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Legal Neuroexceptionalism: Framing a Concept

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Abstract

In the past few decades, there have been significant advances in the sciences concerned with the brain and its functions. As science has advanced, the scientific and practical utility of neurodata – data concerning the structure and function of individuals' brains – has also grown. This expansion in utility, however, has brought with it ever-increasing ethical and legal scrutiny on the legitimate use of neurodata. There is every reason to believe that the expansion in the scientific and practical utility of neurodata, as well as the increased attention given to attendant ethical and legal concerns, will continue apace. It seems likely certain forthcoming legal discussions will concern questions as to whether the collection and use of neurodata should be subject to specific and novel legislation: questions of legal neuroexceptionalism. There has to date, however, been little conceptual exploration of the concept of legal neuroexceptionalism itself – although certain substantive legal neuroexceptionalist claims have been put forward. In this regard, this paper sets out to consider the following question: what does it mean to make a legal neuroexceptionalist claim? In this regard, the paper offers the following preliminary, abstract, proposition: to make a legal neuroexceptionalist claim means making two forms of sub-claim: i) neurodata are somehow exceptional; and ii) these exceptional qualities mandate responses in the form of specific and novel legislation. The paper then further explores each of these two forms of sub-claim in detail.

Keywords: brain, neurodata, exceptionalism, law, ethics, fMRI, functional magnetic resonance imaging

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1. Introduction

The last few decades have yielded significant expansions in our understanding of the nature, structure and functions of the human brain and its relationship with the individual and society. On the back of this increased scientific understanding, there has been a parallel increase in the utility of neurodata – data relating to the structure and function of individuals' brains.[1] In this regard, we see an expanding collection of neurodata to support an ever-widening range of scientific analyses and increasing numbers of consumer products – for example, in the fields of health and entertainment.

With the development in the utility and practical use of neurodata has come increased ethical and legal scrutiny. In light of prior discussions concerning comparable expansions in the use contexts of other forms of biodata – in particular genetic data – it seems likely that, at least certain, forthcoming legal discussions on neurodata will come to revolve around questions of whether the collection and use of neurodata raises unique issues and should be subject to specific and novel legislation: questions of legal neuroexceptionalism.

To date, however, there has been little effort to explore, from a conceptual perspective, the concept of legal neuroexceptionalism itself, although there have been several specific claims that certain forms of neurodata usage raise unique issues and should be subject to novel and specific legislation. This paper seeks to address this gap and to provide such a conceptual exploration. In this regard, the paper considers the following question: what does it mean to make a legal neuroexceptionalist claim?

In answering this question, the paper aims to provide a theoretical contribution to the emerging ethical and legal literature on neurodata. In this regard, it offers the following preliminary, abstract, proposition: to make a legal neuroexceptionalist claim means making two forms of sub-claim: i) neurodata are somehow exceptional; and ii) these exceptional qualities mandate responses in the form of specific and novel legislation. The paper then further explores each of these two forms of sub-claim in detail.

With this contribution, we hope to provide a set of considerations useful to scholars, practitioners, and policy-makers concerned with the regulation of neurodata. We believe the utility of the contribution will lie in: i) demarcating the boundaries of the forms of claim

[1] We appreciate there are several ways in which neurodata can be defined, that each definition will employ different scoping criteria, and that, eventually, alternative approaches will mean different definitions will apply to varied forms of data existing in the world. In this regard, in order to minimise confusion, when we refer to neurodata in this paper, we refer to the forms of data which fall within the scope of the definition for 'personal brain data' provided in the OECD Recommendation of the Council on Responsible Innovation in Neurotechnology: 'data relating to the functioning or structure of the human brain of an identified or identifiable individual that includes unique information about their physiology, health, or mental states.' OECD, RECOMMENDATION OF THE COUNCIL ON RESPONSIBLE INNOVATION IN NEUROTECHNOLOGY, 6, 2019. https://www.oecd.org/science/recommendation-on-responsible-innovation-in-neurotechnology.htm (accessed 8 July 2022). We have chosen this definition as it emerges from an institutional context with regulatory pedigree and as it is likely to be familiar to readers. We highlight, however, that the argument outlined in the paper is made at such a level of abstraction that it should remain relevant regardless of which specific definition is adopted.

which might be regarded as legal neuroexceptionalist claims; ii) providing insight into the range of ways in which legitimate and well-founded legal neuroexceptionalist claims might be made; and iii) providing insight into the range of ways in which legal neuroexceptionalist claims may be open to criticism.

The paper begins by providing an example and elaboration of a form of neurodata which may be the subject of legal neuroexceptionalist claims: functional magnetic resonance imaging (fMRI). This section precedes the substantial analysis concerning what it means to make a legal neuroexceptionalist claim. In this regard, the section rather functions to elaborate a concrete example of a relevant form of data, which will be returned to at various stages of the subsequent discussion, to provide illustrations and examples of our substantive argumentation (section 2).

The paper then moves to provide some background to the concept of legal neuroexceptionalism and to offer and elaborate our preliminary, abstract, proposition: to make a legal neuroexceptionalist claim means making two forms of sub-claim: i) neurodata are somehow exceptional; and ii) these exceptional qualities mandate responses in the form of specific and novel legislation. In light of this proposition, the paper then moves on to explore the structure of each of these two forms of sub-claim in turn (section 3).

Starting with the first sub-claim, the paper provides a description of how neurodata, or some form of neurodata usage, might be considered as exceptional, such as to found a legal neuroexceptionalist claim. In this regard, the paper offers and elaborates the proposal that making a legal neuroexceptionalist claim will mean identifying the exceptional qualities of neurodata in relation to pre-existing norms of data relevant for the function of law. The paper then suggests there are only a limited range of analytical perspectives which can support such an identification of exceptional qualities, and discusses three such perspectives we feel likely to be particularly significant and useful (section 4).

Moving to the second sub-claim, the paper considers the general scope of the utility of legislation as a social mechanism for the production of normative expectations in relation to neurodata. In this regard, the paper offers and elaborates the more detailed proposal that making a legal neuroexceptionalist claim will mean making a series of assertions as to the logic of looking to legislation, as opposed to other avenues of response, to approach the regulation of neurodata in light of its identified exceptional qualities. Three such forms of assertion we feel to be particularly significant in this regard are highlighted and discussed (section 5).

Before moving forward to the body of the paper, we would like to make clear that this piece does not constitute an argument that legal neuroexceptionalist claims are necessarily right or wrong. Nor does the piece seek to criticise or support any specific neuroexceptional arguments or positions.[2] Rather, the paper moves away from the substance of specific legal

[2] We also highlight at this point that we recognise that there are other related ethical and legal approaches with relevance to dealing with data concerning the structure and function of the human brain and the mind – see, for example the discussion of 'mental data' in Ienca and Malgieri. M. Ienca, G. Malgieri. *Mental data protection and the GDPR,* 25(9) J. LAW BIOSCI. 1, 1–19 2022 https://academic.oup.com/jlb/article/9/1/lsac006/6564354 (accessed 8 July 2022). Where such approaches do not correlate with neuroexceptional approaches, they are not covered by the article.

neuroexceptionalist claims and takes the concept of the legal neuroexceptionalist claim itself as a subject of study, and as a subject which would benefit from elucidation.

2. fMRI: A Candidate for Legally Exceptional Neurodata

This paper offers a conceptual analysis of what it means to make a legal neuroexceptionalist claim. While this should be a sufficient contribution in its own right, the provision of an example of a type of neurodata which can be used to illustrate our substantive arguments will likely make it easier for readers from more applied fields – who actually use neurodata – to follow the arguments made. Accordingly, prior to directly addressing the research question the paper seeks to answer, such an example will be provided. In this regard, this section thus outlines different types of neurodata and introduces fMRI as such an example. To be clear, we offer the example of fMRI only as a pedagogical tool, and not to endorse any form of legal neuroexceptionalist claim in relation to this form of neurodata. We have chosen fMRI as our example as this is a form of neurodata which: i) is commonly known; ii) has been the subject of legal neuroexceptionalist claims in the past, with which many readers will already be familiar; and iii) may be the subject of legal neuroexceptionalist claims again in the future.

A number of cutting-edge technologies are used to generate neurodata via *in vivo and ex vivo* processes. These include neurostimulators, brain-computer interfaces and advanced neuroimaging technologies. They produce unprecedented amounts of data with huge potential for clinical and research applications, but which may also prove to be useful for non-clinical and consumer products. The complex assessment of when, how and to what extent this neural information can be accessed and used form the core of the legal neuroexceptionalism debate. Accordingly, whilst we focus on fMRI, we note that other technologies which facilitate the collection and analysis of different forms of neurodata – including but not limited to positron emission tomography (PET), electroencephalography (EEG) and magnetoencephalography (MEG) – each may be the subject of specific legal neuroexceptionalist claims.

Much literature has, in the past, presented fMRI as an example of neurodata that warrants special ethical and legal consideration. fMRI is a specialised form of magnetic resonance imaging (MRI) which measures the changes in 'deoxyhemoglobin concentration consequent to task-induced or spontaneous modulation of neural metabolism', which is used to examine the brain's functional anatomy – i.e. the part of the brain which handles critical functions.[3] In this regard, fMRI differs from most imaging techniques because it goes beyond the provision of high-spatial resolution of brain anatomy to provide an alternative measurement of neural activation based on hemodynamic changes.[4]

In this regard, Illes and Racine argued that increasing advancements in the utility and applications of fMRI present unique challenges that established bioethical frameworks

[3] G. H. Glover, *Overview of Functional Magnetic Resonance Imaging,* 22 NEUROSURG. CLIN. N. AM, 133, 133–139 2011.

[4] J. S. George, C. J. Aine, J. C. Mosher, D. M. Schmidt, D. M. Ranken, H. A. Schlitt, et. al., *Mapping function in the human brain with magnetoencephalography, anatomical magnetic resonance imaging, and functional magnetic resonance imaging,* 12(5) J. CLIN. NEUROPHYSIOL. 406, 406–431 1995.

cannot adequately address.[5] Tovino detailed the many potential applications of fMRI that pose significant challenges to existing legal confidentiality and privacy provisions, and which thus lead to questions of the legal neuroexceptionalism of fMRI.[6] In addition to using fMRI to study human consciousness, research studies also suggested that fMRI may be able to reveal the precise location of specific brain functions,[7] and an individual's social qualities and personal characteristics, including racial prejudice.[8]

Accordingly, whilst fMRI is not the only type of neurodata that might be used to support legal neuroexceptionalist claims, it is, however, a type of data that is widely known in the neuroscience and neurology communities and which has been argued to display some of the characteristics which supposedly justify demands for its legally exceptional treatment.

3. Legal Neuroexceptionalist Claims: An Introduction and a Preliminary Delineation

Over the past few decades, there have been great advances in the scientific understanding of the function of the human genome.[9] These advances have led to a subsequent expansion in the range of circumstances in which individuals' biological samples, and associated genetic data, are collected and processed – including, for example, in the contexts of scientific research, law enforcement and straight-to-consumer genetic tests.[10] Over the same period, there have also been significant advances in the scientific understanding of the structure and function of the human brain. These understandings are also – albeit arguably with less rapidity than those related to genetic data – leading to an expansion in the range

[5] J. Illes, E. Racine, *Imaging or Imagining? A Neuroethics Challenge Informed by Genetics*, 5(2) AM. J. BIOETH. 5, 5–18 2005.
[6] S. A. Tovino, *Functional neuroimaging and the law: trends and directions for future scholarship*, 7 AM. J. BIOETH. 44, 44–56 2007.
[7] S. S. Gupta, *fMRI for mapping language networks in neurosurgical cases*, 24(1) INDIAN J. RADIOL. IMAGING 37, 37–43 2014; E. M. Gordon, T. O. Laumann, A. W. Gilmore, D. J. Newbold, D. J. Greene, J. J. Berg, et. al., *Precision Functional Mapping of Individual Human Brains*. 95 NEURON., 791, 791–807 2017.
[8] A. M. Chekroud, J. A. Everett, H. Bridge, M. Hewstone, *A review of neuroimaging studies of race-related prejudice: does amygdala response reflect threat?* 8 FRONT. HUM. NEUROSCI. 2014 https://www.frontiersin.org/articles/10.3389/fnhum.2014.00179/full (accessed 15 February 2022); M. T. Liuzza, E. Macaluso, P. A. Chiesa, V. Lingiardi, S. M. Aglioti, *An fMRI study on the neural correlates of social conformity to a sexual minority*, 9(4691) SCI. REP., 2019 https://www.nature.com/articles/s41598-019-40447-3.pdf (accessed 15 February 2022).
[9] P. Visscher, M. A. Brown, M. I. McCarthy, J. Yang, *Five Years of GWAS Discovery,* 90(1) AMERICAN JOURNAL OF HUMAN GENETICS 7, 7–24 2012; P. Visscher, N. Wray, Q. Zhang, P. Sklar, M. I. McCarthy, et. al., *10 Years of GWAS Discovery: Biology, Function, and Translation*, 101(1) AMERICAN JOURNAL OF HUMAN GENETICS, 5, 5–22 2017.
[10] Expert Group on Dealing with Ethical and Regulatory Challenges of International Biobank Research, *Biobanks for Europe: A Challenge for Governance,* European Commission Report 8-72 2012; S. Katsanis, *Pedigrees and Perpetrators: Uses of DNA and Genealogy in Forensic Investigations*, 21 ANNU. REV. GENOMICS HUM. GENET.., 535, 535–564 2020; J. W. Hazel, C. Slobogin, *Who Knows What, and When?: A Survey of the Privacy Policies Proffered by U.S. Direct-to Consumer Genetic Testing Companies*, 28 CORNELL JOURNAL OF LAW AND PUBLIC POLICY, 35, 35–66 2018.

of circumstances in which there is utility in collecting and processing neurodata – including, for example, in the contexts of scientific research, entertainment and wellness.[11]

With the expansion in collection and processing of individuals' genetic data came a parallel expansion in ethical and legal considerations as to the legitimate use of this genetic data. These considerations were largely spurred by the fact that understanding of the genome allowed new insight into the biological tendencies of individuals and populations, and thus constituted a novel form of social power.[12] In this regard, a range of ensuing legal discussions revolved around the question of whether genetic data should be regulated via specific and novel legislation: questions of legal genetic exceptionalism.[13] In recent years, there has been a similar expansion in ethical and legal considerations concerning the legitimate use of individuals' neurodata. As with genetic data, these concerns flow from the fact that scientific

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[11] J. J. Daly, E. Huggins, J. E., *Brain-Computer Interface: Current and Emerging Rehabilitation Applications*, 96(30) ARCH. PHYS. MED. REHABIL., 1, 1–7 2015; R. Folgieri, R. Zampolini, *BCI Promises in Emotional Involvement in Music and Games*, 12(1) COMPUTERS IN ENTERTAINMENT, 1, 1–10 2015.

[12] See, for a discussion on genetics and power Rouvroy: A. ROUVROY, HUMAN GENES AND NEOLIBERAL GOVERNANCE: A FOUCAULDIAN CRITIQUE (2008).

[13] See, for example: G. J. Annas, L. H. Glantz, P. A. Roche, *Drafting the Genetic Privacy Act: Science, Policy, and Practical Considerations*, 24(3) JOURNAL OF LAW, MEDICINE & ETHICS, 360, 360–366 1995; C. Curtis, J. Hereward, M. Mangelsdorf, K. Hussey, J. Devereux, *Protecting trust in medical genetics in the new era of forensics*, 21 GENETICS IN MEDICINE, 1483, 1483–1485 2018. For example in Curtis et. al. the authors state: 'Our view is that genetic data is different from other data. It contains highly sensitive information that is unique to us. If our genetic data is compromised we cannot request a new genome. Genetic data is very difficult or impossible to anonymize, particularly as our ability to predict physical traits becomes more refined. What happens to our genetic data affects not only us, but our relatives, and consequences extend to subsequent generations. Genetic data needs more protection than other types of data. Individual ownership of digital genetic data is a fundamental right that a Genetic Data Protection Act should grant' (p. 1483).
The genetic exceptionalism debate has been alive and well for several decades. In this time, a variety of different positions as to the legitimacy of the idea of legal genetic exceptionalism have been put forward. See for an overview: D. HALLINAN, PROTECTING GENETIC PRIVACY IN BIOBANKING THROUGH DATA PROTECTION LAW; 43–44 (2021). These include positions which advocate for novel legislation to deal with the specifics of genetic data - for example those mentioned in the previous paragraph. These also include positions which suggest that the idea of legal genetic exceptionalism should be treated with caution, or may even be misplaced – see, for example a contribution from Murray. T. Murray, *Is Genetic Exceptionalism Past Its Sell-By Date? On Genomic Diaries, Context, and Content,* 19(1) THE AMERICAN JOURNAL OF BIOETHICS 13, 13–15 2019 https://www.tandfonline.com/doi/full/10.1080/15265161.2018.1552038?scroll=top&needAccess=true&role=tab (accessed 18 April 2023). Currently, both positions - as well as a range of intermediate positions – find support in the literature, and it seems unlikely that the debate will find a final resolution any time soon. Whilst this article deals with legal neuroexceptionalism, and it would be out of scope to engage extensively with legal genetic exceptionalism debates, we would nevertheless make two observations concerning the relationship between legal genetic exceptionalism and legal neuroexceptionalism concerning subjects for further research. First, we consider there to be a lack of clarification of basic terminology in legal genetic exceptionalism debates. In this regard, to our knowledge, there has been, to date, no concerted effort to conceptualise the concept of a legal genetic exceptionalist claim – as is done in this article in relation to the concept of a legal neuroexceptionalist claim. We consider this a fruitful subject for further research, and one which might benefit from, and build upon, the analysis done in this article. Second, we see a great deal of utility in more extended consideration of the points of correlation and distinction between the development and content of the two debates, and accordingly utility in more extended consideration as to the potential for cross pollination between the debates.

understanding of the brain may allow insight into the biological tendencies of individuals and populations which may constitute new forms of social power – a power so significant, indeed, that it may even be argued to have implications in relation to the protection of a range of individuals' and groups' basic constitutional rights.[14] Following the development of genetic exceptionalism, we consider that legal discussions – at least *some* legal discussions – on neurodata will also come to revolve around the question of whether neurodata should be regulated via specific and novel legislation: questions of legal neuroexceptionalism.[15]

In order to provide logic and rigour to coming legal neuroexceptionalist discussions, it is necessary to have insight into what might be regarded as a legal neuroexceptionalist claim and as to what it means to make such a claim. Unfortunately, there appears to be little scholarship on neurodata and the law – or indeed equivalent scholarship on genetic data and the law – which takes the concept of legal neuroexceptionalism itself as a subject of study, and which might provide such insight. To begin to address this gap, and to elaborate what it means to make a legal neuroexceptionalist claim, we first observe that all legal neuroexceptionalist claims – regardless of their substantive specifics – can logically be broken into two, conceptually different, forms of sub-claim:

> i. The claim that neurodata is exceptional – i.e. a sub-claim serving to provide an initial differentiation of neurodata, such that neurodata might be looked at as a specific subject of legislative consideration.
> ii. The claim that the identified exceptional characteristics of neurodata mandate specific and novel legislation as a response.

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[14] R. Yuste, S. Goering, B. A. Arcas, G. Bi, J. M. Carmena, A. Carter, et. al., *Four ethical priorities for neurotechnologies and AI*, 551 NATURE, 159, 159–163 2017 https://www.nature.com/articles/551159a (accessed 8 July 2022). For example, in Yuste et. al. the authors observe: 'But the technology could also exacerbate social inequalities and offer corporations, hackers, governments or anyone else new ways to exploit and manipulate people. And it could profoundly alter some core human characteristics: private mental life, individual agency and an understanding of individuals as entities bound by their bodies' (p. 160).

[15] See, for example, Ienca and Andorno: M. Ienca, R. Andorno, *Towards new human rights in the age of neuroscience and neurotechnology*, 13 LIFE SCIENCES, SOCIETY AND POLICY, 2017 https://lsspjournal.biomedcentral.com/articles/10.1186/s40504-017-0050-1 (accessed 15 February 2022). In Ienca and Andorno, the authors make 'the case that the possibilities opened up by neurotechnological developments and their application to various aspects of human life will force a reconceptualization of certain human rights, or even the creation of new rights to protect people from potential harm' (p. 1).

We believe there are several reasons to think discussions concerning genetic data should be considered as illuminating in relation to discussions of neurodata. For example, both genetic data and neurodata are forms of biodata argued to reveal – or potentially reveal – unique, sensitive and, in some cases, potentially predictive information about an individual. Given the two forms of data share key sets of characteristics with relevance to their potential social impact, it seems likely that legal discussions of neurodata will follow similar paths to discussions of genetic data. With this observation, however, we do not intend to suggest that there are not also significant differences between the two forms of data or that such differences will not impact the contours of relevant discussions – for example, certain forms of neurodata may be revelatory as to mental states unlikely to be revealed via genetic analysis, equally neurodata analysis may reveal real-time information about individuals which cannot be produced via genetic analysis.

On the back of this preliminary breakdown, we now move to consider what it means to make each of these sub-claims in turn.

4. The Claim Neurodata is Exceptional (Sub-Claim 1)

To determine whether any phenomenon is exceptional, there needs to be an existing frame of reference against which an exceptional determination can be made – given that an exception is, by definition, a divergence from a norm. In this regard, a legal neuroexceptionalist claim must, in the first instance, build upon the identification of some pre-existing norm for data in relation to which neurodata displays divergent qualities. There are, however, numerous analytical perspectives through which pre-existing norms for data might be identified. Norms identifiable via each of these perspectives, however, need not necessarily converge – pre-given norms for conceptualising data even within informatics, for example, do not necessarily converge.[16] Nor is it the case that a legal neuroexceptionalist claim can rest on norms identified via any and all such analytical perspectives. In this regard, we might further unpack our first sub-claim in the following way: making a legal neuroexceptionalist claim means identifying norms for data from an analytical perspective relevant to the function of law, in relation to which neurodata display exceptional qualities.

On the back of this unpacking, it is possible to make a series of further logical observations as to the possible scope of legal neuroexceptionalist claims. Three seem particularly pertinent. First, we highlight that legal neuroexceptionalist claims cannot be built relying solely on any analytical perspective for identifying pre-existing norms of data which do not directly connect with the law's approach to data. This assertion is valid in relation to all perspectives which do not directly concern law. For example, identification of differences between neurodata and other forms of data used in healthcare, in relation to the provision of healthcare, cannot, alone, constitute the basis for a legal neuroexceptionalist claim. This assertion is even true for ethical analyses of the novelties and significance of neurodata, which do not themselves provide a link to the law. In this regard, ethics work such as that by Illes et. al., which provide such ethical analyses, cannot, alone, constitute the basis for a legal neuroexceptionalist claim – although such work can certainly form the basis for such claims if a subsequent connection to law is made.[17]

Second, we observe that no perspective which highlights general problems in law, and then exemplifies these via neurodata, should be regarded as constituting a legal neuroexceptionalist claim. In such a case, there is no specific exceptional quality of neurodata being identified in relation to the law. Rather, neurodata is simply being used as an example to demonstrate a broader problem. To be clear, with this observation we do not intend to suggest that such claims cannot represent legitimate claims in relation to the law. Nor, indeed, do we intend to suggest that such claims could not form the basis for arguments for the regulation of neurodata – for example, should one simply be considering ideal legislative responses in relation to some specific form of neurodata. We simply intend to highlight that, strictly speaking, such claims are not legal neuroexceptionalist claims, as the issue does not relate specifically to any exceptional characteristics of neurodata. In this

[16] C. Zins, *Conceptual Approaches for Defining Data, Information and Knowledge*, 58(4) JOURNAL OF THE ASSOCIATION FOR INFORMATION SCIENCE AND TECHNOLOGY, 479, 479–493 2007.
[17] Illes and Racine, *supra* note 5, at 5–18.

regard, for example, parts of Tovino's analyses of fMRI and law concerns the degree to which provisions in the US Health Insurance Portability and Accountability Act (HIPAA) will fail to cover certain uses and forms of neurodata. Her analysis here revolves around the identification of forms of activity not covered by the law in question, and then a consideration of whether aspects of neurodata processing might correspond to such activities. Such an approach alone cannot constitute a legal neuroexceptionalist claim, as it does not yet highlight the specific novel qualities of neurodata in relation to the law.[18]

Third, we note that there is no specific level of abstraction at which a legal neuroexceptionalist claim must be made. Law can be considered in terms of hierarchical ontologies, consisting of ever more specific clarifications of basic concepts and principles – perhaps most clearly elaborated in Kelsen's views on the construction of legal systems.[19] At each level of clarification of a basic concept or principle relevant to the regulation of data, new commitments may be made – explicitly or implicitly, intentionally or unintentionally – concerning the norms of data which constitute the subject of the concept or principle in question. In this regard, a legal neuroexceptionalist claim might be made at any level of clarification of a basic concept or principle in relation to which the law makes commitments as to the norms of data. For example, a legal neuroexceptionalist claim could be made in relation to the clarification of a basic concept or principle involving commitments as to the norms of data at the level of the constitution, at the level of secondary law – e.g. in ordinary legislation – or at the level of tertiary law – e.g. via certain delegated executive powers. In this regard, there is not necessarily either need or utility to trying to provide a monolithic answer as to whether neurodata are legally exceptional. Although answers at such an abstract level may be useful, and indeed have been the subject of discussion – see, for example, Schick – in relation to ethical discussions of neuroexceptionalism, this is not necessarily the case in relation to legal discussions.[20]

The above observations serve to further delineate the scope of possible legal neuroexceptionalist claims. These observations, however, leave the following key question open: which analytical perspectives *can* be used to identify pre-existing norms in data, on top of which legal neuroexceptionalist claims might be made?[21] In this regard, we consider that there are a range of such analytical perspectives. Whilst we would not be so bold as to try to offer an extended and exhaustive typology, we suggest – building around the ways in which the law has traditionally been the subject of analysis – that there are three forms of such analytical perspective which will support the majority of prospective legal

[18] S. A. Tovino, *Functional Neuroimaging Information: A Case For Neuro Exceptionalism*, 34(2) FLORIDA STATE LAW REVIEW, 415, 448–456 2007.

[19] See, for a further elaboration of Kelsen's theory of law: H. KELSEN, PURE THEORY OF LAW (Max Knight tr., 2nd edn) 193–279 (2005).

[20] A. Schick, *Neuro Exceptionalism?,* 5(2) AM. J. BIOETH. 36, 36–38 2005.

[21] We highlight that there are many areas of law potentially relevant for the processing of neurodata, and most – if not all – of these areas will display specific characteristics depending on jurisdictions. In this regard, it is impossible to elaborate, *in abstracto*, a specific set of perspectives, capable of specifying pre-existing norms of data, accurate for all neurodata-relevant areas of laws and jurisdictions, against which the specific exceptional qualities of neurodata might be identified. Consider, for example, the differences in European data protection law even across EU Member States in relation to the rules applicable to biobanking and which will likely have similar applicability to neurobanking in Slokenberga et. al.: S. SLOKENBERGA, O. TZORTZATOU, J. REICHEL, EDS., GDPR AND BIOBANKING: INDIVIDUAL RIGHTS, PUBLIC INTEREST AND RESEARCH REGULATION ACROSS EUROPE (2020).

neuroexceptionalist claims. These three claims, each of which will be analysed in more detail in the following sections, are:

i. The communicative power perspective.
ii. The ethical-legal perspective.
iii. The rational-technical perspective.

4.1 The Communicative Power Perspective

Habermas proposes that the legislative process in democratic societies may be considered the means by which the communicative power of the citizenry is channeled into binding outcomes. Habermas thus sees the law, in relation to any given social phenomenon, as the final, concrete, expression of communicative power in relation to a given phenomenon. Communicative power, however, emerges on the back of communicative norms: consensus, or some necessary degree of consensus, as to a normative proposition concerning a phenomenon. Communicative norms relevant for the legislative process themselves emerge on the back of a process of social meaning formation in which multiple possible normative narratives about a phenomenon are exchanged among social actors, leading to the formation of common narratives.[22]

The processing of neurodata may call forth novel social narratives. Such novel narratives may then give rise to communicative normative narratives calling for neurodata to be subject to specific forms of social control. Accordingly, assertions as to neurodata's exceptional qualities built around such narratives – provided they reach some critical mass and relate in some way to law – can form the basis for legal neuroexceptional claims. Such positions will likely gain in strength, in particular, when: i) the supporting narrative does not contradict other basic social norms/control structures – e.g. if a neuroexceptionalist narrative in Europe were capable of being accommodated within the constitutional frameworks laid out by the European Convention on Human Rights (ECHR), the Charter of Fundamental Rights of the European Union (CFREU) and national constitutional traditions;[23] ii) the supporting narrative has significant public support – especially if this is not met by opposition; and iii) if a supporting narrative has the relevant institutional backing to find expression though the organizational forms which make up legislative decision-making processes.

We recognise there are objections to the idea that certain forms of data might be considered exceptional based solely on perceptions and subsequent normative narratives. As Wachbroit puts it in relation to genetic exceptionalism generally – albeit within the context of a discussion of neuroexceptionalism: 'But such perceptions do not support genetic exceptionalism, because it is not a descriptive thesis. It claims that such perceptions are based on the biological facts.'[24] Such objections, however, do not offer obstructions to the

[22] J. HABERMAS, BETWEEN FACTS AND NORMS (William Rehg tr., 15th edn) 1–42 (2017).
[23] European Convention on Human Rights, ETS No. 5, 1950; Charter of Fundamental Rights of the European Union, OJ C 326/391, 2012.
[24] R. Wachbroit, *The Prospects for Neuro-Exceptionalism: Transparent Lies, Naked Minds*, 8(1) AM. J. BIOETH., 3, 3 2008.

possibility of building a legal neuroexceptionalist claim around this analytical perspective.[25] The process leading to the formulation of law in democratic societies includes legal limitations concerning what can be legislated for in relation to neurodata within the legislative process, and the procedures through which this can be done. Within these limits, however, one does not find blanket scientific, or other forms, of quality limitation in relation to the forms of perception, or subsequent normative narratives, concerning the distinguishing features of neurodata which might be translated into legislation. Indeed, such limitations would likely be regarded as highly undemocratic in substituting expert knowledge frameworks for those of citizens. In other words, people can perceive, and construct, whichever normative narratives they like about the exceptional qualities of neurodata and – within certain legal bounds – there is no reason these perceptions and narratives should not be considered as potential foundations for legislative initiatives.

We provide an example using fMRI to illustrate the point: fMRI data has been argued to capture certain thought processes, thus providing objective insights into human minds.[26] This might be argued to be the case where fMRI data is used for lie-detection purposes.[27] An example is that in 2008, a murder case was decided in India on the basis of brain scans.[28,29] On the back of this narrative about fMRI, a common narrative might be constructed that the use of fMRI raises unique issues and should be subject to specific legislative rules. While the communicative power perspective requires an agreement on the narrative, not on the underlying substance, it raises interesting questions about the relationship between

[25] Although it is certainly not the case that any legal neuroexceptionalist claim built solely on perceptions and narratives will be unproblematic, or produce unproblematic policy positions.

[26] Another example might be provided: there may be significant public unease, within a given society, with the prospect of companies collecting and processing individuals' electroencephalogram (EEG) data in the context of computer-gaming. Such unease may lead to the construction of a common narrative, within that society, concerning the illegitimacy of the collection and processing of EEG data in this context. Such a narratives could support a legitimate neuroexceptionalist position calling for specific and novel legislation in response. The building of such a narrative need not have any correlation with the objectively identifiable qualities of EEG data, or any correlation with the unique social possibilities or constellations brought forward by the processing of EEG data in the computer-gaming context. See, for example, the discussion of Brain Computer Interfaces and privacy as an ethical concern in Burwell et. al.: S. Burwell, M. Sample, E. Racine, *Ethical aspects of brain computer interfaces: a scoping review* 18(60) BMC MEDICAL ETHICS, 2017 https://bmcmedethics.biomedcentral.com/articles/10.1186/s12910-017-0220-y (accessed 17 February 2022).

[27] D. D. Langleben, L. Schroeder, J. A. Maldjian, R. C. Gur, S. McDonald, J. D. Ragland, et. al., *Brain activity during simulated deception: an event-related functional magnetic resonance study,* 15 NEUROIMAGE, 727, 727–732 2002; D. D. Langleben, J. C. Moriarty, *Using Brain Imaging for Lie Detection: Where Science, Law and Research Policy Collide*, 19(2) PSYCHOL. PUBLIC POLICY LAW, 222, 222–234 2013.

[28] A. Giridharadas, *India's Novel Use of Brain Scans in Courts Is Debated*, NEW YORK TIMES, 14 September 2008 https://www.nytimes.com/2008/09/15/world/asia/15brainscan.html (accessed 15 February 2022).

[29] Although we highlight that fMRI-based lie detection still faces scientific, ethical and legal challenges in many parts of the world J. A. Matte, *fMRI Lie detection validity and admissibility as evidence in court and applicability of the court's ruling to polygraph testing*. 7 EUR. POLYGR., 191, 191–198 2013; E. Rusconi, T. Mitchener-Nissen, *Prospects of functional magnetic resonance imaging as lie detector*, 7(594) FRONT. HUM. NEUROSCI., 2013 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3781577/ (accessed 15 February 2022); M. J. Farah, J. B. Hutchinson, E. A. Phelps, A. D. Wagner, *Functional MRI-based lie detection: scientific and societal challenges*, 15 NAT. REV. NEUROSCI., 123, 123–131 2014.

narrative and substance. In the above case, for example, such questions may be put forward in relation to whether fMRI data *can indeed* be used to detect lies – which raises a host of epistemological and technical questions, some of which point to the following perspectives.

4.2 The Ethical-Legal Perspective

Systems of law can be seen as knowledge systems comprised of sets of assumptions about the world, related to the delineation of legitimate and illegitimate social activities.[30] Under certain understandings of law, legal systems may be seen as founded upon, and as tools to express, ethical principles and ideals as to how social entities should act and engage with one another, and as to how society as a whole should function. The degree to which ethical principles are realised in relation to a given social phenomenon can then be evaluated in relation to each concretisation of law, at each level of law. For example, in Europe, the constitutional principles contained in the ECHR and the CFREU might be considered in light of their ability to express underlying ethical principles – e.g, individual autonomy. Equally, however, second order legislation – or other orders of legislation – and the provisions contained therein, might also be considered in light of their ability to express ethical principles.

Neurodata may be argued to display qualities, or engender novel constellations of processing, which do not correspond to the assumptions about data, or data processing, underlying some aspect of a legal system. In certain cases, such novel characteristics – or related novel processing constellations – may lead to novel ethical questions being posed as to how individuals within a society should best co-exist and relate, which are not – or are inadequately, or unsuitably – addressed by the assumptions on which an existing legal system has been built, or which are expressed within the legal system. In this case, neurodata might be argued to be exceptional in relation to law. In such a case, ethical-legal arguments concerning the inadequacy of the law's current approach to neurodata might be put forward. Accordingly, assertions as to neurodata's exceptional qualities built on ethical-legal argumentation can constitute the basis for legal neuroexceptionalist claims.

We turn again to fMRI to illustrate the point. fMRI might be said to raise questions about the ability to infer insights from raw data of a novel form. Fundamentally, fMRI creates imaging data that represent spatial information about the brain. These data may thus be argued to contain pointers which allow insights about the individual which go beyond the raw data itself. For example, fMRI has been used to attempt to understand egalitarian, cooperative and altruistic behaviors,[31] the neural correlates of maternal and romantic love,[32]

[30] See, for example: G. TEUBNER, RECHT ALS AUTOPOEITISCHES SYSTEM, 45 (1989).
[31] J. K. Rilling, A. G. Sanfey, J. A. Aronson, L. E. Nystrom, J. D. Cohen, *The neural correlates of theory of mind within interpersonal interactions*, 22 NEUROIMAGE, 1694, 1694–1703 2004; C. T. Dawes, P. J. Loewen, D. Schreiber, A. N. Simmons, T. Flagan, R. McElreath, et. al., *Neural basis of egalitarian behavior*, 109 PROC. NATL. ACAD. SCI. 6479, 6479–6483 2012.
[32] A. Bartels, S. Zeki, *The neural correlates of maternal and romantic love*, 21 NEUROIMAGE, 1155, 1155–1166 2004.

of ethical decision making,[33] and by for-profit organisations in neuromarketing[34] – again, a key question is whether inferences for these various uses can in fact accurately be drawn from fMRI data.

It may subsequently be argued that the processing of these forms of neurodata allow representations of aspects of individuals' mental and emotional states to be made, which are arguably not – or at least not to the same extent – possible via the processing of other forms of data.[35] In turn, the possibility to collect and evaluate such states may also be argued to offer novel, and undesirable, possibilities for the manipulation of individuals and for limiting individual autonomy. Issues such as mental privacy, cognitive liberty and personhood are some of the key ethical challenges arising from exponential use of neurodata in this regard.[36] The existence of the ability to obtain and process such mental states, and accordingly, considerations as to the degree of control over individuals this might facilitate, were arguably, for example, scarcely taken into account in the drafting – or subsequent jurisprudential elaboration – of fundamental European legal principles.[37] Such argumentation might thus form the basis for a legitimate legal neuroexceptionalist claim proposing the recognition of new fundamental rights connected with the ability to limit unfettered collection and processing of fMRI data.[38]

4.3 The Rational-Technical Perspective

Quite apart from their consideration as vehicles for the effective realisation of ethical ideals, legal systems may also be seen from a purely rational-technical perspective: as stable, cogent systems which function to channel forms of human – and organisational – behaviour, in certain ways, such as to produce certain forms of result.[39] The degree of stability and cogency of the system, as well as its ability to achieve a given set of aims in relation to given social phenomena, can then be considered in relation to each concretisation of law, at each level of the legal system. For example, the specific elaborations of legal provisions in an instrument of secondary EU law may be considered in light of their cogency in relation to

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[33] A. L. Glenn, A. Raine, R. A. Schug, *The neural correlates of moral decision-making in psychopathy*, 14 MOL. PSYCHIATRY 5, 5–6 2009.
[34] S. M. McClure, J. Li, D. Tomlin, K. S. Cypert, L. M. Montague, P. R. Montague, *Neural correlates of behavioral preference for culturally familiar drinks*, 44(2) NEURON, 379, 379–387 2004.
[35] See, for example, the discussion in Hallinan et. al.: D. Hallinan, P. Schütz, M. Friedewald, P. De Hert, *Neurodata and Neuroprivacy: Data Protection Outdated?* 12(1) SURVEILLANCE AND SOCIETY, 55, 65 2014 https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/neurodata (accessed 19 July 2022).
[36] E. Vayena, M. Salathé, L. C. Madoff, J. S. Brownstein *Ethical Challenges of Big Data in Public Health*.11(2) (accessed 13 October 2023).
[37] The CFREU, for example, offers little elaboration of rights inherent in thoughts and emotions. As Bublitz observes in this regard: 'I suspect legal scholars and courts are not too ambitious to get into these questions and rather cling to the belief that freedom of thought is not only legally, but factually inviolable as thoughts and the mind are "intangible" and beyond the reach of interventions'. J. C. Bublitz, *If a man's true place is in his mind, what is its adequate protection? On a right to mental self-determination and limits of interventions into other minds*, *in* TECHNOLOGIES ON THE STAND: LEGAL AND ETHICAL QUESTIONS IN NEUROSCIENCE AND ROBOTICS 97 (B. v.d. Berg, L. Klamming eds., 2011).
[38] See, for example: Ienca and Andorno, *supra* note 15, at 11–17.
[39] See, for example: N. LUHMANN, LAW AS A SOCIAL SYSTEM (K. A. Ziegert tr, F. Kastner, R. Nobles, D. Schiff and R. Ziegert eds, 1st English Paperback Edition) 142–274 (2012).

other connected legal principles in other instruments of law, as well as in relation to their capacity to realise the goals aimed at in the instrument in question.[40]

Neurodata may display qualities, or engender novel constellations of processing, which do not correspond to assumptions about data embodied within a legal system, which then raise subsequent questions about the cogency, stability, or capacity to realise certain given aims, of aspects of that legal system relevant to the processing of neurodata. In such cases, neurodata might be argued to be rationally-technically exceptional. In relation to a case of rational-technical neuroexceptionalism, legitimate calls for a re-evaluation of the law's assumptions as to the nature of data, and eventually the concrete legal provisions constructed on the back of these assumptions, might be put forward. Accordingly, assertions as to neurodata's exceptional qualities built on rational-technical argumentation can constitute the basis for legitimate legal neuroexceptionalist claims.

Again, we use the example of fMRI to illustrate the point: traditionally, it had been assumed that fMRI data could be easily anonymised using well-established techniques such as de-facing – where facial features are removed from the fMRI data. Such techniques were deemed to de-identify the data to the point where it was impossible to re-identify and thus lead it to fall outside of the remit of European data protection laws such as the General Data Protection Regulation (GDPR).[41] It is now broadly accepted that these approaches to anonymisation of fMRI data are insufficient and fMRI is unique to individual brains.[42] Defaced fMRIs are now accepted as only pseudonymized rather than anonymised datasets. This, in turn, raises questions as to precisely how fMRI data should be classified under European data protection law – never anonymous, sometimes anonymous in certain contexts, etc. – and as to what the consequences of such classifications should be – applicability of all relevant data protection provisions in totality, variable applicability of provisions dependent on context, etc.[43] Arguments that it is not clear how the concept of anonymity in the GDPR should apply in relation to fMRI might thus form the basis for a

[40] We also highlight that modern legal systems foresee several ways, beyond traditional secondary legislation, in which legal principles and concepts might be elaborated, which might be subject to rational-technical evaluation. Consider, for example, meta-regulatory approaches, which seek to concretise systems of action via reflexive interaction and negotiation, around general principles, between regulators and regulatees. See, for example, the discussion of the meta-regulatory approaches in relation to data processing in Binns: R. Binns, *Data Protection Impact Assessments: A Meta-Regulatory Approach*, 7(1) INTERNATIONAL DATA PRIVACY LAW, 22, 30–34 2017.

[41] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119/1, 2016.

[42] C. G. Schwarz, W. K. Kremers, H. J. Wiste, J. L. Gunter, P. Vemuri, A. J. Spychalla, et. al., *Changing the face of neuroimaging research: Comparing a new MRI de-facing technique with popular alternatives*. 231 (117845) NEUROIMAGE 2021 https://www.sciencedirect.com/science/article/pii/S1053811921001221 (accessed 15 February 2022); A. de Sitter, M. Visser, I Brouwer, K. S. Cover, R. A. van Schijndel, R. S. Eijgelaar, et. al., *Facing privacy in neuroimaging: removing facial features degrades performance of image analysis methods*, 30 EUR. RADIOL., 1062, 1062–1074 2020.

[43] See: D. Eke, I. E. J. Aasebø, S. Akintoye, W. Knight, A. Karakasidis, E. Mikulan, et. al. (2021). *Pseudonymization of Neuroimages and Data Protection Increasing access to data while retaining scientific utility*, 1(4) NEUROIMAGE: REPORTS 2021 https://www.sciencedirect.com/science/article/pii/S2666956021000519 (accessed 15 February 2022).

legitimate rational-technical neuroexceptionalist claim proposing the need for clarifications of classificatory concepts in European data protection law in relation to fMRI.

On the back of our discussion of the first sub-claim, we now turn to the second sub-claim: that the identified exceptional characteristics of neurodata mandate specific and novel legislation as a response.

5. The Claim Neurodata Mandates Specific and Novel Legislative Responses (Sub-Claim 2)

Superficially, it may seem logical – if the frame of reference for the identification of the exceptional characteristics of neurodata is the law – that the response should naturally be the elaboration of specific and novel legislation in response. Indeed, this has often been the approach taken in legal discussions concerning how to approach issues concerning the exceptional characteristics of novel types of data, or data processing operations.[44] This should hardly come as a surprise to those familiar with legal discussions. Legal analyses often focus on the specifics and details of black letter law as a form of self-contained system, and thus often identify both problems and solutions within this frame of reference.

It is not necessarily true, however, that where neurodata can be identified as exceptional under one or more perspective relevant to law, this identification mandates a response through specific and novel legislation. In the first instance, we recall Luhmann's recognition that the law should act, within a given normative frame of reference, in relation to a given phenomenon, to coordinate regulatees' actions such as maximising opportunity and minimising disappointments and negative outcomes. Accordingly, both too much law – so opportunity is unnecessarily restricted – and too little law – so disappointments and negative outcomes unnecessarily proliferate – are undesirable.[45] In this regard, legislation is enacted within specific institutions, at specific times, its enaction in the real-world engenders specific resource allocation, and its function in the real-world can have unintended or unforeseen consequences. These institutions, temporal specifics, resource implications, and unintended or unforeseen consequences, can function as limitations on the utility of law in achieving optimal balances between opportunity and disappointment. Consequently, in certain cases, other approaches to social steering – outside law – may provide superior alternatives to reach a desired outcome in relation to the processing of neurodata.

On the back of the above, we might further unpack our second sub-claim in the following way: making a legal neuroexceptionalist claim means asserting that the enactment of novel and specific legislation offers the optimal response to the identified exceptional – legally relevant – characteristics of neurodata. In this regard, we further propose that making a legal neuroexceptionalist claim means that specific and novel legislation must constitute an

[44] Consider, for example, the argument in Curtis et. al. for genetic exceptionalist regulation which takes this approach. Curtis et. al., *supra* note 13, at 1483–1485.
[45] N. LUHMANN, A SOCIOLOGICAL THEORY OF LAW (Elizabeth King-Utz and Martin Albrow trs, Martin Albrow ed, 1st English Paperback Edition) 22–103 (2014).

optimal solution in light of each of the following three forms of consideration, each of which will be considered in more detail in the following sections:[46]

i. The scope of negative consequences.
ii. The range of alternative regulatory options available.
iii. The capacity of existing legal frameworks.

5.1 The scope of negative consequences

Creating and enacting new legislation comes with costs. These costs come in different forms, three of which deserve specific mention. First, the conceptualisation, implementation and enforcement of rules are associated with costs. The legislative process requires legislative and bureaucratic energy, and if rules are vague or require constant updates, this energy investment may be continuous. The enforcement of rules then requires authorities to be endowed with the resources and know-how to facilitate enforcement. Second, the existence of new rules may imply direct costs to regulatees. Costs may include the need to invest resources to comply with rules, and even to adapt organisational processes to align outcomes with an altered legal landscape.[47] Finally, from a systemic perspective, the introduction of new rules may foreclose future options for social or economic innovation – the more complex, extensive and prospective the rules, the greater social and economic costs may be.

Accordingly, it does not follow that, in all cases in which neurodata can be identified as somehow exceptional under one or more analytical perspective relevant to the function of law, there will always be sufficiently serious negative social outcomes such that enacting specific and novel legislation to address these outcomes will be justified. In certain cases, there is, in this regard, a balancing exercise which may need to be conducted before such a conclusion can be reached: the potential costs of enacting new legal rules should be balanced against the scope – the degree of negative impact which may accrue, as well as the number of times the negative impact may accrue – of negative social outcomes which may result from not legislating.[48] Where the costs of legislation clearly do not outweigh the benefits, legal neuroexceptionalist claims may not be tenable.

[46] We add that legal neuroexceptionalist claims might adequately be made, within certain disciplinary and analytical perspectives, which do not specifically address each of these considerations – we think, for example, of legal positivist argumentation which might legitimately propose legislative change in relation to exceptional characteristics of neurodata without necessarily including an evaluation of costs (see section 5.1). Such claims, however, are still open to criticisms that they have not adequately taken account of relevant considerations regarding the expediency of reliance on legislation as an optimal approach.

[47] See, for example: Organisation for Economic Co-operation and Development, *Regulatory Compliance Cost Assessment Guidance*, 11–15 2014 https://www.oecd-ilibrary.org/docserver/9789264209657-en.pdf?expires=1658220127&id=id&accname=guest&checksum=7FD1FE9D60E375A30D5E82D0BE4B5AF1 (accessed 19 July 2022).

[48] We highlight that there are certain forms of norm in relation to which such balancing exercises are not relevant – in relation to absolute rights, such as the right not to be subjected to torture or to inhuman or degrading treatment or punishment under Article 4 of the CFREU, for example.

We turn again to the example of fMRI to illustrate the point: it might be argued that fMRI data presents characteristics which challenge the rational-technical assumptions on which the accuracy principle in EU data protection law rests, owing to changes in neurological signatures over time.[49] In this case, however, the negative social outcomes for individuals and society, at least currently, of the processing of inaccurate fMRI data, resulting from changes in neurological signatures, seems likely to be highly limited. There are currently few applications which collect, store and process individuals' fMRI data in relation to which the alteration of signatures over time – and resulting inaccuracies in personal data over time – are likely to cause significant negative outcomes. It is true there are fMRI applications, the optimal function of which may rely on the accuracy of individuals' collected neurodata – certain medical applications, for example. As accuracy is a functional necessity for these applications, however, it will already be a feature of design. Given the limited negative social outcomes connected with this issue, doubts might be raised as to whether the cost of specific and novel legislation would be worthwhile.

5.2 The Range of Alternative Regulatory Options Available

There are several mechanisms available for the steering of behaviour in relation to any given social phenomenon. Law itself is one mechanism. Other mechanisms, however, are not – or are only indirectly – connected to law. These include 'organic' social steering mechanisms such as market forces. These also include devoted, albeit extra-legal, norm-setting mechanisms, such as institutionalised ethics bodies and processes.[50] Indeed, the prevalence and relevance of such non-legal mechanisms as means for steering social behaviour has increased significantly over the past few decades. In fact, such non-legal mechanisms already play important roles in steering social behaviour in relation to data processing – consider, for example, the extra-legal bodies which occupy critical positions relevant for the regulation of the internet.[51]

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[49] The accuracy principle in EU data protection law requires the entity processing an individual's personal data – the data controller – to make sure the data remain accurate over time. This principle has developed on the back of the phenomenological assumption concerning personal data as a subject of regulation, that changes in the semantic content of personal data over time will be straightforward to grasp, evaluate and correct. The UK's Information Commissioner's Office – the UK's Data Protection Authority – for example, in considering the accuracy principle, observes: 'It will usually be obvious whether personal data is accurate'. Information Commissioner's Office, *Principle (d): Accuracy*, https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/principles/accuracy (accessed 15 February 2021). Yet neurological signatures are liable to change continuously and unpredictably over time. This raises legal-technical questions around the application of the principle concerning what precisely an obligation to grasp, evaluate and correct neurodata over time should means and as to when a change would be of sufficient magnitude to warrant correction. See: Hallinan et. al., *supra* note 35, at 66–67.

[50] Consider, for example, the hortatory significance of the World Medical Association – a non-legal body – in the production of norms concerning medical research. The World Medical Association is behind the Declaration of Helsinki, one of the most referenced and respected international efforts at establishing a behavioural code for medical research. World Medical Association, *Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects*, (1964 (updated 2013)) https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/ (accessed 19 July 2022).

[51] J. COHEN, BETWEEN TRUTH AND POWER: THE LEGAL CONSTRUCTION OF INFORMATIONAL CAPITALISM, 210–214 (2019).

In this regard, each different form of social steering mechanism will have its own strengths and weaknesses in limiting negative outcomes in each case where neurodata has been identified as exceptional under one or more perspective relevant to the function of law. In certain cases, law via legislation may offer an optimal solution. In other cases, however, alternative mechanisms, or a mix of approaches, will produce optimal results. Market solutions, for example, may present themselves as superior to purely legal solutions where underlying market dynamics, and the rationale and behaviour of market actors, already align with achieving a desired normative outcome in relation to some exceptional characteristic of neurodata. In such a case, no legislative effort will be required, the costs of enacting and enforcing law will be spared, and a more efficient solution might be achieved via market-based approaches. Equally, ethics-based approaches may present themselves as superior to purely legal solutions where there are already strong institutionalised ethics procedures in place, capable of elaborating and enforcing norms in relation to stakeholders – for example in the case of medical ethics bodies in relation to certain forms of medical research.[52] Where non-legal social steering mechanisms offer better alternatives to legislation in minimising negative outcomes, legal neuroexceptionalist claims may be untenable.

For example, the collection of fMRI data for neurodata banking is a relatively novel phenomenon in scientific research processing and raises questions as to how EU data protection law under the GDPR should apply – e.g., questions as to whether, and under what conditions, the processing of individuals' fMRI data for prospective research can be legitimated via consent.[53] It may be possible to address such issues via specific and novel legislation. New legislation, however, may be inadequately flexible to adapt to address a novel data processing activity, whose future developmental trajectories are both dynamic

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We note there is a vast literature dealing with questions on whether, when, and how law should be used as a regulatory response in relation to a given problem. See, for example, the collection of articles providing insight into current and regulatory theory in: REGULATORY THEORY FOUNDATIONS AND APPLICATIONS (Peter Drahos ed) (2017). There is also an extensive literature dealing with the relationship between law and technology. See, for example: L. Bennet Moses, *Recurring Dilemmas: The law's race to keep up with technological change*, 2 JOURNAL OF LAW, TECHNOLOGY AND POLICY 239, 239–270 2007. These literatures comprise a number of different general and conceptual approaches to questions of regulation through law, as well as more concrete investigations into the function of law as a regulatory tool in specific situations. It is beyond the scope of this paper to engage extensively with these literatures – as it is not the purpose of the article to propose substantial avenues of response via law to the problems raised by neurodata. However, we consider that a more extensive engagement with these literatures in relation to neurodata, and the regulation of neurodata, would be welcome and worthwhile. To our knowledge, there has been, to date, limited consideration of the theoretical insights of these literatures in relation to neurodata. Nor have there been more concrete studies as to the specific implications of the use of law as a regulatory tool, or as part of a mixed approach in relation to specific problems posed by neurodata. It would be fascinating, for example, to consider the implications of work on reflexive, or meta-, regulatory approaches in more detail in relation to the regulation of neurodata in general, and in relation to the construction of specific regulatory responses in relation to specific problems.

[52] See, for example: B. Wagner, S. Delacroix, *Constructing a mutually supportive interface between ethics and regulation*, 40 (105520) COMPUTER LAW & SECURITY REVIEW 5–6 2021 https://www.sciencedirect.com/science/article/pii/S0267364920301254 (accessed 15 February 2022).

[53] See, for example, the discussion as to the confusion surrounding the scope of consent possible under EU data protection law in relation to medical research in Dove: E. Dove, *The EU General Data Protection Regulation: Implications for International Scientific Research in the Digital Era*, 46 JOURNAL OF LAW MEDICINE & ETHICS, 1013, 1022 2018.

and uncertain. In this regard, an alternative approach may be to rely on the guidance of existing ethical research principles and processes to fill supposed gaps in law. These principles and processes are set up to deal with novel ethical issues emerging in research and are thus proximate to the context of consent and legitimate processing underpinning neurodata banks in a way that new legislative rules would not necessarily be. This body of principles and practices can also be set up to be more flexible than legislation in adapting to uncertainties connected with future developments.[54]

5.3 The Capacity of Existing Legal Frameworks

Finally, whilst specific and novel legislation provides one option to craft legal responses to a given issue, there are also alternative legal approaches available. In particular, legal responses may also be crafted via the production of new legal knowledge within existing legal frameworks. Two forms of approach for the creation of such legal knowledge deserve particular mention. First, new legal knowledge might be created via courts' jurisprudence – this is the basis of the concept of legal precedent and, for example, how the European Court of Human Rights and the Court of Justice of the European Union adapt the ECHR and CFREU to novel social circumstances. Second, new legal knowledge might be created via regulatory agency guidance – where the subject matter in question falls within the competence of such an authority and the authority has the power to act in this capacity.[55]

In this regard, in each case where neurodata has been identified as exceptional under one or more perspective relevant to the function of law, each of the different alternatives the law provides to address negative outcomes will display different strengths and weaknesses. In certain cases, the adoption of specific and novel legislation may offer an optimal approach. In other cases, however, the production of new legal knowledge from within existing frameworks will offer an optimal approach. For example, in cases where the issue at hand is highly technical and does not require any deep normative balancing between competing rights and interests, guidance via a relevant regulatory authority providing interpretation of existing law may be superior to the adoption of specific and novel legislation by a legislator.[56] In such cases, regulatory authorities are likely to have specific expertise and focus, which will allow them to craft targeted solutions suited to achieve

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[54] See: Wagner and Delacroix, *supra* note 52 at 6.

[55] Even where legislation is the only, or the optimal option, however, we highlight that consideration is still required with regard to the level at which, and form of, statutory rules which should be put in place. For example, in Europe, legal rules may be enacted at EU level, national level and even, in certain cases, at regional level. In Germany, for example, certain elements of health law concerning data processing are regulated at regional level. See, for example: J. Drepper, *Data protection in biobanks from a practical point of view: what must be taken into account during set-up and operation?*, 43(6) JOURNAL OF LABORATORY MEDICINE 301, 301–302 2019 https://www.degruyter.com/document/doi/10.1515/labmed-2018-0112/html?lang=en (accessed 19 July 2022).

[56] For example, detailed guidance concerning the implementation of data protection by design and default rules under Article 25 of the GDPR would have been awkward to achieve via a legislative process. The European Data Protection Board, a regulatory agency tasked with providing clarifications of provisions in EU data protection law, however, was suited to the task European Data Protection Board, *Guidelines 4/2019 on Article 25 Data Protection by Design and by Default*, 2019 https://edpb.europa.eu/sites/default/files/files/file1/edpb_guidelines_201904_dataprotection_by_design_and_by_default_v2.0_en.pdf (accessed 19 July 2022).

specific aims whilst limiting negative outcomes and externalities. Such targeted technical solutions are less likely to emerge in legislative processes – which will likely be less proximate and sensitive to the technical specifics of an issue. Where the production of new legal knowledge within existing frameworks offers better alternatives to the enactment of specific and novel legislation in achieving a given goal, whilst minimising negative outcomes, legal neuroexceptionalist claims may be untenable.

We turn again to fMRI to demonstrate the idea: the possibility that fMRI might be collected and processed to produce information on novel forms of mental state might be argued to support calls for new fundamental rights concerning the protection of mental states – see also section 4.2, above. The creation of such new rights would constitute a significant intervention at a foundational level of law. However, the future practical-use constellations of fMRI technologies, the social conflicts they will cause, and the social problems and benefits they will produce, all remain radically uncertain. Accordingly, it is possible to argue that the creation of rights at this level is not yet warranted. In this regard, rights frameworks – both at international and at European level – already include rights which, either directly or indirectly, relate to mental states. For example, in the CFREU, the right to privacy and the right to freedom of thought both seem relevant. Accordingly, an alternative, less invasive, approach – and thus an approach capable of producing more subtle and targeted solutions to these issues – may be to craft protection for mental states via jurisprudence, relying on existing rights, on a case-by-case basis.[57]

6. Conclusion

In this paper, we sought to answer the following question: what does it mean to make a legal neuroexceptionalist claim? In this regard, we proposed that making a legal neuroexceptionalist claim means, in the first instance, making two forms of sub-claim:

> i. The claim that neurodata is exceptional – i.e. a sub-claim serving to provide an initial differentiation of neurodata, such that neurodata might be looked at as a specific subject of legislative consideration.
> ii. The claim that the identified exceptional characteristics of neurodata mandate specific and novel legislation as a response.

We argue that the first sub-claim might be further unpacked in the following way: making a legal neuroexceptionalist claim means identifying norms for data from an analytical perspective relevant to the function of law, in relation to which neurodata display exceptional qualities. In turn, we argued that there are a range of such analytical perspectives which will be capable of supporting legal neuroexceptionalist claims. In this regard, we proposed that legal neuroexceptionalist claims will usually rely on one of the following three analytical perspectives:

[57] See, for example, the discussion in: S. Ligthart, T. Douglas, C. Bublitz, T. Kooijmans, G. Meynen, *Forensic Brain-Reading and Mental Privacy in European Human Rights Law: Foundations and Challenges*, 14 NEUROETHICS, 191, 191–203 2020 https://link.springer.com/content/pdf/10.1007/s12152-020-09438-4.pdf (accessed 19 July 2022).

i. The communicative power perspective – reflecting the capacity for legal arguments to be built on the back of social narratives.
ii. The ethical-legal perspective – reflecting the consideration of law as a tool for the realisation of ethical principles and ideals.
iii. The rational-technical perspective – reflecting the consideration of law as a stable, cogent system which functions to channel forms of behaviour, in certain ways, such as to produce certain forms of result.

We argue the second sub-claim might be further unpacked in the following way: making a legal neuroexceptionalist claim means asserting that the enactment of specific and novel legislation offers the optimal response to the identified exceptional, and legally relevant, characteristics of neurodata. More specifically in this regard, we argue that making a legal neuroexceptionalist claim implies:

i. The scope of negative consequences flowing from the exceptional qualities of neurodata must be such that specific and novel legislation is worthwhile.
ii. The range of alternative normative options available outside the law to address these consequences must not provide a better approach to social steering than that which could be provided via specific and novel legislation.
iii. The capacity of existing legal frameworks to provide a response to these consequences must not be superior to the capacity of specific and novel legislation to provide a response.

The work in this paper is, to our knowledge, the first such effort at elaborating what it means to make a legal neuroexceptionalist claim. We feel the conceptual investigation of the concept of legal neuroexceptionalism is important. Without such investigation, there is a risk that discussions as to whether, and if so when, neurodata requires specific and novel legislation, will not move forward in a structured and logical manner. We believe the work done in this paper will only become more important over time as the processing of neurodata comes under increased ethical and legal scrutiny and calls for specific and novel legislative responses grow.