Human rights, free will and neuroethics. Biojuridical challenges of emerging biotechnologies

Derechos humanos, libre albedrío y neuroética. Retos biojurídicos de las neurotecnologías emergentes

Alberto García Gómez,* José Carlos Abellán Salort**

Abstract

A reflection and critical assessment of emerging neurotechnologies entails discerning the ethical, social and legal aspects to ensure their rational use, that is, respecting the dignity of the person and the fundamental rights that are at stake when interventions are made on the human brain and that, therefore, affect the person. In this essay we analyze the biojuridical dimension of neurosciences in light of some of the human rights that are at stake: life, integrity, identity, privacy, freedom, etc. The challenge of those who question the existence and, therefore, the legal relevance of free will is critically analyzed, proposing to overcome a neurobiological determinism that, on the one hand, depreciates, in the name of science, the value and meaning of the human condition, entitled of rights and responsibilities before the political communi-

* PhD in Law. Professor of Philosophy of Law, Bioethics, State and Society in the faculty of Bioethics of the Ateneo Pontificio Regina Apostolorum in Rome. Director of the UNESCO Chair in Bioethics and Human Rights (Rome, Italy).
** PhD in Law. Professor of Bioethics and Law and Director of the master's degree in Bioethics of the Universidad Rey Juan Carlos in Madrid.
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ty and that, on the other, embraces an anthropological vision that hardly fits with common sense realities and fundamental goods that transcend and surpass the biological dimension of human beings who live in society.

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Since the last decade of the 20th century, many important developments have been published with regards to the sciences that study the behavior of the brain, associated with the progress of neuroimaging technologies that allow for the registration and understanding of the mechanisms of perception, emotion, motivation, thought, language, memory, etc.

Like any other techno-scientific progress, it is necessary to discern the ethical, social and juridical aspects of these developments, to ensure that they are respectful of human dignity and the fundamental rights that go along with it.

The field of applied ethics that studies the bioethical limits of the developments of neurological sciences, as well as the ethically appropriate behaviors in neurological-clinical attention is *Neuroethics*, which constitutes the basis, with its own methodology, for Biolaw.

1. Bioethics and Biolaw of Neurosciences

Law, as a regulatory system of human conduct through penalties, education and incentives, is interested in neurosciences insofar that they provide knowledge about the human behavior that is the object of juridical norms for the common good. Consequently, law is concerned about neurotechnologies as much as these require hu-

man intervention (from scientists, health professionals, etc.) whose behavior ought to be respectful of a person's dignity and fundamental rights, as an elementary and necessary condition to guarantee social cohesion and peace.

From the perspective of an integral and solidary humanism,[1] the human being is not merely his biological brain, but rather a relational and transcendental being, a being that has the capacity to open himself to the interpersonal relations out of which society is born. Each human being is a subject and not a mere object. Law is concerned precisely with intersubjective relations, the promotion of harmony, and the prevention and resolution of conflict and violence. This is the reason of being of laws and political structures called to serve mutual coexistence.

Ultimately, it seems desirable and universally shared that the human being ought to be at the center of neurotechnologies and that the well-being of each person and of the whole society must inspire research and technological development that boasts of being true progress.[2]

Some scientist currents concerned with neuroscience tend to look for a *body-brain-mind* relation from which they postulate the existence of a moral and religious neurobiology, according to which the *self* is identified, to a larger or lesser extent, with the brain («I am my brain») and consequently question liberty and free will («my brain made me do this…»). If this hypothesis were proved to be true, which is far from happening, it would obviously revolutionize the current conception of law and personal responsibility over which legal systems and juridical structures at a national and international level are constructed.

It is obvious that our brain has a lot to do with our behavior and with the natural sense of responsibility proper to human beings as moral agents endowed with conscience. But if it was proven that we are just «complex machines», that our thoughts, intentions and desires are just a fiction and that the *self* is just a mere cultural construction that holds the big lie about the existence of

human personality, identity and about the responsibility of our own actions and our ethical and religious conceptions, then, what we today call «values» would be nothing more than a senseless artifice of which one must eliminate. Such an anthropological vision assumes as a hypothesis that man's personal and social existence has no bigger meaning or transcendency, as it would be determined by chance or by a evolutionist, materialistic and mechanistic[3] perspective that hardly fits a transcendental conception of human existence.

2. Neurotechnologies in the light of human rights

The brain, the mind and the spirit are fundamental rights of the human being. These three realities can only be understood in their inherent relation and always constituting a part of the totality of the human being (*corpus et anima unum)* which is the human body, meaning that it is not an organism like any other (an object according to juridical categories), but rather belongs to a superior existential and ontological order that constitutes it as a subject, gifted with a special value, which we call human dignity, and a unique social-relational capacity that distinguishes it from inanimate and other animate beings. The complexity of interactions and co-relations present in the body, the brain, the mind and the soul has been conceptualized as a scientific-philosophical challenge (*body-mind problem).*

However, what seems indisputable is that each of us exists, survives and develops thanks to the existence of our brain and a body, our body, that allows us to interact with one another and with the environment. Our nature and our specifically human personality allow for our development in a particular culture, that is at the same time part of our own education and identity. All this would certainly be impossible without a human brain.

Therefore, human life and existence, as well as personality, self-identity and freedom cannot exist as abstract concepts, but only in-

carnated in the singular person that is able to perceive and appreciate his own worth and that of others, as long as his brain and mind function appropriately, allowing him to reason and interact in an harmonious manner with the human environment (family, society, work, nation, etc.) that surrounds him, as well as with the natural environment. We can therefore say that the brain, the mind and the spirit, appropriately integrated, are fundamental elements of the human being, in other words, are conditions of possibility for existence and of the development of human rights.

2.1 Definition, foundation and vocation of human rights

In our reflection about the relation between neurosciences and human rights it is suitable to clarify what we understand for human rights: they are the set of goods the recognition and protection of which, in each historical moment, reflect the concrete the demands of human dignity, freedom and equality, all of which must be positively recognized by legal systems on a national and international level.[4]

When we talk about them as being «goods» we mean that they are «valuable things», that is, realities with which we human beings are gifted and are objectively essential and fundamental for our existence and development. The classic definition of justice as «to each their own» (*ius suum cuique tribuere*) helps us understand this slightly abstract concept, but not the less real. «Their own» (*ius)* is what «belongs to each one».

Human rights, then, have an ethical foundation, given that they are presented as a body of objective moral demands, that is, they don't depend on the consensus of parliamentary majorities that approve and promulgate positive law. My life, my freedom and my dignity do not depend on any law or authority that recognizes them. They are goods (things valuable in themselves) that belong to me for the mere fact of being human. Therefore, human rights precede positive law.

However, human rights conceived this way naturally have a juridical vocation, that is, they must be positivized. That is why the state (the legitimate authority of a specific political community) has the task and the duty of recognizing them, guaranteeing them and promoting them to ensure and facilitate peace, social cohesion and mutual coexistence. The state, therefore, does not create human rights, but rather these belong to every human being. The duty of recognizing and protecting said rights is such that a positive law (democratically approved in a parliament) that ignores or does not recognize them will have to be considered an unjust law.

2.2 Characteristics of human rights

By their own nature, human rights are characterized for being *universal*, given that all human beings possess these fundamental goods and the sole condition for them to be recognized is the fact of being human. Precisely because of it, we can say that human rights are *inherent* that is, inseparable from human conditions. They rise with the new human being and fall with the person's death. Precisely because they are essential goods endowed with objective value, human rights are *unownable*, that is, are not susceptible to acts of domain. That means that said goods are so fundamental to our existence and development as human beings that they cannot be bought, sold, nor can one renounce or dispose of them, not even the individual who owns them. Of course, the State cannot assume the faculty of legitimately owning them, calling upon the collective benefit. In this sense we talk about human rights being *unconditional*, as they ought not to be violated, infringed or arbitrarily limited.

From this general view of human rights, we can better understand in what measure neurosciences and their applications, in the form of neurotechnologies, can contribute to the satisfaction or realization of these rights that entail correlative human duties. Indeed, there are no true and effective rights unless to every right be-

ing called as such (in a strong sense) is associated with a correlative duty (or responsibility to do or not to do) by the other individual, group of individuals or institution. This is a demand proper to the intersubjectivity of the law, which has already been mentioned. Therefore, we must now point out which are the human rights at stake in the field of neurotechnology, and their respective correlative duties.

3. Human rights at stake in neurotechnologies

When we talk about «law» we can use the term or the concept, at least, in two different ways: law as norm (positive law) and law as juridical good.

As «norm», we talk about law as synonym of «regulation» or «regulations», that are dispositions of the legitimate authority that intervenes and regulates, with mandatory character, human behavior, when the common good is at stake (classic definition of positive law of St. Thomas Aquinas). In this sense it is said that a jurist is an expert in law or that ignorance of the law does not exempt us from following it. There are positive laws that regulate up to a certain degree the use of neurotechnologies (e. g. laws dealing with biomedical investigation, drugs, medical devices and implants, about the autonomy of patients and protection of privacy and confidentiality, as well as laws that protect personal data, public health, etc.).

For «juridical good» we understand law as it deals with the basic needs of human existence. It is in this sense that we talk about human rights: the right to life, to integrity, or to self-identity. From this *realistic vision of human rights,*[5] these needs are the fundamental goods of the human being that we ought to recognize, respect and guarantee for all citizens and, for their own command, the authorities of the state. This is the perspective out of which we seek to analyze to what extent neurotechnologies can affect our rights.

It is in this second understanding of law that we now ponder the human rights that are at stake with the use of neurotechnologies. If we go through the *Universal Declaration of Human Rights* of the UN (1948) we find many fundamental goods that have already been recognized as universal and which, therefore, belong both to those using neurotechnologies and the ones that are or can be benefited from them (researchers and subjects participating in experimentation, doctors and patients).

Neurosciences and their neurotechnological applications are, without a doubt, tools that if used correctly (not only on a technical level but also at an ethical one), offer the opportunity to satisfy and promote the right to life, freedom, psychic integrity, and identity of people. All of these are human rights. And along with these individual benefits, is also society as a whole that is benefited by scientific and technological progresses. However, it is important not to forget that the increasing potential of said tools can signify a threat for dignity and these same essential goods of individuals and society.

3.1 Right to life

Life is the first of the fundamental rights over which our existence is constructed. A basic element and condition of possibility of this life of ours is precisely our human body that is naturally endowed with a brain and mental capacities that are developed throughout our existence thanks to the proper functioning of our brain.

It does not seem very accurate to assert that we have the right to have a brain (healthy and completely functional), as, to whom could we attribute the duty of providing us with one? Nonetheless, what we are capable of discovering is that «the human brain is the organ of the human species that most profoundly distinguishes us from all other species, including other primates (...) it is the foundation of human existence –personal, sub-personal and interper-

sonal. This gives us reason enough to attach particular value to the brain, and to appreciate the profound concerns that surround interventions that act directly upon it».[6]

New technologies undoubtedly offer promising possibilities of intervention to try and alleviate or even resolve certain pathologies or mental disorders, but it is undeniable that some of these interventions, mainly those of invasive character (deep brain stimulation or certain neurosurgeries) risk the lives of the patients undergoing them. For this reason, prudence will have to be a leading compass for neuroscientists and neurosurgeons in their neurotechnological diagnosis, treatment and intervention so as to safeguard the patient's life, the safety and efficacy of said interventions, trying to always intervene as little as possible granting the therapeutic result desired in the effective repair of the cerebral damage or mental disorder of the patient.

3.2 Right to physical and psychical integrity

«The crucial role of the brain in the functioning of the mind, the body, and the development of self-conceptions and autonomous agency makes it clear why neurological disorders and other conditions with a neurobiological basis threaten such profound and distressing personal consequences. Damage to the brain can rob individuals of their ability to participate fully in life by affecting the individual's mood, capacity for organized action, their awareness of themselves and others, and their memory».[7]

Neurotechnology interventions with therapeutic ends try to offer a solution to the necessity of alleviate and treat specific cerebral dysfunctions or mental disorders that jeopardize the physical and psychical integrity of individuals. From the bioethical perspective, the therapeutic intention of research and medical interventions justify the use of such methods when the safety and the effectiveness of the procedures are sufficiently ensured, when the

autonomy of the patient is respected (or of the individual that is subjected to experimental procedure or a clinical trial) and a proper consent is obtained on the basis of complete information the nature, aim and possible consequences of the intervention.

3.3 Right to identity

«The brain receives special attention because, for each of us, it is uniquely associated with 'me'; with our subjective self-conception and capacity to develop and exercise this conception through our actions, pursuits and relationships with others. In many cultures (though not all), a high value is placed on the development of this individualized sense of oneself. This is associated with the belief that developing and realizing this identity through the course of one's life and relationships with others is a central aspect of living a fulfilling human life. Brain damage can, however, threaten this ideal of self-realization, since injury or disease has the potential to disrupt this possibility at the most fundamental level by interfering with the capacity to form and maintain a connected sense of oneself over time».[8]

The right to identity -another fundamental human right- is mainly understood as the right to be oneself, referring to the subject's image that participates in social life, with its acquired ideas and experiences, with ideological, religious, moral and social convictions, that both differentiate and qualify the human being[9].

Therefore, personal identity constitutes a good in itself, independently of personal or social condition, of the qualities and defects of the subject: to each is recognized the right of his or her personality being preserved.[10]

In this field, neurosciences have a particularly delicate role given the plasticity of the brain, its capacity of active perception, and its continuous relation and selection of characteristic and properties of the world will directly affect the very definition of identity, expressing new neuroscientific and biotechnological concepts of per-

sonality. For example, those that Rose calls «the neurochemical self».[11]

Conceiving the world in this manner means imagining that disorders reside in the brain of the individual and its functioning, therefore considering psychiatric drugs as a first line of intervention, not only to alleviate the symptoms, but also to regulate and manage these neurochemical anomalies.[12]

Therefore, the use of neuroscientific and biotechnological devices can not only risk the privacy of the individual (a fundamental aspect of identity) with regards to the use of personal data, but can also express the possibility that identity will be reconstructed from outside, thus not being the object of an individual choice anymore. Such tendencies are justified in the name of social security.

3. 4 Right to privacy

Information obtained through the use of neurotechnologies is personal, and data obtained through them must be treated as confidential information as it is especially sensitive.[13]

The hypothesized possibility of «entering» the thought, intentions and memories of people must be carefully analyzed and pondered from an ethical perspective. What every person keeps in his or her mind is a good that only belongs to said person and is therefore exclusive to the person and whomever that person decides to share it with. We can easily imagine that is laws punish trespassing of private property in order to protect the privacy of the household, even more should we exercise caution when talking about the technical possibility of accessing people's mind, especially when the discourse revolves around the possibility of intervening, modify or alter these faculties, under certain conditions.

Prudence and caution will have to lead public and private decision-making in this field,[14] guaranteeing not only the safeguarding of fundamental human rights but also that capacity of decision-making regarding those rights is not left in the hands of certain

individuals, causing inequalities and potential inhumane and degrading treatment.

3. 5 Right to freedom

Respect of human rights implies the legitimate aspiration of men to broaden their knowledge about neurosciences consistent with the tutelage of human integrity –understood as the unity of soul, mind and body– with essential or fundamental necessities such as freedom, identity and safety.

In fact, the very concept of human freedom has been frequently questioned by neurosciences. Contemporary debate about the topic has been well synthesized by Kerri Smith in an article published by *Nature* in the year 2011[15] about the first experiments that have most influenced a vision of the neuro-conditioning of man's freedom.[16]

Precisely from this perspective, in 2008 John-Dylan Haynes demonstrated through neuroimaging techniques that human intentions are formed in the secondary motor cortex up to seven seconds before the individual becomes aware of his own decisions:[17] neurological nets (and their relative pluristratification) would be the cause and would become the elements responsible for intentional and voluntary behaviors as well as all their manifestations, even physical, of the mind-brain system.

The results have also been supported by other research (Bode, 2011) which states that: "these results are in the conclusion that the premise of the cortex is part of a network of brain regions that shape decisions right, much sooner".

However, as some point out,[18] such interpretations of human acts and will do not take into consideration mental intentionality, ignoring the synchrony of processes of intentional elaboration and of the specific mechanisms for the performance of the intention in actions through impulses of the will. Moreover, it would be impossible to explain why a specific behavior was preferred to ano-

ther, nor clarifying the «natural» selection mechanism of such behavioral patterns. Undoubtedly, such perspective does not only denigrate and mortify human dignity, it also wounds the right to the self-accomplishment of one's own identity.

4. Neurosciences and freedom: A new challenge?[19]

Today, some neuroscientists presuppose that human behavior can be wholly explained by physical processes. Neurotechnologies and neurosciences seem to be giving new support to physical determinism theories, which describes all beings' movement as the inexorable consequence of the laws of nature, physical-chemical laws, thermodynamics, etc., which are the cause of all behaviors, also of that human behavior that we think of as «free». Many theories are made according to which everything responds to physical chemical processes in the neurological structures of the human being.[20] Everything is in the brain and has its origin in the brain.[21] These advances would be the base for new deterministic theories, which would pose a new challenge to the very possibility of human freedom.[22]

Man seems to make decisions and choose the course of his actions, according to certain limits. But, is that completely accurate? We all recognize that our actions are motivated, influenced and heavily conditioned by our genetics, our biology, education, culture, our psychological state, etc., but also by what we think, believe, experience. Therefore, we could ask ourselves: if this influence is so strong, would we not be determined by those factors? What is it that really moves and directs the sense of voluntary dynamism of human action? Is it the brain, or that mind that urges me to act, or is it me, as a person, who decides how to act and direct my action based in my neurons? Am I really free, or do I only think I am, everything being a «deception» of my brain?[23]

4. 1 Free will

Western philosophical tradition has for long been embracing the existence of a unique trait in human existence, that distinguishes it from that of any other animate being: the capacity of self-determination, that is, of choosing between different courses of action, part of our actions being therefore product of our will, conscious and more or less autonomous.

This *autonomy*, as a capacity to place in the foreground the determination of the will to act, and, subsequently, to choose the orientation of our action, in one or another sense, presupposes human understanding and absence of coercion. This is what great philosophers and anthropologists, since antiquity, have generically called «free will». In Augustinian terminology, *libertas minor* consists in choosing consciously and voluntarily; *libertas maior*, however, refers to the space of possibilities in which human actions are performed: «freedom for», when man uses correctly his *liberum arbitrium* to do good.[24]

Free will coincides with what we call in modernity «autonomy», psychological freedom, or, more commonly, «freedom of choice», which would have two instances or dimensions: the capacity to choose to act without internal or external coercion («freedom of auto-determination»); and the capacity of choosing the route or course of action, that is, choosing one among all possible options («freedom of specification»).

According to a celebrated tradition of philosophical anthropology, freedom of choice, more than a characteristic or data of human nature, is a feature of certain human actions. Differently from other beings (inert, animal and vegetal)_whose movement is absolutely determined by physical-biological factors, instinct, etc., and which are absolutely incapable of making authentic choices, the human being would possess a moderate, relative (non-absolute) but real free will, which would allow him to decide the direction of some of its actions.

Man would also be the only rational living being capable of autonomously orientating some actions of his internal and external conduct, and therefore only in regards to him could we speak of free will, as a specific characteristic, intrinsic, inherent to its being, that is able to develop since it possesses a minimal mental capacity or psychological maturity.[25]

This capacity of choosing, which some call «freedom of maneuvering», is the necessary presupposition, but not sufficient, of «creative freedom», which is what brings the human being in touch with the good.[26] Autonomy or the capacity of choice consists in the psychological freedom to choose, which is perfected when we choose that which is authentically good.

Free will, therefore, stands as the condition of possibility of human freedom, and therefore, of *moral freedom*, something quite important, given that freedom goes hand in hand with responsibility: man is responsible for his acts, in so far as they are free acts. However, at the same time, actions are truly free when we hold ourselves responsible for them and their consequences.

Man is akin to, seeks and directs his actions towards the true, the beautiful and the good. Focusing on the latter, the mere possibility of choosing the *bonum*, makes the human being the only *moral subject* on the face of the earth, capable of moral right (the consequence of which is *merit*); and moral wrong (the consequence of which is *demerit*). It is then appropriate to speak about a *moral action* when this connects its author with the good that to it belongs; and about *virtue*, when the will is stable in the habit of choosing the good, freely, and therefore, responsibly.

This understanding of human conduct, which ties together freedom and moral responsibility in an inseparable manner, also has consequences in the normative order as law, given that, in the juridical environment, the conditions of freedom of action are fundamental for their juridical qualification. As in the field of ethics, if a juridical process demonstrates that the subject was not

free in his or her actions, he or she could not be held responsible for the actions committed. We can affirm that a good part of juridical responsibility theory depends on the acceptance of free will.

However, since the dawn of anthropological and philosophical thought in general, though especially in Modernity, the real reach and the very existence of freedom of choice has been questioned.

The philosophical thought of Spinoza strongly exemplifies the deterministic conception of nature conceived in a logical-mathematical manner, and therefore man, part of that whole, is the subject and prisoner of the inevitable necessity that determines natural changes, including human affections and passions. «Men are mistaken in thinking themselves free; their opinion is made up of consciousness of their own actions, and ignorance of the causes by which they are conditioned. Their idea of freedom, therefore, is simply their ignorance of any cause for their actions».[27]

Numerous thinkers, according to different foundations, have directly doubted or denied the existence of the freedom of choice, according to the diverse modulations of *determinism* (theological, metaphysical, physical, epistemological and psychological) the central ideas has always remained the same: there are many diverse factors and circumstances (internal and external), affecting, influencing and determining human decisions in such a strong manner that, man does not decide or really choose. The fact of deciding, and the direction and orientation of its actions, are determined by these internal and external factors. We think that we decide, but free will is an illusion without real ground. The mind, according to the psychologist Daniel Wegner, produces just an appearance, a continuous illusion, but does not really know what causes our actions.[28]

For its part, the *fatalist* argument tries to dissolve free will, and consequently also the freedom of choice, in a universal causality. Every happening would have its cause, and a choice is always tied to a reason - there is a «causal antecedent» in every choice.

According to determinists, our decisions are the consequence of the inevitable consequence of strong genetic, physical-biological, metabolic, hormonal, psychological, cultural, biographical, environmental conditions, etc., or of their combination, that determinatively affect our will, eliminating our capacity to choose. Denying free will, one denies the basic premise of a moral and ethical life.

Probably, within the contemporary history of thought, the most weighty theses against the existence of the freedom of choice were formulated by the so-called «masters of the school of suspicion», in particular S. Freud, who attributed the origin of our decisions to the effects of what he called «passive synthesis», inexorable deterministic influence of all human willing.[29] We do not choose; we only believe we do. Consequently, free will does not exist, it is an illusion.

Absolute determinism, in which all the universe, including human beings and their actions are subject to a rigid cause-effect chain, is incompatible with free will (*incompatibilism*). In clear incoherence with the core of this doctrine, some of this current of thought admit human freedom and an absence of external coercion in actions.[30]

Christian theology and the ranks of many important philosophical currents (Neo-Thomists, Realists, Personalists, etc.) have replied to this deterministic assertion, arguing that these factors (internal and external) condition our psychological freedom and strongly influence our free will but do not «determine» our actions, since a margin of autonomy or freedom remain in them.[31]

The determinist ideology excludes free will since freedom proper to human beings breaks the chains of determinism; actions performed under free will have no causal antecedents, just mere conditionings. «Condition» is not the same as «determine».

In any case, «the exercise of free will does not consist in choosing arbitrarily, without any «reason», that would be dissolvent and chaotic, and unthinkable situation, an unintelligent concept,

actions rather take place within the open process of personal development; they are conditioned choices, but not rigidly determined as the laws of nature are».[32]

Recently, some authors have tried to reconcile and harmonize the determinism of nature with the existence of free will: what is called *compatibilism*. It is not easy to combine freedom with the cerebral causal processes.[33] Compatibilism «bases free will in the characteristics of the human mind, that would be generated according to the neuronal processes of the central nervous system, governed by physical and chemical causality. The argument of these intellectuals proposes that these processes that faithfully follow the cause-effect chain would generate, or, using trendy philosophical slang, human conscience and the free will that depends on it, 'emerge' from neurological determinism. Mental life, according to these authors, strictly depends on the nervous system, on biological matter».[34]

In this context, *hard determinism* would be that version of incompatibilism that fully and absolutely accepts the deterministic worldview and, consequently, fully refuses the coexistence of freedom. Finally, *libertarianism*, which agrees with hard determinism in refusing *compatibilism*, accepts, however, the existence of free will admitting an indeterminism in reality that makes it compatible with freedom.[35]

Some other explanations go through the so-called *practical indeterminism*, *quantum indeterminism*, the *physics of chaos*, *emergent evolutionism*, all of them with a materialistic-biological basis.[36]

For Roger Bartra, the solution to the problem of free will is found in what he has called the *exobrain*: «part of human behavior manages to escape the deterministic nets of causation. Decisions are made in a sociocultural context and under certain conditions some individual choices not subject to deterministic laws. It could be argued that there is a social determinism that, at the same time, could be reduced to causal mechanisms located in hundreds or

thousands of brains. However, the different expressions of social determinism in its extreme versions (from social Darwinism to Marxist economics or sociobiology) have failed. With more reason is a determinism that reduces the social to the biological destined to failure (and, following the chain, the biological to the physical). The sociocultural networks that unite the collectivity of brains have their own laws, rules, norms and structures. It is at this point where we can locate the problem of free will, and from here start to understand its neurophysiological and biogenetic dimensions».[37]

Apart from the philosophical response to different forms of determinism, which we do not have room in this essay to summarize,[38] and even though the debate between determinists and indeterminists, and between compatibilists and incompatibilists, is still open,[39] it seems that we can affirm that we all have our own biographical experience of deciding and our moral experience, as an existential proof that, though strongly influenced, our freedom of choice is real.

4. 2 Neurosciences and the new neurobiological determinism

North American scientist Benjamin Libet (1916-2007) had made a name for himself in the 70's of the 20th century for a series of experiments showing that, even when a tactile sensation takes half a second in being consciously reported by the person, subjectively he or she perceives it as having arrived at the same instant.[40] Later, Libet managed to measure the moment in which the person decides to act (for example, moving a finger) and the instant in which he or she finally does it. He registered with an electroencephalograph the activity of the cerebral cortex and with an oscilloscope he timed every event.

Libet observed that voluntary acts came preceded by a specific electrical charge in the brain (the «readiness-potential»). The experiment demonstrated that this electric potential of readiness happened *before* the subjects manifested their intention to perform

an action, that rather took place *after* having consciously decided it. He also showed that a voluntary decision could abort the movement, even when the readiness-potential had already been released.

As Roger Bartra explains: «Libet reached the conclusion that the intentional action starts unconsciously. But he also observed that conscience can control the result of the process through a sort of veto power: it could inhibit the mechanisms that lead to action, even when this has already been unconsciously started. His own conclusions have been heavily criticized by determinists, as he asserted that free will is a scientific option as good or better than its negation.[41]

Libet's experiment generated interpretations that could be tagged under name of *neurological* or *neurobiological determinism*.[42] There is a group of neurophysicists and psychologists that hold that both freedom and conscience, the former being traditionally founded in the latter, are not real properties of the will or of the mind, but are rather «illusions» of the subject, with ground in the cerebral processes that act as physiological support.[43] They present a new version of the combative German naturalist materialism of the end of the 19th century, with names as Haeckel, Vogt and Moleschott, though more refined, scientifically rigorous and undoubtedly gentler.[44] The epistemological and ontological shortcomings of this monism are many and have been diversely pointed out.[45]

But if we focus on what neurosciences could add today to the debate about the existence of free will, we adhere to the conclusions of the analysis of José M. Giménez-Amaya and José I. Murillo, which explains how such an important aspect of our psychological constitution, as «the phenomenon of self-conscience is, is decisive to inquire about self-determination and free will, exceeds the resources of a reductionist neurobiology.... New neuroimaging techniques have not managed to show the functioning of our brain as a whole in a unitary manner, neither from the cognitive perspective nor in the field of affectivity and memory. This invites us to consider the conclusions of their analysis as highly hypothetical.... It

clearly appears, therefore, that the great scientific stumbling block of modern Neuroscience is to find a congruent explanation in the quest to find out how our brain works as a whole and unitarily in the cognitive, emotional and memory processes and now also in terms of self-awareness. Neuroscience is not able to provide a unitary vision of all of our actions as men».[46]

The understanding of self-awareness is vital to face the problem of the existence of free will. For some neuroscientists, a neurobiology compatible with freedom is possible. For instance, Eric Kandel, set forth five principles that should, in his opinion, frame the investigations about mind-brain relations, concluding that Neuroscience is the privileged method to solve humanity's biggest questions, freedom being among them.[47]

If new neurosciences cannot completely explain phenomena such as the cognitive process, memory, affectivity or self-awareness, it is because, even though said phenomena are based in physical-biological structures, they cannot be reduced to them. An interdisciplinary approach is needed, one that does not exclude other sciences, sciences such as philosophy. Neurosciences lack the capacity to offer a global, total and unitary explanation of these processes and activities of the human being, because of the inadequacy of their scientific method to know certain realities that exceed the empirical level and belong to the realm of the metaempiric or metaphysic.

Current biological reductionisms are new forms materialism and scientism that do not help understand, in its enormous complexity, these aspects of our being. As Gazzaniga wrote: «At a time when we all accept that causal forces are the only way to understand the physical world, don't we need a new frame of thinking to define the interactions and mutual dependence of the physical and mental world?... Even with the knowledge of physics, chemistry, biology, psychology and all other disciplines, when the mobile parts are looked at as a dynamic system, an undeniable reality

emerges: we are responsible agents. As my children say: «you will have to get over it». Human life is a great thing».[48]

In our opinion, human acts cannot be reduced to what the empirical data shows, as they are presented reductively in the renewed rationalistic mechanism of some neurologists.[49]

Human action, and the moral life that gives rise to freedom, are something more complex. It is necessary to integrate the physiological, sensorial, organic aspects, etc., with realities that escape biologicist reductionism, such as human affection or love, responsible for what we might call the "awakening" of freedom.

Human action is not human without the intellection of the ends; it is human inasmuch as it has an intentional unity between the proximate and final ends. It is of an existential, transcendent nature.

This interpretative framework, which incorporates an interpersonal dimension, teleology, intentionality and affections, fills the human action with meaning, because it reveals the truth of man.[50]

5. Juridical implications of neurotechnological developments

Law is interested in neurosciences inasmuch as they contribute to knowledge about human behavior, which is also the object of juridical norms, which order human behavior in society with the aim of achieving the common good.

In the specific ambit of criminal law, specialists believe that the possible influence of the inputs of neuroscience are centered both in the preventive orientation of the punitive system and in the future evolution –theoretical and practical– of juridical-criminal culpability.[51]

Law should regulate and affect neurosciences inasmuch as these require human intervention, from scientists, physicians, etc., the behavior of which ought to be respectful with a person's dignity

and fundamental rights, as a condition of possibility of social cohesion and peace.

In this sense, a first juridical implication of the development of neurosciences would be related to the limits that must be established upon investigation, diagnosis and therapeutic processes, performed over the human brain, when it deals with issues regarding the person's identity, or his or her intellective and volitional capacities.

The techniques and investigations that affect the human brain ought to be scrupulously respectful towards human dignity and freedom, being valid in this regard the bioethical exigences contained in the main texts of the juridical documents and international declarations related to the ethics of scientific investigation (Declaration of Helsinki, Universal Declaration of Human Rights (UN), UNESCO's Universal Declaration on Bioethics and Human Rights, Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine (Council of Europe)).

In civil law, there is a distinction between «juridical capacity» and «capacity to act». The former is shared by all humans, for the fact itself of being human. The second one corresponds to persons, starting from full age, as it is assumed, they have the full capacity to understand and make decisions.

But this capacity, necessary in order to perform juridical actions (e. g. signing a purchase agreement or selling a house), can be affected by certain pathologies or mental disorders which place the person, holder of rights, in a weak or vulnerable position. Law has anticipated that in these situations the person can be legally disabled with the aim of protecting him or her from possible abuses, transferring the responsibility of the performance of juridical actions to his or her tutor or legal representative.[52]

Thanks to neurotechnologies, these situations or states of conscience can be more accurately recognized, delimiting in certain ca-

ses the higher or lower communication capacity of the individual. Law cannot be subtracted from this knowledge, inasmuch as it can be considered scientifically true.

As explained above, neuroscience can help us understand the way in which individuals make decisions, as well as the elements that affects us and those that do not. The inputs of neurosciences will bring essential elements for the real determination of the concept of will and in juridical-probative matters, for instance, will allow to discern when a person is lying in front of a tribunal.

However, neurodeterminism defends the dissolution of the distinction between voluntary and involuntary acts, which could lead us to change our current understanding of important concepts in our criminal liability imputation scheme as culpability,[53] willfulness, and at the same time, knowledge or intentionality.

In Spain, Francisco Rubia[54] has warned about this relation: «lack of freedom will completely change the way in which we understand our own conduct and that of others, especially when it comes to praising it or punishing it. We can only punish people who are responsible for their acts, and the punishment is as attached to guilt as guilt is to freedom. Therefore its reach would not be limited to changing the image we have of ourselves and others, but would also have penal consequences, given that punishments are tied to imputability and culpability... If there is no freedom, culpability and responsibility cannot be conceived, therefore those members of society that transgress the laws that we have ourselves created in order to allow pacific coexistence must not be punished. It is to be supposed that no new knowledge can change this fact, but it will surely change the image we have of the criminal or transgressor of those laws, who would not be guilty but, in the benefit of society will have to be isolated. In more than one occasion, I have referred to this with the term «neuroscientific revolution...».[55]

The criminal imputation scheme based upon the willfulness of the act (indeterminism) for which, punishment of the typified fault

depends on the conditions of freedom of the agent and culpability, will have to be revised if it is to be accepted that there is no free will.

Without it, there is no «criminal mind», given that if there is only neuronal and cerebral structure there is no mind, and therefore no crime in the sense that juridical-criminal responsibility demands a subject which with willful intentionality or by guilty negligence commits a crime. Criminal responsibility belongs to a subject (subjective), who «wills» the action and the outcome of the action (objective). If, according to neurodeterminism, the act is not free but determined, then the consequences were not wanted and responsibility cannot be demanded for a harmful consequence thus limiting the possibility of an objective responsibility.

Another implication that will have to be pondered is the use of neurosciences in judicial processes. We are referring to the techniques of assessment of scientific evidence, as, for instance, the so-called «truth detector», as any other technology or medical application that intended to be used to support an accusation or an absolution, for example, empirically demonstrating the presence or absence of the memory of an event as an evidence against the accusation, which could infringe certain fundamental rights of the processed subject.[56]

Twenty of the Spanish Penal Code and other legal systems, as well as the limits that derive from it between culpability and dangerousness. It is debated, for instance, to what degree new neurological techniques of prediction are applicable to criminal law.[57]

Neurotechnological applications, more or less invasive, designed to affect the behavior of inmates, for instance, orienting their rehabilitation, would make it necessary to rethink the meaning of punishment.

It would also be worthy of a consideration that exceeds the possible extension of this essay the application of neurosciences to the prediction of criminal behavior, especially directed towards the prevention of grave crimes such as terrorism.

In these cases, the classical debate in the pondering of two fundamental juridical goods is reproduced: the security of collectivity against the integrity and inviolability of the person that is the terrorist. All neurological intervention oriented towards the access to the cerebral structures of any person, also of the terrorist, in order to obtain information or induce behaviors must be harmonized with the necessary respect for his or her rights.

The same ethical limitation is seen in the relation between neuroscience and jurisprudence, in the sense of anticipating the knowledge about the reasoning and deciding of the judges.

Lastly, in the same general framework must be applicable to eventual interventions (these being genetic, optogenetic, pharmacological or surgical) in the brain (some of them would be regarded as science fiction if it wasn't because some experiments have already been made) with the goals of healing or improvement («*Neuroenhancement*»).[58] About this and the eventual juridical-penal consequences of such interventions, which would carry the possibility of affecting from cognitive faculties to emotional or motivational states (e. g. the neuro-pharmacological reduction of aggressive states), the experts' opinions are diverse.

Reinhard Merkel has dealt in detail with the kind of situation we would face in the frame of the so-called *Neuroenhancement*, or interventions in the brain with the aim of improving the mental condition of the human being.[59]

The possible techniques range from the use of neurodrugs to improve cognitive, emotional and motivational capacities of the brain, all the way up to transcranial magnetic stimulation, memory manipulation, optogenetics or photostimulation the obtain cerebral control, and others, that create expectations of treatment of disease but also of the external control of human behavior and the manipulation of its «neurological identity», all of which present obvious juridical problems.[60]

The debate regarding a *moral* orientation of *neuroenhancement* is also opened, in the sense of raising the question of whether or not

it would be worthwhile to explore the possibilities offered by science in order to affect individual behavior, to increase respect and fidelity towards human rights and the legal system that guarantees them, as a way to reduce their violation; or of rather this kind of intervention should be totally prohibited: would this «moral enhancement» be legitimate?[61]

The bioethical discussion around the legitimacy of the enhancement of neurocerebral capacities confronts the supporters of libertarian theses (limitless individual autonomy) with those who postulate that the morality of any enhancement depends upon the proportionality (personal and social) and of the aim (therapeutic and not merely «liberal»[61]) of the enhancement action.

Recently, there has been a shift from the use of drugs and substances to improve children's school performance or the intellectual capacities of adults, to talking about the legitimacy and even the *duty* to enhance them. The debate between *enhancement* and *achievement*: biotechnology *vs.* personal effort, starring those who, from libertarian positions, claim for the right of enhancing and even for the duty of enhancing:[63] if we have available the drug or the treatment, why not just improve the intelligence of the child or the young boy in order for them to improve their academic performance? If we have biotechnology and pharmacology available, would it not be something fitting, good, and even «due», to increase the intelligence of people so that we can overcome the limits that are foreseen in the future of our species thus erasing our intellectual and moral limitations?

In the wake of this positive *neoeugenics*, neuroscience could become the maker of the *posthumanist* ideal, profoundly dehumanizing, on the line of the project promoted by the *transhumanist* project. The dangers of the underlying anthropology and the moral deficiencies of their project of a new civilization have been described by extensively elsewhere.[64]

The legal permission of neuro-enhancement, with enough time will likely surpass the limits of private medicine and psychiatry,

probably only within the reach of the economic elite, creating problems of social justice in the public sphere, as the eugenic ideology could propitiate the postponement of investments, investigations and treatments due to the ill and disabled, etc. in favor of therapeutic and investigative projects towards the development of those new human beings.

As a conclusion, we can assert that at the present moment new advances in neurosciences cannot explain the complexity of the voluntary human action, without admitting a margin of possibility to free will. The law, if it is to be loyal to the *telos* of service to justice and the common good that justifies it, will have to favor a development of the neurosciences compatible with the respect to the fundamental juridical goods that we have talked about in this text: identity, integrity, privacy, and the inviolability of the human being, irreducible to his physical-biological reality, and consequently holder and carrier of moral and juridical goods inherent to his personal nature.

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