
Neurolaw, Neurorights and Neuroprivacy: Theoretical and Constitutional Issues

Francesco Cirillo

Abstract

Advancements in neurosciences and neurotechnologies have prompted the proposal of new neurorights to address the unique protection needs arising from risks of technological interference. This work examines the critical and doctrinal questions surrounding neurorights, starting with the interaction between cognitive sciences and the conceptual categories of legal culture. The paper explores neurotechnological practices and their potential risks to individual rights, focusing on current legal frameworks in biolaw, criminal procedure, and data protection. The analysis reviews key neurorights proposals, such as cognitive liberty, mental privacy, and psychological continuity, and discusses the theoretical and practical challenges in affirming these protections within the broader legal and ethical context.

I progressi nelle neuroscienze e nelle neurotecnologie hanno condotto alla proposta di nuovi neurodiritti per rispondere alle particolari esigenze di protezione derivanti dai rischi delle interferenze tecnologiche. Questo lavoro esamina le questioni critiche e dogmatiche dei neurodiritti, muovendo dall'interazione tra le scienze cognitive e le categorie concettuali della cultura giuridica. Esplora le tecniche neurotecnologiche e i loro potenziali rischi per i diritti delle persone, concentrandosi sulle questioni giuridiche attuali nel biodiritto, nella giustizia penale e nella protezione dei dati. L'analisi si sofferma sulle principali proposte in tema di neurodiritti, come la libertà cognitiva, la *privacy* mentale e la continuità psicologica, e discute le sfide teoriche e pratiche nell'affermare queste protezioni all'interno del più ampio contesto giuridico ed etico.

Table of contents

1. Neurorights and Neuroprivacy. – 2. Neurolaw as Cognitive Science? – 3. Neurolaw and Criminal Justice. – 4. Neurolaw as Biolaw? – 5. Neurolaw as Data Protection Law? – 6. Theoretical Criticisms and Dogmatic Questions. – 7. Conclusions.

Keywords

Neurolaw – neurorights – neuroprivacy – neural data protection – neurotechnology

* L'articolo è stato sottoposto, in conformità al regolamento della Rivista, a referaggio "a doppio cieco".

1. Neurorights and Neuroprivacy

The progressive invention of increasingly effective neurotechnology for extracting information related to cognitive activity and manipulating cognitive processes has led some scholars to highlight the necessity of new neurorights¹.

From this perspective, the issue of neuro-rights emerges as a complex and intellectually stimulating manifestation of the debate on “new” rights². A new technology appears on the scene, presenting unprecedented risks to individuals; thus, a debate arises on the assertion of new rights. In this debate, typically opposing positions clash: some argue for the necessity of recognizing autonomous rights, others attempt to relate the expectations of protection to already recognized rights or deny that such a necessity exists, with various possible intermediary positions³. This pattern, for example, characterized the emergence of the right to privacy⁴: With the advent of new media, American scholars highlighted the relevance of a new right⁵, which perhaps was not entirely new as it emphasized new dimensions of protection for already recognized rights, and thus, through a complex process, led to the recognition of new claims, gradually made effective by court case-law⁶. Nonetheless, the same has happened for data protection, which appeared as an instrumental aspect of privacy, or for the new dimensions of the freedom of emotional or sexual relationships.

However, the issue of neurorights is not merely a variation of the problem of new rights emerging with societal and technological changes. Indeed, neurorights necessitate reflection on general legal theory, the metaprinciples that inspire it, and the possible doctrinal solutions that should accompany their affirmation⁷. Emblematically, the assertion of the right to free will, cognitive liberty, or mental privacy raises far more

¹ R. Yuste - S. Goering *et al.*, *Four Ethical Priorities for Neurotechnologies and AI*, in *Nature*, 551, 2017, 159 ss.; M. Ienca - R. Andorno, *Towards New Human Rights in the Age of Neuroscience and Neurotechnology*, in *Life Sciences, Society and Policy*, 13, 2017, 1 ss.; O. Pollicino, *Costituzionalismo, privacy e neurodiritti*, in *Rivista di diritto dei media*, 2, 2021, 9 ss.; R. de Asís Roig, *Derechos y tecnologías*, Madrid, 2022, 123 ss.

² E.g. F. Modugno, *I «nuovi diritti» nella giurisprudenza costituzionale*, Torino, 1995, 1 ss.

³ *Ex multis*, P. Alston, *Making Space for New Human Rights: The Case of the Right to Development*, in *Harvard Human Rights Yearbook*, 1, 1988, 3 ss.

⁴ See M. Luciani, *Il diritto al rispetto della vita privata: le sfide digitali, una prospettiva di diritto comparato*, Studi del Servizio Ricerca del Parlamento europeo, Bruxelles, 2018, 1 ss.; A. Cerri, *Riservatezza (Diritto alla)*, *Diritto costituzionale*, in *Enciclopedia giuridica*, vol. XXVII, Rome, 1991. A broad picture of the first decades of the right in W.L. Prosser, *Privacy*, in *California Law Review*, 3, 1960.

⁵ Emblematically, S. Warren - L. Brandeis, *The Right to Privacy*, in *Harvard Law Review*, 5, 1890, 193 ss., who present their “new” right as in reality an ancient and always recognized law, which just shows a “new” aspect in front of new media.

⁶ A short map of this route: A. Lukács, *What is Privacy? The History and Definition of Privacy*, in G. Keresztes (ed.), *Tavaszi Szél*, Budapest, 256-265.

⁷ S. Fuselli, *Neurodiritto. Per una introduzione*, in Id. (ed.), *Neurodiritto. Prospettive epistemologiche, antropologiche e giuridiche*, Milano, 2016, 7 ss.; A. D’Aloia, *Law Challenged. Reasoning About Neuroscience and Law*, in A. D’Aloia - M.C. Errigo, *Neuroscience and Law. Complicated Crossings and New Perspectives*, Cham, 2020; or V. D’Antonio - G. Sica, *Neurodiritti e mental privacy: alla ricerca di un framework normativo*, in V. D’Antonio (ed.), *Diritti digitali*, Scafati, 2022, 293 ss.

complex issues than those involved in extending the content of a right or asserting a new claim. Free will, cognitive activity, mind, psyche, consciousness, or memory are challenging to treat precisely as the object or content of an individual right because the autonomy of will and the psychological dimension belong to the extra-judicial or meta-judicial foundation of the legal order, and of fundamental rights⁸. They are the (non-judicial) premise of a theoretical construction that derives the recognition of certain fundamental rights from a specific anthropological vision, according to various and converging views, the individual has rights to freedom precisely because they possess free will or autonomy of will. Whereas it is much more challenging to assert rights to freedom so that such autonomy is preserved or promoted. In this shift, the autonomy of will moves from the meta-judicial level to the general theory of law, eventually finding its place within doctrinal discourse (finding its place within the dogmatic level of legal doctrinal discourse).

For these reasons, the issue of neurorights has a significant philosophical-legal dimension concerning both the non-judicial premises of their affirmation and the connections with cognitive sciences, as well as the theoretical-dogmatic aspects of their “construction”. Furthermore, as potential new (fundamental) rights, their emergence also poses a constitutional problem, as they intertwine with already recognized rights (on the national, European, and international level). Lastly, the issue can—and should—be examined from specific disciplinary perspectives. Neurorights engage with a range of issues well-known to criminal law and criminal procedure law (for instance, neuroscientific evidence in trials); they can be viewed from the perspective of biolaw, as neurotechnology is a practice accessing the biological realm, similar to surgery or pharmacology; and finally, especially concerning neural data protection, they fit within the broader debate on regulating the digital environment (consider, for example, the current reflection on the manipulative potential of AI⁹). This interdisciplinary nature of neurorights underscores the breadth and depth of the topic, engaging scholars from various fields¹⁰.

Bringing together these distinct planes is neither an easy operation nor a fully achievable objective. Nonetheless, the current state of the debate and its ability to permeate different disciplinary sectors make an extensive and nuanced view increasingly necessary, aiming to outline a possible common framework within which to inscribe future research directions. Moreover, as illustrated in the following paragraphs, each level allows for illustrating or characterizing specific classes of rights proposed in the literature. The philosophical-legal reflection around the paradigm of cognitive sciences

⁸ A picture of the philosophical debate in D.A.J. Richards, *Rights and Autonomy*, in *Ethics*, 1, 1981, 3 ss. See also J. Kiper, *Do Human Rights Have Religious Foundations?*, in *Religion & Human Rights*, 2, 2012, 109 ss. The classic thesis of the religious foundation of metaprinciples can be traced back to E.W. Böckenförde, *The Fundamental Right of Freedom of Conscience* (1970), now in M. Künkler - T. Stein (eds.), *Religion, Law, and Democracy: Selected Writings*, Oxford, 2020, 168 ss., or to C. Schmitt, *Political theology: Four Chapters on The Concept of Sovereignty* (1922), Chicago, 2005, particularly through his argument that modern political concepts are secularized theological concepts (free will and autonomy, in this case).

⁹ . *AI Act*, art. 5; on this topic, R. Uuk, *Manipulation and the AI Act*, Brussels, 2022, 2-5; or M. Ienca, *On Artificial Intelligence and Manipulation*, in *Topoi*, 3, 2023, 833 ss.

¹⁰ *Inter alia*, L. Palazzani, *Dalla bio-etica alla techno-etica: nuove sfide al diritto*, Torino, 2017, 333 ss.; S. Amato, *Biodiritto 4.0. Intelligenza artificiale e nuove tecnologie*, Torino, 2020, 113 ss.

(§ 2) enables the discussion of the criticalities of the right to free will, the so-called cognitive liberty (such as the autonomy of cognitive activity as a doctrinal object). The realm of criminal justice and procedure (§ 3) provides a framework for neurorights as positions implicit in the right to a fair trial and evidence or the free expression of thought (and its free omission): namely, those neurorights formulated as aspects of privacy *versus* authority. The biolegal field allows for projecting the issue of neurorights into the context of bodily rights, thus addressing the so-called *habeas mentem*¹¹, psychic integrity, psychological continuity, and other related concepts. Finally, the area of data protection offers an apparently specific yet potentially expansive viewpoint: technologies for processing personal data (such as personal neural data)—that is, any neurotechnology that utilizes data processing—fall within the application scope of data regulation; hence, the issues related to a possible autonomous category of psychic or neural data, and those related to the conditions and limits of their processing. Given these considerations, it will be possible to outline the main issues on the philosophical-legal, general theoretical, doctrinal, and positive legal levels, and to demonstrate that the concept of neuroprivacy, although ambiguous like the concept of privacy itself, is perhaps more suitable for addressing the issues discussed in the literature without hastening the affirmation of new rights fraught with conceptual ambiguities.

2. Neurolaw as Cognitive Science?

From an initial perspective, like neuroethics¹², neurolaw aspires to be an interdisciplinary field of study where legal disciplines meet cognitive sciences or, where possible, neuroscience in the strict sense¹³. In other words, alongside a law of neuroscience (that is, a law regulating neuroscience and neurotechnologies), the past few decades have seen the scientific ambition to construct a neuroscience of law, which is the study of legally relevant issues through the lenses of cognitive sciences¹⁴. We will not dwell here on the ambiguities of referring to the neural level (of the prefix ‘-neuro’), nor on its appropriateness, but we can immediately observe that the attempt to reshape legal categories based on the “knowledge” of psychic activity is certainly not new.

¹¹ A principle that is not brand new: F.H. Sanford, *Creative Health and the Principle of Habeas Mentem*, in *American Journal of Public Health and the Nations Health*, 2, 1956, 139-148. See also A. Barbera, *Un moderno “Habeas Corpus”*, in *Costituzione Economia Globalizzazione. Liber amicorum in onore di Carlo Amirante*, Napoli, 57 ss.; or A. Baldassarre, *Diritti della persona e valori costituzionali*, Turin, 1997, 372 ss. For some authors it is about that old general right/concept of moral freedom (which does not exist according to A. Pace, *Problematica delle libertà costituzionali*, Padova, 1992).

¹² For the first concept see A. Roskies, *Neuroethics*, in *Stanford Encyclopedia of Philosophy*, 2021; for the second one, recently G.D. Caruso, *Neurolaw*. Cambridge, 2024; or S.M. Wolf, *Neurolaw: The Big Question*, in *American Journal of Bioethics*, 8, 2008, 21–22. The term “neurolaw” is over thirty years old: J.S. Taylor - J.A. Harp - T. Elliott, *Neuropsychologists and Neurolawyers*, in *Neuropsychology*, 5, 1991, 293 ss.

¹³ J.A. Chandler, *Neurolaw and Neuroethics*, in *Cambridge Quarterly of Healthcare Ethics*, 4, 2018, 590-598.

¹⁴ A meta-analysis of the «extraordinary growth in the amount of legal scholarship, legal practice, and public policy at the intersection of law and neuroscience» in F.X. Shen, *The Law and Neuroscience Bibliography: Navigating the Emerging Field of Neurolaw*, in *International Journal of Legal Information*, 3, 2010, 352 ss.

In the Italian context, at the end of the 19th century a broad debate arose between two Schools of criminal law, the Classical and the Positive, the former leaning towards preserving the traditional concepts of criminal law (primarily, the freedom-responsibility binomial, from which the retributive function of punishment derives), and the latter advocating for criminal justice far from the category of guilt and closer to that of dangerousness¹⁵. The Italian Positive School had obvious strong connections with the broader positivist ambitions¹⁶ of the late 19th century, and its fortune did not differ from that of positivism *tout-court*: an ambitious and all-encompassing research program, yet often relying on simplistic worldviews and excessively rigid deterministic models, frequently destined to end in paradoxically unscientific results, as well as often veering towards racist or reactionary tendencies. An exemplary case was precisely the now outdated results of the Positive School, which, in its attempt to offer an early criminology and a scientific theory of delinquency, ended up producing a rather confused “system” imbued with prejudices and racism¹⁷.

These early premature attempts to introduce a form of (pseudo)scientific determinism into the law—described by Foucault and authors inspired by him as the medicalisation of criminal law¹⁸—encountered a progressive failure but left peculiar legacies in legal systems. This initial phase can be linked to technologies that aim to “read” the minds of defendants or reduce their tendency towards reticence, such as lie detectors or truth serums, which, transplanted from European positivism into other cultures, are still used in various countries today. In the next paragraph, we will focus on this aspect, analysing the relationships between neurolaw and criminal justice. In any case, the premature ambition of the late 19th century found new fortune precisely in the wake of developments in neuroscience over the last few decades. Thus, the increasing ability to read cognitive activity and manipulate mental processes has led, on one hand, to the belief that humans are much less free than they assume to be and, on the other hand, to highlight the risk of manipulative intervention by these technologies. Emblematically, we could consider the literature that evaluated the impact of Libet’s experiments in the law context¹⁹, but the discussion did not only involve the free will.

¹⁵ M.A. Musmanno, *The Italian Positive School of Criminology*, in *American Bar Association Journal*, 7, 1925, 427-430, where a singular interview with Enrico Ferri, one of the founders of the Italian Positive School, is reported: «The fundamental principle embraced in our school goes back to Galileo Galilei and Leonardo da Vinci, a principle which was followed, disciplined and systematized by Francis Bacon in his “Novum Organum”, namely, the inductive method of reasoning which consists in observing facts, particularizing, classifying and reproducing them in experiments where possible, and then drawing from them the general conclusions or the legal norm».

¹⁶ It is not referred to the so-called legal positivism or any positive legal theory («the thesis that the existence and content of law depends on social facts and not on its merits», according to L. Green, *Legal Positivism*, in *Stanford Encyclopedia of Philosophy*, 2003), but it is referring to the philosophical ambition of reducing the social sciences to deterministic paradigms (even in the absence of evidence of the validity of the explanatory models), like in the Comtian thought.

¹⁷ The case of Lombroso, *inter alia*, S. Montaldo, *Lombroso: The Myth, the History*, in *Crime, Histoire & Sociétés*, 2, 2018, 31 ss. See also F. Rotondo, *Un dibattito per l’egemonia. La perizia medico legale nel processo penale italiano di fine Ottocento*, in *Rechtsgeschichte*, 12, 2008, 139 ss.

¹⁸ Especially in M. Foucault, *Les anormaux: cours au Collège de France (1974-1975)*, Paris, 1999. See also M. Mitjavila, P. Mathes, *Labyrinths of Crime Medicalization*, in *Saúde e Sociedade*, 25, 2016, 847 ss.

¹⁹ S. Pockett, *The Concept of Free Will: Philosophy, Neuroscience and the Law*, in *Behavioral Sciences & the Law*,

Consider, for example, the impact of neuroscience on our (still vague) understanding of memory, the claims to extract information or to manipulate its processes²⁰.

Indeed, in this field, the renewed confidence that science offers reductionistic explanations of cognitive activity leads some authors to propose a complete revision of legal categories, from imputability to autonomy, from culpability to intentionality²¹. This hypothesis generates all kinds of criticisms, as the autonomy of law is asserted, the reductionistic paradigm of the hard sciences is opposed (especially in some contexts of the humanities), and the process of “naturalization” of law is criticised, as it is seen as bending to logics that are foreign to it²². From this perspective, the debate surrounding the concept of neurolaw is a specific manifestation of the broader debate between the “two cultures”²³, with proponents on one side advocating for the absolute uniqueness of the human being (and its dignity), and on the other, a tendency to encompass the human being within a naturalistic paradigm.

Nonetheless, it is likely that this debate will not cross the thresholds of academia: Even if one were to embrace a reductionist and materialistic view of cognitive activity, it would be unclear with which categories to reconstitute a law devoid of the presupposition of the autonomy or free will. Furthermore, for those who expect neuroscience to “prove” the non-existence of free will, it is likely that this result will never be achieved, partly because there is no clear concept of free will, and partly because, as in any field, it is impossible to prove the non-existence of something²⁴. Additionally, despite many advances in the field of neuroscience, very few results seem robust enough to be exported into the theory and practice of organising human societies, as

2, 2007, 281 ss.

²⁰ On the memory detection see again S.M. Wolf, *Neurolaw: The Big Question*, in *The American Journal of Bioethics*, 1, 2008, 21-22; P. Catley, *The Future of Neurolaw*, in *European Journal of Current Legal Issues*, 2, 2016; D.V. Meegan, *Neuroimaging Techniques for Memory Detection: Scientific, Ethical, and Legal Issues*, in *The American Journal of Bioethics*, 8, 2008, 9 ss.; or A. Farano, *Neuroscienze e diritto: un primo bilancio*, in S. Salardi – M. Saporiti (eds.), *Le tecnologie ‘moralì’ emergenti e le sfide etico-giuridiche delle nuove soggettività*, Torino, 2020, 42 ss.

²¹ F. Corso – A. Lavazza, *Neuroetica e neurodiritto: fine dell'imputabilità?*, in M.F. Pacitto (ed.), *Neuroetica. Convegni cassinati. Scuola di Alta Formazione in Neuroetica e Filosofia delle Neuroscienze*, Roma, 2020, 153 ss. See also M.C. Errigo, *Neuroscienze, tecnologia e diritti: problemi nuovi e ipotesi di tutela*, in *Dirittifondamentali.it*, 3, 2020, 244 ss.

²² C. Sarra, *Questioni pregiudiziali*, in S. Fuselli (ed.), *Neurodiritto*, cit., 78 ss.; A. Pirozzoli, *La libertà di coscienza e le neuroscienze cognitive*, in *Consulta OnLine, Liber amicorum per Pasquale Costanzo*, 2020, 6; N. Irti, *L'uso giuridico della natura*, Roma-Bari, 2013, 33. Some authors speak about neuroessentialism or ruthless reductionism. «Neuroessentialism is the position that, for all intents and purposes, we are our brains» [B. P. Reiner, *The Rise of Neuroessentialism*, in J. Illes - B. Sahakian (ed.), *The Oxford Handbook of Neuroethics*, Oxford, 2011, 1]. About ruthless reductionism, J. Bickle, *Philosophy and Neuroscience: A Ruthlessly Reductive Account*, Alphen aan den Rijn, 2003.

²³ The formula of C.P. Percy, *The Two Cultures*, London, 1959: «Literary intellectuals at one pole—at the other scientists, and as the most representative, the physical scientists. Between the two a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding». Some remarks in G. Lumia, *Il diritto tra le due culture*, Milano, 1971. On this relationship see the conclusions of P. Sommaggio, *Neurociviltà o libertà cognitiva?*, in S. Fuselli (ed.), *Neurodiritto*, cit., 150 ss.

²⁴ A typical logical fallacy (I. Copi – C. Cohen, *Introduction to Logic*, Harlow, 2014, 132–133). On the free will debate: M. De Caro – A. Lavazza, *La libertà nell'era della scienza*, in M. De Caro, A. Lavazza - G. Sartori (eds.), *Siamo davvero liberi? Le neuroscienze e il mistero del libero arbitrio*, Torino, 2019, VII ss.

the case of law²⁵.

For all these reasons, although further research is desirable, neurolaw, understood as the neuroscience of law, or as the cognitive sciences of the legal phenomenon, represents a program more than a reality, an ambition more than a body of knowledge.

The other aspect of neurolaw, the law of neuroscience, involves no lesser critical issues. The general assumption driving authors, particularly in the bioethical and neuroscientific fields, but today also in legal contexts, is that neurotechnology poses a risk to humans due to their interference with cognitive activity (whether extracting information or manipulative or inductive interference).

The vast majority of neurotechnology applications are currently confined to the fields of therapy and scientific experimentation, so the issue seems to reduce to the development of good practices²⁶ for clinical experimentation on humans (consider the protocols approved by the Food and Drug Administration for Neuralink's brain-computer implants²⁷). In contrast, the main concerns are directed at a potential widespread use of these technologies in various sectors of society²⁸ both by private stakeholders and in the relationships between citizens and authorities, envisioning forms of profiling, control, and manipulation that pose risks to individual freedom and dignity.

Certainly, some authors deploy a general fear of technologies toward neurotechnologies, a fear that seems prevalent in public debate from artificial intelligence to biotechnology²⁹. But even steering clear of pessimistic views and irrational fears, one must acknowledge that concerns about potential cognitive manipulation are justified. It is primarily based on these considerations that proposals for new neurorights emerged within the academic community to address these new risks. Some of these proposals were favourably received by legislators and governments, as seen in the case of Chile³⁰, the Spanish government's digital rights charter³¹, the soft law documentation of many

²⁵ I am not referring to individual applications in the context of criminal proceedings, where neuroscience could well progressively support or replace psychiatric expertise (for the current value of neuroimaging in insanity assessments see for instance G. Meynen, *Neuroscience-Based Psychiatric Assessments of Criminal Responsibility: Beyond Self-Report?*, in *Cambridge Quarterly of Healthcare Ethics*, 3, 2020, 446 ss.). *Contra*, a "dystopic" example: J.M.R. Delgado, *Physical Control of the Mind. Toward a Psychocivilized Society*, New York-London, 1971.

²⁶ See also R. Yuste, *Advocating for Neurodata Privacy and Neurotechnology Regulation*, in *Nature Protocols*, 18, 2023, 2869 ss.

²⁷ A. J. Jawad, *Engineering Ethics of Neuralink Brain Computer Interfaces Devices*, in *Perspective*, 4, 2021; D. Hurley, *Ethical Questions Swirl Around Neuralink's Computer-Brain Implants*, in *Neurology Today*, 10, 2024, 1 ss.

²⁸ *The Neurorights Foundation: Market Analysis: Neurotechnology*, at neurorightsfoundation.org, 2023; see also the report of J. Genser - S. Damianos - R. Yuste (eds.), *Safeguarding Brain Data: Assessing the Privacy Practices of Consumer Neurotechnology Companies*, at neurorightsfoundation.org, April 2023.

²⁹ A lucid criticism is in V. Zeno-Zencovich, *Artificial Intelligence, Natural Stupidity and Other Legal Idiocies*, in *MediaLaws*, 1, 2024.

³⁰ The new art. 19 of the proposed Constitution: «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 ellas». See. P. López Silva - R. Madrid, *Acercas de la protección constitucional de los neuroderechos: la innovación chilena*, in *Prudentia Iuris*, 94, 2022, 39 ss.

³¹ *Carta de Derechos Digitales* adopted by Spanish Government, 14 July 2021, § XXVI.

international and European institutions³², and most recently, the European legislator's consideration of the manipulative risks of AI³³.

However, this aspect of neurolaw, now as the law of neurotechnology, also presents philosophical, theoretical, doctrinal, and constitutional problems. Notably, the proposed catalogs of neurorights differ in identifying which rights they encompass³⁴.

While it is possible, as we will try to do, to identify homogeneous classes of rights referable to individual proposals, these rights appear, on the one hand, already affirmed in many legal traditions, and on the other hand, grounded in a rather obscure theoretical framework³⁵.

The class of rights that presents the most critical issues from a philosophical and general-theoretical perspective includes the right to free will, cognitive liberty, the right to cognitive autonomy. In the case of these rights, the autonomy of will, variously named, which often features in legal philosophy as a metaprinciple akin to dignity in the foundation of human rights³⁶—an assumed value from which the existence of rights derives—becomes the content or object of the right. As if an individual, just as they can claim the right to move or express themselves freely when impeded, could similarly claim to be free in their will when manipulated by others. This presents a glaring recursion, like the image of Baron Munchausen lifting himself out of the swamp by his hair³⁷. Besides the theoretical paradox inherent in such a right, what is more surprising is that the proposal embraces the reductionist paradigm of neuroscience, admitting that cognitive activity is entirely predictable and manipulable; yet it repudiates this paradigm by asserting free will. In other words, if free will truly existed as an indeterminate principle immune to external factors, then it would not be subject to manipulation by neurotechnology.

The glaring recursion and the contradiction inherent in admitting free will while denying its presence suggest that the issue is probably misconceived. If one assumes the paradigm of neuroscience, that is, assuming that cognitive activity is nothing different

³² UNESCO, *Report of the International Bioethics Committee of UNESCO (IBC) on ethical issues of neurotechnology*, SHS/BIO/IBC-28/2021/3, § 190; OCSE, *Recommendation on Responsible Innovation in Neurotechnology*, 11 December 2019,

³³ Resolution of EP on «*Artificial Intelligence in a Digital Age*» (2020/2266(INI), 3 May 2022, § 247; and *funditus* in the *AI Act* (e.g. art. 5).

³⁴ For example, according to Ienca and Andorno, four neurorights can be identified: cognitive liberty, mental privacy, mental integrity, and psychological continuity. The Neurorights Initiative at Columbia University proposes five neuro-rights: mental privacy, personal identity, free will, fair access to mental enhancement, and protection from algorithmic bias. Based on this proposal and the amended art. 19 of the Chilean Constitution, the bill on the protection of neurorights and mental integrity, and the development of research and neurotechnologies, reflects the Neurorights Initiative's proposal: prohibiting neurotechnological interference that harms the psychological and mental continuity of a person, personal identity, autonomy of will, and the ability to make decisions freely, and protecting the mental substrate of personal identity (art. 4); elevating neural data to a special category of health data (art. 6), subjecting their dissemination and transmission to organ transplant regulations (sic, art. 7); and promoting fair access to neurotechnologies (art. 10).

³⁵ A critical analysis in J.C. Bublitz, *Novel Neurorights: From Nonsense to Substance*, in *Neuroethics*, 17, 2022, 12.

³⁶ For instance, N. Bobbio, *Libertà*, in *Enciclopedia del Novecento*, Rome, 1978, § 4;

³⁷ A quite common *topos*: yet in R. von Jhering, *Der Zweck im Recht*, II ed., Leipzig, 1884, 3-4.

from other natural phenomena, then free will does not exist, and claiming it would make no more sense than claiming a theological or abstract object as a human right. However, this paradigm is not compatible with the current dogmatics of fundamental rights and principles such as culpability or responsibility.

Conversely, by adopting a mentalist, psychological paradigm, or one that nonetheless affirms the unique indeterminacy of human choices—a common assumption in all Western legal traditions—the foundational metaprinciples of legal categories are justified, but the manipulative potential of technologies cannot be fully embraced.

These incompatibilities between paradigms can also be observed in the other perspectives discussed in the next three paragraphs (criminal proceedings, biolaw, and data protection), but they are certainly more evident when one seeks to affirm a right to free will or the right to control over one's mental states.

3. Neurolaw and Criminal Justice

The field of law that first encountered “knowledge” (scientific or not) aimed at the psychic dimension was, as previously mentioned, criminal law and criminal proceedings. Following the initial attempts to establish a new theory and practice oriented toward psychology (as in the case of the Italian Positive School), criminal proceedings have since maintained varying degrees of intersection with psychology, psychiatry, and, more recently, neuroscience³⁸. In criminal law, it is alongside the asserted relevance of the criminal (f)act that the importance of psychological elements emerges: the imputability of the offender, guilt and intent, the genuineness of testimony; all aspects that refer to awareness, intentionality, agency, memory, and so on.

However, the intersections between psychology and criminal law have not always been successful, to the extent that legislators often limited the use of psychiatric evidence in criminal proceedings to avoid determining solutions or culpability based on ambiguous psychological hypotheses. A notable example is the Italian Code of Criminal Procedure of 1930, which, despite being drafted in an authoritarian context, took care to exclude psychiatric evidence for assessing culpability (art. 314, para. 2)³⁹.

Such limits persisted in legal systems, and, in the Italian case, they even found justification on constitutional grounds that were not present at their inception. Indeed, the current prohibitions on using lie detectors or truth tests are justified by the Constitutional Court as being detrimental to an individual's moral freedom (or moral autonomy)⁴⁰, a principle that, though philosophically or religiously framed, does not seem far from the more secular concept of cognitive liberty discussed earlier⁴¹.

³⁸ O. Di Giovine, *Ripensare il diritto penale attraverso le (neuro-)scienze?*, Torino, 2019, 17 ss.

³⁹ Similarly, now art. 220 Italian Code of Criminal Procedure.

⁴⁰ Constitutional Court, decisions nos. 124/1970, 179/1973, 229/1998.

⁴¹ G. Vassalli, *Il diritto alla libertà morale (Contributo alla teoria dei diritti della personalità)*, in *Studi in memoria di Filippo Vassalli*, vol. II, Torino, 1960, 1670-1701; but see also A. Barbera, *I principi costituzionali della libertà personale*, Milano, 1967; A. Bonomi, *Le neuroscienze in rapporto alla libertà morale: aspetti di diritto costituzionale*, in *Forum di Quaderni Costituzionali*, 2018, 1 ss.; or A. Santosuoso - B. Bottalico, *Neuroscienze e genetica comportamentale nel processo penale italiano. Casi e prospettive*, in *Rassegna italiana di criminologia*, 6, 2013, 72 ss.

Nonetheless, with the invention of new neuroscientific diagnostic tools, the debate on the admissibility of neuroscientific evidence in criminal proceedings found new momentum. Several Italian legal cases, following the same pattern and analogous to those in other jurisdictions, illustrate the current situation⁴². During the trial, the defendant claims their right to use any means of evidence to prove their innocence, proposing to undergo a neuroscientific test. The most common case involves tests (I.A.T. or autobiographical Implicit Association Test, and T.A.R.A., or Timed Antagonistic Response Alethiometer) to detect mnemonic traces of violent episodes or, based on the absence of such traces, to provide elements supporting the defendant's innocence. Thus, on one side, there is the defendant's right to evidence, and on the other, their "moral freedom", which would prevent the use of neurotechnological devices in criminal proceedings. Currently, the interpretation by the Supreme Court and the Constitutional Court favours the inviolability of moral freedom over the right to evidence. However, the unreliability of the diagnostic tests plays a certain role in the background of these cases.

Indeed, the courts frequently refer to three elements: the explicit prohibition by the legislator; the constitutional legitimacy of the prohibition, ostensibly to protect the constitutional value of moral freedom; and lastly, questioning the relevance of the first two arguments, the scientific unreliability of the diagnostic tests. However, imagine that a new diagnostic test could reliably detect traces of a criminal event in an individual's memory or equally reliably ensure the absence of such traces. Could the inviolability of cognitive freedom justify prohibiting a defendant from using such enlightening evidence? Moreover, what would happen if the test produced an opposite result? Could a judge disclose traces of a criminal event in memory as a basis for a verdict?

Similar issues arise in different contexts: assessing the offender's imputability, where psychiatric evidence is admitted and can utilize neuroscientific tools; evaluating subjective elements, intent, and guilt; assessing testimony, and so forth. All actors of criminal procedure are involved in the "neurohype"⁴³, not least the judge, whose decision could be subject to psychological or neuroscientific evaluation⁴⁴.

In any case, the introduction of neuroscientific tools in criminal proceedings is strongly limited by two factors: the explicit presence of prohibitions on using psychiatric or neuroscientific evidence at certain trial stages and the substantial unreliability of the

⁴² A. Farano, *Neuroscienze e diritto*, in S. Salardi, M. Saporiti (eds.), *Le tecnologie 'moralì' emergenti e le sfide etico-giuridiche delle nuove soggettività*, Torino, 2020, 48 ss.; G. Gullotta - M. Caponi Beltramo, *Neurodiritti: tra tutela e responsabilità*, in *Sistema penale*, 1 October 2021, 7 ss.; G. Gennari, *Oscillazioni neuro...scientifiche: test a-LAT e macchina della verità*, in *Sistema penale*, 10 December 2020; O. Di Giovine, *Prove di dialogo tra neuroscienze e diritto penale*, in *Giornale italiano di psicologia*, 4, 2016, 336; G. di Chiara, *Il canto delle sirene. Processo penale e modernità scientifico-tecnologica: prova dichiarativa e diagnostica della verità*, in *Criminalia*, 2007.

⁴³ A. Wexler, *Separating Neuroethics from Neurohype*, in *Nature Biotechnology*, 9 August 2019, 988 ss.

⁴⁴ Recently A. Santosuosso - M. Giustiniani, *Vulnerable Defendants: Redefining Decision-Making through the Lenses of Neuroscience, Law and Artificial Intelligence*, in H. Wishart, CM Berryessa (eds.), *NeuroLaw in the Courtroom. Comparative Perspectives on Vulnerable Defendants*, Abingdon-NewYork, 2024, 37 ss.; O.D. Jones - J.D. Schall - F.X. Shen - M.B. Hoffman - A.D. Wagner, *Brain Science for Lawyers, Judges, and Policymakers*, Oxford, 2024; M.A. Thomaidou - C.M. Berryessa, *Bio-Behavioral Scientific Evidence Alters Judges' Sentencing Decision-Making: A Quantitative Analysis*, in *International Journal of Law and Psychiatry*, 95, 2024.

scientific results of the tests.

However, both factors may only have a historical character and may prove precarious. Legislative limits can be reviewed or overcome due to technological improvements. However, even their constitutional legitimacy, the constitutional legitimacy of the prohibitions, could face a similar fate. This can happen, especially considering the growing relevance of scientific evidence in the judicial review of laws⁴⁵. Particularly in cases involving a collision of fundamental rights (to evidence and moral freedom), the judgment on the reasonableness of the legislative prohibition can well be grounded in scientific evaluations. Consider, notably, the pandemic context, where the proportionality of legislative prohibitions often relied on scientific parameters related to the necessity and suitability of imposed measures⁴⁶. Based on these premises, it is one thing to affirm the constitutional illegitimacy of a technologically unreliable device; it is another to persist in deeming the prohibition of scientifically founded evidence legitimate.

Future debate may be framed within this theoretical context, particularly due to the development of technologies far more reliable than those now clumsily attempting to enter criminal proceedings.

4. Neurolaw as Biolaw

Suppose the philosophical perspective and criminal law reveal a web of complex relationships between law and neuroscience, in which the fundamental questions may be unresolvable. Then, the perspective of biolaw is more solid and perhaps more oriented towards positive law. Neurotechnological devices are predominantly and most effectively used in research and medical therapy, and it is in these sectors that a regulatory dimension can be observed. The law of research, experimentation, and medical therapy is a very specific area. However, the field may be the laboratory for observing issues that will interest other sectors of society sooner or later.

If we adopt the perspective of the “body”, perhaps even with ruthless reductionism, the interference of neurotechnology on the human being appears as a practice of accessing the body itself: these are interventions with therapeutic purposes, possibly also for experimentation and research, which as such are subject to a complex framework of rules on clinical experimentation. At this level, all proposals for those neurorights

⁴⁵ A. Ruggeri, *Diritti fondamentali e scienza: un rapporto complesso*, in *Consulta OnLine*, I, 2022, 251 ss.; G. Fontana, *Tecnoscienza e diritto al tempo della pandemia (considerazioni critiche sulla riserva di scienza)*, in *Osservatorio sulle fonti*, 1, 2022, 808; F. Pacini, *Ai confini della normatività. Hard law e soft law in “tempi difficili”*, in *Gruppodipisa.it*, 18 June 2022, 7 ss.; S. Penasa, *Il dato scientifico nella giurisprudenza della Corte costituzionale: la ragionevolezza scientifica come sintesi tra dimensione scientifica e dimensione assiologica*, in *Politica del diritto*, 2, 2015, 295 ss.; C. Casonato, *La scienza come parametro interposto di costituzionalità*, in *Rivista AIC*, 2, 2016, 5 ss.; S. Zorzetto, *Dal “sogno cartesiano” alla “razionalità limitata”: usi e abusi della scienza nella politica legislativa*, in Ead. - F. Ferraro (eds.), *La motivazione delle leggi*, Torino, 2019, 167 ss.; P. Veronesi, *La Corte costituzionale e la scienza: alcune tendenze e punti fermi*, in *BioLaw Journal*, 2, 2024, 125 ss.; L. Busatta, *Tra scienza e norma: il fattore scientifico come oggetto, strumento e soggetto della regolazione*, in *Costituzionalismo.it*, 1, 2021, 143 ss.

⁴⁶ Constitutional Court., decision no. 14/2023; see also F. Girelli - F. Cirillo, *Immuni e green pass. Prospettive di bilanciamento nella pandemia*, in *Consulta Online*, 1, 2022, 254 ss.

that already seem protected by the legal systems of Western traditions should be considered, such as psychophysical integrity or the right to access therapies, albeit in new forms of human enhancement.

Reconstructing the regulatory framework is quite challenging because various historical matrices built it. Consider the affirmation of bioethical principles, gradually transferred into the legal realm, the emergence of the principle of informed consent in North American jurisprudence and then in European law, European or national laws, and international norms on clinical experimentation. We can summarize this regulatory framework in a single principle escorted by a regime of exceptions: interventions on the human body are generally prohibited unless the law and, where applicable, the individual's consent legitimizes exceptional interventions under highly limited conditions and purposes.

Viewed from another perspective, we are faced with one of the possible variations of the concept of privacy, now understood as a prohibition of interference in an individual's private life, whose most exclusive domain coincides with their body (consider the reasons that led the case-law to derive the right to abortion from the right to privacy). Regarding practices involving interventions on a person's body, such as neuropharmacology, neurosurgery, or even structural or functional neural imaging diagnostic techniques, their (legitimate) use outside a healthcare context would be difficult to envisage for factual reasons even before legal ones. This is especially true when considering that even scientific research on the human body – the so-called clinical research – must always take place within the healthcare sector, if only due to the limited availability and high costs of the necessary equipment⁴⁷.

Regarding the regulation of healthcare treatments, reference must be made to a broad framework of international, European, and domestic sources, which can only be briefly summarized. This framework includes fundamental constitutional and international principles (above all, informed consent), healthcare organization law, norms on the liability (civil or criminal) of healthcare professionals⁴⁸, technical sources (guidelines and international standards), and professional ethics. For example, at the international level, the 1964 Declaration of Helsinki⁴⁹ and the 1997 Oviedo Convention affirm a broad set of principles, from the right to privacy to the right to receive information collected about one's health, thus leading to the affirmation of the right to the protection of health-related information. In the European Union context, regarding only the sector of pharmaceutical experimentation, the need for harmonized regulations across different states led, for example, in April 2014, to the approval of Regulation EU/536/2014 on clinical trials on medicinal products for human use⁵⁰. Similarly, in

⁴⁷ See A. Iannuzzi (ed.), *La ricerca scientifica fra possibilità e limiti*, Napoli, 2015; G. Marsico, *La sperimentazione clinica: profili bioetici*, in L. Lenti - E. Palermo Fabris - P. Zatti (eds.), *Trattato di biodiritto. I diritti in medicina*, Milano, 2011, 625 ss.

⁴⁸ E. Catelani, P. Milazzo, *La tutela della salute nella nuova legge sulla responsabilità medica. Profili di diritto costituzionale e pubblico*, in *Istituzioni del Federalismo*, 2, 2017, 305 ss.

⁴⁹ About the Declaration, U. Schmidt - A. Frewer (eds.), *History and Theory of Human Experimentation. The Declaration of Helsinki and Modern Medical Ethics*, Stuttgart, 2007.

⁵⁰ M. Fasan, C.M. Reale, *Genere e sperimentazioni cliniche: il Regolamento (UE) n. 536/2014, un'occasione mancata?*, in *BioLaw Journal*, 4, 2022, 272 ss.; see also C. Casonato, *I farmaci, fra speculazioni e logiche*

the Italian context, in line with the principles mentioned above, Clinical Trial Ethics Committees⁵¹ were established in the 1990s, progressively expanding their role to serve as an «organizational model balancing scientific freedom and the protection of individuals in biomedical research»⁵². Therapeutic activities, broadly understood to include diagnostic and clinical research activities, are overseen by the Italian National Guidelines System⁵³, consistent with a broader horizon of internationally derived guidelines and standards⁵⁴.

The wide range of methods and techniques mentioned in connection with neuroscience and neurotechnologies would require distinct evaluation on a case-by-case basis. Thus, a detailed examination of such a broad range of legal and technical norms is precluded here.

For the purposes of this inquiry, however, it is relevant to focus on the emergence of the principle of informed consent, which unites the entire referenced normative framework within the broader context of strengthening patient protections linked to the affirmation of the right to privacy, particularly in the North American context.⁵⁵ Nevertheless, it is worth emphasizing the centrality of the concept of privacy, which, despite its semantic ambiguities, demonstrates sufficient flexibility to address various issues⁵⁶.

This general framework of guarantees and protections for the body already seems entirely suitable to accommodate new forms of protection against neurotechnological interference, especially because, unlike the initial levels observed, the perspective of the body adopts a paradigm wholly compatible with the reductionism that characterizes the neuroscientific approach. We are not facing a clash of paradigms again, but rather two compatible and consistent viewpoints.

costituzionali, in *Rivista AIC*, 4, 2017, *passim*.

⁵¹ The Committees «are independent bodies responsible for ensuring the protection of the rights, safety, and well-being of individuals involved in experimentation and for providing public assurance of such protection. Where not already assigned to specific bodies, ethics committees may also perform consultative functions concerning ethical issues related to scientific and healthcare activities, with the aim of protecting and promoting the values of the individual» (Italian Minister of Health Decree, February 8, 2013, art. 1), established in the context of clinical trials, but whose consultative functions in the healthcare sector have progressively expanded. In relation to the topic of experimentation, see F. Giunta, *Lo statuto giuridico della sperimentazione clinica e il ruolo dei comitati etici*, in *Diritto pubblico*, 2, 2002, 631 ss., on the birth of the *Committees*, 634 ss.

⁵² W. Gasparri, *Libertà di scienza, ricerca biomedica e comitati etici. L'organizzazione amministrativa della sperimentazione clinica dei farmaci*, in *Diritto pubblico*, 2, 2012, 586.

⁵³ The law 24/2017 on professional liability attributed fundamental importance to this, giving the National Institute of Health, through the National Center for Clinical Excellence, Quality, and Safety of Care, the role of methodological guarantor and national governance of the process of producing the guidelines themselves. On this topic, see C.M. Masieri, *Linee guida e responsabilità civile del medico. Dall'esperienza americana alla legge Gelli-Bianco*, Milano, 2019, 23 ss.

⁵⁴ For example, consider the system implemented thanks to the European Network for Health Technology Assessment (see *ennetha.eu*).

⁵⁵ See C. Casonato, *Il Principio di autodeterminazione. Una modellistica per inizio e fine vita*, in *Osservatorio AIC*, 1, 2022, 54 ss.; G. Razzano, *Principi costituzionali ed ambito di applicazione del consenso informato*, in *Trattato di diritto e bioetica*, Napoli, 2017, 11 ss.

⁵⁶ Regarding the preference for a broader, ambiguous, and provisional concept of neuroprivacy, see the conclusions (§ 7).

5. Neurolaw as Data Protection Law

Considering once again a different point of view, neurotechnologies almost all perform digital data processing related to individuals: this is certainly the case for diagnostic devices, but also for statistical research in neuropharmacology, robotics in neurosurgery, or brain-computer implants.

This circumstance brings the activities in question within the scope of data regulation, specifically the European Regulation EU/679/16 (GDPR), which primarily safeguards the right to data protection (enshrined in art. 8 of the Charter of Nice at the EU level and protected in the context of the Council of Europe with reference to art. 8 of the ECHR and Convention 108/1981) but also the complex balance between this right and other fundamental rights⁵⁷. The GDPR requires, in brief, that data be processed lawfully, fairly, and transparently, collected for specified legitimate purposes and limited to them, stored for a limited time, and secured appropriately (principles set out in art. 5). It assigns tasks, responsibilities, and obligations based on the types of processing, organizational context, technologies used, purposes, types of data processed, etc.

Among the most relevant (and problematic) principles of the GDPR, art. 25 addresses data protection by design and by default, which mandates that data controllers, considering a complex set of variables⁵⁸, implement appropriate technical and organizational measures to enforce the necessary principles and safeguards to meet the requirements of this Regulation and protect the rights of data subjects. This implies that operators intending to implement data processing technology must conduct a thorough analysis of the impact on fundamental rights and design the technology and organization needed for processing activities to achieve the best balance between the involved rights and interests.

The regulation, therefore, not only predetermines balancing operations between the right to data protection and other rights or interests but also complements the role of member states (legislators, constitutional courts, ordinary courts, supervisory authorities) with that of the norm's recipients, who are involved in defining the regulatory horizon it addresses, following a model that is both self-regulatory and techno-regulatory⁵⁹.

⁵⁷ See C. Colapietro, *Il diritto alla protezione dei dati personali in un sistema delle fonti multilivello*, Napoli, 2018, 21 ss.; or O. Pollicino, *Judges, Privacy and Data Protection from a Multilevel Protection Perspective*, in *Federalismi*, 4, 2022.

⁵⁸ Art. 25, para 1.: «Taking into account the state of the art, the cost of implementation and the nature, scope, context and purposes of processing as well as the risks of varying likelihood and severity for rights and freedoms of natural persons posed by the processing, the controller shall, both at the time of the determination of the means for processing and at the time of the processing itself, implement appropriate technical and organisational measures, such as pseudonymisation, which are designed to implement data-protection principles, such as data minimisation, in an effective manner and to integrate the necessary safeguards into the processing in order to meet the requirements of this Regulation and protect the rights of data subjects».

⁵⁹ By self-regulation, we mean a form of regulation not unilaterally imposed by the state or another institutional actor, adopted in light of the observation of the ineffectiveness or suboptimal effectiveness of authoritative public intervention. (G. Napolitano, *Autoregolamentazione*, in *Dizionario di Economia e Finanza*, Roma, 2012). In self-regulation, the stakeholders are called to cooperate in defining the

The innovative GDPR approach is not without critical aspects, which nonetheless involves all data processing operators in defining the protection not only of the right to data protection but also of every fundamental right (including potential neuro-rights) whose consideration is determined (and, indeed, primarily) by the design of a data processing technology. This would occur even more so if we accept the perspective that algorithmic profiling produces persuasive or inductive effects that threaten individuals' cognitive autonomy: in this case, it is highlighted that the freedom of a person to self-determination would be nonetheless an inviolable constitutional right, enforceable not only against public authorities but also against private entities⁶⁰.

This raises several critical and interconnected issues.

The first is primarily the actual sustainability of fundamental rights in private relations: rights originally conceived as protections against the authority's power (and thus also as duties of state non-intervention) risk, in their horizontal projection between citizens, transforming into an obligation of state intervention in every aspect of contractual autonomy.

Furthermore, significant doubts might arise regarding the current regulation of digital data. On one hand, its appropriateness is contested due to the lag in the European digital market, and on the other extreme, because faced with an enormous number of ever-evolving rules, the effectiveness of this intricate regulatory framework appears rather weak⁶¹.

Moving beyond these first two observations, the literature highlights the prohibition on processing special categories of data, such as those revealing ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, as well as genetic data, biometric data, and data concerning the health or sex life of the data subject (art. 9 GDPR). This prohibition, given the provision of ten classes of exceptions (among which the mere consent of the data subject stands out), rather results in a strengthened protection regime for these special categories of data⁶².

Regarding neural data, some would ensure their full classification as sensitive or spe-

relevant norms. In the field of data protection and the digital context, the self-regulatory approach is increasingly favored, although it is often implemented in models where public intervention coexists with regulatory negotiation between institutional actors, such as supervisory authorities, and the stakeholders themselves. [S. Sileoni, *I codici di condotta e le funzioni di certificazione*, in V. Cuffaro - R. D'Orazio - V. Ricciuto (ed.), *I dati personali nel diritto europeo*, Torino, 2019].

By techno-regulation, we mean the ability of technical standards and design choices in the digital environment to contribute to, if not replace, the traditional normative dimension. In other words, in the design of software, digital platforms like social networks, or apps, the developer defines, based on standards and choices that are initially technical in nature, what the user can and cannot do. This creates an overlap between the writing of the computer code and the political-legal decision on the freedoms or limitations that will characterize the user experience.

⁶⁰ About the concept of *Drittwirkung*, A. Lamberti, *L'ambiente digitale: una sfida per il diritto costituzionale*, in *Federalismi.it*, 4, 2022, 448. Similarly, the possibility of deriving neuroethics and the consequent necessary framework of protections against neurotechnological risks within the notion of personhood is already in S. Rodotà, *Il diritto di avere diritti*, Roma-Bari, 2013, 371 ss.

⁶¹ Again V. Zeno-Zencovich, *Artificial Intelligence, Natural Stupidity*, cit., *passim*.

⁶² A. Thiene, *La regola e l'eccezione. Il ruolo del consenso in relazione al trattamento dei dati sanitari alla luce dell'art. 9 GDPR*, in A. Thiene - S. Corso (eds.), *La protezione dei dati sanitari. Privacy e innovazione tecnologica tra salute pubblica e diritto alla riservatezza*, Napoli, 2023, ss.

cial data categories⁶³: it is true that neural data revealing health conditions are indeed health data outright, just as neural data related to sexual activity are sexual data in the proper sense. Similarly, we can include neural data in special categories even in the case of neuro-sensitive devices capable of recognizing an individual's approval or disapproval of political news and, therefore, revealing (or allowing the prediction of) a user's political opinions (or, likewise, in the case where the data allows the prediction of the user's health conditions)⁶⁴. Nonetheless, if the processing is not aimed at collecting or predicting information related to special categories, the protection of neural data remains subject to the ordinary safeguards provided by the GDPR framework. This limitation could imply, however, that entire sectors of neural data processing are subject to relatively weak protections: consider, for example, the exploitation of neural data as indicators of consumer engagement and attention related to products or content⁶⁵, and more generally, the uses of neurotechnologies in the various sectors of the "attention economy" (the exploitation of neural data to determine audience preferences and improve content personalization in the media and entertainment industries)⁶⁶. To be clear, the framework of positive norms, as interpreted by supervisory authorities and case law, does not allow psychic data related to consumer preferences and engagement to be subject to enhanced protection, nor would it be possible – and perhaps not even desirable – to completely preclude platforms from using "vaguely psychic" data. A reversal of this approach, although desirable in the opinion of some, could require positive intervention by the Legislator (European or national)⁶⁷. In this context, the unique Chilean bill stands out, which, in art. 7, would subject the processing of neural data to the provisions regarding organ transplantation (*sic!*)⁶⁸. Such a problem leads some authors to dismiss any issue regarding the protection of neural data, for the marginal cases where they are not already classified as special categories, by proposing the inclusion of a specific class of neurodata in art. 9 of the GDPR⁶⁹. Such an intervention would likely be useful in extending the enhanced pro-

⁶³ "Neural data" undoubtedly fall into the category of sensitive data and must be treated according to the regulations of the new GDPR on personal data protection, according to R. Trezza, *La tutela della persona umana nell'era dell'intelligenza artificiale: rilievi critici*, in *Federalismi.it*, 2022, 300). See also P. Perlingieri, *Note sul "potenziamento cognitivo"*, in *Tecnologie e diritto*, 1, 2021, 214 ss.

⁶⁴ N. Minielly - V. Hrinco - J. Illes, *A View on Incidental Findings and Adverse Events Associated with Neurowearables in the Consumer Marketplace*, in I. Bárd - E. Hildt (eds.), *Developments in Neuroethics and Bioethics. Ethical Dimensions of Commercial and DIY Neurotechnologies*, Cambridge, 2020, 267 ss.

⁶⁵ J. Zhang - J. Ho Yun - E.-J. Lee, *Brain Buzz for Facebook? Neural Indicators of SNS Content Engagement*, in *Journal of Business Research*, 130, 2020.

⁶⁶ T. Terranova, *Attention, Economy and the Brain*, in *Culture Machine*, 13, 2012, 1 ss.

⁶⁷ D. Hallinan - P. Schütz - M. Friedewald - P. de Hert, *Neurodata and Neuroprivacy: Data Protection Outdated?*, in *Surveillance & Society*, 1, 2014, 55 ss.

⁶⁸ Art. 7: «La recopilación, almacenamiento, tratamiento y difusión de los datos neuronales y la actividad neuronal de las personas se ajustará a las disposiciones contenidas en la ley n°19.451 sobre trasplante y donación de órganos, en cuanto le sea aplicable, y las disposiciones del código sanitario respectivas». A nonsense according to C. Bublitz, *Novel Neurorights: From Nonsense to Substance*, cit., 7.

⁶⁹ «Insofar as some forms of neurodata are not covered but should be so, one may insert "neurodata" to art. 9, next to other types of data such as genetic data. No need for further reforms» (C. Bublitz, *ibid.*, 7).

tection regime to the grey area of neural data not classified as sensitive, but it would certainly not be entirely conclusive. First, because the threat it aims to address appears rather «invisible»⁷⁰; second, because the regulation of the digital environment contends with its a-territorial nature (the lack of territorial boundaries)⁷¹; third, because classifying neural data as special categories does not circumvent the critical issues that still arise in this sector⁷²; and lastly, because consent (even if free, specific, informed, explicit, given through an unequivocal positive act, etc.) would still tend to legitimize risky processing.

The perspective of data protection seems the most suitable for addressing the issue of technological interference in cognitive activity, especially because it extends its scope of interest to non-interventional technologies, which could hardly be understood from the perspective of bodily intervention and biolaw. Nonetheless, the debate has mainly focused on defining an autonomous category of neural data. This result could add a set of personal data that is difficult to define to the already crowded set of special categories. Even this result, in any case, would not allow overcoming the problems and limits found in the field of protecting data belonging to special categories, especially with reference to uncontrolled uses in non-healthcare contexts.

6. Theoretical Criticisms and Dogmatic Questions

The proposal by Yuste that substantiates the Neurorights Initiative identifies five neuro-rights⁷³: mental privacy, personal identity, free will, fair access to mental enhancement, and protection from algorithmic bias. According to the proposal by Ienca and Andorno, four neuro-rights could be identified: cognitive liberty, mental privacy, mental integrity, and psychological continuity⁷⁴.

Analyzing these proposals, one can distinguish between several main classes of rights to be examined: the first class concerns integrity (psychic, psychological, of the mind, etc.); the second concerns privacy (of the mind, brain, neurons, etc.); the third concerns liberty (of the mind, psychic, cognitive, free will, autonomy of choice, etc.); the fourth concerns identity and continuity (psychic, psychological, etc.); and the fifth concerns access to enhancement (neural, cognitive, psychic, etc.).

The issue of integrity (whether psychic, psychological, or mental) is relatively straightforward, primarily because art. 3 of the Charter of Nice explicitly affirms that every-

⁷⁰ P. De Pasquale, *Verso una Carta dei diritti digitali (fondamentali) dell'Unione europea?*, in *Osservatorio europeo*, March 2022, 14 ss.

⁷¹ About the «a-territorial nature of the Internet», G. De Minico, *Towards an Internet Bill of Rights*, in *Federalismi.it*, 5, 2016, 14 ss. See also F. Pizzetti, *Il sistema cinese di tutela e sicurezza dei dati e il quadro europeo nello scenario della competizione mondiale*, in *Federalismi.it*, 4, 2022.

⁷² E. Catelani, *Nuove tecnologie e tutela del diritto della salute: potenzialità e limiti dell'uso della Blockchain*, in *Federalismi.it*, 4, 2022, 214, ss.; or A. Thiene - S. Corso (eds.), *La protezione dei dati sanitari. Privacy e innovazione tecnologica tra salute pubblica e diritto alla riservatezza*, Napoli, 2023.

⁷³ See neurorightsfoundation.org/mission.

⁷⁴ M. Ienca - R. Andorno, *Towards New Human Rights in the Age of Neuroscience and Neurotechnology*, cit., *passim*.

one has the right to physical and mental integrity. Additionally, constitutional jurisprudence recognizes the “physical or mental integrity of individuals” as fundamental to the very existence of the legal system⁷⁵. This right, which is relevant in discussions on potential neuro-rights, is not new. It is already acknowledged as psychic integrity and extensively protected by various safeguards. For instance, compensatory protection for psychic damage is treated as biological damage⁷⁶; moreover, the constitutional prohibition of torture, enshrined in art. 613-bis of the Criminal Code, includes provisions against psychic torture, penalizing those who cause acute physical suffering or verifiable psychic trauma through severe violence, threats, or cruelty.⁷⁷The specific nature of this integrity, whether termed mental, psychic, or psychological, does not necessitate a debate between dualism and biological reductionism. Violations of psychic integrity are already regarded as breaches of a unified, indistinct entity, which can be evaluated using different criteria, such as biological damage verified through psychiatric consultation.

Regarding privacy, the NeuroRights Foundation asserts that «any NeuroData obtained from measuring neural activity should be kept private. If stored, there should be a right to have it deleted at the subject’s request»; or, according to the other authors, «it should guarantee the systemic protection of brain information»⁷⁸. Overall, the primary risk highlighted in the literature is the extraction of information and the unregulated processing of data flows related to individuals. The main concern, therefore, is linked to privacy, encompassing information related to the nervous system, cognitive processes, emotions, and more generally, the mind and thoughts of the person. The proposals primarily focus on data protection, for which it is already possible to outline a framework of claims and powers based on positive law⁷⁹. In this case, it does not seem appropriate to discuss a new neuroright, although it is likely that the current regulation does not fully guarantee the protection of private life (arts. 8 ECHR and 7 CFREU) and the instrumental right to data protection (art. 8 CFREU) against neurotechnologies. The most problematic aspect is the possible definition of an autonomous category of (neuro)data to be subjected to an enhanced protection regime.

⁷⁵ Constitutional Court, decisions nos. 290/2001, 236/2020.

⁷⁶ Italian Supreme Court, civil division, III, 11 June 2009, no. 13547.

⁷⁷ Art. 13, para. 3, of the Italian Constitution states that «all physical and moral violence against persons subject to restrictions of freedom shall be punished», and art. 27, par. 3, provides that «punishments cannot consist of treatments contrary to the sense of humanity». The issue here would be more about effectiveness than recognition: C. Scialla, *L’inafferrabile reato di tortura nello spazio della detenzione*, in *BioLaw Journal*, 4, 2022, 113 ss.

⁷⁸ Respectively on the NeuroRights Foundation website and in M. Ienca, *On Neurorights*, cit., 7.

⁷⁹ As outlined in arts. 15-22 of the GDPR, these rights enable a broad range of claims and powers. These include the right to obtain information about which data is being processed (right to information); the right to request and receive data in an intelligible form (right of access); the right to obtain the update or correction of submitted data (right to rectification); the right to have data deleted (right to erasure); the right to oppose data processing (right to object); the right to revoke consent for data processing (right to withdraw consent); the right to oppose automated processing and not be subject to decisions based solely on automated processing, including profiling (right to object to automated processing); the right to obtain the blocking or limitation of data processed unlawfully and those no longer necessary for the processing purposes (right to restriction of processing); and the right to transfer data to another controller (right to data portability).

Certainly, here as elsewhere, the emphasis on the neural level has the drawback of overlooking the broader framework of data processing types, not all of which are solely focused on neural activity in the strict sense.

Nonetheless, the hypothesis of creating distinct categories of data for various reference levels (mental, neural, psychic, psychological, cognitive, etc.) is unconvincing. The implicit naive reductionism in the notion of neural data (neuronal or neurodata) seems preferable to a slippery multiplication of categories, which would draw any type of mental information related to the person into an enhanced protection regime (any taste, memory, or evaluation «regarding an identified or identifiable natural person», per art. 4 GDPR). It should be noted that the risk to fundamental rights is not so much determined by the qualification of the data, but by the type of processing and the context (as per art. 25 GDPR). Therefore, regulation should focus on neurotechnologies rather than on neurodata themselves.

Proponents of cognitive liberty emphasize the necessity of safeguarding an individual's freedom to control their mental states⁸⁰. This conception of freedom appears to resonate more closely with Eastern spiritual practices, which are protected under art. 19 of the Constitution. The notion of cognitive liberty, however, is somewhat ambiguous, as it presupposes that the individual exists independently of their cognitive processes, mental states, or consciousness, and can thus assert control over them. More pragmatically, the advocacy for cognitive liberty seems to aim at preventing manipulative interference by covert or unwanted external agents. While the focus of mental privacy is on protecting “outgoing” information, cognitive liberty seeks to prevent the intrusion of information or stimuli that could subtly influence cognitive functions, regardless of whether such interference results in perceptible or permanent harm to psychic integrity. This concern is clearly addressed by the right to private life (arts. 8 ECHR and 7 CFREU) and is further supported by the constitutional protections of bodily integrity (arts. 2, 13, and 32 of the Constitution). It is, therefore, difficult to envision a legal framework that upholds the inviolability of personal freedom, domicile, and correspondence, yet remains indifferent to covert neuromodulation practices.

Cognitive liberty thus emerges as a demand for non-interference through neuromodulation technologies, potentially accompanied by informational rights regarding the risks associated with these technologies, as well as secondary protective measures. Consequently, the establishment of an autonomous right to free will or control over mental states appears superfluous. More beneficial would be enhanced regulatory measures and the widespread implementation of informational obligations concerning the inductive impact of these practices.

Turning to identity and the consequent psychological (or psychic) continuity, the proposals here are based on two necessary assumptions: that individuals possess an identity (i.e., a specific and stable essence) and that this identity is maintained over time through significant continuity of psychological aspects. The concept of psychological continuity is primarily developed through philosophical rather than psychological re-

⁸⁰ *I.e.*, «the positive liberty of having the possibility of acting in such a way as to take control of one's mental life» e «freedom of thought as the normative foundation of a person's autonomous control over her mind» (M. Ienca, *On Neurorights*, cit., 6-7); «Individuals should have ultimate control over their own decision making» for the Neurorights Initiative.

flection on the theme of identity⁸¹. Consider neurostimulation techniques that induce changes in musical preferences, as in the case of a sixty-year-old individual with obsessive-compulsive disorder treated with deep brain stimulation, who consequently developed an unexpected passion for Johnny Cash as a side effect⁸². It is thus assumed that neurotechnologies can modify—potentially deliberately and not only in relation to musical tastes—certain distinctive traits of personal identity⁸³.

There is a recognized need to protect personal identity and the continuity of psychological life from external alterations⁸⁴ and to prohibit technologies from disrupting one's sense of self or blurring the boundary between self-awareness and external technological inputs⁸⁵. While it is debatable whether such an essentialist concept of identity can constitute a fundamental right, the preservation of personal identity against unwanted external forces is a complex issue⁸⁶. It could be debated whether such a structural and essentialist concept of identity qualifies as a value and, if so, whether it is sufficiently shared to justify the establishment of an autonomous fundamental right. Similarly, one might question, in abstract terms, whether personal identity can ever be entirely preserved over time from the influence of unwanted external forces. Nevertheless, the right to personal identity is already well-established in European law (ECtHR jurisprudence on art. 8) and in national contexts. Initially recognized as the right to a correct social projection, it has evolved to include the right to a name, control over personal information, and one's biological truth, ultimately becoming the «right to be oneself»⁸⁷ even allowing for significant changes in one's individual history (e.g., the right to be forgotten and the right to alter sexual characteristics). External interference in this domain is already broadly prohibited by numerous legal provisions.

⁸¹ P. van Inwagen, *Materialism and the Psychological-Continuity Account of Personal Identity Source*, in *Philosophical Perspectives*, 11, 1997, 305 ss.

⁸² M. Ienca, *Neurodiritti: storia di un concetto e scenari futuri*, in *Privacy e neurodiritti. La persona al tempo delle neuroscienze*, cit., 50; M. Mantione - M. Figeo - D. Denys, *A Case of Musical Preference for Johnny Cash Following Deep Brain Stimulation of the Nucleus Accumbens*, in *Frontiers in Behavioral Neuroscience*, 8, 2014, 1 ss. Research «may suggest an association between DBS and changed musical preference». The improbability of such a late change in musical tastes is particularly noteworthy, especially considering the singularity of the individual having no pronounced musical preferences prior to the clinical treatment.

⁸³ On the subject of the relationship between neurotechnologies and music, a number of studies could be cited to the contrary, demonstrating the use of musical stimulation integrated with neuromodulation techniques: «[l]istening to modulated vocalizations/music is potentially an efficient strategy for neuromodulation of the autonomic nervous system» (N. Rajabalee *et al.*, *Neuromodulation Using Computer-Altered Music to Treat a Ten-Year-Old Child Unresponsive to Standard Interventions for Functional Neurological Disorder*, in *Harvard Review of Psychiatry*, 5, 2022, 311).

⁸⁴ M. Ienca - R. Andorno, *A New Category of Human Rights: Neurorights*, in *Research in Progress Blog*, 26 April 2017. Art. 4 of the Chilean proposal also addresses psychological continuity: «*si puede dañar la continuidad psicológica y psíquica de la persona*».

⁸⁵ According to NeuroRights Foundations: «Boundaries must be developed to prohibit technology from disrupting the sense of self. When neurotechnology connects individuals with digital networks, it could blur the line between a person's consciousness and external technological inputs».

⁸⁶ See, for instance, the criticism of F. Remotti, *Contro l'identità*, Bari-Roma, 2001 or Id., *L'ossessione identitaria*, Bari-Roma, 2010.

⁸⁷ G. Pino, *L'identità personale*, in S. Rodotà - M. Tallacchini (eds.), *Ambito e fonti del biodiritto*, in *Trattato di biodiritto*, Milano, 2010, 301 ss. Or see the comprehensive framework of issues in E. Lecaldano, *Identità personale. Storia e critica di un'idea*, Torino, 2021.

For cases not covered by the protection of psychic integrity and cognitive liberty, interference in the sphere of personal identity and psychological continuity would still constitute an intrusion into the individual's private domain, with all associated rights, freedoms, and powers, as previously discussed for other classes of rights.

Lastly, equitable access to cognitive enhancement raises concerns about creating a “two-speed” humanity: one group enhanced due to economic and cultural access to neurotechnologies, and another excluded⁸⁸. This scenario could seem particularly dystopian if we do not consider the existing cultural and economic inequalities that already result in highly unequal health distributions both globally and within individual countries. There is a clear and direct link between income and health, known as the social gradient, which is evident not only in developing countries but also in the wealthiest nations.

Therefore, this expectation, primarily highlighted by the NeuroRights Foundation, can be seen as part of the broader category of the (social) right to healthcare. The claim in question should be understood as the right (to equitable access) to a health-care service (provided or funded by the public sector, depending on jurisdiction), and pertains to treatments that, if not aimed at addressing pathological conditions but rather at improving psycho-physical wellbeing, border on forms of human (neuro) enhancement. This is hardly a novel concept, or at least not new in the specifically “neural” context⁸⁹.

Similar considerations arise concerning the protection from bias, which underscores the necessity of countermeasures to combat bias and input from user groups to foundationally address bias in the context of neurotechnologies. Thus, this would not constitute an autonomous class of rights but rather a general expectation towards the quality of technology, protecting various interests (sometimes adhering to the principle of *neminem laedere*, sometimes aimed at combating social inequalities, etc.).

A comprehensive analysis suggests that all new neurorights pertain to two distinct yet partially connected phenomena: informational extraction and manipulative interference with the individual. The need for protection from both forms of access, “outgoing” and “incoming”⁹⁰, could be conveniently subsumed—at the cost of overcoming some methodological caution—under a single provisional nomenclature: neuroprivacy.

On one hand, it has been observed that the concept of privacy acts like a veritable “black hole” that engulfs virtually all individual rights, configuring itself as a kind of «general right to self-determination»⁹¹ where privacy, in the strict sense, is just one of

⁸⁸ «There should be established guidelines at both international and national levels regulating the use of mental enhancement neurotechnologies. These guidelines should be based on the principle of justice and guarantee equality of access» (NeuroRights Foundation).

⁸⁹ On human enhancement, N. Bostrom, *Intensive Seminar on Transhumanism*, New Haven, 2003; P. Benanti, *Postumano, troppo umano. Neurotecnologie e human enhancement*, Roma, 2017, 20 ss.

⁹⁰ «Questo tipo di doppia proiezione, in entrata e in uscita, è uno dei pericoli in questo momento più rilevanti», according to O. Pollicino, *Costituzionalismo, privacy e neurodiritti*, cit., 16.

⁹¹ M. Luciani, *Il diritto al rispetto della vita privata: le sfide digitali, una prospettiva di diritto comparato*, Studi del Servizio Ricerca del Parlamento europeo, Bruxelles, 2018, 1. See also A. Cerri, *Riservatezza (Diritto alla)*, *Diritto costituzionale*, in *Enciclopedia giuridica*, XXVII, Roma, 1991. A similar statement yet in W.L.

its specifications, while data protection is considered an autonomous and instrumental right. Undoubtedly, merging different issues into this macro-category has produced broad and fertile reflection, especially true in this initial phase of research⁹². In this sense, leveraging the potential ambiguity and broad semantic scope of the concept of privacy would be beneficial for our purposes.

On the other hand, when identifying a reference level for protecting an individual's intimacy (among neurons, neural processes, cognitive processes, mind, psyche, etc.)⁹³, one might favour the generic (and perhaps overused) reference to the neural level, in line with the neurohype that characterises many of the various involved disciplines. This “neuro-essentialist” or reductionist option would allow for a “methodological reduction” to a single principle because it places all forms of interference on a secular, bodily level (without the need to invoke all possible levels of reference).

7. Conclusions

The emergence of new rights in response to novel forms of technological interference in cognitive activities occupies a vast and complex domain. These interferences—whether incoming or outgoing—into the psychic sphere encompass neurosurgery, brain imaging, certain pharmacological treatments and narcotics, psychometrics, facial recognition, and the measurement of seemingly non-psychic parameters (such as heart rate, skin conductance, and electrodermal activity), as well as vocal analysis, among others. This spectrum includes various techniques and practices that access the body's dimension, ranging from less to more interventionist, involving heterogeneous data types and diverse instruments with varying levels of prevalence. The array of technologies not only spans a wide scope but also serves a multitude of purposes, from therapeutic to enhancement, and from commercial applications to social control. For example, a particularly relevant aspect of art. 5 of Regulation (EU) 2024/1689 (AI Act) is the prohibition of using AI systems that deploy «subliminal techniques beyond a person's consciousness or purposefully manipulative or deceptive techniques with the objective, or the effect, of materially distorting the behavior of an individual or a group of individuals». This prohibition gains particular significance when applied to emotion recognition systems and the protection of vulnerable persons. The provision highlights the risk that technologies designed to detect and exploit emotional states might be used to manipulate intentions and behaviors, exacerbating existing vulnerabilities or creating new ones. This scenario exemplifies the ineffability of suitable legal

Prosser, *Privacy*, cit., 422: «It is evident from the foregoing that, by the use of a single word supplied by Warren and Brandeis, the courts have created an independent basis of liability, which is a complex of four distinct and only loosely related torts; and that this has been expanded by slow degrees to invade, overlap, and encroach upon a number of other fields».

⁹² *Ibidem*, 423: «This is not to say that the developments in the law of privacy are wrong. Undoubtedly, they have been supported by genuine public demand and lively public feeling and made necessary by real abuses on the part of defendants who have brought it all upon themselves».

⁹³ Consequently, we might derive terms such as brain privacy, privacy of mind, mental privacy, neural privacy, psychoprivacy, cognitive privacy, etc.

categories to address these phenomena, particularly in determining the boundary between manipulative techniques and legitimate influences on individual decision-making.

For this reason, in the discussion, it was illustrated how different facets of the same issues can (and should) be examined from multiple perspectives. Within a broader framework that integrates theoretical and doctrinal reflection with the context of positive law, it is possible to assess proposals concerning new neurorights. This involves either aligning them with already recognised rights or highlighting the critical issues posed by their innovative elements, especially the paradoxes they may present.

Lastly, the concept of neuroprivacy, though ambiguous, has proven useful—a notion that, while dogmatically unsatisfactory, serves as a provisional guide for future research. Some of the emphasis placed in the literature on the dystopian image of neurotechnologies likely stems from excessive caution, or even an irrational fear, toward certain emerging technologies. Nonetheless, while questioning the need for new regulations in this sector and an array of new human rights—given that the *corpus juris digitalis* is already overly dense—we recognise that the challenge posed to the law by neuroscience is indeed central. Despite the ineffable confrontation between these two realms and the numerous contradictions arising from their intersection, this remains a critical area. The hope is that this vital space, still largely uncharted today, will not be filled solely with regulations, but also with bridges that connect law and cognitive sciences.