advances suggest that the coming decades will allow the development of humanoid computing entities with cognitive and emotional characteristics similar to those of humans. On the one hand, Affective Computing discipline aims to equip Information Technology (IT) entities with emotional intelligence that allows machines to interpret the emotions of their interlocutors and adapt their behavior accordingly [4],[5]. On the other hand, advances in biology make it possible to program bio-organic entities within biocomputer nanoplatforms [6]. This presages the integration of organic parts composing androids to replace current electronic central units for example. The nature of the robot would change from the concept of android to the concept of biodroid as introduced by Fauquet-Alekhine [7]. The biodroid can be defined by drawing a parallel with the cyborg. The cyborg, contraction of Cybernetic Organism, is a hybrid creature composed of cybernetic and organic parts, and its existence is of natural origin; this can be considered an "augmented human being". The biodroid resembles this type of hybrid being with the difference that its origin is artificial [3],[7]. Whether the biodroid has a humanoid aspect or not, what interests us here is to consider an artificial product from every point of view, combining cybernetic and organic parts, and endowed with an autonomous and emotional artificial intelligence, which would make it possible to obtain an intelligence that would approach that of the Human in terms of strategy and efficiency according to some scientists (e.g. [4],[8],[9]). Such an entity may be of the order of fiction today but the effectiveness of such a realization is close because “it is now clear that composite, hybrid creatures can be bioengineered with any desired combination of living cells (or whole brains) and real-time optical-electrical interfaces to machine-learning architectures [10:5] (see also: [11-14]). For several years, many laboratories have already integrated bio-organisms into computers (e.g. [15],[16]).

In this context, analyzing the applicability of the European Parliament resolution becomes crucial because it could be topical imminently. This article proposes to take stock of the implications of this issue and then to analyze one of the questions little investigated in this corpus yet identified in the scientific literature: the question of the birth of the entity receiving the status of electronic person [3].

2. MATERIAL AND METHOD

First, a literature review takes stock of the questions asked within the scientific community relating to the status of electronic persons.

In a second step, an analysis is made in order to expose the way in which the status of legal person is attributed to the human being. The objective is to be able to draw a parallel with the case of an electronic entity. It is therefore necessary to keep in mind the difference between "person" in the legal sense of the term and "person" to designate the human being as a biological body endowed with a mind. As pointed out by Scancati& Gallo [17:123], the « concept [of the legal personality] does not necessarily refer anymore to the man but it’s linked to the powers and the interests of the man, which are concentrated in accordance with predicative structures and normative schemes, or it refers to complex subjects to whom have been conferred features suitable to action both in the field of private law and public law.” According to the authors, “the notion of legal person adapts to the definition of the artificial subjects which are allowed on a merely functional level and, then, to every artificial individual” [17:124]. “From the standpoint of [Kelsen’s] ‘pure doctrine of law’, an electronic person can be treated as a personified unity of the rules of law, which oblige and authorize an artificial intelligence that has the criteria of ‘reasonableness’ ” ([18] quoted by [19:36]).

This analysis of the attribution of the status of legal person to the human being necessarily integrates the notion of birth; this is pointed out as a particular difficulty in the literature when it concerns personal electronics [3],[20]. In order to avoid dispersion in the different legal systems of the different countries that would complicate the understanding of the analysis, it is carried out via a bibliographic research and an analysis of the legal codes limited to the French system.

In a third step, an illustrative discussion is proposed in two stages, the first to analyze how the status of electronic person can be attributed to a smart android, and the second to consider the case of a biodroid taking as a basis the French legal framework.

A smart android is a smart robot with a humanoid appearance, the smart robothaving been defined in the European Parliament resolution of 2017 [1: section 1]: the smart robot has the capacity of "acquisition of autonomy through sensors and/or by exchanging data with its environment (inter-connectivity) and the trading and analysing of those data; self-learning from experience and by interaction (optional criterion); at least a minor physical support; the adaptation of its behaviour and actions to the environment. The smart robot is also characterized by the "absence of life in the biological sense".

Thebiodroid is a synthetic and bio-organic hybrid entity that can have a humanoid appearance. The biodroid, a concept introduced by Fauquet-Alekhine [7], is an interesting example because this robotic entity still fictitious today is bound to become part of our daily lives in an inevitable way in the decades to come. Considering the biodroid in this analysis therefore makes it possible to anticipate future difficulties. Imagining that a biodroid can be endowed with organic parts is conceivable given the technological advance (e.g. [21-23]).

Beforehand, to facilitate the understanding of the following, some notions are clarified below. The following definitions come from Le Cornu dictionary dedicated to the French legal system [24],[25]:

i. Human being: any individual belonging to the human race recognized as such from the origin, the conception.
ii. Legal personhood: ability to become a subject of law, i.e. to have rights and obligations.
iii. Legal person: group granted with legal personality under certain conditions, such as an association.
iv. Natural person: a human being taken as a subject of law (endowed with legal personhood).

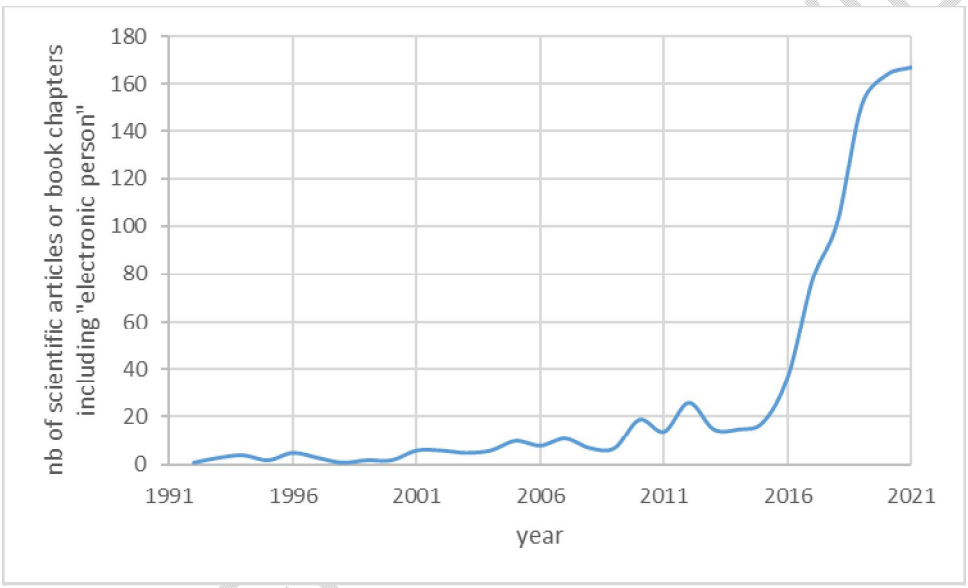
3. ANALYSIS

3.1. Contribution of the scientific community

In the imminent prospect of a daily life invaded by smart robots or biodroids in permanent interaction with humans, the legal approach of the concept of electronic person for robots takes on even more importance and the analysis of publications also testifies to an awareness within the scientific community, whether technologically, ethically or legally. Indeed, it seems that the period when the European Parliament resolution was published has been a period of emulation within the scientific community on this issue. While the concept of electronic persondid not concern more than a dozen scientific communications per year until 2009 and about twenty until 2015, Figure 1 shows a significant increase in publications on the subject from 2016, the year of the publication of the preliminary study report to the European Parliament's resolution of 2017. However, the first publications dating back to the 90s used the electronic expression person with another meaning. For

example, Young [26] mentioned “electronic person” referring to a Life magazine article (Nov. 20, 1970) entitled "Meet Shakey, The First Electronic Person”, where “electronic person” relates to the physical sense and designates a robot as an electronic body that is supposed to be able to precepting, reasoning, speaking, remembering, learning, thinking. Later, Mongeau [27:90] exposed the notion of “decorporated consciousness”: “the electronic extension of body into the symbolic world of the mind connects to the Overmind thesis. If the 'Electronic Person' becomes, in effect, a decorporated consciousness, then the foundation for reality as we accept it today, the material world, is radically distanced”. These particularities were taken into account on Figure 1.

The concept of electronic person in the legal sense seems to have been first introduced and proposed for IT entities by Karnow in 1994: “I suggest the extraordinary developments in technology, and specifically the information, or digital, revolution, gives rise to a new legal entity: the electronic persona.” [28:4].Since then, and especially from 2016, the concept of electronic person has resolutely oriented towards its legal meaning relating to IT entities.



,

Fig 1. Number of scientific articles or book chapters including the exact expression "electronic person" published per yearfrom 1992 to 2022; data from Google Scholar.

A recent study [29] looked at how the legal concept of electronic person could fit into existing legal systems. The study identified the necessary conditions for an IT entity to be granted electronic person, that is, to be recognized as subject of law. Three conditions were identified as necessary to do this. First, the concept of electronic person must be integrated into the legal system in place in the country. Second, the country must pursue a policy that recognizes the rights and obligations of the electronic person. Third, civil society must be able to support this recognition. The study conducted a comparative analysis concerning the integration of the concept of electronic person into an existing legal system: that of the USA, that of Europe, and that of the Russian Federation. The study concluded that “the legal systems of the USA and Canada are most adapted to the perception of the concept of an electronic person. […] The countries of European Union are less adapted (due to the concept of individual autonomy) and the Russian legal system is the least adapted (due to the prevalence of the will criterion of a capable person)” [29:106]. This last point is also highlighted by other studies (e.g. [30]).

Regarding Europe, Wettig stressed the need to analyze some key aspects of the potential legal personality of IT entities, and pointed in particular to the issues of the beginning and end of this status (which can be translated by birth and death), the capacity to act, and of the liability fund [20].

3.2. Legal birth (concept of legal personhood)

Some scientists have attempted to address the issue of the status of electronic person for robots by drawing a parallel with the legal concept of “legal person” (e.g. [31]). It seems to us that this parallel is inappropriate insofar as robots are physical entities and cannot be treated as a common legal person which are essentially devoid of physical existence. This is why the analysis to be followed focuses on the legal concept of natural person and draws parallels with the legal personhood of the human being.

French law has created a strong relationship between the legal birth and the birth of the natural person. As we shall see, the notion of the birth of the physical person is closely linked to the notion of life, which is linked to physiological capacities dependent on the existence of bioorganic systems.
In addition, French law legislates on what is before birth and on the necessary link between before and after birth, based on the notions of "unborn child" and "potential person". However, in this first approach, these concepts are not addressed and will give rise to a forthcoming subsequent study.

This section examines the concept of birth for humans under French law.

3.2.1. Relationship to the "natural person"

First of all, it is necessary to understand the difference between physical birth and legal birth. Physical birth is the birth of a being, in this case the child, physiologically conceived by another being, in this case the mother. The legal birth is an intellectual construction from the sciences of law.

Legal personhood is also an intellectual construction, a creation of law. As such, it is defined and assigned by the law according to rules that it determines itself.

The legal personhood of a natural person is acquired at the time of his legal birth, but an unborn child may acquire it whenever it is in his or her interest.

The acquisition of legal personhood is assimilated to the birth of the child, i.e. when the fetus detaches itself from its mother's body. It is associated with the declaration of birth (see Article 55 of the Civil Code).

3-2-2.Relation to the concept of "life"

However, birth alone is not a sufficient criterion for legal personhood. For this, the child must be born alive and viable.

The child must be born alive means that at birth, the child must have breathed, that is, it must have had air in the lungs. Otherwise, the deceased child cannot be considered as born and then deceased but as stillborn and will never have acquired legal personhood.

The child must be born viable means that the child must be endowed with a certain aptitude for life. This is not the case for a child born before the viability threshold, i.e. at about 6

months of pregnancy, or for a child without an organ essential to life. Thus, children born alive, but died shortly after birth because they were not viable, never benefited from legal personhood.

Even if died before the declaration in town hall, the child born alive and viable can obtain a birth certificate: this requires a medical certificate attesting that the child was born alive and viable. The civil registrar then draws up at the same time a birth certificate and a death certificate.Otherwise (stillbirth, late miscarriage, etc.), only a lifeless child certificate is issued (see Article 79-1 of the Civil Code).

3-2-3.Notion of consciousness

In addition, we recently undertook a study [3] analyzing how the status of electronic person could be applied to a robotic entity by taking the example of French law. In particular, the findings show that “The introduction of the status of ‘electronic person’ or ‘electronic personality’ proposed by the resolution and applicable to autonomous robots would transform the passive posture of the robot under French law into an active posture: the robot, currently an object of law, would become a subject of law. It is thus both being invested with rights and being subjected to duties. The latter would imply that the robot is aware of the duties that are its own and has the ability to respect its duties” [3:104]. This would imply the notion of consciousness. However, the consciousness is a psychological process, and as noted by Durneva [30], the recognition of the presence of psychological processes in an electronic entity that has no biological origin seems difficult to accept.However, the resolution of the European Parliament states the "absence of life in the biological sense" to define smart robots [1:§1].

The problem lies in the contradiction between the “absence of life in the biological sense”and the need for consciousness of the robotics entity linked to the questions of birth and death (as pointed out by Wettig [20]), themselves related to the concepts of "living being" and "being born viable" in French law [3:104].

3-2.3.Synthesis

In summary, in French law, the child acquires the legal personhood when born provided that s/he is born alive and viable. The unborn child is the bearer of rights which becomes effective provided that s/he acquires legal personhood at birth, that is to say, that s/he is born alive and viable, even if only for a fraction of a second.

As a result, the embryo and then the fetus do not have legal personhood but they carry rights which will become effective on the acquisition of legal personality.
Thus, for a being to enjoy rights, s/he must acquire a legal status. If reference is made to the status of the human being, the status to be acquired and that of “legal personhood”.

4. DISCUSSION

In the French legal system, legal personhood is therefore attributed to the birth of the human being provided that the child is born (concept of birth) viable (concept of viability) (see also [3]). This concept of viability presupposes an ability to live in continuity after birth, with a more or less important longevity. For smart androids or biodroids, the assumption could be that everything will be controlled by the designer so that viability is no longer a point to be discussed: viability would then be similar to the ability to operate as expected and sustainably. In any case, the question of birth (i.e. the moment when it is decided that the smart robot is born) remains to be defined and is prior to the question of viability. Moreover,

the notion of birth implies the notion of death; the latter notion must therefore be integrated into the discussion.
As announced in the "Methods" section, taking as a basis the French legal framework, an illustrative discussion is proposed in two stages, the first to analyze how the status of electronic person can be attributed to a smart android, and the second to consider the case of a biodroid.

According to thebasic categories of robots provided by theInternational Organization for StandardizationISO 8373*Robots and robotic devices – Vocabulary* distinguishing industrial robots (fixed or mobile base), service robots (personal, professional and medical), and military robots, smart android and biodroid may be categorized in all sub-categories of service and military robots. This basic categorization does not focus on the kinematics on mechanical characteristics of the robots because, as highlighted by [32:28], this is "insufficient to distinguish industrial robots from service robots". Furthermore, Haidegger et al. [33] depicted the standards Robotics 0.0to Robotics 4.0. Smart android and biodroid may be categorized between Robotics 3.0 andRobotics 4.0, the former relating to "high degree of autonomy, […] complex behaviors and complete safety-criticaltasks in the proximity of humans" [33:119] while the latter includes the synergies of all of the current software and hardware possibilities and the integration of Internet of Robotic Things (IORT) [33:119].

4.1. Case of smart android

With regard to the smart android endowed with intelligence and emotion supported by an AI, it could be proposed that the birth of such an electronic entity occurs at the time of its activation.

However, the android can be activated and turned on or activated and turned off. By analogy, the coffee machine, which is also an electronic entity, can be turned on or off and yet it remains a coffee machine. Thus, it can be proposed that the smart android, once activated, whether it is turned on or off, remains the same smart android as long as its AI and physical integrity are not modified by one or more actions of its designer or user. One way to solve the problem is to consider that the birth of the smart android corresponds to its first activation and that subsequently, whether it is turned on or off, its birth is not questioned as long as its evolution, its development, are the results of its own development in complete autonomy. In other words, the smart android can change on its own, but an action of its designer, such as an update of its AI for example, transforms the android into another android. So there is death of the previous version to give birth to the new version of the smart android.

This proposal then raises the question of the questioning of the birth as soon as the designer of the smart androiddecides to make an update, an adjustment of the content of the programming, or a modification of the memory of the robot by addition or removal, this list is not exhaustive.This type of action on the part of the designer of the smart android modifies the evolution of the smart android independently of the own development of the android in complete autonomy. In the case of an update, it seems difficult to consider that the new version of the smart android is equalto the old version.It therefore seems difficult to maintain the attribution of the status of electronic person to the new version on the pretext that the previous version was granted with it. The proposal is therefore as follows: any modification of the smart android that would not be because of its own development in complete autonomy must be considered as the production of a new smart android and therefore means the death of the previous version and the birth of the new version. In fact, the status of electronic person is lost by the previous version and must be reconsidered for the new version. This proposal does not definitively settle the issue since it is necessary to

differentiate between an update of the software of AI and the update of the hardware such as the repair of an arm for example. To make the analogy with the human, in the first case it would be a question of changing the mind in the brain of a person while in the second case it would be a question of treating the injury ofan arm. Although changing the mind in a person's brain is not possible, it is clear that if it would be possible, the person would no longer be the same, whereas healing a person's arm, even by doing a transplant from another person, is not perceived by people as changing the person receiving the transplant. Applying this reasoning to the smart android, the updates to be taken into account in the proposal concern only everything related to the software associated with the smart android, that is to say what could be qualified as its system of thought. However, this reasoning raises a new question: let us assume two technologically different smart androids for which all the software of the first are moved to the second. The result is that the system of thought of the first android has changed to second android. By analogy with the human, this is equivalent to taking the mind of a person A in a body A to transpose it instead of the mind of a person B in a body B: in such a configuration, it will not be impossible to consider that person B is person A in body B, by considering that what takes precedence to define the person is the mind rather than the body. However, there is no rule or law that requires us to look at the situation in this way. The latter question could therefore be unanswered and could be offered for further study. It is possible to propose a first element of answer: considering that, if the status of legal personhood is attributed to an entity considered as a physical person endowed with a mind (for the human, mind and body form a whole, and for the robot, the system of thought and the associated robotic entity as a support form a whole), they form an inseparable whole to be considered as a "person". This is coherent with other approaches such as this of Haidegger et al. [34] considering that robots are the embodiment of AI which AI is the cognitive controller block of robots.Thus, the transposition of the system of thought from an android A to an android B is not compatible with the preservation of the status of electronic person.

Regarding the viability of smart android, it could be proposed that this electronic entity be considered viable as long as it meets all the criteria enabling it to achieve the objectives or purpose for which the entity was designed, in a safe, efficient and sustainable manner.

In summary, the proposals are as follows:

i. The birth of the smart android corresponds to its first activation and thereafter, whether it is turned on or off, its birth is not questioned as long as its evolution is the result of its own development in complete autonomy.
ii. Any modification of the software defining the system of thought of the smart android (including the destruction of this system) that would not be due to its own development in complete autonomy must be considered as the production of a new smart android and therefore means the death of the previous version and the birth of the new version.
iii. The status of electronic person is attributed to a smart android composed of software and electronic supports which form an inseparable whole, the dissociation resulting in the loss of the status of electronic person.
iv. The smart android is considered viable when it meets all the criteria that allow it to achieve the objectives or purpose for which it was designed, in a safe, efficient and sustainable way.

4.2. Case of the biodroid

With regard to the biodroid endowed with intelligence and emotions supported by an AI, it is necessary to reconsider the proposals formulated for the smart android taking into account the fact that the entity considered in present section integrates both a synthetic part and an

organic part; the biodroid is therefore endowed with a part considered living in the biological sense of the term. As a reminder, as stated in the introduction, this possibility was excluded from the European Parliament's resolution. However, as proposed in the section "Introduction",even if such an entity remains fictional to this day, biotechnological advances foreshadow its existence in the coming decades. It therefore seems important to anticipate the associated issues.

Regarding the notion of birth, as for the smart android, the proposal is to consider that the birth of the biodroid corresponds to its first activation, and thereafter, its birth is not questioned as long as its evolution is the result of its own development in complete autonomy. To the extent that the status of legal personhood is attributed to an entity considered as a natural person endowed with a mind (the body and the mind forming a whole), the system of thoughtand its support, i.e. the synthetic and/or associated bioorganic entity, also form an inseparable whole. In the first approach, this could lead to think that a lethal degradation of the bio-organic part of the biodroid would be considered a dissociation of the whole and therefore would be associated with the death of the biodroid. However, this approach must be nuanced by making an analogy with the human. The human is entirely organic and depending on the part of the body that is destroyed, s/he can be considered alive but bruised or dead. The same goes for the biodroid: it all depends on the role that the affected bio-organic part plays for the functioning of the biodroid. If the affected bio-organic part serves as a support for the biodroid'ssystemof thought, it is clear that there is dissociation between "body and mind" and that the biodroid no longer exists. Thus, the proposal is as follows: any modification of the system of thought of the bioroid that is not due to its own development in complete autonomy must be considered as the production of a new biodroid and therefore means the death of the previous version and the birth of the new version. This implies that if the system of thought of thebiodroid is supported bybio-organic components, the destruction of these necessarily leads to the destruction of thesystem of thought of the biodroid and therefore can be considered the death of the biodroid.

Subsequently, the third proposition for the smart android applies in full to the biodroid: the status of electronic person is attributed to a biodroid composed of asystem of thought and synthetic and organic supports that form an inseparable whole, dissociation leading to the loss of the status of electronic person.

With regard to the viability of the biodroid, as well as for the smart android, it could be proposed that this electronic entity be considered viable as long as it meets all the criteria that allow it to achieve the objectives or purpose for which the entity was designed, in a safe, efficient and sustainable manner, and, inparticular,whereas all its organic parts are deemed to be viable in the biological sense of the term.

In summary, the proposals are as follows:

i. The birth of the biodroid corresponds to its first activation, and subsequently, whether it is turned on or off for its synthetic part, its birth is not questioned as long as its evolution is the result of its own development in complete autonomy.
ii. Any modification of the biodroid's system of thought (including the destruction of this system) that is not due to its own autonomous development must be considered as the production of a new biodroid and therefore means the death of the previous version and the birth of the new version.
iii. If the biodroid’s system of thought is supported bybio-organic components, the destruction of the latter necessarily leads to the destruction of the biodroid’s system of thought and therefore can be considered as the death of the biodroid.

iv. The status of electronic person is attributed to a biodroid composed of a system of thoughtand synthetic and organic supports that form an inseparable whole, dissociation leading to the loss of the status of electronic person.

v. Biodroids are considered viable if they meet all the criteria that enable them to achieve the objectives or purpose for which they were designed in a safe, effective and sustainable manner, and in particular if all itsorganic parts are considered viable in the biological sense of the term.

4.3. Consciousness

As seen in section 3-2-3 "Notion of consciousness", the notion of "consciousness" is closely related to the concept of "birth". Some authors wish to integrate into the reflection the notion of consciousness concerning the attribution of the status of electronic person to smart robots. Regarding the question analyzed in this article, namely to identify the conditions for the birth of the smart robot in order to determine to what extent or when the status of electronic person can be attributed to it, the notion of consciousness does not seem relevant in view of the parallel made with the legal personhood of humans in French law. Indeed, as developed in the previous study [3:103], “personality ‘is recognized to all human beings without exception’, because the attribution of legal personality is ‘independent of the level of consciousness of the person. The very young child (infans), like the mentally insane, are legal persons in the same way as the fully reasoned adult […]. Attached to the quality of human being, and independent of the state of consciousness, legal personality is, ultimately, subordinated to only one condition: that the being considered is born viable’ [35:191].” Perhaps this is why the European Parliament's resolution does not address the concept of consciousness, especially since it is well known that self-awareness, related to consciousness, comes after birth [36],[37]. Thus, to say that self-awareness or consciousness are essential characteristics to consider the robot as an electronic person does not seem admissible.

However, consciousness can be an important element regarding the status of electronic person when associated with liability (see also the capacity to incur liability in tort/delict or extra-contractual liability), i.e. the capacity to be held liable for one's breaches. Depending on the legal systems of the country, the capacity to incur liability in tort/delict takes different forms. The notion of consciousness becomes an important element here insofar as an offence can only be defined in relation to a rule and this offence concerning the subject implies the notion of guilt necessarily associated with the notion of consciousness (e.g. [30]).

5. LIMITATIONS

The approach chosen in this study explored the concept of the birth of an electronic entity endowed with artificial and emotional intelligence. This was illustrated with the cases of the smart android and biodroid. One of the limitations is that the approach was undertaken only from the French legal angle of the legal personality conferred on a physical being existing from a date considered as the birth of this entity. Another limitation is that the hybrid nature of the biodroid was not fully explored in the analysis: since the biodroid is an entity combining synthetic and organic parts, an exploration from a legal perspective understanding the biodroid as a hybrid being might bring relevant complements to the present study; a parallel might be drawn with the notion of miscegenation for human beings

The legal approach chosen in this study is that of French law. The results therefore propose options for answering the research question that are limited to this legal angle and may be inappropriate to some other legal systems yet to be determined. The effect of this difference

between legal systems of different countries has been reported in section 3-1 "Contribution of the scientific community" (see also [29]).

6. CONCLUSIONS

The publication of legislative proposals concerning the legal personality of IT or electronic entities such as smart robots or biodroids raises several questions of applicability both ethically and culturally or technically (compatibility with the legal systems of different countries).
One of the technical issues is the definition of the birth and death of the personality of a computer or electronic entity such as a robot, a question that must be dealt with both from the physical and legal standpoints.
The bibliographic research showed that too few studies address the analysis of this issue. This article attempts to contribute to this analysis and results in a series of proposals that could assist in the investigation of the issue. These proposals are based on the French legal framework and require additional analyses for application to other legal systems, as has been demonstrated in other studies. The proposals arising from the study of the smart robot and of the biodroid are as follows:

- If the status of electronic person is granted to an entity composed of a system of thought and synthetic and/or organic supports that form an inseparable whole, their dissociation entails the loss of the status of electronic person.
- The birth of the entity (smart android, biodroid or other) corresponds to its first activation and subsequently, whether it is turned on or off, its birth is not questioned as long as its evolution is the result of its own development in complete autonomy.
- Any modification of the software making the system of thought of the entity (including the destruction of this system) that is not due to its own development in complete autonomy must be considered as the production of a new entity and therefore means the death of the previous version and the birth of the new version.
- If the system of thought of the entity is supported by bio-organic components, the destruction of the latter necessarily entails the destruction of the system of thought of the entity and therefore can be considered as the death of the entity.
- The entity is considered viable if it meets all the criteria that allow it to achieve the objectives or purpose for which it was designed, in a safe, efficient and sustainable manner, and, in particular in the case of a hybrid entity (bio-organic and electronic such as biodroid), when all of its organic parts are deemed viable in the biological sense of the term.

This analysis also highlights the need to clarify the notion of consciousness for such entities. In particular, it highlights certain limiting arguments on this issue in the published legislative proposals.The main limitation addresses the capability of IT or electronic entitiesto being conscious oftheir duties, a necessary capacity linked with the transition from “object of law” to subject of law” granted by the electronic person status.

In addition, although this article makes an interesting contribution to the analysis of the issue from the perspective of the French legal system, it also shows that similar analyzes must be carried out for each legal system, as the differences from one to another are so significant in some cases. This leads to the additional proposal to work on the homogenization of legal systems. However, the analysis also shows that there could be an underlying cultural difficulty.In conclusion,the issue is far from being resolved and requires an in-depth multidisciplinary analysis to date. The results of such analysis will have then to be studied on a case-by-case basis for each different legal system.

Beyond these basic questions, scientific communities will have to question issues still absent from the literature, such as that of human-robot marriage or the adoption of a robot by a human (in the legal sense of the situation) or vice versa. In the continuity of the rare studies on the ability of a robot to be a signatory of a contract, also emerges the question of the ability of a robot to inherit the heritage of a human or another robot.

REFERENCES

1. EU (2017). Civil Law Rules on Robotics - European Parliament resolution of 16 February 2017 with recommendations. Commission on Civil Law Rules on Robotics (2015/2103(INL)). Brussels, Belgium.

2. EU (2019). Civil Law Rules on Robotics - European Parliament resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics (2018/2088(INI)). Brussels, Belgium.

3. Fauquet-Alekhine Ph. Can the robot be considered as a person? The European perspective. Advances in Research. 2022;23(6):100-105, Article no.AIR.94832.

4. Grinin L, Grinin A. The cybernetic revolution and the future of technologies. In: Picard RW, editor. The 21st Century Singularity and Global Futures Affective computing. MIT press; 2000:377-396.

5. Picard RW. Toward computers that recognize and respond to user emotion. IBM systems journal. 2000;39(3.4):705-719.

6. Волобуев АН, Романов ДВ, Романчук ПИ. Природа и мозг человека: парадигмы обмена информацией [Natureandthehumanbrain: paradigmsofinformationexchange]. Бюллетеньнауки и практики [Bulletin of Science and Practice]. 2021;7(1):59-76. Russian.

7. Fauquet-Alekhine Ph. Scientific communication on artificial intelligence: the question of the social status of the biodroid. Advances in Research. 2022;23(5):1-5, Article no.AIR.89954.

8. Udayar S, Fiori M, Bausseron E. Emotional intelligence and performance in a stressful task: The mediating role of self-efficacy. Personality and Individual Differences. 2020;156;109790:1-6.

9. MacCann C, Jiang Y, Brown LE, Double KS, Bucich M, Minbashian A. Emotional intelligence predicts academic performance: A meta-analysis. Psychological Bulletin. 2020 ;146(2):150.

10. Bongard J, Levin M. Living things are not (20th century) machines: updating mechanism metaphors in light of the modern science of machine behavior. Frontiers in Ecology and Evolution. 2021;9:650726.

11. Grosenick L, Marshel JH, Deisseroth K. Closed-loop and activity-guided optogenetic control. Neuron. 2015;86(1):106-139.

12. Newman JP, Fong MF, Millard DC, Whitmire CJ, Stanley GB, Potter SM. Optogenetic feedback control of neural activity. Elife. 2015;4.

13. Pashaie R, Baumgartner R, Richner TJ, Brodnick SK, Azimipour M, Eliceiri KW, Williams JC. Closed-loop optogenetic brain interface. IEEE Transactions on Biomedical Engineering. 2015;62(10):2327-2337.

14. Roy DS, Kitamura T, Okuyama T, Ogawa SK, Sun C, Obata Y, ... Tonegawa S. Distinct neural circuits for the formation and retrieval of episodic memories. Cell. 2017;170(5):1000-1012.

15. Nicolau DV. Editorial A (nother) New Beginning in 2020!. IEEE Transactions on NanoBioscience. 2020;19(2):161-161.

16. Aaser P, Knudsen M, Ramstad OH, van de Wijdeven R, Nichele S, Sandvig I., ... Valderhaug V. Towards making a cyborg: A closed-loop reservoir-neuro system. Artificial Life Conference Proceedings 14. MIT Press. 2017:430-437.

17. Stancati C, Gallo G. Could an Electronic Person Exist? Robots and Personal Responsibility. In: Giovagnoli R, Lowe R, editors. The Logic of Social Practices. Cham: Springer International Publishing. 2020: 121-129.

18. Kelsen H. Reine Rechtslehre [Pure Theory of Law]. 2nd ed. Vienna: Franz Deuticke. 1960. German.

19. Yastrebov OA. The Legal Capacity of Electronic Person: Theoretical and Methodological Approaches. Proceedings of the Institute of State and Law of the RAS, 2018;13(2):36-55.

20. Wettig S, Zehender E. A legal analysis of human and electronic agents. AI & L. 2004;12:111-135.

21. Fauquet-Alekhine Ph. Biodroids as embodied AI: an imminent social issue. In MW Bauer, B Schiele, editors. Science Communication – Taking a Step Back to Move Forward. Paris, CNRS Publishers. 2023:175-181.

22. Furusawa K, Teramae R, Ohashi H, Shimizu M. Development of Living “Bio-Robots” for Autonomous Actuations. Journal of Robotics and Mechatronics, 2022;34(2):279-284.

23. Nicolau V, Andrei M. On Image Compression for Mobile Robots Using Feed-Forward Neural Networks. Soft Computing Applications: Proceedings of the 8th International Workshop Soft Computing Applications (SOFA 2018). 2021;2(8):112-121.

24. Cornu G. Droit civil, Introduction, les personnes, les biens. Paris : Domat Droit privé, 9ème éd. 1999.

25. Cornu G. Vocabulaire juridique: Association Henri Capitant. Paris : Presses Universitaires de France (12th edition). 2020. French.

26. Young PR. Persons and artificial intelligence. The Catholic University of America. 1991.

27. Mongeau SA. Opening the Overmind: The Culture and Philosophy of Virtual Reality. Doctoral dissertation, Miami University Oxford. 1993

28. Karnow CE. The encrypted self: fleshing out the rights of electronic personalities. Journal of Computer & Information Law. 1994;13:1-16.

29. МельниковаЕН. ВСТРАИВАЕМОСТЬ КОНЦЕПЦИИ ЭЛЕКТРОННОГО ЛИЦА В ПРАВОВУЮ СИСТЕМУ ГОСУДАРСТВА ИЛИ ГОСУДАРСТВЕННОГО ОБРАЗОВАНИя [Integrality of the concept of electronic person in the legal system of the state or state education]. Российскийюридическийжурнал [Russian Juridical Journal]. 2022;143(2):94-112. Russian.

30. Дурнева ПН. Искусственныйинтеллект: анализ с точкизренияклассическойтеориправосубъектности [Artificial intelligence: analysis from the point of view of the classical theory of legal personality]. Гражданскоеправо [Civil law]. 2019;(5) :30-33. Russian.

31. List C. Group agency and artificial intelligence. Philosophy & technology. 2021;34(4):1213-1242.

32. World Robotics 2022 – Industrial Robots. Produced by VDMA Services GmbH, Lyoner Str. 18, 60528 Frankfurt, Germany.

33. Haidegger T, Galambos P, Rudas I.J. Robotics 4.0–Are we there yet?. In 2019 IEEE 23rd International Conference on Intelligent Engineering Systems (INES). 2019:000117-000124.

34. Haidegger T, "Taxonomy and Standards in Robotics". In Marcelo H. Ang, Oussama, Khatib, and Bruno Siciliano (eds), Encyclopedia of Robotics, Springer Nature, 2021.

35. Aubert JL. Introduction au droit et thèmes fondamentaux du droit civil. Paris: Armand Colin (7ème éd.); 1998. French.

36. Solms M, Friston K. How and why consciousness arises: some considerations from physics and physiology. Journal of Consciousness Studies. 2018;25(5-6):202-238.

37. KoCh, C. When does consciousness arise. Scientific American Mind. 2009;20(5):20-21.