Analysis of the existing European human rights framework concerning the human rights issues raised by neurotechnologies and their applications

Report commissioned by the
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Author:
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Author: Roberto Andorno
Associate Professor of biomedical law and bioethics
University of Zurich, Switzerland

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS 5
TERMINOLOGY 6
1. INTRODUCTION 7
2. HUMAN RIGHTS IMPACTED BY NEUROTECHNOLOGIES 9
2.1 Mental privacy 9
2.1 Cognitive liberty and freedom of thought 13
2.2 Mental integrity 15
2.3 Personal identity 17
3. CONCLUSIONS AND RECOMMENDATIONS 19
REFERENCES 24

LIST OF ABBREVIATIONS

- **CFR: EU Charter of Fundamental Rights**
- **CHRB: Council of Europe's Convention on Human Rights and Biomedicine (Oviedo Convention)**
- **ECHR: European Convention on Human Rights**
- **ECtHR: European Court of Human Rights**
- **ICCPR: International Covenant on Civil and Political Rights**
- **ICESCR: International Covenant on Economic, Social and Cultural Rights**
- **UDHR: Universal Declaration of Human Rights**

TERMINOLOGY

Neurotechnology: This term refers to any devices, systems, and procedures that directly measure, access, analyse, predict or modulate the nervous system to understand, influence, restore or anticipate its structure, activity and function. Neurotechnology encompasses both medical and non-medical applications, using tools that measure, infer, and influence nervous system activity, as well as mental states, through direct interaction with the nervous system or by interfacing with devices and systems. (*)

Neural data: Qualitative and quantitative data about the structure, activity and function of the nervous system gathered through neurotechnology. Neural data are sensitive data, as they may reveal neurological conditions and can potentially be used to infer mental states. (*)

Cognitive biometric data: Data obtained from technologies that, while not being neurotechnologies per se, can generate information potentially enabling the diagnosis of neurological conditions or the interpretation or prediction of mental states. Examples of these technologies are eye tracking, video oculography, typing dynamics, voice recognition, facial recognition, blood pressure and sugar measurement, and sleep movement monitoring. These technologies raise privacy issues similar to those posed by neurotechnologies. (*)

Mental states: this term is used to refer to any cognitive, affective, and conative state of the mind (i.e., related to a wish or intention).

Brain-Computer Interface (BCI): A system that creates a direct connection between brain activity and an external device, typically allowing users to control machines or interact with their environment (such as communicating or moving a robotic limb) using only their thoughts. In the clinical field, BCIs have shown significant promise in helping patients with severe motor impairments. BCIs are also used for non-medical purposes such as well-being, self-assessment, and entertainment.

Electroencephalogram (EEG): A non-invasive method that records electrical activity in the brain by means of small, metal discs (called electrodes) that attach to the scalp. It is used to diagnose epilepsy and other neurological conditions.

Deep Brain Stimulation (DBS): A procedure that involves the surgical implantation of electrodes in specific areas of the brain. A battery-operated pulse generator, similar to a cardiac pacemaker, delivers electrical signals through the electrodes. DBS is used to treat Parkinson's disease, essential tremor, obsessive-compulsive disorder, and other neurological conditions.

(*) This definition originates from the 2025 UNESCO Draft Recommendation on the Ethics of Neurotechnology, developed by an Expert Group that included the author of this report.

1. INTRODUCTION

Neurotechnologies offer unprecedented possibilities for accessing, recording, altering data from the human brain, and even for potentially predicting individuals' behaviour. These devices and procedures can be used either in a wearable form or implanted through surgery.

Brain imaging techniques, various forms of brain-computer interfaces, transcranial and intracranial electrical stimulation, and other related technologies have great potential to significantly improve the health and well-being of neurological patients by providing new diagnostic, preventive, and therapeutic tools. For example, brain-computer interfaces can greatly enhance the independence, and abilities of people with various motor impairments due to spinal cord injury or brainstem stroke. These devices can record neural signals from the brain, decode the user's intent, and translate this into commands to control a prosthetic limb (Vilela & Hochberg, 2020).

Besides medical applications, advancements in this field offer new opportunities for self-monitoring mental health and cognitive performance, brain-controlled computer usage, communication, and even entertainment. However, these same technologies, if misused, could pose unprecedented threats to human rights and human dignity that were unthinkable only a few decades ago. As rapid advancements continue in this area, it is becoming increasingly urgent to assess whether existing legal frameworks are adequate to effectively protect individuals' mental sphere.

In addition to concerns about mental privacy, the possibility of altering neural data through neurotechnologies generates disquiet about the possible emergence of sophisticated forms of mind control and infringements on freedom of thought, self-determination, personal identity, and mental integrity.

Undoubtedly, the human interests potentially threatened by neurotechnologies are significant enough to deserve protection under human rights norms. It is important to remember that the brain is the organ most directly connected to our decisions, thoughts, and memories – essentially, to the core of our personality, our sense of self, and, by extension, our dignity as human beings. It is evident that in this field we are beginning to face a wide range of unprecedented threats to human personality, which require a strong response from the legal system and, in particular (though not exclusively), from human rights standards.

This report aims to assess whether the current European human rights framework is adequately equipped to address emerging challenges or whether gaps remain. It is intended as a first step toward developing an interpretative guide for adapting the European human rights framework to better respond to these new challenges.

Let us remember that the European Convention on Human Rights (hereafter, ECHR, or simply "the Convention") serves as the cornerstone of the European human rights system. Drafted in the aftermath of the Second World War, the ECHR was adopted in 1950 and entered into force in 1953. It almost exclusively protects civil and political

rights, that is, the so-called “first generation rights”, which are the rights of liberty that protect individuals against violations by the state, such as the right to life, privacy, fair trial, freedom of thought and expression, freedom from torture and inhuman and degrading treatment, and freedom from discrimination. In contrast, economic, social, and cultural are not addressed by the Convention, and were left to a separate and later document.[1] The focus of the Convention on the rights of liberty is relevant to the purpose of this report because most of the rights that are at stake in the context of neurotechnologies are first-generation rights. Thus, there is a natural affinity between the philosophy that inspired the ECHR and the rights that are potentially impacted by neurotechnological developments.

It is also important to mention that the ECHR has strong enforcement mechanisms and provides for both state and individual applications. According to Articles 33 and 34, any contracting state and any individual, non-governmental organisation and group of individuals may bring an application alleging a breach of the Convention by a state that has ratified it. The system’s centerpiece is the European Court of Human Rights (ECtHR), a judicial body responsible for interpreting the Convention and ruling on alleged violations, and whose judgements are binding for states.

The analysis made in this report pays particular attention to the ECHR and the jurisprudence of the ECtHR. In addition, it considers other relevant European legal instruments, notably the Council of Europe’s Convention on Human Rights and Biomedicine (hereafter, Oviedo Convention), and the EU Charter of Fundamental Rights (hereafter, CFR), and the three pillars of the international human rights system: the 1948 Universal Declaration of Human Rights (hereafter, UDHR), and the 1966 International Covenants on Civil and Political Rights (hereafter, ICCPR), and on Economic, Social and Cultural Rights (hereafter, ICESCR).

This report also takes into account the recommendations made by a group of experts at a roundtable jointly organised by the Council of Europe and the OECD (Organization for Economic Cooperation and Development) in 2022 (O’Sullivan et al., 2022). In addition, this report places great value on the work conducted in this area by the UN Human Rights Council Advisory Committee (2024) and UNESCO (2025).

[1] The economic, social and cultural rights are enshrined in the European Social Charter, which was opened for signature in 1961 and became effective four years later. A separate monitoring committee oversees its implementation.

2. HUMAN RIGHTS IMPACTED BY NEUROTECHNOLOGIES

Today, most experts seem to agree that, to a greater or lesser extent, existing human rights need to be reinterpreted or expanded to encompass the emerging issues raised by neurotechnological advances (Ligthart et al, 2023, p. 464-465). Some experts even believe that some new human rights must be created to address these challenges more effectively (Ienca and Andorno, 2017).

So far, the academic debate on the so-called "neurorights" has been largely focused on determining the "list" of rights to be included in that category, how they should be defined, and whether they are entirely new rights or just extensions of existing rights. In contrast, important questions concerning the effective *implementation* of these rights, and how they should be *balanced* against other human rights and social interests have not been sufficiently addressed in the literature.

Despite academic controversies on how or to what extent existing human rights frameworks must be adapted to offer protection against misuse of neurotechnologies, there is currently a strong consensus on the human values involved in this area and the need to uphold them through human rights norms, as well as civil and criminal legislation. This is evident in the various reports, declarations, and recommendations adopted or being prepared by international and regional organisations, such as UNESCO, OECD, the Human Rights Council, and others.[2]

Taking into account these documents and the scholarly work in this area, the rights particularly relevant for dealing with the challenges posed by neurotechnologies appear to be: a) mental privacy, b) cognitive liberty and freedom of thought, c) mental integrity, and d) personal identity.

2.1 MENTAL PRIVACY

Respect for mental privacy is what is most immediately at risk with the increasing access to neural data enabled by neurotechnologies. The notion of mental privacy refers to the idea that people should have control over the access to and use of their neural data by others. Neural data are highly sensitive, as they can be used to infer mental states, and may also provide insights into a person's neurological and psychological condition. For example, specific patterns of brain activity might reveal early signs of Alzheimer's disease or predispositions to mental health disorders. While this information could be valuable for early diagnosis and treatment, it also raises significant concerns regarding privacy (Bertoni & Ienca, 2024, p. 12). It is also noteworthy that various wearable devices that enable access to cognitive biometric data, while not being neurotechnologies per se, raise privacy concerns similar to those

[2] See UNESCO IBC, 2021; UNESCO,2025; UN Human Rights Council Advisory Committee, 2023; OECD, 2019; Council of Europe, 2021; OAS-IJC, 2023).

associated with neurotechnologies and also deserve careful consideration by lawmakers (Magee, Ienca, Farahany, 2024).

It also important to point out that access to neural data would give a variety of actors the ability to make inferences about neurotechnology users and unfairly disadvantage some of them, giving rise to the so-called “neurodiscrimination” (Muhl & Andorno, 2023). Among the third parties that might be tempted to misuse neural data for discriminatory purposes are, for instance, employers interested in monitoring their employees' concentration at work, schools seeking to scan children's brains to assess their attention levels, and authoritarian governments eager to identify regime opponents. Therefore, it is crucial to implement appropriate policy measures to safeguard individuals from unauthorised access to their neural data. To this purpose, the formal recognition of a "right to mental privacy" has been proposed to specifically preserve the privacy of neural data (Ienca and Andorno, 2017; Yuste et al., 2017).

Certainly, international and European human rights norms already recognise a general right to privacy, including the confidentiality of personal data. The foundational instrument of international human rights law, the UDHR, provides:

> “No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honor and reputation. Everyone has the right to the protection of the law against such interference or attacks” (Article 12)

This norm is restated in almost the same words in the 1966 International Covenant on Civil and Political Rights (art. 17). For its part, the Universal Declaration on Bioethics and Human Rights adopted by UNESCO in 2005 provides that

> “The privacy of the persons concerned and the confidentiality of their personal information should be respected. To the greatest extent possible, such information should not be used or disclosed for purposes other than those for which it was collected or consented to” (...) (Article 9).

At the European level, the ECHR recognises a right to respect for one’s “private and family life, his home and his correspondence” (Art. 8, para 1). According to paragraph 2, this right can be subject to certain restrictions that are “in accordance with the law" and "necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.”

The European Biomedicine Convention (Oviedo Convention) expressly refers to the right to privacy regarding personal health data when it stipulates that

> “[e]veryone has the right to respect for private life in relation to information about his or her health” (Art. 10, para. 1).

Similarly, the EU Charter of Fundamental Rights, after providing that “[e]veryone has the right to respect for his or her private and family life, home and communication” (Article 7), stipulates that “[e]veryone has the right to the protection of personal data concerning him or her” (Article 8, para. 1). Moreover, “[s]uch data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law” (idem, para. 2).

As can be seen from the above-mentioned norms, international and European human rights law conceive the right to privacy very broadly, encompassing a range of heterogeneous elements. This makes it difficult to identify this right’s content in very precise terms. It is not by chance that the right to privacy has been described as the “least defined and most unruly of the rights enshrined in the [European] Convention” (Harris et al., 2022, p. 508).

As a matter of fact, current human rights law does not explicitly recognise a right to mental privacy. Therefore, the question is whether the general right to privacy needs to be interpreted extensively to better protect the mental sphere. Scholars have discussed this question intensively over the past few years. Many of them agree that some specific provisions regarding mental privacy must be envisaged. While some of them think that just some minor specifications in existing norms would suffice, others consider that formally recognising a right to mental privacy would be helpful for its implementation.

Regarding European human rights law, the first interpretative issue is whether Article 8 of the ECHR can be understood in the sense that it also includes a right to mental privacy. Let us remember that the ECtHR has defended the doctrine of the Convention as a “living instrument which (...) must be interpreted in the light of present-day conditions” and “in line with social and technological developments” (Tyrer v. UK, 1978, para 31; Harris et al., 2022, p. 508). Based on the Convention’s preamble, which refers not only to the “maintenance” but also to the “further realisation” of human rights, the Court has concluded in favour of a *dynamic (or evolutive) interpretation* of the Convention (Sudre et al., 2023, p. 240). This approach is commonly referred to as a *teleological* interpretation (from *telos,* meaning finality). Such an interpretation considers the "object and purpose" of the Convention, which is the advancement of the "ideals and values of a democratic society" (Preamble).

On the other hand, the Court has made it clear that it is not possible, by means of an “evolutive interpretation,” to derive from the Convention and its Protocols, “a right that was not included therein at the outset” (Johnston and Others v Ireland, 1986, para 53). Thus, it is crucial to draw a line between *judicial interpretation,* which is permissible, and *judicial legislation,* which is not. (Harris et al., p. 8.).

What are the implications of the above analysis? Given the dynamic interpretation of the Convention, supported by the ECtHR’s jurisprudence, it can be claimed that neural data obtained through neurodevices are protected by the general right to privacy. Indeed, neural data hold a particular status, as they are closely linked to the inner self,

and, consequently, to the very core of personhood. Therefore, they are, in many respects, unique and not comparable to other categories of personal data (Ienca & Andorno, 2017, p. 14; López-Silva, Wajnerman-Paz & Molnar-Gabor, 2024, p. 9-10). An extensive interpretation of Article 8 of the ECHR does not necessitate understanding the concept of “home” in Article 8 of the Convention so broadly as to consider the brain as the “home of our mind” (G. Malgieri in: O’Sullivan et al., 2022, p. 19).

Some experts have suggested that neural data could be better protected under secondary legislation of the European Union by classifying it as a new category of specially protected personal data under Article 9(1) of the General Data Protection Regulation (Bublitz, 2022; European Parliament’s Scientific Foresight Unit, 2024, para. 6.4. and 9.3). In this regard, scholars disagree on whether, or to what extent, the GDPR provides sufficient protection for neural data, or whether interpretative efforts are necessary to achieve that protection (Rainey et al., 2020; Ienca and Malgieri, 2022). Another normative framework that is relevant to this matter is the Council of Europe’s Convention 108 (Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data), adopted in 1981, which aims to safeguard the right to privacy, “taking account of the increasing flow across frontiers of personal data undergoing automatic processing” (Preamble). In 2018, this Convention was updated through a new version known as "Convention 108+". An expert report that examined in detail the Convention 108 in relation to privacy and neurotechnology concluded that “while Convention 108 provides a solid foundation for protecting personal data, including neural data”, some areas may need guidelines for new interpretation of the Convention provisions “to better protect neural data” (Bertoni and Ienca, 2024, p. 29).

At this stage, it is important to remember that the responsibility for extensively interpreting legal norms lies primarily with the courts, as this is often overlooked. Indeed, courts have the specific role of interpreting and applying laws to resolve individual cases when conflicts arise. In doing so, courts can, in principle, interpret normative frameworks extensively to fairly resolve the cases at hand. Yet, considering the significance of the human rights and freedoms that are potentially jeopardised by neurotechnologies and the urgency of ensuring their protection, relying solely on possible court decisions seems inadequate. Legislative action appears necessary to ensure respect for human rights in this context. The recent reports, declarations, and recommendations mentioned above agree on this point. It is indisputable that having specific legal norms for promoting respect for the mental sphere presents important advantages. First, specific legal frameworks may contribute to addressing the unique challenges posed by neurotechnologies in clear and distinct terms and minimise uncertainty for individuals, companies, and states. Second, specific legal changes can lead to more consistent normative standards within each country and, more broadly, across Europe, and avoid solely relying on court rulings that may vary from court to court. Third, such laws would enable a more proactive and comprehensive strategy

rather than passively waiting for court decisions, which may take years and are typically only applicable to individual cases.

2.1 COGNITIVE LIBERTY AND FREEDOM OF THOUGHT

Cognitive liberty may be violated by the improper use of neurotechnologies, impairing individuals' ability to make autonomous decisions. It is a complex notion that connects very directly with inner freedom and agency. In this report, it is understood as "mental self-determination", meaning that individuals are entitled to exercise control over their own mental states, which cannot be altered or conditioned by third parties without their consent. Cognity liberty conveys the idea that individuals have the right to act autonomously, that is, to make their own choices with the aid of their cognitive capacities and free will. It is noteworthy that self-determination is crucial in a democratic system, as it is a prerequisite for the exercise of most other fundamental rights and freedoms.

Scholars have different views on the precise meaning and content of cognitive liberty. For instance, according to Bublitz (2013), this liberty encompasses both the right to enhance one's mental state through neurotechnological devices and the right to refuse to do so. However, this understanding of cognitive liberty is problematic for many reasons. A *positive* right to neuroenhancement would imply that the state should facilitate or even provide, access to neuroenhancement devices to anyone who desires them, regardless of the presence of any neurological condition or medical indication. Recognising such a right would impose a new and unnecessary financial burden on already strained public healthcare systems. More importantly, a positive right to have access to cognitive enhancement would raise questions of justice in society, similar to those raised by doping in sports. Indeed, healthy people who enhance their cognitive abilities through neurotechnologies would gain an unfair advantage over non-enhanced individuals (for instance, in terms of access to jobs). This consequence would be even more serious in socioeconomic contexts already marked by significant inequalities and would generate "new kinds of disparities" (UNESCO, 2025, para. 156). Therefore, it seems more reasonable and prudent to understand cognitive liberty only as a *negative* right, i.e., as the right to reject the coercive use of neurotechnologies, and not as a *positive* right to access to neuroenhancement tools (Ienca & Andorno, 2017, p. 11; UNESCO IBC, 2021, para. 149-151; Muñoz & Borbón, 2023). Obviously, the above-mentioned problem would not be solved by the recognition of an (utopian) "right to *equal* access to mental augmentation", as advocated by Yuste and colleagues (2021).

As mentioned above, mental self-determination is the prerequisite for the exercise of most rights and freedoms. However, it is not expressly protected in international and European human rights law. Theoretically, it could be argued that it is a component of the right to personal autonomy, which, according to the ECtHR, is included in the right to respect for private life enshrined in Art. 8 of the ECHR. Interestingly, the right to personal autonomy has been recognised the ECtHR as particularly relevant in the

sphere of healthcare, especially in decisions about whether or not to undergo certain medical interventions (Pretty v. UK, 2002; Lambert and Others v. France, 2015; Pindo Mulla v. Spain, 2024). However, mental self-determination has a much deeper meaning and implications than merely the right to make decisions about one's body and medical interventions. It has to do with the fundamental ability to act as a *self,* as a subject, especially regarding the internal thinking process.

A direct corollary of cognitive liberty is the classic *right to freedom of thought,* which neurotechnological applications can jeopardise in unprecedented ways, as they have the potential to both decode and alter mental states, thoughts, personal preferences, and memories and, therefore, open the door to sophisticated forms of mind control.

References to the freedom of thought (in the sense of the freedom to hold one's own opinions and beliefs) can be found in some of the first human rights declarations, such as the French Declaration of the Rights of Man and Citizen (1789), which provides in Article X:

> "No one should be disturbed for his opinions, even religious ones, as long as the *manifestation* of such opinions does not interfere with the public order established by law." (emphasis added)

For its part, the founding instrument of international human rights law, the 1948 UDHR, also refers to the freedom of thought when it states:

> "Everyone has the right to freedom of thought, conscience and religion; this right includes freedom (...) to *manifest* his religion or belief in teaching, practice, worship and observance" (Art. 18). (emphasis added)

Almost identical terms are used by the 1966 ICCPR (Article 18.1), the ECHR (Article 9.1), and the EU CFR (Article 10.1).

It is interesting to note that all the above-mentioned instruments only refer to the freedom to *manifest* one's thoughts. The problem with this narrow notion is that the challenge posed by neurotechnologies is not the freedom to *express* one's opinions or beliefs (the *forum externum,* or external dimension of thoughts). Rather it is the freedom of thought in its literal and deepest sense, that is, the freedom to think by oneself and autonomously without being monitored or controlled by others (*forum internum,* or internal dimension).

In this regard, it is noteworthy that the drafters of the UDHR and other foundational human rights instruments did not foresee the tremendous advances in neuroscience and neurotechnology that took place in the following decades. Therefore, historical statements about freedom of thought are not necessarily a reliable guide for analysing this right in a contemporary context (Ligthart et al., 2021). Thus, it is not surprising that the 2021 UN Report on the Freedom of Religion or Belief points out that the scope and content of freedom of thought "remain largely underdeveloped and poorly understood" (Shaheed, 2021, para 4). For this reason, the Rapporteur emphasises the

need for "further clarity on the legal content and scope" of this freedom and encourages the adoption of a General Comment on the freedom of thought to help establish the missing clarity. More specifically, in relation to neurotechnologies, the Rapporteur considers that, according to a broadly shared view among experts, “contemporary legal frameworks are unprepared for emerging predictive and neurotechnologies and their implications for freedom of thought, amongst other rights” (ibid., para 79).

It is true that Article 18, paragraph 2 of the ICCPR could be seen at first glance as a useful tool against unauthorized uses of neurotechnologies, as it states that “(n)o one shall be subject to coercion which would impair his freedom to have or adopt a religion or belief of his choice”. However, this provision is too narrowly focused on “religion and beliefs” and does not include other categories of thoughts or personal preferences whose manipulation under coercion would also constitute a serious infringement upon the *internal* dimension of the freedom of thought. In addition, the 1993 UN Human Rights Committee's General Comment on Article 18 expressed the view that the coercion referred to by paragraph 2 only involves the "use of threat of physical force or penal sanctions” (UN Human Rights Committee, 1993). Therefore, it is unclear whether it would also cover the unconsented manipulation of thoughts using neurotechnological means when no such threats are made.

2.2 MENTAL INTEGRITY

While the right to bodily integrity protects against interference with one’s body, the right to mental integrity aims to protect against certain forms of interference with one’s mind. However, there are differing interpretations regarding the meaning of mental integrity. Some scholars have proposed a very broad definition of mental integrity as meaning “the individual mastery of his mental states and his neural data so that, without his consent, no one can read, spread or alter such data in order to condition the individual in any way” (Lavazza, 2018). The problem with this broad definition is that it overlaps with mental self-determination and even with mental privacy. Being so general and unfocused, it becomes useless because of its ubiquitous nature (Blumental-Barby & Ubel, 2024).

Thus, it seems preferable to define mental integrity more narrowly so that it has a specific goal and can be distinguished from other human rights violations in this area. In this regard, it has been proposed that, by analogy with the right to physical integrity, the element of *harm* would be characteristic of the right to mental integrity. While the right to physical integrity protects against harm to the body, the right to mental integrity would protect against harm to the mind (psychological harm) such as that caused by neurodevices (Ienca & Andorno, 2017).

Some might argue that a right to mental integrity would be superfluous, given that the brain is part of the body, and the body is already protected by the established right to physical integrity. However, this objection does not consider that the kinds of bodily

interference that infringe on the right to physical integrity do not necessarily correspond to the kinds of mental interference that infringe on mental integrity. For instance, non-invasive forms of brain stimulation or brain-computer interfaces (BCIs) may harmfully interfere with brain activity and behaviour, and severely violate one's right to mental integrity. However, they may not violate the right to physical integrity despite having serious impacts on a person's mind (Ligthart et al., 2023). In addition, it should be considered that individuals using invasive neurotechnology, such as Deep Brain Stimulation, could be at risk of having their device hacked by malicious actors, resulting in psychological harm (Ienca and Haselager, 2016; Ienca and Andorno, 2017).

The right to mental integrity has not played a very important role in European human rights law so far, and, as a result, its scope and meaning remain vague (Bublitz, 2013, p. 248; Istace, 2023, p. 226). Certainly, the EU CFR explicitly mentions the right to both physical and mental integrity. Article 3, titled "Right to the integrity of the person", states that "everyone has the right to respect for his or her physical and mental integrity" (para. 1). However, it is primarily understood as a right to mental health. This seems to be the meaning of mental integrity in the Convention on the Rights of Persons with Disabilities (CRPD), which states that: "Every person with disabilities has a right to respect for his or her physical and mental integrity on an equal basis with others" (Article 17). Nevertheless, there is a lack of clear definitions or guidelines to interpret Article 3.1 of the CFR, and neither the explanatory reports nor the preparatory works of Article 3 of the CFR offer any guidance (Istace, 2023, p. 223).

For its part, the Oviedo Convention defines the purpose of the instrument itself by appealing to the notion of integrity in Article 1:

> "Parties to this Convention shall protect the dignity and identity of all human beings and guarantee everyone, without discrimination, respect for their *integrity* and other rights and fundamental freedoms with regard to the application of biology and medicine" (emphasis added).

However, no explicit reference to *mental* integrity is made in the Convention. The Explanatory Report to the Convention does not specify how the term "integrity" must be understood.

The ECtHR's jurisprudence has referred to the right to mental integrity on some occasions and has associated this notion either with the right to private life enshrined in Article 8 of the ECHR, or with the prohibition of inhuman or degrading treatments, included in Article 3 of the ECHR. The notion of mental integrity was used, for instance, to refer to the psychological harm resulting from the police inaction towards the continuous harassment experienced by a disabled person by other individuals (Dordevic v. Croatia, 2012), the distress suffered by an asylum seeker woman whose small child was detained and deported to her home country (Mayeka and Kaniki Mitunga v. Belgium, 2007), the forced administration of emetics (a medicine that

induces vomiting) to an individual to provoke the regurgitation of a bag containing illegal drugs that he had allegedly swallowed (Jalloh v. Germany, 2006), or the threat of being deported to his country of origin, where he could face inhuman or degrading treatment (Bensaid v. United Kingdom, 2001), or the maltreatment, including assault, sleep deprivation and insults inflicted on an individual placed in police custody (Akkoc v. Turkey, 2000).

It is worth noting that in all of the above-mentioned cases and similar cases, psychological harm is somehow the indirect consequence of others' illegitimate behaviour. But the use of neurotechnological devices is different and unique in that psychological harm is not solely caused by another person's abusive behaviour but also (or mainly) the direct result of a technological intervention in the brain (for instance, through the hacking of an implanted neurodevice). Therefore, we are faced with situations that are not entirely comparable.

2.3 PERSONAL IDENTITY

Various brain stimulation procedures can (intentionally or unintentionally) alter people's identity or *sense of self.* The term "identity" is here understood as the set of qualities, preferences, beliefs, and other important personality traits that characterise a person. Because these qualities are so closely tied to our identity, it can be argued that they cannot be intentionally altered by others without our consent. As Paul Tiedemann points out, we understand ourselves as personal unities and as subjects and sources of attitudes as long as these attitudes have a minimum level of coherence. This is why a serious lack of coherence makes it impossible to understand oneself (Tiedemann, 2016). Consequently, it seems important to prevent neurotechnologies from being used in ways that could disrupt people's sense of identity, and challenge fundamental assumptions about the nature of the self and personal responsibility (UN Human Rights Council, 2024, para. 27). Not surprisingly, over the past few years, it has been argued in favour of the formal recognition of a "right to personal identity" or a "right to psychological continuity" (Ienca & Andorno, 2017, p. 20-23; Yuste, Goering, Arcas, et al., 2017). This proposal has generally received a positive echo from experts (UNESCO, 2021, p. 11-13). Interestingly, a study of the potential gaps in international and regional human rights law regarding neurotechnologies concluded that the least protected "neuroright" is precisely the right to personal identity (Genser, Herrmann and Yuste, 2022, p. 8).

Based on the very broad wording of Article 8 of the ECHR (right to respect for private life), the jurisprudence of the ECtHR has recognised the notion of "personal identity" in cases concerning, for instance, access to information about one's biological origins (Gaskin v. UK, 1989), the establishment of a legal parent-child relationship between children born from a surrogate mother abroad and their biological father (Mennesson v. France, 2010), the use of a family name (Burghartz v. Switzerland, 1994), the mention of one's correct ethnicity on the identity card (Ciubotaru v. Romania, 2010), and sexual identity (Goodwin v. UK, 2002).

Explicit references to personal identity are rare and generally vague in international and regional human rights law instruments. For instance, the Convention on the Rights of the Child (1990) includes the “right of the child to preserve his or her identity, including nationality, name and family relations as recognised by law without unlawful interference” (Art. 8). The Convention on the Rights of Persons with Disabilities (2006) refers to the right of children with disabilities “to preserve their identities” (Art. 3.h), and emphasises the importance of preserving the “linguistic identity of the deaf community” (Art. 24.3.b).

At the European level, neither the ECHR nor the CFR mentions a right to personal identity. The Oviedo Convention defines its purpose by reference to the need to “protect the dignity and *identity* of all human beings” (Article 1). However, the Explanatory Report to the Convention does not offer any guidance on the definition of identity. The main concern for mentioning "identity" appears to have been the potential for changes in the human germline and the need to preserve the human identity for future generations (see paragraph 14).

3. CONCLUSIONS AND RECOMMENDATIONS

Neurotechnologies play an important role in improving the well-being of patients with neurological disorders by offering new preventive, diagnostic, and therapeutic tools. These technologies also provide useful devices for mental self-assessment, communication, and many other legitimate purposes.

However, these same tools pose unprecedented threats to human rights and dignity. Notably, they can be used to gain unauthorised access to individuals' mental information as well as to jeopardise freedom of thought, personal identity, and mental integrity and self-determination.

Human rights are called to play a central role in addressing these emerging challenges, as the fundamental human interests at stake in this field are directly related to the very core of human personhood and dignity. It is interesting to mention that protecting the mental sphere through human rights involves, to some extent, revisiting the first generation of human rights (i.e. rights of liberty) and therefore aligns well with the philosophy that inspired the adoption of the ECHR in 1950.

In recent years, various international or regional organisations have proposed regulatory principles for governing neurotechnologies, or are in the process of doing so. These proposals are very encouraging because they show a high degree of consensus on the basic rights and freedoms that are at stake in this area.

So far, much of the academic discussion has revolved around whether the normative principles that have been proposed should lead to the creation of entirely “new” human rights (the so-called “neurorights”) or more modestly, to the interpretive expansion of existing human rights to cover the novel issues. As a matter of fact, this debate is more of a theoretical nature and is not very relevant from a practical perspective. Let us not forget that human rights have basically a *practical,* not a *theoretical* purpose; they aim to promote and protect fundamental human basic goods and interests. Therefore, the really key issue is *how to best protect those basic goods and interests that are at risk in this area.* In other words, the crucial questions that still need further discussion among experts and lawmakers are:

a) how those rights (notably, mental privacy, cognitive liberty, mental integrity, and personal identity) can be effectively *protected by the law,* and

b) how they should be *balanced* against other human rights and social interests.

The precedent analysis of international and European human rights law shows that existing normative frameworks are ill-prepared to deal with the emerging issues. Therefore, it is not surprising that most legal experts agree that some adaptations of existing human norms are necessary. Indeed, virtually no one defends the position that there is no need for normative action to prevent the misuse of neurotechnologies and that we should rely solely on court decisions.

It is true that courts could, at least within certain limits, interpret the existing human rights framework extensively to cover the novel issues. However, as mentioned previously, establishing specific legal standards at domestic, regional, and international levels would provide significant advantages in terms of clarity, consistency, and comprehensiveness of the responses to the new challenges.

It is also important to remember that intergovernmental human rights instruments should focus on developing frameworks of general principles. This is because national governments, rather than international organisations, are the primary agents responsible for enforcing human rights. Intergovernmental organisations play a significant, albeit subsidiary, role in establishing commonly shared principles. However, the primary locus for effectively implementing those standards is the domestic level through more detailed norms (notably, civil and criminal law norms). This is clear, for instance, in the Oviedo Convention (see Articles 23 to 25).

What should be the nature of intergovernmental normative frameworks to be adopted at the European level? The logical first step in this process would be the adoption of a soft law instrument, such as a recommendation (see O'Sullivan et al., 2022, p. 28-29). Soft law instruments have the invaluable advantage of allowing a broad and rapid consensus on common standards between governments. This is particularly valuable when dealing with complex or sensitive issues, such as those related to scientific developments. These kinds of instruments are a great asset because they allow countries to gradually become familiar with the commonly agreed standards before having to deal with the adoption of enforceable rules (Andorno, 2013, p. 37-41). This strategy, of course, does not prevent the initiation of the years-long process required for the adoption of a legally binding instrument, such as, for instance, an Additional Protocol on the Oviedo Convention.

In summary, based on the findings presented in this report, the following recommendations can be made:

► **Recommendation 1.** *Updating the European human rights framework and domestic laws to better respond to the specific challenges posed by neurotechnologies*

In the context of the Council of Europe, it is recommended as a short-term measure to adopt a soft law instrument, such as a recommendation.3 This instrument would provide a framework of principles for specifically addressing the novel challenges to human rights posed by neurotechnologies. That set of common principles should guide European countries in adapting their domestic legislation to the emerging issues in this area. This strategy does not rule out the possibility of starting the process of creating a legally binding document (for instance, an Additional Protocol to the Oviedo

[3] Recommendations are adopted by the Committee of Ministers. See Article 15b of the Statute of the Council of Europe: "In appropriate cases, the conclusions of the Committee may take the form of recommendations to the governments of members, and the Committee may request the governments of members to inform it of the action taken by them with regard to such recommendations".

Convention). In parallel, domestic lawmakers should be encouraged to adapt civil, criminal, labour, and procedural laws to respond satisfactorily to the new challenges.

- **Recommendation 2.** *Requiring free and informed consent for the collection and use of neural data, given the sensitive nature of such data*

Preserving the privacy of neurotechnology users requires that neural data be collected, stored and used only with the free and informed consent of the individuals from whom the data are obtained, whether for medical or non-medical purposes. Enhanced security measures should be taken to ensure the confidentiality of such data and to prevent unauthorised third parties from gaining access to the identity of the data subjects. Given that neural data may reveal neurological and psychological conditions and could potentially be used to infer mental states, they should be labelled as sensitive data and encrypted using the highest quality procedures (Bertoni and Ienca, 2024, p. 29).

- **Recommendation 3.** *Recognising a right to mental privacy*

Besides adding neural data to the category of sensitive personal information in data protection laws, it would be helpful to recognise mental privacy as the object of a human right. This recognition would help emphasise that the issue at stake in this area is not merely the protection of a specific category of personal data, but the preservation of persons' inner self from illegitimate technological intrusions.

- **Recommendation 4.** *Ensuring mental self-determination and freedom of thought*

It is crucial to prevent the use of neurotechnologies to intentionally influence or manipulate people's mental decision-making processes, as this would seriously violate individuals' self-determination and freedom of thought. The ability to make decisions based on one's own free will and personal preferences is one of the most cherished values in democratic societies and must be preserved at all costs. In other words, human rights frameworks should ensure that individuals maintain the freedom to think and act without being influenced or conditioned by others through neurotechnologies.

- **Recommendation 5.** *Guaranteeing a right to personal identity*

Legal frameworks should ensure that individuals' personal identity is not intentionally altered by third parties or the state through the use of neurotechnologies. The psychological continuity of individuals deserves legal protection, ensuring that each person can continue to perceive themselves as the same individual over time and freely develop their personality (Art. 22 of the UDHR). In particular, brain stimulation procedures, whether for medical or non-medical purposes, should be closely monitored to prevent an impact on users' identity without their knowledge and free consent.

► **Recommendation 6.** *Ensuring the right to mental integrity*

Laws should prevent neurotechnologies from being used in ways that harm people's psychological dimension. In this context, civil and criminal laws that address, respectively, compensation for damages and punishment for harmful behaviour are especially relevant. The protection of mental integrity holds particular significance due to the potential increase in criminal activity involving the malicious use of neurotechnologies in the upcoming years.

► **Recommendation 7.** *Preventing neurodiscrimination and algorithmic biases*

Legal frameworks, including labour regulations, must clearly stipulate that information derived from neural data may not be used to determine decisions related to employment or other relevant areas, except in cases where neurological conditions may pose a demonstrable risk to the health and safety of the individual or others. Laws must also establish that informed consent given by employees to the use of neurodevices in the workplace is not considered freely given if it is obtained through any form of coercion, particularly when refusal would result in any detriment. In addition, measures must be taken to prevent or mitigate algorithmic biases in artificial intelligence-based devices used to process and analyse neural data.

► **Recommendation 8.** *Being cautious in the authorisation of neurotechnologies for enhancement purposes*

The use of cognitive enhancement devices by healthy individuals should be regulated with particular caution. The use of such devices without therapeutic justification could be socially problematic, as it could lead to an unfair advantage for the neuroenhanced individuals over others in various areas of social life, such as access to jobs or in the assessment of school or university performance. The emergence of a social divide between those who choose to technologically enhance their cognitive abilities and those who cannot or choose not to must be prevented.

► **Recommendation 9.** *Establishing procedural mechanisms for the effective protection of rights related to neurotechnologies*

The mere formal recognition of human rights specifically related to neurotechnologies would be ineffective unless accompanied by the establishment of rapid and effective procedural mechanisms to protect those rights. It is therefore recommended that states create such procedural remedies, in conformity with Article 13 of the ECHR.[4] Similar to the *habeas corpus* and *habeas data* remedies recognised in certain countries to protect against arbitrary arrest and misuse of personal data, respectively, an emergency judicial remedy (potentially called called *habeas mentem* or *habeas*

[4] "Everyone whose rights and freedoms as set forth in this Convention are violated shall have an effective remedy before a national authority notwithstanding that the violation has been committed by persons acting in an official capacity."

cogitationem) could be created to safeguard rights related to the protection of the mental sphere (UN Human Rights Council Advisory Committee, 2024, para. 72; Muñoz and Marinaro, 2024).

► **Recommendation 10.** *Creating specialised agencies to monitor neurotechnologies*

States should establish independent oversight bodies to ensure that the development, use and application of neurotechnologies comply with human rights standards and minimise risks and negative impacts on individuals and society. These specialised agencies will be responsible for monitoring and guiding all phases of the neurotechnology life cycle, including its commercialisation and use. Additionally, they should promote responsible innovation in neurotechnology and encourage the industry to integrate ethical and legal considerations in the design of their products. These agencies will also be involved in the governance of neurotechnologies by issuing guidelines and policy reports (UNESCO, 2025, para. 160).

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