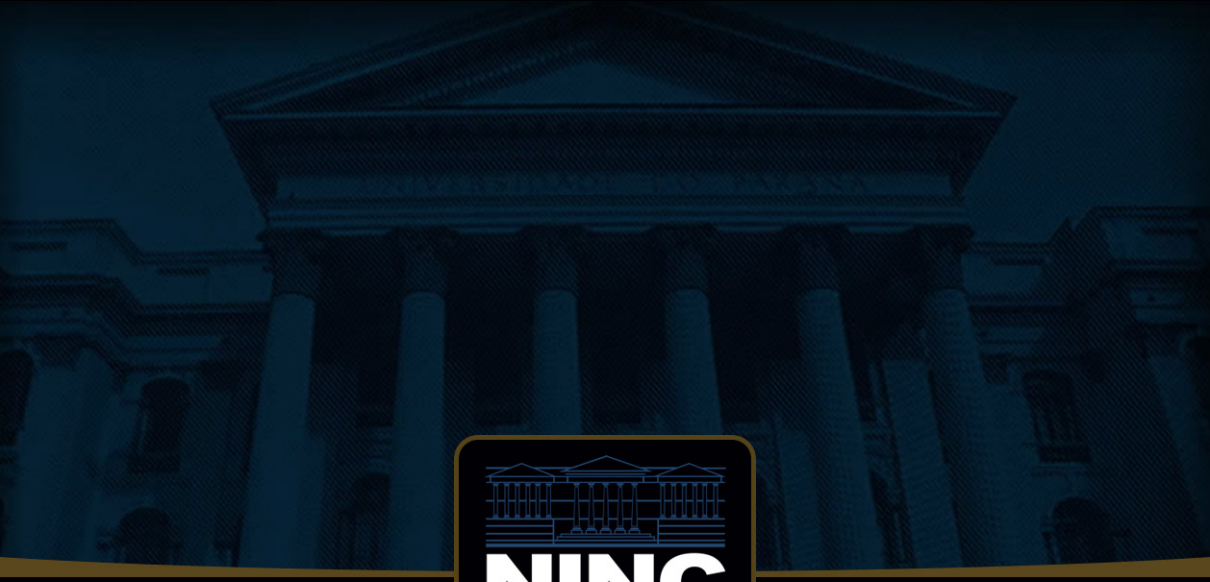

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Neurorights as fundamental rights*

Neurodireitos como direitos fundamentais

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Abstract

This article aims to examine the hypothesis that neuro-rights are implicitly recognized as fundamental rights in the Brazilian Constitution and to emphasize the importance of their future explicit constitutional enshrinement. Initially, the article outlines the context of the information society and data capitalism, in which information and communication technologies (ICTs) constitute a networked and surveillance-oriented community identifiable with neurocapitalism. Subsequently, the discussion addresses the right to privacy and the recognition of the fundamental nature of data protection rights as a

Resumo

O artigo tem como objetivo analisar a hipótese de reconhecimento da existência implícita, bem como da importância de futura positivação expressa, dos neurodireitos como direitos fundamentais na Constituição brasileira. Assim, no primeiro momento, é exposto o contexto da sociedade da informação e do capitalismo de dados, em que as tecnologias da informação e comunicação (TICs) constituem uma comunidade de conexão e vigilância identificável ao neurocapitalismo. Após, o texto trata do direito à privacidade e do reconhecimento da fundamentalidade do direito à proteção de dados – como paradigma hermenêutico análogo.

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comparable hermeneutic paradigm. Although the topic remains controversial, the text adopts the fivefold classification of neurorights: (1) mental privacy, concerning the transfer of neural data; (2) personal identity, involving the need to establish limits on technological interventions in individuality, including brain enhancements and the insertion of nanorobots; (3) free will in decision-making; (4) fair access to mental enhancement; and (5) protection against algorithmic bias and discrimination. The study employs deductive methods and bibliographic research techniques. Its object is the examination of whether neurorights may be recognized as fundamental rights within the Brazilian legal system. The conclusion affirms the hypothesis that recognizing neuro-rights as implicit fundamental rights is relevant, as well as the necessity of their legal regulation, without negating the importance of their future explicit constitutional positivization.

Keywords: fundamental rights; neurorights; information society; information and communication technologies (ICTs); neurocapitalism.

Embora seja um assunto controverso, o texto adota a classificação quíntupla dos neurodireitos: 1) privacidade mental, quanto à transferência de dados neurais; 2) identidade pessoal, com necessidade de fixação de limites na intervenção tecnológica na individualidade, inclusive com relação aos melhoramentos do cérebro e inserção de nanorrobôs; 3) livre arbítrio para a tomada de decisões; 4) acesso justo ao aprimoramento mental; 5) proteção contra o preconceito e vieses algorítmicos. Em investigação realizada pelo método dedutivo, mediante técnica de pesquisa bibliográfica, a pesquisa tem como objeto, portanto, o problema do reconhecimento ou não dos neurodireitos como direitos fundamentais no ordenamento jurídico brasileiro. A conclusão confirma a hipótese de pertinência do reconhecimento dos neurodireitos como direitos fundamentais implícitos, bem como da sua necessária regulação legal – o que não retira a importância de sua futura positivação constitucional expressa.

Palavras-chave: *direitos fundamentais; neurodireitos; sociedade da informação; tecnologias da informação e comunicação (TICs); neurocapitalismo.*

CONTENTS

1. INTRODUCTION

The evolution of information and communication technologies (ICTs) is undeniable, as they become increasingly ubiquitous in everyday life, not only through traditional internet access and smartphones but also via new devices powered by artificial intelligence. In this context, nanotechnology and the Internet of Things (IoT) are gradually forming an integrated and complex ecosystem. While these developments offer innovative and promising solutions to contemporary human challenges, they also generate unprecedented problems, demands, and, inevitably, new rights.

In particular, neurotechnologies have advanced significantly, enabling interactions between machines and the human neurological system. The so-called "neurorights" represent the legal reflection of this technological and human transformation, constituting new subjective rights that require recognition and protection. These emerging technologies are already prompting behavioral changes and affecting individuals' mental health. Issues such as loss of identity, manipulation of free will, and the implantation of cognitive biases are now part of daily life in the information society, shaping the judgment of individuals and social groups. Notably, this mental, social, and

cultural transformation is still in its early stages. Even more impactful technologies are likely to emerge, making this a matter of concern for both scientists and legal scholars.

In a study guided by the hypothetical-deductive method, utilizing bibliographic research techniques, this paper examines the hypothesis of implicit recognition of neurorights within the formal constitutional system – and the importance of their express regulation, including within the Brazilian constitutional framework.[1] The central argument is that they should be included in the category of autonomous fundamental rights and, as fundamental rights, are multifunctional. The relevance of this discussion is underscored by the recent Proposed Constitutional Amendment (PEC) No. 29/2023, to include "protection of mental integrity and algorithmic transparency" as fundamental rights in Article 5 of the Federal Constitution.[2]

The first part of the article provides a brief overview of the reality of the Fourth Industrial Revolution, in which information and communication technologies (ICTs) are leading contemporary society toward a model characterized by communication and surveillance. This topic also examines the phenomenon of neurocapitalism, which involves the use of data and the manipulation of people for the interests of big tech companies. It then addresses the right to privacy (and intimacy) and the recognition of the fundamental nature of the right to data protection, which is increasingly vital due to the advancement of information and communication technologies (ICTs). Subsequently, the importance of protecting and regulating neurorights is proposed, including as autonomous fundamental rights.[3] The pioneering nature of the Chilean Constitution is cited, with the express inclusion of neurorights among fundamental rights (in 2021), in addition to the recent decision of the Chilean Supreme Court on the Insight product, in the case of *Guido Girardi vs. Emotiv Inc*. There is also Bill No. 522/2022 in Brazil, which aims to amend Law No. 13,709/18 (General Personal Data Protection Law) to conceptualize neural data and regulate its protection. There are also international initiatives aimed at regulating human rights in the digital age, with the intention of protecting neuro-rights as well.

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1 This proposal has already been defended by other Brazilian jurists, such as Augusto César L. de Resende. RESENDE, Augusto César Leite de. Neurodireitos como Direitos Fundamentais na Constituição Federal de 1988. **Pensar**, Fortaleza, v. 30, n. 1, p. 1-14, jan./mar. 2025.

2 SENADO FEDERAL, **Proposta de Emenda à Constituição n. 29, de 2023.** 2023. Available in: https://legis.senado.leg.br/sdleg-getter/documento?dm=9386704&ts=1686688862951&disposition=inline Accessed on May 21, 2025.

3 This regulation should also operate at the level of the administrative legal system, as is the case with other new technologies. HACHEM, Daniel Wunder; FARIA, Luzardo. Regulação jurídica das novas tecnologias no Direito Administrativo brasileiro: impactos causados por Uber, WhatsApp, Netflix e seus similares. **Revista Brasileira de Direito**, Passo Fundo, vol. 15, n. 3, p. 180-203, set./dez. 2019.

2. DATA CAPITALISM AND HUMAN BEINGS IN THE INFORMATION SOCIETY

According to Klaus Schwab, the Fourth Industrial Revolution is currently underway,[4] driven by the so-called "digital revolution". Its defining features include a more ubiquitous and mobile internet, supported by technologies such as blockchain, cloud computing, big data, artificial intelligence (AI), the Internet of Things (IoT), virtual reality, nanotechnologies, and nanomaterials. These developments are increasingly present in contemporary life, with sensors that are smaller, more powerful, and more accessible than ever before.[5]

The concept "technological ubiquity" has been used in light of the constant presence of technologies that are advancing and developing at an increasingly rapid pace. This fact can be explained by Manuel Castells' analysis of the "information society," in which "new information technologies are integrating the world into global networks of instrumentality."[6] This so-called "Information Age," which focuses on "*informationalism*," impacts social domains and cultural expressions with the emergence of a new social structure, in which social relations are defined based on cultural attributes that lead to a new identity. In turn, given the widespread dissemination of information and communication technologies (ICTs) around the world, Shoshana Zuboff believes that concerns about an information society are outdated and argues that "the oldest questions need to be applied to the broadest possible context," which is defined as the information civilization,[7] which is founded on a "culture of data".[8] Within this informational context, Stefano Rodotà maintains the existence of a "surveillance society," characterized by increasing monitoring of human beings and the dissemination of

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[4] The First Industrial Revolution, dating from 1760 to 1840, was marked by the construction of railways and the invention of the steam engine, while the Second Industrial Revolution corresponds to the late 19th and early 20th centuries, with electricity and assembly lines. The Third Industrial Revolution began in the late 1960s, known as the "digital or computer revolution," with the invention of computers and the internet. SCHWAB, Klaus. **A quarta revolução industrial.** Tradução de Daniel Moreira Miranda. São Paulo: Edipro, 2016, p. 15-16.

[5] STRINGHI, Antonella. Asistencia virtual automatizada e inclusiva para optimizar la relación de la ciudadanía con la Administración Pública. **International Journal of Digital Law**, Belo Horizonte, ano 1, n. 1, p. 117-128, jan./abr. 2020, p. 118; GABARDO, Emerson; KOBUS, Renata Carvalho. Quarta Revolução Industrial: *Blockchain* e *Smart Contracts* como Instrumentos da Administração Pública Inteligente. *In*: RODRÍGUEZ-ARANA, Jaime; DELPIAZZO, Carlos; SILVA FILHO, João Antônio da; VALIM, Rafael; RODRÍGUEZ, Maria. (Org.) **Control Administrativo de la Administración**. v. 2. São Paulo: Imprensa Oficial de São Paulo, 2019, p. 492-495.

[6] CASTELLS, Manuel. **A Sociedade em Rede.** 19. ed. rev. e atual. Rio de Janeiro: Paz e Terra, 2018, p. 77.

[7] ZUBOFF, Shoshana. **A Era do Capitalismo de Vigilância.** Tradução de Jorge Schlesinger. Rio de Janeiro: Intrínseca, 2020, p. 14.

[8] PHILIPPI, Juliana Horn Machado. Transformação digital e urgência da cultura de dados na Administração Pública brasileira. **Revista Eurolatinoamericana de Derecho Administrativo**, Santa Fe, vol. 10, n. 1, e232, ene./jun. 2023.

personal information in databases.[9] In addition to data collection through the use of the internet and other information and communication technologies (ICTs), there is the insertion of chips and "smart tags" for monitoring people, with remote control through radio frequency identification (RFID) technologies, which are often used by companies to control the actions and movements of human beings.

There are proposals that digital devices could function as a "digital guardian angel" for certain individuals. Under the pretext of protecting people, for example, so that they can be rescued immediately in an emergency, an unprecedented system of life control comes into existence. Devices and electronic tools connected to a computer can be inserted into the human body, with human "tagging," in true surveillance, and even with technological modification of bodies. This context is highly complex and problematic, notably in terms of demands for respect for people's digital dignity.[10] This makes it imperative to discuss a new understanding of the legal instruments available, disruptive technologies, and, consequently, the new constitutional dimension that emerges within this ecosystem.

On the other hand, "neurocapitalism" is a concept related to the strategy instituted in the West, mainly by Silicon Valley companies, which utilizes algorithms and the manipulation of human attention – technological innovations that encourage and facilitate the voluntary adoption of control instruments in exchange for an illusion of individual freedom. The individual is deprived of their uniqueness due to these algorithms, which play a very influential role and are often secret and protected by copyright. Thus, there is a logic with predetermined criteria that establishes what to show to whom, in a hypothetical big brother guided by economic speculation, with the possibility of classifying human beings and categorizing them for full exploitation.[11]

Digital surveillance capitalism is *sui generis* and unprecedented; that is, it constitutes a new piece in history, and one that cannot be adequately apprehended, much less confronted, by currently existing concepts such as monopoly and privacy. It should be clarified, however, that digital surveillance capitalism should not be confused with the technologies it employs. It is the logic that permeates technology and directs it toward a specific action, that is, "it employs many technologies, but cannot be equated with any one specific technology".[12] Technologies are, therefore, the means of surveil-

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9 VIANA, Ana Cristina Aguilar. From data to information: a meta-legal framework to political-juridical analysis of digital transformation. **International Journal of Digital Law**, Belo Horizonte, ano 5, n. 1, p. 9-24, jan./abr. 2024.

10 MUNÕZ, Jaime Rodriguez Arana. Nuevas tecnologías Derecho administrativo y dignidad de las personas. **International Journal of Digital Law**, Belo Horizonte, ano 4, n. 3, p. 93-109, set./dez. 2023.

11 GRIZOTTI, Giorgio. **Neurocapitalism:** technological mediation and vanishing lines. Translated by Jason Francis McGimsey. New York: Autonomedia, 2019, p. 167.

12 ZUBOFF, Shoshana. **A Era do Capitalismo de Vigilância.** Tradução de Jorge Schlesinger. Rio de Janeiro: Intrínseca, 2020, p. 26-27.

lance capitalism, which leads to the commodification of data and, in turn, produces the need for recognition and protection of the data subject as a legal entity.[13]

Industrial revolutions were (and continue to be) important for economic growth, especially with the triumph of large companies, which strengthened their capital and began to offer new products. As a result, there were profound transformations, not only economic but also social, with a significant increase in the standard of living of people who could afford these increasingly technological products.[14] At the global level, there is a redistribution of production, as well as of the spaces and functions occupied by human beings. Due to globalization, the opening of markets, and technological transformation, José Eduardo Faria points out that since the 1990s, there has been a deterritorialization and weakening of nation states—institutions that are "unable to prevent the transfer of part of their decision-making power to areas of influence of private capital and large business conglomerates".[15] In this context, it is natural to see an even greater "bias" in technological logic, that is, the supposed functional rationality, apparently neutral, is strongly aligned with the vision of a particular ideological hegemony.[16] The absence of "technological neutrality" in the structural analysis of societies is nothing new. But a new model of domination is emerging (in which private interests, private capital, especially the current big tech companies, predominate), which escapes the state control achieved in the mid-20th century. These companies are openly resisting attempts to regulate their products and interests in favor of citizens.

Mateus de Oliveira Fornasier and Norberto Milton Paiva Knebel consider that Law No. 13,709 (General Data Protection Law – LGPD) embodies a concept of "digital citizenship," prioritizing the protection of personal data, yet still permits the conversion of this data into commodities, creating an ambiguous and contradictory legal relationship. They compare data owners in the surveillance society to workers in traditional capitalism, whose production is exploited to add more value to the owner of the means of production. Once citizens are connected, as data owners, they passively observe the

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13 FORNASIER, Mateus de Oliveira; KNEBEL, Norberto Milton Paiva. O titular dos dados como sujeito de direito no capitalismo de vigilância e mercantilização dos dados na Lei Geral de Proteção de Dados. **Revista Direito e Praxis.** Rio de Janeiro, v. 12, n. 2, 2021, p. 1.027.

14 GABARDO, Emerson; KOBUS, Renata Carvalho. Quarta Revolução Industrial: *Blockchain* e *Smart Contracts* como Instrumentos da Administração Pública Inteligente. *In*: RODRÍGUEZ-ARANA, Jaime; DELPIAZZO, Carlos; SILVA FILHO, João Antônio da; VALIM, Rafael; RODRÍGUEZ, Maria. (Org.) **Control Administrativo de la Administración**. v. 2. São Paulo: Imprensa Oficial de São Paulo, 2019, p. 493.

15 FARIA, José Eduardo. Democracia e Governabilidade: os direitos humanos à luz da globalização econômica. *In*: FARIA, José Eduardo. (Org.) **Direito e Globalização Econômica:** implicações e perspectivas. São Paulo: Malheiros, 2015, p. 141.

16 FEENBERG, Andrew. **Entre a Razão e a Experiência**: ensaios sobre tecnologia e modernidade. Vila Nova de Gaia/Portugal: Inovatec, 2019, p. 47.

commodification of their produced informational content, in a true expansion of the frontiers of capitalism.[17]

In contrast to this reality, from the point of view of "ought to be", there is the concept of a "Digital Rule of Law," resulting from the adaptation of the human rights paradigm due to social changes, which lead to the need for their protection in digital spaces, such as freedom of expression and the rights to work and education. One of the new challenges of digitization is the fact that the internet can be an environment that threatens human rights, driven by artificial intelligence and big data.[18] For the State to keep pace with these new demands and regulate them effectively to prevent violations of citizens' rights, as well as protect democratic processes, legislators must seek specialized information to become aware of the relationship between human rights and digital technologies.[19] In addition, there is a need for public awareness and a strong political will for human emancipation in the face of the power of neurocapitalism, particularly considering its aptitude for producing authoritarian setbacks.[20]

In this third decade of the 21st century, there is a society of "continuous spectacularization",[21] in which people are increasingly immersed in the "total information society," with a growing supply of personal data in exchange for the provision of goods and services, as a result of the spread of information and communication technologies (ICTs). In this reality, it is essential to adopt a different approach to the available instruments and technologies themselves as factors influencing the protection of rights.[22] Due to the increasingly intensive and pervasive intervention of information and communication technologies (ICTs) and, above all, the involvement of big tech companies

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17 FORNASIER, Mateus de Oliveira; KNEBEL, Norberto Milton Paiva. O titular dos dados como sujeito de direito no capitalismo de vigilância e mercantilização dos dados na Lei Geral de Proteção de Dados. **Revista Direito e Praxis.** Rio de Janeiro, v. 12, n. 2, 2021, p. 1.027.

18 SÁNCHEZ DÍAZ, María Fernanda. El impacto de la inteligencia artificial generativa en los derechos humanos. **Revista Eurolatinoamericana de Derecho Administrativo**, Santa Fe, vol. 11, n. 1, e252, ene./jun. 2024.

19 BELLOCHIO, Lucía; SANTIAGO, Alfonso. Estado digital de Derecho. **A&C – Revista de Direito Administrativo & Constitucional.** Belo Horizonte, ano 20, n. 80, abr./jun. 2020, p. 91 e 100.

20 GABARDO, Emerson; BREPOHL, Marion; GONÇALVES, Marcos. Authoritarian setback in the current crisis of Brazilian democracy. **Tempo e Argumento**, v. 13, p. 1-48, 2021.

21 On the subject of the "society of the spectacle," one cannot fail to mention Guy Debord's doctrine: "Just as the logic of merchandise prevails over the various competitive ambitions of all merchants, or as the logic of war prevails over the frequent modifications of weaponry, so too does the rigorous logic of the spectacle command everywhere the exuberant and diverse extravagances of the media". DEBORD, Guy. **A Sociedade do Espetáculo:** comentários sobre a sociedade do espetáculo. Tradução de Estela dos Santos Abreu. Rio de Janeiro: Contraponto, 1997, p. 171. Considering the time when Debord's work was written (1967, with comments in 1988 and translation in 1997), it is understood that the concept of "media" that was dominant at the time can be transposed to the social networks and applications of the present day (2024), especially those managed by big tech companies such as Meta, Google, Apple, Amazon, among others.

22 RODOTÀ, Stefano. **A vida na sociedade da vigilância:** a privacidade hoje. Organização, seleção e apresentação de Maria Celina Bodin de Moraes. Tradução de Danilo Doneda e Luciana Cabral Doneda. Rio de Janeiro: Renovar, 2008, p. 281-282.

and their algorithms in people's lives and consciousness, the discussion regarding the legal protection of neuro-rights becomes relevant.

3. INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS), PRIVACY, AND THE FUNDAMENTAL RIGHT TO DATA PROTECTION

In this environment of information and communication technologies, especially with the digitization and virtualization of relationships and spaces, it is essential to acknowledge the existence of cyberspace: a global network of interconnected computers that encompasses not only the physical infrastructure but also the vast ocean of information through which human beings navigate. Thus, "cyberculture" is also born, consisting of "a set of techniques (material and intellectual), practices, attitudes, ways of thinking, and values that develop alongside the growth of cyberspace".[23]

Considering that, with digitization, the "person" transcends the physical body, their rights in the digital sphere must also be considered. Thus, the fundamental rights of "digital persons" must be observed, especially given the magnitude of data, information, and profiles that are traced virtually, so that they are protected from metrics they are unaware of. This is why efficient regulation of the digital environment, or "digital regulation," is necessary, establishing a clear legal framework for the use of artificial intelligence and the protection of sensitive data.[24]

As for the interaction between human bodies and technologies, there is a noticeable trend toward valuing the transhumanist perspective,[25] as well as "*biohacking*",[26] regarding the interaction between human bodies and technologies, a noticeable trend is emerging toward valuing the transhumanist perspective, as well as "biohacking,"

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[23] LÉVY, Pierre. **Cibercultura**. 3. ed. Tradução de Carlos Irineu da Costa. São Paulo: Editora 34, 2010, p. 17.

[24] VALLE, Vivian Cristina Lima López; GALLO, William Ivan. Inteligência artificial e capacidades regulatórias do Estado no ambiente da administração pública digital. **A&C – Revista de Direito Administrativo & Constitucional**, Belo Horizonte, ano 20, n. 82, out./dez. 2020, p. 78-82.

[25] "The level of development achieved today by neuroscience makes it possible to alter human cognitive abilities, which transhumanists see as a major achievement in the quest to 'improve humanity'. For bioconservatives, however, this type of neurotechnological advance, in addition to its potential to infringe on various human rights, poses a threat to human nature." LOPES, Ana Maria D´Ávila. Iniciativas internacionais de proteção aos neurodireitos humanos: transumanismo ou bioconservadorismo? **Revista Quaestio Iuris**, v. 17, n. 01, 2024, p. 444-465.

[26] To understand the concept of biohacking: "Biohacking promises to make humans stronger and smarter by optimizing abilities with the help of supplementation and/or technology. The goal is to promote better health, awareness, and productivity. To achieve this, it is essential to expand body and mind awareness by managing thoughts, improving sleep and nutrition, modifying the environment, and fostering better interpersonal relationships. Biohacking, therefore, is the combination of cybernetic engineering and biological engineering. It is the use of biology with nutritional, medical, and electronic techniques, which aims to increase the physical and mental capacity of human beings, being a means of self-determination of the will, and which can result in transhumanism and cyborgism." TOBBIN, Raíssa Arantes; CARDIN, Valéria Silva Galdino. Biohacking e ciborguismo: melhoramento humano à luz dos direitos da personalidade. **Revista Opinião Jurídica**. Fortaleza, ano 20, n. 35, set./dez. 2022, p. 114.

which involves modifying the human body itself, thereby transforming humans into true cyborgs, with optimized body and mind. In this context, it is possible to implant neurochips and hypercode data extracted from the human body, with the imminent transformation into a "machine body," a hybrid "hyperbody" that does not get sick or has a longer life expectancy due to technoscience and techno-modification (a body that is controlled, dominated, and modified in laboratories). There is a risk of objectification of human beings and their bodies, whether through cloning or the creation of hybrid bodies, as well as through the creation of robots and mechanized inventions, characteristic of the digital and technoscientific revolution, which leads to these "Post-Human Subjects of Law," and which constitute real challenges for regulation.[27]

In the field of personal data, there is a computerization of the means for its processing, which reflects on the right to privacy of individuals, mainly due to the exponential increase in storage capacity, as well as the possibility of obtaining new information by combining data, the result of techniques such as profiling, data mining, among others.[28] These are new phenomena; however, as Danilo Doneda warned, data protection is an offshoot of the traditional right to privacy, as it remains "a constant objective reference to a discipline for personal data, which has maintained the link of continuity with the discipline of privacy, of which it is a kind of heir, updating it and imposing its characteristics".[29]

It is worth mentioning that the right to privacy originated in 1890, when Samuel Warren and Louis Brandeis published the article "The Right to Privacy" in the Harvard Law Review, considering the right to privacy as arising from personality, with protection of the individual from the entertainment press, photographers, or the possessor of any other modern instrument for recording or reproducing sounds. They also cite the expression "right to be alone," first used by Judge Cooley, about the inventions of the time and business methods, with an emphasis on the protection of the person and the security of the individual.[30] At the time of publication, instant photographs were used by news companies, invading people's privacy and intimacy. It can be said that this article became a paradigm for the study of the right to privacy.[31] It can thus be seen that the very origin of privacy has a predominantly individualistic character.

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27 BITTAR, Eduardo C. B. **Revista Direito e Praxis.** Rio de Janeiro, v. 10, n. 02, 2019, p. 947-953.

28 The creation of a "data profile" involves identifying the structure, quality, and content of the data; "data mining," on the other hand, goes further, aiming to discover patterns, relationships, and trends in the data set. MENDES, Laura Schertel. **Privacidade, proteção de dados e defesa do consumidor:** linhas gerais de um novo direito fundamental. São Paulo: Saraiva, 2014. *E-book* Kindle, p. 992.

29 DONEDA, Danilo. A proteção dos dedos pessoais como um direito fundamental. **Espaço Jurídico.** Joaçaba, v. 12, n. 2, jul.-dez. 2011, p. 95.

30 WARREN, Samuel D.; BRANDEIS, Louis D. The Right to Privacy. **Harvard Law Review**. v. 4, n. 5. dec. 15, 1890, p. 195.

31 BOFF, Salete Oro; FORTES, Vinícius Borges; FREITAS; Cinthia Obladen de Almendra. **Proteção de dados e privacidade**: do direito às novas tecnologias na sociedade da informação. Rio de Janeiro: Lumen Juris, 2018, p. 64.

Despite the close relationship, while privacy protection falls within the private sphere of the individual, personal data protection goes beyond that.[32] They are, therefore, distinct rights; they are autonomous rights, which require a normative expansion to clarify their protection.[33] Personal data does not necessarily consist of private information, but can also be public. As a result, public facts can reveal details about behavior and personality, just as trivial facts can be related to sensitive information about individuals. It should be noted that the right to data protection safeguards the relational dimension of the human person, which extends beyond the scope of protecting the right to privacy or intimacy.[34]

In 2020, the Plenary Session of the Federal Supreme Court recognized the fundamental nature of the right to data protection by endorsing the preliminary injunction granted by Justice Rosa Weber in ADI 6387 MC/DF, to suspend the effectiveness of Provisional Measure No. 954/2020, which required telephone companies to share user data with the Brazilian Institute of Geography and Statistics (IBGE) during the public health emergency caused by the COVID-19 pandemic. In declaring his vote to endorse the preliminary injunction, Justice Gilmar Mendes weighed the dilemmas resulting from today's technological transformations and recognized the fundamental nature of the right to personal data protection, highlighting the development of the concept of informational self-determination.[35] It was the first time that the Plenary of the Federal Supreme Court had considered the issue and expressed "on the fundamental right to personal data protection and the autonomy of its constitutional protection in the national legal system".[36]

On February 10, 2022, Constitutional Amendment No. 115 added item LXXIX to Article 5 of the Constitution,[37] to expressly include the right to personal data protec-

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[32] OLIVEIRA, José Roberto Pimenta; PIRES, Mariana Ferreira da Cruz. Proteção de dados no direito administrativo sancionador. **A&C – Revista de Direito Administrativo & Constitucional**, Belo Horizonte, ano 24, n. 95, p. 99-130, jan./mar. 2024. p. 109.

[33] MACHADO, Diego Carvalho; MENDES, Laura Schertel. Tecnologias de Perfilamento e Dados Agregados de Geolocalização no Combate à COVID-19. **Direitos Fundamentais & Justiça**. Belo Horizonte, ano 14, número especial, nov. 2020, p. 113; MELGARÉ, Plínio. O direito à proteção de dados e a inconstitucionalidade do capitalismo de vigilância. *In*: SARLET, Gabrielle Bezerra Sales; TRINDADE, Manoel Gustavo Neubarth; MELGARÉ, Plínio. **Proteção de Dados:** temas controvertidos. Indaiatuba: Foco, 2021, p. 113.

[34] BIONI, Bruno. **Proteção de Dados Pessoais:** a função e os limites do consentimento. 2. ed. Rio de Janeiro: Forense, 2020. *E-book*, p. 94-95.

[35] BRASIL. Supremo Tribunal Federal (Tribunal Pleno). Medida Cautelar na Ação Direta de Inconstitucionalidade 6387/DF. Relatora Ministra Rosa Weber. Julgado em 07 de maio de 2020.

[36] MACHADO, Diego Carvalho; MENDES, Laura Schertel. Tecnologias de Perfilamento e Dados Agregados de Geolocalização no Combate à COVID-19. **Direitos Fundamentais & Justiça**. Belo Horizonte, ano 14, número especial, nov. 2020, p. 114; GABARDO, Emerson; PHILIPPI, Juliana Horn Machado. Direito à saúde e direito à proteção de dados pessoais em tempos de pandemia. *In*: BELLI, Luca; DONEDA, Danilo; HARTMANN, Ivar A.; SARLET, Ingo; ZINGALES, Nicolo. (Org.). **Proteção de Dados na América Latina**: COVID-19, democracia, inovação e regulação. Porto Alegre: Arquipélago, 2021, p. 23-40.

[37] ACIOLY, Luis Henrique de Menezes; SILVA, Matheus Fernandes da; MONTEIRO NETO, João Araújo. A Emenda Constitucional nº 115 de 10 de fevereiro de 2022 e o enforcement da proteção de dados pessoais no Brasil. **Revista de Investigações Constitucionais**, Curitiba, vol. 11, n. 3, e275, set./dez. 2024; MARTINS, Ricardo

tion as a fundamental right.[38] This inclusion represents a significant achievement for Brazilian society, promoting the reduction of risks and negative externalities inherent in the processing of personal information.[39] In this way, the fundamental right to data protection, which had already been widely defended by doctrine and is essential for both individuals and society, especially in times of the expansion and ubiquity of information and communication technologies (ICTs), was finally established. Although implicit recognition of the right is possible, the symbolic force of its express constitutionalization cannot be overlooked.

4. TECHNOLOGICAL ADVANCES AND THE PROTECTION OF NEURORIGHTS AS FUNDAMENTAL RIGHTS

With the evolution and ubiquity of information and communication technologies (ICTs), especially concerning artificial intelligence (AI) and Big Data,[40] there have even been reports of the identification of human emotions by artificial intelligence (emotional artificial intelligence – EAI), which raises questions about the new model of surveillance that this enables.[41] In a surveillance society, individuals are becoming increasingly transparent, while organizations collect data that distorts the information. Although it is intended to serve a specific purpose, it is often made available for different purposes.[42] Not without reason, the European Union's proposal to regulate artificial intelligence, which led to the publication of the Regulation on March 13, 2024, seeks to exercise extensive control over the risks inherent in the phenomenon.[43]

Marcondes. Proteção de dados, competências dos entes federativos e a Emenda Constitucional n. 115/22. **Revista de Investigações Constitucionais**, Curitiba, vol. 9, n. 3, p. 645-658, set./dez. 2022.

38 "The right to protection of personal data, including in digital media, is guaranteed under the law".

39 MENDES, Laura Schertel. **Democracia, poder informacional e vigilância:** limites constitucionais ao compartilhamento de dados pessoais na Administração Pública. 13 ago. 2022. Disponível em: https://oglobo.globo.com/blogs/fumus-boni-iuris/post/2022/08/laura-schertel-democracia-poder-informacional-e-vigilancia.ghtml Acesso em 07 out.2023.

40 Big Data encompasses the volume, speed, and variety of data, enabling the utilization of large amounts of data for various purposes. For Bruno Bioni, it is "a technology that allows the same database to be reused for different purposes [...] incompatible with the traditional regulatory dynamics of informational self-determination, now touched upon by the principles of specification and limitation of purposes". BIONI, Bruno. **Proteção de Dados Pessoais:** a função e os limites do consentimento. 2. ed. Rio de Janeiro: Forense, 2020. *E-book*.

41 SCARFF, Robbie. **Emotional Artificial Intelligence, Emotional Surveillance, and the Right to Freedom of Thought.** 24 abr. 2021. Disponível em: https://easychair.org/publications/preprint/qJfZ Acesso em 20 mai. 2025.

42 RODOTÀ, Stefano. **A vida na sociedade da vigilância:** a privacidade hoje. Organização, seleção e apresentação de Maria Celina Bodin de Moraes. Tradução de Danilo Doneda e Luciana Cabral Doneda. Rio de Janeiro: Renovar, 2008, p. 15.

43 GABARDO, Emerson; MENENGOLA, Everton; SANMIGUEL, Nancy Nelly González. The proposal of the European regulation on artificial intelligence. **Sequência**. v. 43, n. 91, p. 1-27, 2022.

The detection of human emotions by artificial intelligence can be inaccurate and limited, since facial expressions can convey different feelings depending on the context, the individual, and cultural factors. The industry is aware of this, yet it continues to offer emotion recognition services for a wide range of purposes, including advertising, law enforcement, healthcare, and education. Dora Kaufmann warns that the real danger today is not that artificial intelligence may be more intelligent than humans, but instead that we use the assumption that it is more intelligent than humans to trust it with making important decisions.[44]

In the field of marketing, predictive algorithms are used that, based on consumer data, enable consumer profiling to offer products and services. This raises questions regarding data protection, given that these algorithms are "trained" using databases containing consumer information,[45] turning data into valuable commodities.[46] However, "new" marketing can also encompass research that incorporates physiological and neurological elements, extending beyond traditional marketing methods, and includes measurements of detection/reaction times, eye tracking, and electroencephalograms. Currently, companies have been using neuromarketing, "*un campo que emplea métodos neurocientíficos para investigar y comprender el comportamiento humano en relación con los mercados y los intercambios comerciales*."[47] In this way, an examination of activated brain regions is conducted, which provides accuracy in analyzing consumer emotions and can influence their purchasing choices, leading to discussions about the breach of autonomy and privacy.

Neurotechnologies, such as brain-computer interfaces (BCIs), are nothing new in medical research for neurological treatments. However, large corporations have seen the potential and opportunity to commercialize this type of technology. This is the case, for example, with Brain-to-text, a BCI developed by Facebook that allows its users to write texts on their phones using only conscious thought, and Kernel Flow, Kernel's BCI,[48] which utilizes infrared technology to transmit neural information at any time and on any device.

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[44] KAUFMAN, Dora. **Detectar emoções humanas com inteligência artificial**: fato ou falácia? 13 mai. 2022. Disponível em: https://epocanegocios.globo.com/colunas/IAgora/noticia/2022/05/detectar-emocoes-humanas-com-inteligencia-artificial-fato-ou-falacia.html Acesso em 03 out. 2023.

[45] SÁNCHEZ DÍAZ, María Fernanda. El derecho a la protección de datos personales en la era digital. **Revista Eurolatinoamericana de Derecho Administrativo**, Santa Fe, vol. 10, n. 1, e235, ene./jun. 2023, p. 7.

[46] BITENCOURT, Caroline Müller; MARTINS, Luisa Helena Nicknig. A inteligência artificial nos órgãos constitucionais de controle de contas da administração pública brasileira. **Revista de Investigações Constitucionais**, Curitiba, vol. 10, n. 3, e253, set./dez. 2023, p. 3.

[47] FLÓREZ ROJAS, María Lorena. Neuromarketing vs. libertad y autonomía de las decisiones del consumidor. **Direitos Fundamentais & Justiça**, Belo Horizonte, ano 16, p. 55-86, out. 2022, p. 56.

[48] Kernel is a biotechnology company founded in 2016 by Bryan Johnson, who developed Kernel Flow, a portable device (a helmet-shaped headset) that measures the brain and its activities to build biomarkers using multimodal neuroimaging, providing advanced, multimodal data for comprehensive insights. Its website states that its mission is to transform precision neuromedicine, thereby accelerating the development

Among the various prospects that focus on the interaction between neuroscience and artificial intelligence, Neuralink,[49] stands out as one of the projects of Kernel and Elon Musk (CEO of Tesla), with the creation of devices that can translate brain activity and "write" neural information in the brain.[50] In summary, the purpose of Neuralink is to implant a chip in the human brain to connect the mind to a machine, which has already been tested on animals. There is talk of the possibility of alleviating disabilities, allowing people with paralysis to communicate with computers through brain activity. If effective, this could have a profoundly positive impact on the lives of a significant number of people. However, the primary concern lies in the risks of merging technology, especially when it becomes available to the public in other applications. Furthermore, concerns exist about potential errors in the chips and uncertainty regarding the safety of their removal, particularly in terms of the risk of brain damage.[51] It is essential to note that in 2023, the US Food and Drug Administration (FDA) authorized Neuralink to conduct human trials of its brain chips.[52] In fact, when consulting the Neuralink website, it is possible to see that there is already a call for volunteer patients to register for present or future tests, and that the first research is already underway: "Neuralink's PRIME Study," a fully implantable, wireless brain-computer interface, with the placement of a small, invisible implant in a part of the brain that plans movements, to allow people with quadriplegia to control external devices with their thoughts.[53]

It is also worth mentioning *the Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) initiative*. A *BRAIN Initiative Alliance (BIA)* is a US initiative with public and private members and affiliates, such as *the Defense Advanced Research Projects Agency (DARPA), the Intelligence Advanced Research Projects Activity (IARPA), the National Science Foundation (NSF), and the U.S. Food and Drug Administration (FDA)*, among others. In short, the purpose of BRAIN is to understand how the human brain works to prevent and treat neurological and psychiatric disorders such as Alzheimer's,

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of treatments and improving patient outcomes. KERNEL. **Our Vision.** Available in: https://www.kernel.com/ Accessed in September. 2023.

[49] Neuralink's own website states its mission as follows "*Create a generalized brain interface to restore autonomy to those with unmet medical needs today and unlock human potential tomorrow*", and that "*Brain-computar interfaces have the potential to change lives for better. We want to bring this technology from the lab into people's homes*". NEURALINK. **Our Mission**. Available in: https://neuralink.com/ Accessed on February 25. 2024.

[50] YUSTE, Rafael; GOERING, Sara; ARCAS, Blaise Agüera y, *et al.* Four ethical priorities for neurotechnologies and AI. **Nature**, v. 551, n. 7679, p. 159-163, 2017.

[51] VIEIRA, Nathan; ZARAMELA, Luciana. **Neuralink:** projeto de Elon Musk preocupa especialistas. 02 fev. 2022. Disponível em: https://canaltech.com.br/saude/neuralink-projeto-de-elon-musk-preocupa-especialistas-208223/ Accessed on September 17. 2023.

[52] CNN BRASIL. **Empresa de Musk está autorizada a testar chips cerebrais em humanos nos EUA.** 2023. https://www.cnnbrasil.com.br/tecnologia/empresa-de-musk-esta-autorizada-a-testar-chips-cerebrais-em-humanos-nos-eua/ Acesso em 17 set. 2023.

[53] NEURALINK. **Join Neuralink's Patient Registry**. Disponível em: https://neuralink.com/patient-registry/ Accessed on February 25. 2024.

Parkinson's, autism, schizophrenia, depression, and brain injuries. It aims to accelerate the development and application of new technologies to produce a dynamic image of the brain, thereby enhancing our understanding of how it works in recording, processing, using, storing, and retrieving large amounts of information. [54]

As seen, there are reports of the use of technologies, especially artificial intelligence, for medicinal and therapeutic purposes, including the treatment of brain injuries, epilepsy, and schizophrenia, as well as to enhance human experience. However, it is worth considering that this phenomenon may increase social inequalities (since there is no equality in access to technologies),[55] in addition to enabling hackers, governments, and large companies to exploit and manipulate people's lives, such as mental privacy, free will, and individuals' understanding of their bodies.[56] In the event of a hack, users may not only have their sensitive data exposed but also suffer unwanted interference, with repercussions on important aspects of their lives. Thus, if not regulated, the misuse of this type of technology can have significant social, psychological, and neural repercussions on users. [57]

It cannot be overlooked that, despite rapid technological progress and its opportunities and potential, there are risks associated with the interaction and influence of new technologies on the human mind, people's thoughts, emotions, and mental privacy. Technological advances in the field of neuroscience may allow for the deduction of thoughts,[58] and with that, the programming of future behavior patterns and decisions, as is typical of the aforementioned surveillance capitalism. This raises questions regarding the legal protection of neurorights, especially regarding their classification as a fundamental human right.[59] Technological advances in the field of neurorights generate numerous benefits, but they also make human life and social relations more complex and risky, imposing essential demands on the legal field.

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[54] THE BRAIN INITIATIVE. **The Brain Initiative.** Disponível em: https://braininitiative.nih.gov/ Accessed on May 20. 2025.

[55] VALLE, Vivian Cristina Lima López; FELISBERTO, Jéssica Heinzen. Administração Pública digital: limites e possibilidades em atenção à desigualdade social e ao custo dos direitos. **Revista Eurolatinoamericana de Derecho Administrativo**, Santa Fe, vol. 9, n. 1, p. 151-179, ene. /jun. 2022. GABARDO, Emerson; FIRKOSWSKI, Olga Lucia Castreghini de Freitas; AGUILAR Viana, Ana Cristina. The digital divide in Brazil and the accessibility as a fundamental right. **Revista Chilena De Derecho Y Tecnología**, v. 11, p. 1-26, 2022.

[56] YUSTE, Rafael; GOERING, Sara; ARCAS, Blaise Agüera y, *et al.* Four ethical priorities for neurotechnologies and AI. **Nature**, v. 551, n. 7679, p. 159-163, 2017.

[57] LÓPEZ-SILVA, Pablo; MADRID, Raúl. Protegiendo la mente: un análisis al concepto al concepto de lo mental en la ley de neuroderechos. **RHV. An International Journal of Philosophy.** Valparaiso: Instituto de Filosofia, Universidad de Valparaiso, n. 20, p. 101-117, 2022. p. 106.

[58] KOLBER, Adam J. Will there be a neurolaw revolution? **Indiana Law Journal**, v. 89, 2014, p. 840.

[59] Neurorights are exclusive to human beings and do not apply to animals or legal entities. However, they should cover Brazilians, resident foreigners, non-resident foreigners, and stateless persons. It is a right granted to individuals under Brazilian sovereign jurisdiction, in accordance with the Brazilian Constitution. On this subject: RESENDE, Augusto César Leite de. Neurodireitos como Direitos Fundamentais na Constituição Federal de 1988. **Pensar**, Fortaleza, v. 30, n. 1, p. 1-14, jan./mar. 2025, p. 7.

Not all jurists, however, advocate for the express and autonomous regulation of neuro-rights at the constitutional level. For authors such as Raúl Madrid and Maria da Paz Madrid, constitutional protection of neurorights would be particularly unnecessary, given that they could be included within the scope of the protection of the right to privacy. Nevertheless, these authors defend the need to present a bill on the subject, to raise citizens' awareness of the importance of the associated rights and duties, as well as the relevance of scientific and technological advances to the common good. They also warn that the law should not contain an open norm (as is already the case with fundamental rights in the Constitution); unambiguous standardization would be necessary to take into account the functioning of the human mind and its capture by computerized procedures, considering the citizen as an integral unit of corporeality and consciousness (that is, mind, body, and soul), and not just one of these aspects.[60] They affirm that "*una ley de protección de neuroderechos puede incluir la protección de 'datos neuronales' de los particulares, e impedir al mismo tiempo que las tecnologías neurocientíficas alteren el consentimiento de sus decisiones*".[61] Their argument refers to Spanish law, but it is also fully applicable to the Brazilian context. Pierangelo Blandino adopts a similar stance when analyzing the Chilean case. According to the author, despite the need to protect the physical and mental integrity of individuals in relation to computer-human interfaces and their possible consequences (such as influencing behavior and free will), specific constitutional protection of neurorights would not be justified. The author argues that these issues can be framed within the context of the right to privacy, and that the creation of new fundamental rights is insufficient to protect against emerging threats to existing fundamental rights, while also expanding the core of traditional fundamental rights already enshrined in the Constitutions.[62]

The framework suggested by these authors, opposed to specific constitutional protection, would, however, depend on strong and stable legal regulation, in addition to interpretation of doctrine and jurisprudence. It so happens that the West is experiencing a period of intense axiological and hermeneutical volatility in its decision-making bodies (in several countries, notably Brazil). Constitutional positivism, therefore, can be an important mechanism for avoiding casuistic views or those incompatible with

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60 MADRID, Raúl; MADRID, María da Paz. ¿Es necesaria la Protección de los Llamados "Neuroderechos"? *in*: SARLET; Gabrielle Bezerra Sales; TRINDADE, Manoel Gustavo Neubarth; MELGARÉ, Plinio. **Proteção de Dados**: temas controvertidos. Indaiatuba: Foco, 2021. p. 301-314.

61 MADRID, Raúl; MADRID, María da Paz. ¿Es necesaria la Protección de los Llamados "Neuroderechos"? *in*: SARLET; Gabrielle Bezerra Sales; TRINDADE, Manoel Gustavo Neubarth; MELGARÉ, Plinio. **Proteção de Dados**: temas controvertidos. Indaiatuba: Foco, 2021. p. 309.

62 BLANDINO, Pierangelo. **The new Chilean Constitution and the bill on neuro rights: new perspectives in Constitutional Law, regulation and in the Metaverse.** 25 nov. 2021. Available in: https://www.dirittocomparati.it/the-new-chilean-constitution-and-the-bill-on-neuro-rights-new-perspectives-in-constitutional-law-regulation-and-in-the-metaverse/ Accessed on October 3. 2023.

the legal system as a whole. Furthermore, it has significant symbolic power to constrain both the actions of the Legislative Branch and the Judiciary in this matter.

With the constitutional affirmation of the protection of neurorights, new challenges will undoubtedly arise, necessitating the need to define the regulatory framework. As occurred with data protection, it will be necessary to reflect on the need for specialization to deal with these "new" rights, as well as to establish conduct and sanctions in the event of violations of such rights. There will also be a need to raise awareness and strengthen the culture regarding these rights, with adversity to be faced in the face of the various ideological spectrums and interests involved, which transcend national boundaries.[63]

One cannot lose sight of the importance of the influence of technologies and big tech companies on power, politics, society, and people's lives, including changes in spatial and temporal paradigms due to digitization and rapid technological evolution, which also leads to a transformation in the concept of ethics. In this context, Hans Jonas argues that, unlike classical concepts of ethics, such as those of Plato and Aristotle, which were based on anthropocentrism, individualism, contemporaneity, and instantaneity, current ethics should be guided by universality, focused on a predictable future, and with an unfinished dimension of responsibility.[64] In other words, for Hans Jonas, there must be concern for the collective, with a responsibility required by the future, considering a time when those currently responsible will likely no longer exist, and a transcendence of ethics and accountability. This view, however, needs to be filtered through the constitution.[65]

It is undeniable that, with technological innovations, especially in the context of the Fourth Industrial Revolution and since Web2,[66] there has been a considerable change in the concept of privacy, which was initially limited to the publication of

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[63] NOHARA, Irene Patrícia; MARTINS, Fernando Medici Guerra; PINTARELLI, Camila Kühl. Desafios de Positivação e de Regulação da Proteção aos Neurodireitos. *In*: CABRAL, Flávio Garcia; GOMES, Priscilla de Siqueira; MISHIMA, Rejane Amorim Monteiro (Org.). **Regulação da Atividade Econômica e dos Serviços Públicos**. Leme/SP: Mizuno, 2024. p. 181.

[64] JONAS, Hans. **O Princípio Responsabilidade**: ensaio de uma ética para a civilização tecnológica. Rio de Janeiro: Contraponto/PUC-Rio, 2006, p. 49.

[65] SCHIER, Paulo Ricardo. **Filtragem constitucional – construindo uma nova dogmática jurídica**. Porto Alegre: Sérgio Fabris, 1999.

[66] With regard to the web, it is important to distinguish that the web is one of the applications of the internet, in that the web uses the internet to share files through browsers. In other words, web and internet are not synonymous. It can also be said that there are three generations of the web: (i) Web1 or Web 1.0, in the 1980s and 1990s, with the possibility of connection through websites, in a static form and without much interaction, for the purpose of reading; (ii) Web2 or Web 2.0, a term coined by Tim O'Reilly in 2004, as the "web of communication," with greater interaction between people on platforms. Users are no longer mere consumers but also producers of content, as seen in blogs and social networks, with consequent greater concern about data collection; (iii) Web3 or Web 3.0, the "semantic web," with data cross-referencing and information reading by devices to provide more accurate information, such as artificial intelligence, the internet of things (IoT), and internet portability. MAGRANI, Eduardo. **A Internet das Coisas.** Rio de Janeiro: FGV, 2018, p. 63-73.

photographs and the disclosure of names in journalistic articles, and now encompasses the protection of personal data collected and processed by public and private entities. Therefore, the use of personal data has given rise to new challenges to the right to privacy.[67] However, it is understood that neurorights cannot be considered merely an extension of the right to privacy, given the importance and urgency of their protection, which impacts the lives of all citizens, not only in aspects related to privacy, but also in the formation of opinions, free will, and decision-making. Data tends to be more critical than the traditional idea of privacy itself. Moreover, it makes no sense to insert something so relevant and new into a concept that does not fully encompass it. Furthermore, if they are protected only at the infra-constitutional level, they become subject to controversy, including from the perspective of their civil procedural protection within the Brazilian system. Therefore, their categorization as fundamental rights is a requirement corresponding to their factual (in intensity and extent) and legal (in substantive and procedural terms) importance.

Paragraph 2 of Article 5 of the 1988 Constitution enshrined the notion of a catalog, with material openness, covering other fundamental rights not expressly mentioned in the formal list in Title II, such as rights provided for in human rights treaties, implicit rights, and rights arising from principles.[68] This also includes fundamental rights provided for in other parts of the constitutional text, such as Articles 196 to 200 of the Constitution.[69] Furthermore, fundamental rights are not simple rights, since, as seen as a whole, they are "bundles of fundamental legal positions" with multifunctionality.[70] The functions of fundamental rights are divided into two main blocks: defense, related to the rights of freedom, with "prohibition of undue interference in the private sphere of the dataowner, whether as a result of actions by the Public Power or by private subjects"; and provision, which imposes on the State the pursuit of objectives and the consequent implementation of assumptions for the exercise of rights by citizens. It is subdivided into services in the strict sense, that is, factual services, and services in the broad sense, encompassing normative services (duty to develop norms), which

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67 MENDES, Laura Schertel. **Privacidade, proteção de dados e defesa do consumidor:** linhas gerais de um novo direito fundamental. São Paulo: Saraiva, 2014. *E-book* Kindle, p. 394-401.

68 Regarding the criteria for recognizing these rights, see: NETTO, Luísa. Criteria to scrutinize new rights: protecting rights against artificial proliferation. **Revista de Investigações Constitucionais**, Curitiba, vol. 8, n. 1, p. 11-75, jan./abr. 2021; NETTO, Luísa Cristina Pinto e; WIELEN, Anna Rechnitzer Van Der. Nuevos derechos en acción: reconocimiento del matrimonio igualitario en Ecuador y Chile bajo la influencia de la Corte Interamericana de Derechos Humanos. **Revista de Investigações Constitucionais**, Curitiba, vol. 11, n. 3, e271, set./dez. 2024.

69 SARLET, Ingo Wolfgang. Algumas considerações em torno do conteúdo, eficácia e efetividade do direito à saúde na Constituição de 1988. **Direito e Democracia.** Canoas: Ulbra, 2002. v. 3, n. 1. p. 338.

70 HACHEM, Daniel Wunder. São os direitos sociais "direitos públicos subjetivos"? Mitos e confusões na teoria dos direitos fundamentais. Revista de Estudos Constitucionais, Hermenêutica e Teoria do Direito (RECHTD), São Leopoldo, v. 11, n. 3, p. 404-436, set./dez. 2019.

may be protective or procedural.[71] Furthermore, due to its multifunctionality and to view fundamental rights as a whole, the rule must be observed from two perspectives: (i) subjective, which considers the perspective of the rights holders; and (ii) objective, which imposes objective legal duties on the State.[72]

The same rule, resulting from a systematic interpretation of various provisions, has several functions linked to the promotion of legal rights that are already considered essential by the Constitution.[73] Thus, viewed as an express fundamental right, the protection of neurorights will be multifunctional, with a defensive function (negative, to prevent undue interference by third parties about the right holder) and a service function (positive, to impose on the State the obligation to implement public policies, with private individuals as creditors of these services). There will be several fundamental legal positions linked to the fundamental right to the protection of neurorights.[74] Furthermore, the infra-constitutional legislation itself and the resulting administrative regulations will undoubtedly have to address several new and relevant issues inherent to the regulated fundamental right.

In an article published in Nature magazine, Rafael Yuste and other researchers from the Morningside Group (made up of neuroscientists, neurotechnologists, clinicians, artificial intelligence engineers, and others) argue that existing ethical guidelines are insufficient when it comes to artificial intelligence and brain-computer interfaces. These authors raise four areas that require attention: privacy and consent; identity and agency (understood as the experience of being in control of situations, with a connection between internal intention and external outcome);[75] increased intelligence; and

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[71] HACHEM, Daniel Wunder. **Tutela administrativa efetiva dos direitos fundamentais sociais:** por uma implementação espontânea, integral e igualitária. Curitiba, 2014. Tese (Doutorado) – Programa de Pós-Graduação em Direito, Universidade Federal do Paraná, p. 131-133.

[72] NOVAIS, Jorge Reis. **As restrições aos direitos fundamentais não expressamente autorizadas pela Constituição.** Coimbra: Coimbra Editora, 2003, p. 55-56.

[73] HACHEM, Daniel Wunder; GUSSOLI, Felipe Klein. La multifuncionalidad y doble titularidad (individual y transindividual) del derecho fundamental al medioambiente. **Revista Catalana de Dret Ambiental**, v. X, p. 1-34, 2019.

[74] Regarding the fundamental legal positions of fundamental rights, it is recommended to read: GABARDO, Emerson; PHILIPPI, Juliana Horn Machado. Direito à saúde e direito à proteção de dados pessoais em tempos de pandemia. *In*: BELLI, Luca; DONEDA, Danilo; HARTMANN, Ivar A.; SARLET, Ingo; ZINGALES, Nicolo. (Org.). **Proteção de Dados na América Latina**: COVID-19, democracia, inovação e regulação. Porto Alegre: Arquipélago, 2021, p. 26.

[75] On the right to agency: 'Cognitive freedom, as positive freedom, approximates to a sense of agency. Often approached as the feeling of being in control of a particular event, the sense of agency arises in situations where the individual intends to produce a specific result and the body moves through the action of the brain's voluntary motor, thereby producing the desired result in the world of appearances. In other words, it is the experience that connects intimate intentions with their external results, with the individual as the protagonist of their own actions and influence on the reality that surrounds them, with the consequent emergence of the alluded sense of control over the given situation". PINTARELLI, Camila Kühl. **O direito de pensar:** um novo capítulo na história do pensamento jurídico. Coimbra: Instituto Jurídico Faculdade de Direito da Universidade de Coimbra, 2025, p. 106.

the generation of prejudice, given that different nations, beliefs, ethnicities, and backgrounds may have different socioeconomic needs and perspectives. They therefore argue that governments should establish deliberative bodies to facilitate debate on neurotechnologies and neurorights.[76]

In the United States, the NeuroRights Foundation, part of Columbia University's NeuroRights Initiative, aims to promote the ethical use of neurotechnologies and artificial intelligence, as well as protect human rights against potential abuses resulting from neurotechnologies.[77] The project divides neuro rights into five categories: (i) mental privacy, so that there is regulation of the sale and transfer of neural data, because no data obtained from the measurement of neural activities should be kept private and, if stored, the owner should have the right to request its deletion; (ii) personal identity, to set limits capable of regulating the intervention of technology in the sense of individuality, since there may be confusion between personal consciousness and external technological inputs; (iii) free will, so that individuals have control over decision-making, without manipulation; (iv) fair access to mental enhancement, with guidelines for the use of mental enhancement neurotechnologies; and (v) protection against bias, as a standard for algorithms in neurotechnology, with algorithm design to prevent bias.[78]

It is understood that personal identity encompasses discussions regarding bodily modification, given the possibility of nanorobots being inserted into human bodies, which could lead to an interface between the brain and the cloud, involving the decoding of brain waves and the feeding of artificial intelligence.[79] Furthermore, brain "enhancements" or neuroenhancements, even with drugs, can raise questions about the loss of identity and autonomy of individuals.[80] Based on this premise, it is also possible to question how the use of brain chips and nanorobots, with modifications to the human body, can interfere with personal identity.

In 2014, Jan Christoph Bublitz and Reinhard Merkel wrote an article discussing the manipulation of people and its influence on decision-making, which highlighted the need to protect people's rights in the face of manipulation. The same work outlines the neuroright to mental self-determination, to protect people's minds from

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[76] YUSTE, Rafael; GOERING, Sara; ARCAS, Blaise Agüera y, *et al.* Four ethical priorities for neurotechnologies and AI. **Nature**, v. 551, n. 7679, p. 159-163, 2017.

[77] NEURO TECHNOLOGY CENTER COLUMBIA UNIVERSITY. **NeuroRights Initiative Columbia University.** Available in: https://ntc.columbia.edu/neurorights-initiative/ Accessed on May 20. 2025.

[78] THE NEURORIGHTS FOUNDATION. **Mission:** the five neurorights. Available in: https://neurorightsfoundation.org/mission. Accessed on May 20. 2025.

[79] BRAIN SUPPORT. **Brain to cloud interface:** a new perspective for human enhancement. 12 jan. 2022. Available in: https://www.brainlatam.com/blog/brain-to-cloud-interface-a-new-perspective-for-human-enhancement-843 Accessed on March 13. 2024.

[80] BUBLITZ, Jan Cristoph; MERKEL, Reinhard. Autonomy and authenticity of enhanced personality traits. **Bioethics**, v. 23, n. 6, p. 360-374, 2009.

psychological harm and manipulation.[81] In this context, it is agreed with the classification made by the NeuroRights Foundation, which can be included in the category of neurorights (or rights to mental self-determination in a broad sense): 1) mental privacy, regarding the transfer of neural data; 2) personal identity, with the need to set limits on technological intervention in individuality, including to improvements to the brain and other parts of the human body – beyond the insertion of nanorobots; 3) free will for decision-making; 4) fair access to mental enhancement; 5) protection against prejudice and algorithmic biases.

In the Brazilian infra-constitutional field, Bill No. 1,229/21, authored by Representative Carlos Henrique Gaguim (DEM-TO), was pending in the Chamber of Deputies, to create "rules to ensure the protection of central nervous system data, defined as neural data, obtained from any electronic, optical, or magnetic system",[82] in addition to amending Law No. 13,709/2018 (General Data Protection Law – LGPD). The justification for the bill mentioned the decisions handed down by the Federal Supreme Court in May 2020, in ADIs 6387, 6388, 6389, 6390, and 6393, which recognized the fundamental right to data protection as an autonomous right.[83] To this end, it considered the risks to the privacy, intimacy, and autonomy of individuals due to the processing of data collected on the internet and social networks, contrasting them with the even greater risks of collecting data directly from the human brain through the use of neurotechnology. Furthermore, it defended the need for regulation to ensure: "a) the right to mental privacy; b) the right to identity and personal autonomy; c) the right to free will and self-determination; d) the right to equitable access to cognitive enhancement; and e) the right to protection against algorithmic action or decisions".[84]

However, as can be seen from its status on the Chamber of Deputies website, on March 15, 2022, Bill 1,229/2021 was withdrawn at the request of its author, Deputy Carlos Henrique Gaguim.[85] However, as an alternative, on March 9, 2022, Deputy Carlos Henrique Gaguim himself presented Bill 522/2022 to amend Law No. 13,709/2018 (LGPD), conceptualizing neural data and including it as sensitive data, as well as defining brain-computer interfaces and neurotechnology. This bill also proposes a legal framework for the processing of neural data. On October 23, 2024, Representative

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81 BUBLITZ, Jan Christoph; MERKEL, Reinhard. Crimes against minds: On mental manipulations, harms and a human right to mental self-determination. **Criminal Law and Philosophy**, v. 8, p. 51-77, 2014, p. 58-62.

82 CÂMARA DOS DEPUTADOS. **PL 1229/2021.** Available in: https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2276604 Accessed on May 21. 2025.

83 RUARO, Regina Linden; RODRIGUEZ, Daniel Piñeiro. Personal data protection and State surveillance: the risks of digital discrimination and the Federal Supreme Court's vision**. A&C – Revista de Direito Administrativo & Constitucional**, Belo Horizonte, ano 22, n. 90, p. 63-85, out./dez. 2022.

84 GAGUIM, Carlos Henrique. **Projeto de Lei n. 1229/2021.** Brasília, 06 abr. 2021. Available in: https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra?codteor=1985389 Accessed on May 21. 2025.

85 CÂMARA DOS DEPUTADOS. **PL 1229/2021.** Available in: https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2276604 Accessed on May 21. 2025.

Adriana Ventura, rapporteur for the Health Committee (CSAUDE) of the Chamber of Deputies, issued an opinion in favor of the bill's approval, accompanied by the presentation of a substitute bill to stipulate that neural data constitutes health data.[86]

In addition, Bill No. 2,174, dated April 26, 2023, authored by Representative Rubens Pereira Júnior (PT-MA), "establishes the rules and principles for the protection of fundamental rights related to the human brain and nervous system, to ensure the protection and promotion of individuals' neuro-rights",[87] with the express provision of the State's duty to guarantee them and promote their defense (Art. 3). In art. 2, Bill No. 2,174/2023 defines neurorights as "fundamental rights related to the human brain and nervous system",[88] and proposes a non-exhaustive list with seven categories of neurorights: 1) the right to cerebral and neurological integrity; 2) the right to cerebral and neurological privacy; 3) the right to cognitive freedom; 4) the right to cognitive equality; 5) the right to neuroscientific education and information; 6) the right to personal autonomy and free will; 7) the right to non-discrimination based on neurological characteristics.[89] The intention to expand the categories of neurorights is clear, but without rigidity, through the proposal of an open and illustrative list, and the innovative inclusion of the right to non-discrimination based on neurological characteristics.

As for proposals at the constitutional level, Constitutional Amendment Proposal (PEC) No. 29/2023 is currently being processed, to "include, among fundamental rights and guarantees, the protection of mental integrity and algorithmic transparency".[90] The proposal is broad in that it aims to protect the human mind and neural activity in the face of scientific progress, to preserve freedom, equality, and privacy. At the same time, when dealing with "mental integrity," it is not limited to neurotechnologies, as it aims

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[86] CÂMARA DOS DEPUTADOS. **PL 522/2022.** Available in: https://www.camara.leg.br/propostas-legislativas/2317524 Accessed on May 21. 2025.

[87] CÂMARA DOS DEPUTADOS. **Projeto de Lei n. 2.174/2023**. Available in: https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2358605 Accessed on May 18. 2025.

[88] CÂMARA DOS DEPUTADOS. **Projeto de Lei n. 2.174/2023**. Available in: https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2358605 Accessed on May 18. 2025.

[89] Regarding discrimination based on neural data, or "neurodiscrimination," especially in the workplace, Camila Pintarelli points out: "Despite the positive aspects that neurotechnology can provide in the workplace, its use exposes at least two well-defined ethical dilemmas, beyond the threat to employee privacy itself: the increase in power and information asymmetry in labor relations, and the risk of neurodiscrimination, understood as discrimination based on neural signals (such as predisposition to dementia or severe inability to focus, for example) or on indicators of mental health, cognitive performance, intentions, and emotional states manifested by a particular worker who uses neurotechnology tools." PINTARELLI, Camila Kühl. **O direito de pensar:** um novo capítulo na história do pensamento jurídico. Coimbra: Instituto Jurídico Faculdade de Direito da Universidade de Coimbra, 2025, p. 142.

[90] SENADO FEDERAL, **Proposta de Emenda à Constituição n. 29, de 2023.** 2023. Cognitive freedom, as positive freedom, is similar to the sense of agency. Often described as the feeling of being in control of a particular situation, the sense of agency arises in situations where the individual intends to produce a specific result, and the body moves through the voluntary action of the brain to produce the desired result in the world of appearances. Available in: https://legis.senado.leg.br/sdleg-getter/documento?dm=9386704&ts=1686688862951&disposition=inline Accessed on May 21. 2025.

precisely to protect mental activity in the digital context, that is, there is concern not only with the scientific/therapeutic use of neurotechnologies, but also with the interference of technologies in the human mind, mainly due to the power of algorithms, social networks, and the interests that permeate them.

With Constitutional Amendment Proposal (PEC) No. 29/2023, Brazil "became the second country in the world to demonstrate constitutional concern for the protection of the human mind in the technological arena as a fundamental human right".[91] In this scenario, the approval of PEC No. 29/2023 seems appropriate, so that neurorights are materially and formally recognized as fundamental rights and receive protection compatible with their importance in the current social, political, and technological context, thus not depending solely on doctrinal understanding and judicial hermeneutics for the characterization of their existence.

There is also an important initiative at the state level: in the state of Rio Grande do Sul, on December 20, 2023, Constitutional Amendment No. 85 was approved to amend the wording of paragraph 235 of the State Constitution to include the neuroright to mental integrity as one of the foundations of state policy on science, technology, and scientific research.[92] It should be noted that both PEC No. 29/2023 and Constitutional Amendment No. 85/2023 of the State of Rio Grande do Sul were influenced by Camila Pintarelli, who presented the drafts of both proposals.[93]

It is worth highlighting the innovation brought about by the Chilean Constitution, a pioneer in the protection of neurorights, with the unanimous approval of a bill (Boletín n. 13.827-19) for the publication of Law n. 21.383, which modifies art. 19, 1º, of the Chilean Constitution, to include the protection of brain activity and the information derived from it, that is, neurorights.[94] This initiative represents an unprecedented inno-

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[91] NOHARA, Irene Patrícia; MARTINS, Fernando Medici Guerra; PINTARELLI, Camila Kühl. Desafios de Positivação e de Regulação da Proteção aos Neurodireitos. *In*: CABRAL, Flávio Garcia; GOMES, Priscilla de Siqueira; MISHIMA, Rejane Amorim Monteiro (Org). **Regulação da Atividade Econômica e dos Serviços Públicos**. Leme/SP: Mizuno, 2024. p. 179.

[92] "Art. 235. The state policy on science and technology shall be defined by a specific body, created by law, with representation from the scientific community and Rio Grande society. Sole paragraph. Scientific and technological policy and research shall be based on respect for life, health, human dignity, the mental integrity of human beings, and the cultural values of the people, on the protection, control, and recovery of the environment, and on the use of natural resources.". RIO GRANDE DO SUL. **Constituição do Estado do Rio Grande do Sul.** Available in: https://www2.al.rs.gov.br/dal/LinkClick.aspx?fileticket=WQdlfqNoXO4%3d&tabid=3683&mid=5359 Accessed on May 20. 2025.

[93] NOHARA, Irene Patrícia; MARTINS, Fernando Medici Guerra; PINTARELLI, Camila Kühl. Desafios de Positivação e de Regulação da Proteção aos Neurodireitos. *In*: CABRAL, Flávio Garcia; GOMES, Priscilla de Siqueira; MISHIMA, Rejane Amorim Monteiro (Org). **Regulação da Atividade Econômica e dos Serviços Públicos**. Leme/SP: Mizuno, 2024. p. 179-180.

[94] "*El desarrollo científico y tecnológico estará al servicio de las personas y se llevará a cabo con respeto a la vida y a la integridad física y psíquica. La ley regulará los requisitos, condiciones y restricciones para su utilización en las personas, debiendo resguardar especialmente la actividad cerebral, así como la información proveniente de ella*;" BIBLIOTECA DEL CONGRESO NACIONAL DE CHILE/BCN. **Ley 21383**: modifica la Carta Fundamental, para

vation in protecting individuals against the potential misuse of neurotechnologies, and it undoubtedly serves as a model for similar initiatives worldwide.[95]

Still on the subject of Chile's pioneering role in the protection of neurorights, it is worth mentioning the decision of the Chilean Supreme Court, which, when analyzing the Insight device (for monitoring brain activity) in the case of *Guido Girardi vs. Emotiv Inc*., highlighted the importance of neurorights and the ethical and legal impacts of neurotechnologies. The lawsuit was filed in 2022 by Guido Girardi, a former senator and president of *Fundación Encuentros del Futuro* (FEF), against Emotiv for the sale of Insight, before the *Corte de Apelaciones* in Santiago. Initially, Emotiv did not acknowledge any wrongdoing, and the appeal was denied. Guido Girardi appealed to the Supreme Court, which ruled that there was a violation of the constitutional guarantees provided for in paragraphs 1 and 4 of Article 19 of the Chilean Constitution. He upheld the appeal to affirm that the commercialization and use of Insight, as well as the handling of the data obtained, must strictly comply with applicable regulations. It also ordered the deletion, without further processing, of all information stored and collected using the Insight device.[96]

Digital rights in the use of neurotechnologies are addressed in Spain's *Carta de Derechos Digitales* (Digital Rights Charter), published in July 2021 and designed as a roadmap for public authorities and future legislative projects in areas related to digital rights. Chapter XXVI deals with the regulation of neurotechnologies in people to ensure: 1) that each person controls their own identity; 2) individual self-determination and freedom to make decisions; 3) protection of data obtained from or related to brain processes; 4) physical and mental integrity in the use of human-machine interfaces; and 5) that there be no undue interference in decisions and processes based on neurotechnologies. It also provides for the possibility of regulating neurotechnologies beyond therapeutic uses, for cognitive improvement and enhancement of people's abilities.[97]

Such is the importance of the subject that the European Parliament's Special Committee on Artificial Intelligence drew up Report A09-0088/2022, dated 5 April 2022, dealing with neurorights. The document acknowledges the importance of artificial intelligence in technological advancements, including brain research, while also highlighting the potential risks to fundamental rights. Item 36 highlights the concern

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establecer el desarrollo científico y tecnológico al servicio de las personas. Available in: https://www.bcn.cl/leychile/navegar?idNorma=1166983 Accessed on May 21. 2025.

95 LÓPEZ-SILVA, Pablo; MADRID, Raúl. Protegiendo la mente: un análisis al concepto al concepto de lo mental en la ley de neuroderechos. **RHV. An International Journal of Philosophy.** Valparaiso: Instituto de Filosofia, Universidad de Valparaiso, n. 20, p. 101-117, 2022. p. 104.

96 CNN CHILE. **Histórico: Suprema Corte Acoge primer recurso a nível mundial para evitar que empresa pueda leer la mente por neurodatos.** 10 ago. 2023. Available in: https://www.cnnchile.com/pais/girardi-corte-suprema-recurso-dispositivo-leer-mente-proteccion-datos-neuroderechos_20230810/ Accessed on November 24. 2023.

97 ESPAÑA DIGITAL. **Carta de Derechos Digitales**. Available in: https://www.derechosdigitales.gob.es/es/carta-espanola-de-derechos-digitales Accessed on May 21. 2025.

regarding the absence of legislation specifically addressing neurological data and the development of safe neurological technologies within the European Union.[98] Item 247 invites the Commission to consider neurorights for inclusion in the Universal Declaration of Human Rights,[99] to protect the human brain from interference, manipulation, and control by technologies based on artificial intelligence.[100] Subsequently, on May 5, 2022, the European Parliament deliberated on this report and approved, with 495 (four hundred and ninety-five) votes (with 34 votes against and 102 abstentions), the Resolution on artificial intelligence in the digital age (2020/2266(INI)), to improve the regulatory environment to ensure respect for fundamental rights. The wording of Report A09-0088/2022 was repeated, including item 36, which addresses concerns about safety in neurotechnologies, specifically concerning fundamental rights, the need for consent, and the absence of legislation in this area.[101]

Another essential document is the Ibero-American Charter of Digital Principles and Rights,[102] presented at the XXVIII Ibero-American Summit of Heads of State and Government in March 2023, to which Brazil is a signatory. This is a non-binding charter, and it is worth highlighting the 9th (ninth) of the ten commitments signed, for "an approach to emerging technologies that does not renounce the centrality of people",[103]

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[98] "36. Notes that AI can contribute to the rapid progress of new technologies, such as brain imaging, which already have important applications in medicine but also entail substantial risks to human agency and the expression of fundamental rights without requiring consent; is concerned about the lack of legislation concerning neurological data and believes that the EU should strive to become a world leader in the development of safe neurological technologies;". PARLAMENTO EUROPEU. Comissão Especial sobre Inteligência Artificial na Era Digital. **Relatório -A9-0088/2022**: Relatório sobre a inteligência artificial na era digital. Relator: Axel Voss. Processo: 2020/2266(INI). 05 abr. 2022. Available in: https://www.europarl.europa.eu/doceo/document/A-9-2022-0088_PT.html Accessed on May 21. 2025.

[99] "247. Calls on the Commission to consider an initiative on neurorights with the aim to guard the human brain against interference, manipulation and control by AI-powered neurotechnology; encourages the Commission to champion a neurorights agenda at the UN level in order to include neurorights in the Universal Declaration of Human Rights, concretely as regards the rights to identity, free will, mental privacy, equal access to brain augmentation advances and protection from algorithmic bias;". PARLAMENTO EUROPEU. Comissão Especial sobre Inteligência Artificial na Era Digital. **Relatório -A9-0088/2022**: Relatório sobre a inteligência artificial na era digital. Relator: Axel Voss. Processo: 2020/2266(INI). 05 abr. 2022. Available in: https://www.europarl.europa.eu/doceo/document/A-9-2022-0088_PT.html Accessed on May 21. 2025.

[100] PARLAMENTO EUROPEU. Comissão Especial sobre Inteligência Artificial na Era Digital. **Relatório -A9-0088/2022**: Relatório sobre a inteligência artificial na era digital. Relator: Axel Voss. Processo: 2020/2266(INI). 05 abr. 2022. Available in: https://www.europarl.europa.eu/doceo/document/A-9-2022-0088_PT.html Accessed on May 21. 2025.

[101] EUROPEAN PARLIAMENT. **Resolução do Parlamento Europeu, de 3 de maio de 2022, sobre inteligência artificial na era digital (2020/2266(INI))**. 03 mai. 2022. Available in: https://www.europarl.europa.eu/doceo/document/TA-9-2022-0140_PT.html Accessed on May 21. 2025.

[102] SECRETARÍA GENERAL IBEROAMERICANA. **Carta Ibero-americana de Princípios e Direitos em Entornos Digitais.** 2023. Available in: https://www.segib.org/pt-br/?document=carta-ibero-ameriana-de-principios-e-direitos-em-entornos-digitais Accessed on May 21. 2025.

[103] SECRETARÍA GENERAL IBEROAMERICANA. **Carta Ibero-americana de Princípios e Direitos em Entornos Digitais.** 2023. Available in: https://www.segib.org/pt-br/?document=carta-ibero-ameriana-de-principios-e-direitos-em-entornos-digitais Accessed on May 21. 2025. p. 33.

given innovations such as artificial intelligence, quantum computing, and neurotechnologies, with the provision for revision and updating of the Charter when necessary to adapt it to new realities.

The digital and technological revolution is undoubtedly beneficial, but we must not lose sight of the fact that technological and digital advances bring new risks. Information and communication technologies (ICTs), including neurotechnologies and nanotechnologies, are capable of altering the functioning of the human body, prompting us to consider the construction of a post-human subject linked to an "artificial superintelligence".[104] The connection between law and technology gives rise to new and immeasurable challenges to law and regulation. The state, through its legal and constitutional system, will be responsible for this regulation (and the ethical concerns inherent to it). It would be naive to think that big tech companies would get involved and allocate resources to projects involving neurorights if there were no priority perspective of obtaining and distributing profits. In addressing this issue, any perspective that contradicts institutionalization, public intervention, the rule of law, and decisions based on the public interest is dangerous and misguided from the standpoint of preserving people's rights and fostering good social coexistence.

When considering the regulation of technological development and the future of humanity, we must take into account the world we want to live in and leave for future generations.[105] There must be concern for the ethical and responsible use of neurotechnologies, as well as critical reflection based on the idea of sustainability and fundamental rights.[106] Thus, with concern for possible human rights violations, and given this interrelationship between the body, especially the brain, and machines, there is an urgent need for legal and constitutional protection of neurorights, as well as their express recognition as fundamental rights.

5. CONCLUSIONS

With the evolution of information and communication technologies (ICTs), there is an increasing amount of data collection and processing, not only on the internet and social networks, but also through the use of artificial intelligence, the internet of things (IoT, with smart devices), and nanotechnology, with increasingly smaller

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104 GABARDO, Emerson; NOHARA, Irene Patrícia. Superinteligência e os desafios reais e fictícios de regulação em tempos de inteligência artificial. **Sequência**. v. 45, n. 97, p. 1-22, 2024.

105 FEENBERG, Andrew. **Entre a Razão e a Experiência**: ensaios sobre tecnologia e modernidade. Vila Nova de Gaia/Portugal: Inovatec, 2019, p. 67.

106 FLORES FILHO, Edgar Gastón Jacobs; FIRMO, Marina de Castro. Dignidade Humana e Neurodireitos na Era Digital. **Revista do Instituto de Direito Constitucional e Cidadania – IDCC.** Londrina, n. 2, e063, jul./dez. 2022. p. 18.

devices, sensors, and chips that can be inserted into the human body. In other words, information and data are processed constantly and virtually everywhere.

This data has economic value,[107] which motivates its exploitation by companies, especially big tech companies such as Google, Meta (Facebook and Instagram), Amazon, and Apple, among others. This information society can be characterized as a "surveillance society" embedded in "surveillance capitalism", with the collection, processing, and even sale of data, aimed at promoting products and favoring these companies.

It is precisely in this typical scenario of "data capitalism," and with the growth of neurotechnologies and the interaction between human brains and machines, that concerns about neurorights arise. It should be borne in mind that at stake is not only the economic aspect, which benefits large companies through the collection of neural data (neurocapitalism), but also the protection of privacy (especially mental privacy), informational self-determination, personal identity, free will in decision-making, as well as protection against possible prejudices resulting from algorithmic biases. Thus, it is understood that the following can be considered rights that can be categorized as neurorights: 1) mental privacy, regarding the transfer of neural data; 2) personal identity, with the need to set limits on technological intervention in individuality, including about improvements to the brain and other parts of the body – in addition to the insertion of nanorobots; 3) free will in decision-making; 4) fair access to mental enhancement; 5) protection against prejudice and algorithmic biases. This classification, however, is dynamic, flexible, and non-exhaustive, being perfectly compatible with others, such as that of Bill 2.174/23.

Due to the current and future challenges to mental and psychological integrity, as well as to individuals' autonomy and identity, it is crucial and urgent to regulate and protect neurorights, both at the infra-constitutional and constitutional levels – and, especially, to recognize them as fundamental rights. To this end, it is reasonable to consider the approval of PEC No. 29/2023 as appropriate, so that neurorights are formally recognized as fundamental rights and receive material and procedural protection compatible with their importance in the current global social, political, and technological context. Given the importance of protecting neurorights, it is understood that this is an autonomous fundamental right, currently implicit in the Brazilian Constitution, but which deserves to be constitutionally enshrined, as occurred with the recent example of the fundamental right to data protection, inserted in item LXXIX of Article 5 of the Constitution of the Republic.

[107] THE ECONOMIST. **The world's most valuable resource is no longer oil, but data:** the data economy demands a new approach to antirust rules. 06 mai. 2017. Available in: https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data Accessed on May 20. 2025.

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