ORIGINAL
Research Article

Neurotechnology and human rights: assessing the need for neurorights*

Neurotecnología y derechos humanos: evaluando la necesidad de los neuroderechos

Recibido: Enero 24 de 2024 – Evaluado: Marzo 06 de 2024 – Aceptado: Abril 23 de 2024

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To cite this article / Para citar este artículo
Peña Cuellar, D. M., Vidal Lasso, A. D., Luna Salas, F. & Roa Méndez, J. A. (2024). Neurotechnology and human rights: assessing the need for neurorights. *Revista Academia & Derecho, 15* (28), 1-23.

* Unpublished article. Research Article developed by the FIBIDE Research Group of the University of the Amazonia, Florencia, Caquetá, Code: COL0175628, in synergy with the University of Cartagena and in execution of the research line of Public Law and Private Law.

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Abstract

The continuing development of neurotechnology presents meaningful challenges to the protection of human rights, especially in terms of privacy and mental integrity. In response to these challenges, the proposal to embrace neurorights has emerged, that is to say, to adapt or expand traditional human rights to better protect individuals in the face of new technological capabilities. Therefore, this article examines the feasibility of recognizing neuro-rights as a new legal category.

In this context, the evolution of the concept of neuro-rights is reviewed, along with its introduction by writers such as Marcello Ienca and Rafael Yuste. Next, the various proposals for neuro-rights are analyzed, highlighting their similarities and differences.

Finally, after applying the analytical-synthetic and historical-logical methods, complemented with the use of the specialized Atlas.ti software based on literature review and text analysis, it is concluded that it is not necessary to create neuro-rights as a new category, as this could even weaken the special protection of already established rights. Instead, it is proposed that existing human rights should be dynamic and flexible to adapt to neurotechnological advances, ensuring effective and consistent protection in all areas.

Keywords: Neurotechnology, science and technology, Neurorights, human dignity, human rights.

Resumen

El desarrollo continuo de la neurotecnología presenta desafíos significativos para la protección de los derechos humanos, especialmente en términos de privacidad e integridad mental. En respuesta a estos desafíos, ha surgido la propuesta de acoger los neuroderechos, es decir, se busca adaptar o expandir los derechos humanos tradicionales para proteger mejor a los individuos frente a las nuevas capacidades tecnológicas. Por lo que, este artículo examina la viabilidad de reconocer los neuroderechos como una nueva categoría jurídica.

En este sentido, se revisa la evolución del concepto de neuroderechos y su introducción por autores como Marcello Ienca y Rafael Yuste. A continuación, se analizan las diferentes propuestas de neuroderechos, identificando sus similitudes y divergencias.

Finalmente, luego de aplicar los métodos analítico-sintético e histórico-lógico, complementados con el uso del software especializado Atlas.ti a partir de revisión bibliográfica y análisis de textos, se concluye que no es necesaria la creación de neuroderechos como una nueva categoría, esto podría incluso debilitar la protección especial de los derechos ya establecidos. En cambio, se propone que los derechos humanos existentes sean dinámicos y flexibles para adaptarse a los avances neurotecnológicos, garantizando una protección efectiva y coherente en todos los ámbitos.

Palabras clave: Neurotecnología, ciencia y tecnología, Neuroderechos, dignidad humana, derechos humanos.

Resumo

O desenvolvimento contínuo da neurotecnologia apresenta desafios significativos para a proteção dos direitos humanos, especialmente em termos de privacidade e integridade mental. Em resposta a esses desafios, surgiu a proposta de adotar os neurodireitos, ou seja, busca-se adaptar ou expandir os direitos humanos tradicionais para melhor proteger os indivíduos diante das novas capacidades tecnológicas. Este artigo, portanto, examina a viabilidade de reconhecer os neurodireitos como uma nova categoria jurídica.

Nesse sentido, revisa-se a evolução do conceito de neurodireitos e sua introdução por autores como Marcello Ienca e Rafael Yuste. A seguir, analisam-se as diferentes propostas de neurodireitos, identificando suas semelhanças e divergências.

Finalmente, após a aplicação dos métodos analítico-sintético e histórico-lógico, complementados pelo uso do software especializado Atlas.ti, a partir de revisão bibliográfica e análise de textos, conclui-se que não é necessária a criação de neurodireitos como uma nova categoria jurídica, pois isso poderia até enfraquecer a proteção especial dos direitos já estabelecidos. Em vez disso, propõe-se que os direitos humanos existentes sejam dinâmicos e flexíveis para se adaptarem aos avanços neurotecnológicos, garantindo uma proteção eficaz e coerente em todos os âmbitos.

Palavras-chave: Neurotecnologia, ciência e tecnologia, Neurodireitos, dignidade humana, direitos humanos.

Résumé

Le développement continu de la neurotechnologie présente des défis significatifs pour la protection des droits de l'homme, notamment en termes de vie privée et d'intégrité mentale. En réponse à ces défis, il a été proposé d'adopter les neuro-droits, c'est-à-dire d'adapter ou d'élargir les droits humains traditionnels pour mieux protéger les individus face aux nouvelles capacités technologiques. Cet article examine donc la viabilité de la reconnaissance des neuro-droits en tant que nouvelle catégorie juridique.

À cet égard, l'évolution du concept de neuro-droits et son introduction par des auteurs tels que Marcello Ienca et Rafael Yuste sont passées en revue. Ensuite, les différentes propositions de neuro-droits sont analysées, en identifiant leurs similitudes et divergences.

Enfin, après avoir appliqué les méthodes analytico-synthétiques et historico-logiques, complétées par l'utilisation du logiciel spécialisé Atlas.ti à partir d'une revue de la littérature et d'une analyse de textes, il est conclu qu'il n'est pas nécessaire de créer les neuro-droits en tant que nouvelle catégorie juridique. Cela pourrait même affaiblir la protection spéciale des droits déjà établis. Au lieu de cela, il est proposé que les droits humains existants soient dynamiques et flexibles pour s'adapter aux avancées neurotechnologiques, garantissant une protection efficace et cohérente dans tous les domaines.

Mots-clés : Neurotechnologie, science et technologie, Neuro-droits, dignité humaine, droits de l'homme.

SUMMARY**:** - Introduction. -Research Problem. -Methodology. - Outline of the resolution of the research problem. - Drafting Plan, 1. Neuroscience and Neurotechnology, 2. Neuro-rights: The Proposal for a New Catalogue of Rights, 3. The meta-fundamentality of human rights: A response to the creation of neuro-rights. – Conclusions -References

Introduction

The continuous dynamism of human beings has precipitated several revolutions across various domains, including social, political, scientific, and technological (Peña-Cuellar and Vidal-Lasso 2020, p. 40). Within the latter domain, neurotechnology has emerged, providing tools capable of intervening inhuman cognition and behavior and presenting challenges to privacy, autonomy, and mental integrity. These advancements necessitate a thorough examination of how traditional human rights can effectively protect individuals in the face of new technological capabilities.

In light of this, the creation of a new category of rights known as "neuro-rights" has been proposed, suggesting that traditional human rights are insufficient to address the novel realities emerging in the digital and neuroscientific contexts. In contrast, the theory of meta-fundamentality offers a critical perspective on this debate, arguing that human rights transcend constitutional provisions and are grounded in universal principles that protect the dignity and freedom of the individual (Bastida, 2005).

This approach is supported by the theory of rights inflation, which cautions against the risks of diluting the special protection afforded by human rights through excessive expansion of their catalog.

The foregoing debate highlights a tension between the potential of neurotechnologies and the legal system's capacity to adapt to these innovations without fragmenting the existing human rights framework. Therefore, it is essential to consider whether a separate category of rights is necessary to address these challenges or if the current human rights framework can be effectively adapted.

Based on this, the research seeks to analyze the need to adjust existing human rights in response to advancements in neuroscience, considering meta-fundamentality as a key to understanding and justifying the continued protection of human rights in an evolving technological context.

Research Problem:

To what extent is the creation of neurorights as a new legal category of human rights related to neurotechnology appropriate?

Methodology

The present research employs a combination of analytical-synthetic and historical-logical methods, complemented by the use of specialized Atlas.ti software for a rigorous and detailed analysis. The application of each of these methods is detailed below:

- **Analytical-Synthetic Method:** It was used to develop a detailed analysis of the problems detected and the information obtained from the literature review and specialized documentation. A documentary study was carried out that included scientific and official documents from national and international organizations. In addition, current articles in newspapers, magazines and other media were consulted. The Atlas.ti software was used to manage and analyze the qualitative data, allowing the categorization and synthesis of the relevant information for the effective completion of this research work.

- **Historical-Logical Method:** This method was applied to contextualize the object of research and the field of action. It was narrated how, with the passage of time, technological advances in the field of neurotechnology have manifested themselves and influence today. Atlas.ti software was used to trace and study the historical and logical evolutions of concepts and regulations related to neurotechnology and human rights.

By virtue of this exhaustive review of the existing literature, a critical analysis of the proposals of various authors and the evaluation of the feasibility of these proposals in light of the fundamental principles of human rights is carried out. A dogmatic qualitative approach is employed to provide a comprehensive view of the problem.

Outline of the Resolution of the Research Problem

The resolution of the research problem is organized as follows: i) identification of the relationship and developments between neuroscience and neurotechnology, emphasizing their impact on the legal field; ii) examination of various initiatives and classifications of neuro-rights proposed in the doctrine; iii) analysis of existing human rights from the perspective of meta-fundamentality, assessing their adequacy to address the challenges posed by neurotechnology.

Drafting Plan

1. Neuroscience and neurotechnology

The brain plays a fundamental role in the life of the human being, Gazzaniga (2006) expresses that “it is what sustains, manages and generates the sense of identity and personality, the perception of the other and the human essence” (Pág. 34), and from an ontological perspective, it can be said that from there its inherent characteristics are born, giving it a special value by existing in reality and giving meaning to everything that is common to it.

In this order of ideas, it is important to clarify that the brain is not a muscle; it is composed of millions of neurons interconnected by axons and dendrites, which allow regulating all the functions of the brain, body and mind (CogniFit n.d.). Identifying, understanding and analyzing brain activity is an ambitious task, mainly carried out by neurotechnology and neuroscience.

A notable example is the International Brain Initiative (IBI), formed by representatives of the most relevant brain research projects in the world, with the purpose of unifying knowledge. For Adams, et al (2020) the IBI has the vision of “catalyzing and promoting neuroscience research through international collaboration and knowledge sharing, uniting diverse ambitions to expand scientific possibilities and disseminating discoveries for the benefit of humanity”. (Pág. 212)

Corollary to the above, neuroscience is intrinsically related to the human being, being this the cornerstone of its object of study and research, therefore, Mora and Sanguinetti (1994) define it as "the interdisciplinary field that studies various aspects of the nervous system: anatomy, functioning, pathology, development, genetics, pharmacology and chemistry, with the ultimate goal of understanding in depth the cognitive processes and behavior of the human being".

The efforts of neuroscience in recent decades are evident in different scientific fields and professional fields such as psychology, medicine, technology, biology and science in general, therefore, neuroscience is mutating and adopting, according to Redolar (2002) "a multidisciplinary character that has allowed disciplines with different traditions, methodologies and different objects of study to incorporate the scientific analysis of the nervous system as something fundamental and vertebral in its theoretical framework". (Pág. 347)

For Álvarez Duque (2013) it is evident to highlight that neuroscience is supported by other related disciplines with the purpose of "understanding that the brain produces the marked individuality of human action; that is, it seeks to relate the changes that occur in neurons and correlates with mental processes" (Pág. 155), such as thoughts, emotions, ways of speaking, acting and in general everything that comes directly from the human brain that characterizes each person.

The term neuroscience, according to Jones (2000) "expresses a new concept called a science of the brain or mind, and a discipline not constrained by the prevailing attitudes, dogmas and techniques underlying the traditional disciplines" (Pág. 6), becoming a modern field of study that seeks to explore terrain not yet fully investigated.

In this regard, neuroscience has been understood to be the study of the nervous system, which includes the brain, spinal cord and sensory nerve cell networks (Colquehuanca, 2019).

In summary, as stated by Luna Salas et al., the object of neuroscience is the understanding of the nervous system, which could be explained metaphysically as the study of the system through which the human mind functions, scientifically approached.

Now, based on what has been said, different fields of study have been conceived, within which is neurotechnology, which for Müller and Rotter (2017) is understood as "the assembly of methods and instruments that enable a direct connection of technical components with the nervous system". (Pág. 1)

That is, they are those technologies aimed at studying the nervous system or improving its function, which allow extending the range of available treatments for the rehabilitation of damaged functions and provide new assistive solutions for lost functions (Barrios et al. 2017).

In this vein, Roberts (2019) emphasizes that the main objective of neurotechnology is "to achieve a connection interface between the brain and a computerized device that is capable of responding in real time, that learns, adapts, and manages to function in an integrated way (as a closed circuit)". (Pág. 2)

In this way, it seeks a priori to have a positive impact on people's quality of life, which is why, according to UNESCO (2021) "to this end, enhancing our scientific understanding of human brain function and unlocking the pathological conundrums of several treatment-resistant neurological and mental disorders is a major priority". (Pág. 5)

Thus, in the words of Ienca and Andorno (2021) it can be noted that "modern advances in neuroscience and neurotechnology have allowed the progressive unlocking of the human brain (...) about brain processes, as well as about their relationship with mental states and observable behavior". (Pág. 2)

However, humanity has perceived throughout history the different revolutions that have taken place and the neurobiologist Rafael Yuste already warns that the next revolution that is approaching in a couple of years will be that of brain devices, which means that they will be, according to Tello (2021) technologies of a non-invasive nature:

> (...) that will allow us to connect our brain with the internet through a brain-computer interface (BCI), a kind of 'brain iPhone' that heralds an unprecedented business because of its features, including the promise of increasing our cognitive abilities. That will make it possible to connect our brains to the Internet through a brain-computer interface (BCI), a sort of "brain iPhone" that heralds an unprecedented business for its features, including the promise of increasing our cognitive capacities. (Pág. 418)

It should be noted that, for García García (2020), thanks to the union between neuroscience and neurotechnology, a "new opportunity is offered to understand our mind and behavior, the structure and functions of the self, not only by observing behavior from the outside, but also by studying the functional organization of the brain". (Pág. 10)

For example, Ausín, Morte and Monasterio (2020) indicate that neuroimaging and functional-structural neurostimulation techniques such as "functional magnetic resonance imaging (fMRI), positron emission tomography (PET), even electroencephalography (EEG) (...) transcranial magnetic stimulation (TMS), transcranial direct current stimulation (TDCS)" (Pág. 1). These are imaging neurotechnologies that open their doors to examine the structure of the brain, in addition to its anatomy by means of devices and computers that identify the performance of brain activity.

On the other hand, neurostimulation techniques, as previously mentioned, consist of modulating brain activity and nerve impulse, using invasive or non-invasive magnetic devices to stimulate the regions of the brain that are of interest, normally these techniques are intended for therapeutic purposes especially, thus a reciprocal relationship between the human brain and technological tools is observed, advancing with certainty towards the objectives proposed by neurotechnology and neuroscience.

It should also be highlighted that neuroprosthetic techniques or brain-machine interfaces, known by their acronym (BMI), have been created with the aim of providing solutions through effective treatments to patients with hearing disorders. Therefore, Alzérreca, Pardo and Délano (2011) point out that auditory neuroprostheses in the field of otorhinolaryngology are:

> (i) cochlear implant (CI) whose electrodes directly stimulate the auditory nerve, (ii) the auditory brainstem implant (ABI) which stimulates the cochlear nucleus in the brainstem, and (iii) the auditory midbrain implant (AMI) which activates neurons in the

> inferior colliculus. The CI is the most effective, safe and clinically successful nervous system prosthesis, with almost 200,000 patients implanted worldwide. (Pág. 318)

The essence of these neuroprosthetic techniques has the final destination of trying to recover, replace, improve the sensory, motor and cognitive functions of people who in their daily lives have lost the ability to hear degeneratively, therefore, with these new methods is the stimulation of the auditory nerve by implementing electrical signals, this is how the incidence of cochlear implants is observed in the study of otolaryngology for patients with deafness can hear again.

Brain-machine interfaces are intended to amplify the cognitive capabilities of the human brain by embedding sensors to measure, decode and modulate brain activity, so that Lebedev and Nicolelis (2017) express that "BMI studies have demonstrated neural control over the movements of robotic and virtual actuators executing upper and lower limb functions." (Pág. 1)

At this stage, brain-machine interfaces will allow the introduction of artificial intelligence through actuators and robotic devices, in order to be able to effectively pre-detect the various pathologies that may arise from the brain, which is why the inclusion of neurotechnology related to artificial intelligence in obtaining and searching for novel neurophysiological methods, is beneficial for people who have lost the mobility of their limbs, since they can regain their auditory, cognitive and sensory abilities.

Now, neurotechnology is a constantly evolving field that seeks to unravel the human brain and develop technologies. Thus, various research projects, both governmental and private are advancing in this field with goals ranging from mapping brain activity to creating brain-machine interfaces. The following is an overview of some of the most prominent projects in this field:

a. Governmental or government-supported initiatives:

- **The Brain project:** Known in English as Brain Research through Advancing Innovative Neurotechnologies or Brain Activity Map Project, was proposed in 2013 by then U.S. President Barack Obama with a multi-million-dollar budget and a planned duration of a decade.

A key role in this project has been played by the Spaniard Rafael Yuste, a researcher at Columbia University, whose main objective of the project is to decipher the brain structure in order to understand its functions and mental processes, including perception, attention, learning, memory, language, thought and emotions (García García, 2020).

This megaproject aims to carry out a complete mapping of the neuronal activity of the human brain, making it possible to understand its structure and functions, and to analyze in detail all its neuronal circuits. For Iacoboni (2009) it is essential to bear in mind that "the human brain contains about one hundred billion neurons, each of which can make contact with thousands, even tens of thousands, of other neurons" (Pág. 18), these contacts are the means by which neurons communicate with each other.

Given the broad scope of the Brain Activity Map project, it is reasonable to assert that its long-term objectives encompass developing techniques for measuring neuronal activity and circuits, innovating technologies for collecting these data, implementing neuromodulation or stimulation techniques for treating neurodegenerative disorders, and ultimately, compiling and examining all brain and neuronal activity using advanced technologies.

From the Brain Project, several research projects have been developed, e.g. *i*) **Human Connectome Project**, where researchers have worked on the creation of detailed maps of neuronal connections in the brain, using advanced imaging techniques such as functional magnetic resonance imaging (fMRI) and two-photon microscopy (Van Essen et al. 2013); *ii*) **Genetic Tools (Development of Genetic Tools for Neuroscience)**, genetic tools such as CRISPR and optogenetics, which allow manipulating and studying neuronal activity with precision.

- **Human Brain Project (HBP):** European Union project, launched in 2013, is a European research initiative that seeks to advance knowledge of the human brain through simulations and computational modeling. It aims to create a collaborative research platform to explore the structure and function of the brain. (Human Brain Project & Ebrains, 2023)
- **China Brain Project:** Launched in 2016, the China Brain Project focuses on basic and applied research in neuroscience, including the development of advanced technologies for the study of the brain, and the translation of these advances into clinical and artificial intelligence applications. (Yuan et al. 2022)
- **Brain/MINDS (Brain Mapping by Integrated Neurotechnologies for Disease Studies):** Launched in 2014, it aims to map the brains of non-human primates to better understand the human brain and develop treatments for neuropsychiatric diseases. (Okano, Miyawaki and Kasai, 2015)
- **Canadian Open Neuroscience Platform (CONP):** Canadian initiative, which consists of an open data platform that promotes collaboration and data sharing among neuroscience researchers in Canada, facilitating access to advanced tools and resources in neurotechnology (The Canadian Open Neuroscience Platform n.d.).
- **The Israel Brain Technologies (IBT):** Is an initiative that promotes innovation and development in neurotechnology, supporting startups and research projects that seek advances in the treatment of neurological and psychiatric diseases. (IsraelBrain n.d.)

b. Private Initiatives

In addition to government-supported projects, private companies have also invested significantly in brain research and the development of innovative technologies, of which the following stand out:

- **Neuralink:** Focuses on neural activity and brain-machine interfaces, which hold promise for restoration of sensory and motor function and treatment of neurological disorders (Musk, 2019).

The company plans to implant invasive brain chips known as N1 Link, which will allow access to different areas of the brain and obtain previously unreachable data.Because of this Forbes (2022) characterizes the Link wires in the following terms: “thin, flexible wires that cannot be inserted by the human hand. Therefore, the company is building a robotic system that the

neurosurgeon can use to reliably and efficiently insert these threads exactly where they need to be."

In this way, Neuralink seeks to revolutionize the world and even neurotechnology itself by linking the human brain with artificial intelligence in scientific and technological development, where these chips have already been implemented in animals such as monkeys and pigs to record neural activity, moreover, Pisarchik, Maksimenko and Hramov (2019) "studies in animals, mainly monkeys, have demonstrated the effectiveness of invasive recording of cortical neuron activity to create an effective brain-machine interface to control more complex movements." (Pág. 4)

Similar to Project Brain, Neuralink aims to implement these brain chips to treat people with brain injuries, facilitating the understanding of the human brain and developing invasive brain-machine interfaces that allow patients with quadriplegia the ability to perform reaching and grasping tasks through a robotic arm manipulator (Pisarchik, Maksimenko and Hramov, 2019).

The innovation of these interfaces will help people with paralysis, tetraplegia and quadriplegia to regain motor control of their limbs through computers and mobile devices, and neuromodulation techniques that allow the recovery of sensory, cognitive and general body function. In the long term, the goal is to enable direct communication between people through their thoughts by implementing N1 Link chips.

- **Kernel Project:** The company Kernel, founded in 2016, has developed a prototype non-invasive brain interface based on near-infrared spectroscopy, capable of identifying mood states. (Kernel, 2024)
- **Neuroelectrics projects:** The company Neuroelectrics has applied non-invasive brain stimulation to Alzheimer's patients, improving their episodic memory. This company has led pioneering projects in the use of non-invasive neurostimulation technologies for the treatment of neurological and psychiatric diseases through the development of innovative devices. (Neuroelectrics, 2024)
- **Project BrainGate:** Is a brain-computer interface (BCI) system developed by a consortium of physicians, scientists and engineers to restore communication and mobility to people with severe disabilities by implanting sensors in the brain that control external devices. (Braingate, 2024)
- **MindMaze:** Develops neurotechnology platforms that combine virtual reality and brain-computer interfaces for neurological rehabilitation and treatment of neurological diseases. (MindMaze, 2024)

That said, neuroscience and neurotechnology have progressed significantly, offering promising solutions for understanding and treating the human brain. Projects such as Brain and pioneering companies such as Neuralink are pushing the boundaries of brain knowledge and technological capabilities. Thus, with these advances come some potential applications including:

- Treatment of neurological diseases, as they can be used to develop new treatments for conditions such as Alzheimer's, Parkinson's and epilepsy.
- Cognitive performance enhancement, which can be used to develop technologies that help people learn, remember and make decisions more efficiently.

- Brain-machine interaction, generating brain-machine interfaces that allow people to control devices or systems with their thoughts.

Thus, in the face of this eminent technological advance, a series of legal challenges arise, such as, for example, the question of whether it is ethical to use neurotechnology to improve the cognitive performance of some people, which could create a new form of social inequality. Similarly, it is also questioned how to ensure the privacy of neuroscientific data, which could be used to obtain personal information about people, moreover on the latter last August 9 (09), 2023, the Third Chamber of the Supreme Court of Chile issued a ruling on the constitutional action of protection filed by Guido Girardi Lavín against the company Emotiv Inc.

This company specializing in bioinformatics and technology markets the "Insight" device in Chile, which collects information on the brain activity of its users. Girardi Lavín purchased the device in March 2022, registering in Emotiv's data cloud and accepting the company's terms and conditions. However, by using a free license, he was unable to manage his brain data. Subsequently, he discovered that all his brain data was recorded and stored in Emotiv's cloud without his consent, so he claimed risks of re-identification, hacking, unauthorized reuse and others, requesting modification of the company's privacy policies and deletion of his brain data.

In this particular case, the Supreme Court decided to protect the rights of the plaintiff under the framework of Law No. 21,383, which amended the Fundamental Charter and establishes that scientific and technological development must respect the physical and psychological integrity of individuals. It also emphasized that neurotechnology poses risks to human rights and privacy, referencing international regulations and Law No. 20,120 concerning scientific research on human subjects. Finally, it considered the necessity of explicit consents and adequate protection of personal information, concluding that Emotiv Inc. did not fully comply with these regulations.

In view of the above and taking into account the transformative power of these technologies, several academics have proposed the need to create a new category of human rights, called "neuro-rights", an initiative that is analyzed in the following section.

2. Neurorights: The proposal for a new catalog of rights

Rafael de Asís considers that the first time the term Neurolaw was coined was by Sherrod Taylor in the early 90's in the article "*Neuropsychologists and Neurolawyers*", however it should be noted that the term was not used in an environment of recognition of new rights, Rather, the authors would adopt it from the civil branch for lawsuits on traumatic brain injuries, highlighting the role of neuropsychologists together with lawyers in the study of those pathologies and the relevance that their specialized knowledge would have within the litigation (Taylor, Harp and Elliott 1991).

On the other hand, according to Marcello Ienca, the term neurorights was first introduced in a paper published by him together with R. Andorno in 2017, entitled "A New Category of Human Rights: Neurorights".

In this work, Ienca and Andorno, after analyzing the main human rights standards, concluded that these were not sufficient to protect human beings in the face of neurotechnology, so it was necessary to adapt the rights already recognized and even create new rights.

Furthermore, in 2017, Rafael Yuste, along with other scientists, published an article entitled "Four ethical priorities for neurotechnologies and AI", for them, the combination of neurotechnologies and artificial intelligence, raises four areas of concern: privacy and consent; agency and identity; enhancement; and bias (Yuste et al., 2017).

In this sense, Yuste, Genser and Herrmann (2021) publish the article "It's Time for Neuro-Rights", where they argue that: "existing treaties cannot offer the solid and complete protection of human rights that a neurotechnological world requires..." (Pág. 155). For them, "the current era demands a novel framework of protection: neuro-rights" (Pág. 155), for which they propose the adoption of five neuro-rights.

For his part, Marcello Ienca has classified the proposals for neuro-rights into five major groups that are connected to already recognized rights.

Thus, although both Yuste and Ienca advocate the creation of neurorights, their approaches and proposals differ in certain aspects, see:

Yuste, Genser and Herrmann	Marcello Ienca
The right to identity, or the ability to control the physical and mental integrity of yourself, in the face of the risk of changes that may be produced in it by the effects of connecting our brain to intelligent interfaces.	**The rights derived from the good integrity:** The right to mental integrity (the right of people to be protected from illegal and harmful manipulations of their mental activity). **Rights derived from identity:** This includes the right to personal identity, both as a right to preserve "the personal identity of persons and the continuity of their mentality "[16] , as well as the right to control their physical and mental integrity.
The right to agency, or the freedom of thought and free will to choose one's own actions, in the face of the risk that the machine connected to our brain will make the choice.	**Rights derived from freedom of thought:** - Cognitive freedom (the right to mental self-determination), - the right to agency (the right to recognition of the capacity of choice or free will), - mental freedom (the right to conscious control over one's own mind)[15] and - freedom of thought

The right to mental privacy, or the ability to keep thoughts protected from disclosure, in the face of the risk of these thoughts being extracted from our brains.	**Rights derived from privacy:** - The right to mental privacy (the right of individuals against non-consensual intrusion of third parties into their brain data, against unauthorized collection of such data and against its disclosure). - The right to neuroprivacy (the right to protection of neural or brain data).
The right to equal access to mental enhancement, or the ability to ensure that the benefits of improvements in sensory and mental capacity through neurotechnology are distributed fairly among the population.	It points out two rights related to the promotion of requirements necessary for the realization of the other rights: - The right to equal access to mental enhancement and, - The right to protection against algorithmic bias
The right to protection against algorithmic bias, or the ability to ensure that technologies do not introduce bias.	

Source: Own creation.

Based on the above, it can be inferred that an attempt has been made to create a "typology" of rights that would make up the category of neuro-rights. Among these, the right to protection of identity and physical and mental integrity, freedom of thought and free will, and mental privacy are postulated as a common point. However, the contents attributed to these typologies vary considerably.

In addition, there is a difference regarding the right to equal access to mental enhancement and the right to protection against algorithmic bias. Some claim that these rights are related and advance other rights, while others argue that they are two autonomous and distinct typologies of rights.

A fortiori, neuro-rights represent for Cáceres, Diez and García (2021) "a new and more recent formulation of human rights that refer to the brain-mind of people, that is, to their personality" (Pág. 65). This concept has emerged in response to developments in neurotechnology in recent years. In particular, the term neurorights originated from the "Brain Initiative" attempt to connect the cerebral with the mental by mapping the circuits and neural networks that generate our conscious activity (López and Madrid, 2021).

In this context, neuro-rights are understood as the ethical, legal, social or natural principles of freedom or law related to the cerebral and mental domain of a person. In other words, they are the fundamental normative rules for the protection and preservation of the human brain and mind (Ienca, 2021).

Now, when making an assessment of the foundations proposed by the authors who defend the position of creating neuro-rights, among which De Asis (2022a) stands out, they agree "in affirming that new technologies pose a danger of manipulation and intervention of our brain and nervous system, which implies a threat to mental integrity" (Pág. 138). This is why, in view of the new threats, it is recommended that human rights be updated from an evolutionary and adaptive perspective, in the face of the new techno-scientific reality (Ausín, Morte and Monasterio, 2020).

In view of the above, it is prudent, in light of the values that underpin human rights, to analyze the arguments of those who propose to embrace neuro-rights as a new legal category.

3. The meta-fundamentality of human rights: A response to the creation of neuro-rights.

In anticipation of the new threats posed by neurotechnology, the need arises to analyze whether current human rights are sufficient to protect mental integrity or whether it is necessary to create a new category of rights, the so-called neuro-rights.

However, the doctrine does not seem to have a unified criterion, as mentioned by María Ballesteros, on the one hand, some argue that the Universal Declaration of Human Rights should be updated to adapt to new technological needs and demands. On the other hand, there is the position that the declaration is still fully in force and that the current rights are sufficient with proper interpretation and application. (Ballesteros, 2022)

In support of the latter position, Borbón D., Borbón L and Laverde J (2020) argue that the Universal Declaration of Human Rights should not be updated, given that "to achieve a suitable legal framework it is not strictly necessary to propose a new category of human rights in the Universal Declaration of Human Rights, when it could be adopted more clearly and precisely through an international treaty" (Pág. 155).

It is important to note that finding an absolute definition of what constitutes human rights today could become a pipe dream, given that for Ballesteros (2022) "human rights have evolved with society to adapt to different social realities" (Pág. 33). This evolution has led to changing conceptions over time, although the essence of human rights has always been linked to the human being as its starting point.

Historical events are the result of social and political movements that have marked significant milestones in the history of mankind. In 1776, for example, the first declaration of human rights was promulgated in Virginia, which according to Sierra (1969) "represents one of the most important steps towards true democracy, promoting the freedom and equality of men, and defending the individual against the abuses of power and the absolutism of the State" (Pág. 145). This declaration established a series of rights inherent to all human beings and laid the

foundations for a government based on life, equality before the law, liberty and due process, among other principles.

The Virginia Declaration also influenced the French Revolution of 1789, driven by the social, political, economic and intellectual crisis that reflected inequalities between social classes, the rigor of absolutism, misery and the emergence of liberal ideas. This is why Soboul and Martinez (1981) indicate that the Declaration of the Rights of Man and of the Citizen, "concretizes the essentials of the rights of man and the rights of the nation, with a concern for the universal that singularly surpasses the empirical character of English liberties" (Pág. 65).

These two key events at the end of the 18th century highlight the manifestation of natural law (iusnaturalism) in human rights declarations. According to this vision of Bulygin (1987), "human rights are conceived as rights granted by natural law and their existence does not depend on positive law. The only thing left to the legislator is their recognition" (Pág. 79).

Over time, legal positivism gained strength over natural law, being reflected in the various legal systems of the time, where human rights were configured as constitutional rights and guarantees accepted and recognized by legislators. However, the idea that human rights derive from iusnaturalism remains fundamental.

In this way, human rights are seen as innate attributes of the human being, by the fact of being human, and that they prevail beyond the moral, legal and over the power of the State, regardless of its origin or organization (Nikken 1994). The first declarations of human rights represent a significant historical achievement.

Now, it is necessary to emphasize the universal, inherent, inalienable and unconditional characteristics of human rights (García and Abellán, 2019), reaffirming that all people are entitled to them without distinction of social class, ethnicity, sex, religion, political opinion or any other condition that could be used to limit them arbitrarily. In this same sense, human rights are based on the principles of interdependence, integrality and indivisibility (Peña-Cuellar et al., 2020).

From another perspective, it is argued that human rights are not mere preferences or arbitrary choices but are related to the fundamental needs and interests of human beings. These rights represent legally valid or protected interests, arising from diverse social, political, economic and intellectual struggles where human integrity and dignity have been affected (Ballesteros, J., 2003).

In addition, human rights are evolving, setting parameters that allow the establishment of an integrated relationship between the individual and society. This makes it easier for people to develop fully, identifying with themselves and with others, which is why they have been recognized as individual and social guarantees in legal regulations (Acu, 2010), which is where the interference of legal positivism can be observed, reflected notoriously in the Constitution of each country or in the various international treaties and conventions that are suitable instruments for the effective protection of human rights.

That said, as anticipated, there are those who argue that traditional human rights are insufficient in the face of trends and advances in the virtual world (Riofrío, 2014).

For his part, Rafael de Asís in his work "On neuro-rights" considers that this type of proposal - to recognize new categories of human rights - is conditioned by the argument of inflation, which states that the more the list of rights is extended, the less possibilities there are for special protection (De Asís, 2022).

In view of the above, in addition to the inflation argument made by Rafael de Asís, in terms of this paper it is argued that human rights, from a meta-foundational perspective, transcend constitutional provisions and are rooted in universal principles that protect the intimate sphere of the individual.

This implies that it is not necessary to create new categories of human rights to address advances in neuroscience and technology. Rather, an adaptation of current regulations is required to ensure effective protection in these new contexts, which is what is decanted below.

For several years, the indiscriminate use of the term "neurolaw" has been observed, driven by the increasing penetration and influence of neuroscience in various fields of knowledge and society. This trend has generated the need to rethink and address complex interdisciplinary studies, a situation to which law has not been indifferent (Ingargiola, 2014).

In view of this permeation, authors such as Alessia Farano point out that the roles of neuroscience in law are categorized as "normative", "criminological" and "evidential/forensic", the first proposing that the legal system can benefit from neuroscientific knowledge to produce norms that efficiently influence behavioral response, The second is concerned with understanding the extent to which brain functioning can influence criminal behavior. The third alludes to the impact of the use of neuroscientific evidence in judicial processes and how it interacts, clashes and collides with procedural and constitutional guarantees (Farano, 2020).

From this perspective, it is argued that neurotechnology, while influential in law, represents merely a further categorization of the role that neuroscience plays in the field. Thus, "neurorights" as a new category of human rights does not have a solid basis, but rather reflects the intersection between law and neuroscience, without constituting distinct and separate human rights.

In view of this, it should be noted that, from the theory of the meta-fundamentality of human rights, the essential and inherent values of these rights are projected towards the intimate sphere of the human being from birth. This is because these values are directly integrated into the legal system with the aim of granting them recognition and ensuring them through the imperative force of positive law (Bastida, 2005).

Inviolable and inalienable human rights are considered as an integral part of a pre-existing and supra-positive legal order, with the purpose of safeguarding human dignity as a fundamental value inherent to all human beings (Bastida, 2005) which, in the words of Luna Sala, is the prerogative of every person to demand from the rest of fellow citizens treatment in accordance with their human condition (Salas, 2019).

In this sense, the concept of the meta-fundamentality of human rights arises from the very essence of the individual and is not restricted to the mandate of a specific constitutional norm. This perspective holds that rights are not exclusively linked to positive law or to constitutional supremacy. Rather, even if the Constitution did not explicitly recognize them, human rights would endure as the fundamental basis of the state order, defying constitutional self-proclamation as the supreme norm.

This approach, based on values such as human dignity, suggests that existing rights provide a solid framework for addressing the emerging challenges of neurotechnology. Consequently, the fundamental values of human rights, such as dignity, freedom and equality, suggest that the creation of neuro-rights as a new legal category is not necessary. Existing human rights already protect the individual in terms of privacy and freedom.

From a constitutional perspective, human rights have been intrinsically linked to the principles and values legitimately recognized by each legal system. In this context, the conception of human rights in relation to universal values suggests that they are practically synonymous, as long as it is understood that rights imply obligations that only make sense when one has the capacity to fulfill them (Annan, 2003).

According to Secretary General Kofi Annan of the University of Tübingen in Germany, these universal values such as freedom, equality, human dignity, peace and social progress, fundamental to the realization of human rights (Annan, 2003), can have a broad influence on the configuration of existing rights, thus avoiding the need to create a new catalog of rights, as proposed by the Neuro-rights Initiative.

Adding to the previous argument and following Rafael de Asís, the author Eduardo Bertoni also embraces the theory of inflation, asserting that the ongoing legislative reforms in various legal systems aim to obscure and delegitimize the protection provided by current human rights standards. His position, rooted in the theory of the metafundamentality of human rights, emphasizes the urgent need to regulate new neurotechnologies without necessarily creating new rights *per se* (Bertoni, 2024).

In line with the above, other authors support this position by proposing specific and concrete legislation that adequately responds to the challenges posed by neuroscience (Borbón, D., 2024). This approach not only avoids the inflation and devaluation of human rights, but also ensures that existing rights can be applied flexibly and dynamically in the face of technological advances (Bublitz, 2022).

For example, in Argentina, bill 0339-D-2022 was proposed to reform, *inter alia*, the Federal Criminal Procedure Code of the Nation, requiring prior, express consent and court order before using neurotechnology in criminal proceedings, *ergo* in this way, it is intended to establish a real and concrete protection of constitutional rights from the inappropriate use of neurotechnology in criminal matters.

The same happened in the aforementioned Chilean case, in which, about the existing regulations, the Supreme Court decided to protect the plaintiff's rights, albeit under the framework of Law No. 21,383, which amended its Fundamental Charter, but in which it was broadly established that scientific and technological development must respect the physical and psychological integrity of people.

Finally, the third argument supporting the inappropriateness of creating new human rights is that existing rights are extensive enough and adaptable to protect human beings in any context, even in virtual environments such as those involving neurotechnology. Moreover, the notion of neuro-rights, understood as human rights adapted to the digital era and the influence of neuroscience, can be coherently integrated within the existing catalog of human rights, based on principles such as human dignity, freedom and equality.

However, the only option is not to create a new catalog of human rights; there are other ways to regulate, in a prospective manner, the problems related to the new neurotechnologies. One of them is to propose specific reforms that allow for a broad and dynamic conception of the human rights already recognized.

Therefore, an assessment of the fundamentals proposed by the aforementioned authors, it is considered that indeed, in view of the neurotechnological advances and their imminent impact on social issues, it is necessary to have legal discussions on the forms of protection and the need to consider that the instruments should be adapted to their special nature.

However, it is crucial to avoid conveying this message in a way that implies ignoring established human rights in order to create new ones, as it could even result in an unnecessary fragmentation of the legal framework, when the current system already provides the necessary foundations to address contemporary challenges in an effective and comprehensive manner.

Instead, a prudent and adaptive approach must be adopted to adjust existing human rights to the new emerging social realities, which implies ensuring that existing regulations are flexible and relevant to protect human dignity and rights in these new digital contexts.

Conclusions

The continued advancement of neuroscience and neurotechnology presents a complex path, as the development of new tools that allow direct access to the human brain promises to open up unprecedented opportunities at the brain-machine interface, integrating neurotechnology in a meaningful way into the daily lives of individuals.

Following this logic, the Brain Project and other global initiatives are promoting collaborations between scientists and laboratories around the world to unravel the fundamentals of brain functioning. However, in the face of these advances in the digital ecosystem and the growing use of neurotechnologies, there is a real concern about possible negative consequences, especially with regard to privacy and individual integrity.

Consequently, the creation of “neuro-rights” as new human rights has been promoted by several doctrinaires. However, this study argues that the term “neurolaw” does not correspond to new rights, but rather alludes to the intersections of neuroscience in law.

Therefore, after analyzing the current Human Rights, it is concluded that it is inappropriate to recognize what has been called “neuro-rights” as a new category of Human Rights. This is based on the theory of values and the meta-fundamentality of human rights, such as dignity and freedom.

Similarly, the theory of rights inflation is invoked, which postulates that the longer the list of rights is expanded, the fewer the possibilities for special protection.

Thus, it is asserted that the content of already recognized rights such as privacy, equality and freedom is sufficient to protect the human being from this new intersection of law and neuroscience, so it is proposed that these existing rights must be dynamic, extended and reinterpreted, since as society evolves, rights must also evolve and adapt to ensure adequate protection of the individual in all environments, including the virtual one.

In conclusion, the creation of neuro-rights as a new category is not only unnecessary but could weaken the special protection of already established rights. It is imperative, therefore, that existing rights be sufficiently dynamic and flexible to adapt to new technological realities, thus ensuring effective and consistent protection in all areas, especially in the context of advanced neuroscientific technologies.

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