



Neurorights in Chile: Between neuroscience and legal science

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1. Introduction

Day after day, through smart phones or virtual helpers such as Amazon's Alexa, Microsoft's Cortana, Google's Assistant or Apple's Siri, technology giants receive enough information to figure out and even predict our behavior. But can they *read our minds*? Two bills of law introduced in the Chilean Congress in 2020 assume they just might and propose to safeguard mental integrity by making neurorights into a new human right. One bill seeks "[T]o protect neurorights and mental integrity and advance research

[☆]This paper was associated by research project funded by Chile's National Science and Technology Development Fund (FONDECYT) (Project No. 1180676).

and neurotechnologies” (Bulletin 13,828–19),¹ while the other proposes to add neurorights to the constellation of rights enshrined in the Constitution (Bulletin 13,827–19).² The aim is not just to propose a new human right, but to encourage its adoption across international law.³ In the context of this book, these bills hold special interest. Not only are these initiatives the first of their kind in the Americas, Chile is presently in the thick of a constituent process in which the drafters might eventually consider these issues relevant.⁴

For purposes of the arguments raised here, neurotechnology designates a field of science and engineering that explores and develops methods in which the nervous system interfaces with technical devices (Stieglitz, 2019). Cochlear implants, for example, can transform acoustic signals into electric waves that stimulate the auditory nerve. In 2018, electrode implants that stimulated his spinal cord famously helped quadriplegic patient David Mzee to walk again. Pinpointing a standard definition of neurorights is a somewhat tougher proposition, as they have yet to be recognized as such and the few articles that cite them offer no conceptualisations. Thus, neurorights can at best be described as a set of intentions to protect people from the eventual dangers of neurotechnology. This article offers a critical assessment of the notion of neurorights embraced in the Chilean legislative initiatives. We intend to show that, camouflaged under some philosophical oversimplifications, the bills seek to protect individuals from persistent human rights threats using the wrong means. We hold that the meticulous neuroscientific, neurotechnological and artificial intelligence arguments

¹ Text: www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=13828-19 [last visited 12 October 2020].

² See the bill amending article 19(1) of the Chilean Constitution to protect mental integrity and safety in relation to the advancement of neurotechnology at www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=13827-19 [last visited 12 October 2020].

³ For examples of the media hype surrounding these bills, see “Charla de Rafael Yuste promueve inédita ley de neuroderechos en Chile y el mundo” www.futuro360.com/data/rafael-yuste-ofrecera-charla-sobre-la-etica-de-la-neurociencia-y-la-inteligencia-artificial_20190527/; “Chile, laboratorio mundial de los neuroderechos” elpais.com/ciencia/2020-10-08/chile-laboratorio-mundial-de-los-neuroderechos.html; “Chile podría convertirse en el primer país en tener una ley que proteja los neuroderechos” www.latercera.com/que-pasa/noticia/chile-podria-convertirse-en-el-primer-pais-en-tener-una-ley-que-proteja-los-neuroderechos/HUJ5J3OCBBH2PH5BZGCUF2N5BQ/; “Chile podría ser pionero en incorporar ‘neuroderechos’ en la Constitución” www.df.cl/noticias/df-constitucional/chile-podria-ser-pionero-en-incorporar-neuroderechos-en-la/2020-10-07/172458.html [last visited 11 October 2020].

⁴ The new Chilean constitution will be written by 155 constituents elected by direct vote. The resulting assembly will have 1 year to draft a new constitution, which will then be ratified in a referendum. In a first in comparative law, the assembly is to have gender parity and set seats aside for indigenous peoples.

used to buttress the bills are not relevant to legal science, notably to the theory of legislation, and that they extrapolate the simple recognition of certain new findings in science and technology into legal inferences that lack in rigor.



2. The Chile bills: Grounded on technology that has yet come to pass

Both proposed bills cite research and developments that are supposedly on the cusp of producing certain outcomes that ought to be counteracted. Chief among these is the work of Dr. Jack Gallant, who in 2011 astounded the scientific community by claiming that he was close to being able to reconstruct what people were seeing by peering into their minds. A decade later, his experiment has yet to yield the expected results and Gallant himself has conceded that mapping the human brain may well be, for now, impractical.⁵ Also cited is Neuralink, an Elon Musk startup that a few years ago announced a “neural lace” that would let humans communicate with a computer and upload and download thoughts without a physical interface. The technology could cure or alleviate a long list of congenital or degenerative diseases and increase cognitive ability to boot. But Neuralink’s claim that the technology would be deployed in humans by 2020 failed to materialize. To be sure, scientists have long been implanting devices in the human body in order to achieve a certain neural response. What was new about Neuralink were its electrodes as thin as a human hair and “sewing machine” of sorts that would install them as the heart pumps—an experiment that remains in the prototype stage of development.⁶

In other words, the scientific and technological target milestones cited as warranting the proposed bills are of doubtful import and may lead to the false belief that it is time to regulate them. Chief among reasons to legislate cited by the bill sponsors is Chile’s becoming first in the world to do so. Pioneering mental privacy protection may well be part of a strategy to position Chile at the international forefront in such matters—but is that enough reason to legislate? Legisprudential theory provides tools to assess the

⁵ In a talk given in April 2020, Dr. Gallant noted that even single-subject studies showed over 2000 semantic domains triggering in complicated constellations of meaning: www.youtube.com/watch?v=qekfk-lBgb8 [last visited 29 January 2021].

⁶ Neuralink is currently in crisis and just six of the eight founding scientists remain on board. It appears that Musk’s oversized dreams and personality have collided with “the slow and incremental pace of science” www.statnews.com/2020/08/25/elon-musk-neuralink-update-brain-machine-implants/ [last visited 29 January 2021].

reasoning of lawmakers and enable interpreters of the law and citizens at large to ascertain the motives for the sanctioning of certain rules, the ends pursued, and what drove their adoption. As de Ruggiero notes (De Ruggiero, 1929, p. 141), a search for the rationale of the law reveals three layers or levels of reasoning: *ratio legis*, which references the protected human need and the law's intent; *vis legis*, the special normative virtue of the precept, which issues not from the drafter's subjective will but from the intrinsic, objective efficacy it acquires when its external formulation becomes independent from its authors; and, finally, *ocasio legis*, the discrete circumstances of the time that shaped formulation of the precept (cf. Von Savigny, 1840, §34).

When checked against these levels of reasoning, the only possible conclusion is that the proposed bills address no real need, since the described threats are presently inexistent. Nor is any special normative virtue evident, as Chile's legal system already has sufficient rules addressing the eventual threats, should they ever materialize. Lastly, there seem to be no motivations of public importance which, when revealed by the lawgiver, should justify triggering the lawmaking process. All that is offered are desultory reasons which, when presented to the citizenry, appear to play no other role than magnifying a danger that is neither clear nor present.



3. Neurorights and legislative rationale: Many reasons not to legislate

Although political power in democratic societies is always coercive and backed by a legitimate law enforcement monopoly, it is also the power of free, equal citizens in an atmosphere of cooperation. If each citizen has an equal share in political power, then power should be exercised, at least when questions of basic justice are at stake, in ways that all can publicly endorse in the light of their own reason (Rawls, 2001, pp. 90–91). This general formulation of the principle of democratic legitimacy pervades lawmaking. Luc Wintgens notes that since lawmaking is a form of restriction on freedom, the reasons for renouncing it are a result of the social contract that supports a rational body politic (Wintgens, 2003, pp. 261–287). Legislation is rational reasoning that yields something more profound: social legitimacy (Wintgens, 2012, pp. 279–282). Legislating, therefore, requires proof that triggering the complex, lengthy and costly process of lawmaking is suitably justified.

The Chilean constitutional reform bill is predicated on the need to configure a new fundamental right in order to protect the physical and mental integrity of individuals from technological mechanisms attempting to “augment, diminish or perturb individual integrity without due consent.” To protect freedom of conscience and mental privacy from certain neurotechnologies, the bill seeks to recognize five new human rights to: (1) mental privacy (e.g., brain data); (2) personal identity and autonomy; (3) free will and self-determination; (4) equal access to cognitive augmentation in order to prevent inequality, and (5) protection from automated algorithmic or decision-making biases.

Do the proposed bills meet the standards required under legislative theory? This question is examined below based on Manuel Atienza’s criteria on lawmaking rationale (Atienza, 1997), Jeremy Waldron’s principles of the lawmaking process (Waldron, 2006, pp. 15–32) and Luc Wintgens’ theory of rational legislation (Wintgens, 2003, 2012). To Atienza, laws must be *linguistically rational*, e.g., the text of the law must send a clear message to the *subjects bound by it*. But to meet this criteria, proper use of the language matters. The proposed neurorights bills use terms such as “psychological and mental continuity,” “mind,” “thoughts,” “neural connections” and “mental processes.” The trouble with these terms, evidently, is that they are so obscure and vague as to render the above requisite impossible to meet. Nor do they satisfy Wintgens’ *principle of coherence*, as the wording is not comprehensible to the subjects bound by it.

While the proponents do define what they understand neurotechnologies to be (“a range of non-pharmacological devices, methods and instruments enabling direct or indirect connections with the nervous system”), they do not explain how such methods can be told apart from other non-pharmacological technological developments which routinely observe, alter, and determine our psyche. From television, the internet, and psychological or psychiatric therapy to computed tomography scans, cochlear implants and brain surgery, all are capable of stalking or radically altering what the bills refer to as “personal identity” or free will. In a paradigmatic example that the conceptual framework of neuroscience remains too rudimentary to be regulated, the proponents rely on predominantly metaphysical concepts that have been debated for centuries by theologians, philosophers, and more recently, psychologists and psychiatrists. Suffice it to consider the distinction between third- and first-person accounts of notions such as mind, consciousness, and normativity. “Even if a material correspondence between cerebral (the object of neuroscientific investigation) and mental levels exist, the mental

cannot be totally explained by third-person scientific accounts. This fact lies at the root of an epistemic insufficiency of neuroscientific explanations” (Salles, Evers, & Farisco, 2019, p. 127).

Atienza also states that legal texts require *legal and formal rationality*, e.g., new laws should fit harmoniously into the existing legal system and be readily understood by both the subjects bound by them and the justice system that enforces them. But it is clearly evident that the proposed bills aim to protect old rights from new threats, in a classic case of normative redundancy. Also not satisfied is Wintgens’ *principle of normative coherence*, as the bills do not fit harmoniously into the existing legal system. Stretching as far back as the Middle Ages, privacy rights remain privacy rights, whether threatened by a medieval abbot spying on his monks or by 21st century governments operating surveillance cameras or flying drones over people’s homes. As such, most scholars and scientists who have pondered these issues conclude that techniques that purport to *read the mind* are already properly regulated under the standard rights to freedom of expression (or freedom of non-expression, per Lighthart), freedom of thought, and privacy enshrined in domestic legislation and across a range of international instruments (Lighthart, 2020, pp. 126–128). Moreover, the bills do not spell out who the subjects bound by the new rights are, much less the bodies enforcing any resulting obligations. As such, they also fail to meet Wintgens’ *normative density* requirement, e.g., the need for certainty about breaches and sanctions. While the bills cite a “right to protection from bias,” which seems to be the mere specification of the right to be free from arbitrary discrimination, this is more properly embodied in a proposed reform of data protection laws propounding the right to explanation.⁷

Atienza further cites *pragmatic rationality*, a concept that requires demonstrated that the law is upheld, that can achieve its expected objectives. Given the kind of events described in the neurorights bills, it is hard to envisage how the stated goals are to be accomplished, as such invasions of mental privacy do not presently exist in Chile—or anywhere else, for that matter—and human beings can hardly be asked to adapt their behavior to fictional situations. Also not satisfied is Waldron’s principle of *explicit legislation*, which requires the law to have the ability to actually influence or alter people’s lives. Furthermore, in Wintgens’ terms, also unfulfilled is the need for *contextual rationality*, as the use of cognitively invasive technologies, in the sense

⁷ A right based on article 22 of the EU General Data Protection Regulation (GDPR) allowing data owners to demand responses from operators of automated decision-making systems. The right to explanation advances accountability and transparency and protects individual freedoms (Dreyer & Schulz, 2019, p. 27).

described in the proposed bills, is bereft of supporting evidence. The term “mind-reading,” as used to describe the mechanisms employed by brain-computer interfaces (BCI) and neurotechnology-based neural decoding is, for all intents and purposes, metaphorical. “The mind” is an expansive concept that encompasses mental states that range from imagination, emotions and intentions to perception and decision-making. Using BCI technology, neuroscience can point to correlates between mental states and brain activity, but as Rainey et al. note, access to the material basis of mental states remains exceedingly piecemeal (Rainey, Martin, Christen, Mégevand, & Fournere, 2020, pp. 2295–2311). As incipient physical imprints of the expression of the mind, neural correlates provide data so fragmentary as to not be even close to decoding thought—an indisputable fact recognized even by Rafael Yuste, the premier proponent of neurorights.⁸

Dr. Edward Chang, a leading researcher of interfaces peering into how the human brain controls the ability to speak, acknowledges that the technology can only read the signals of speech (Anumanchipalli, Chartier, & Chang, 2019, pp. 493–498). Actually, reading what we are thinking or decoding inner thoughts remains impossible; such research is not feasible and may well never be.⁹ Even if it were perfectly possible to tell the words someone is trying to say based on brain signals, this is not even close to mind- or thought-reading. The technology can look at areas of relevance to the motor aspects of speech production, but not look at thought. And since *what thoughts are and how they are produced* isn’t yet known, even conceptually, speaking of mind-reading remains science fiction. Atienza’s lawmaking conditions also include *teleological rationality* and *ethical rationality*. The former refers to the social ends the law must contemplate and endeavor to attain while the latter judges the axiological justification of the law, concepts that can help assess those who wield legitimate normative power; e.g., the lawmakers sponsoring these bills. As such, the first order of business is wondering about the ethics of taking up invaluable time on the legislative agenda without valid social justification. Does it make sense to ask citizens to follow rules designed for an inexistent factual context? Suppose we weigh these bills against legislative initiatives seeking, for example, to advance education, connectivity, health care, or access to food or housing. Under the *duty of care* (Waldron) or the *principle of alternativity* (Wintgens) that ought to inform lawmakers (Waldron, 2006, pp. 23–24), proof is needed that the resulting

⁸ Rafael Yuste, R. “Mapear el cerebro es el mayor desafío de la ciencia.” youtu.be/iVyTEu4FDvw [last visited 29 January 2021].

⁹ Chang, E. “Why computers won’t be reading your mind any time soon,” *Wired Magazine*. www.wired.co.uk/article/brain-computer-interfaces [last visited 29 January 2021].

restrictions on freedom will in fact bring about substantive change or improvements. Laws that fail to achieve their goals, or are plain superfluous, may undermine the notion of justice. And since democratic overreach can undercut the legitimacy of representative institutions, unwarranted laws are not harmless.

Also not satisfied is the *principle of representation*. As Waldron writes, Parliament is a forum that should give voice to the publicly relevant interests of the sovereign (Waldron, 2006, pp. 24–25). Does Chilean society feel that neurorights should be regulated? What interests does the proposed legislation serve? What issues does it address? Lawmaking is much more than representation. It entails publicly deliberating and justifying one's stands honestly, genuinely, and transparently.

Therefore, we agree with local scientists such as Rómulo Fuentes who has stated that “[W]hile developments in this field are certainly encouraging, they remain incipient. Objectively, we remain far from possessing the technological knowledge and skills to record with sufficient accuracy *even trace amounts of the brain activity that would help decode or modify thought*, if such a thing were even possible.”¹⁰ In this scenario, Fuentes adds, legislating based on fear of a hypothetical future could prove unwise.



4. New old news

A legal review of the proposed legislation uncovers the rather old news that fundamental rights are constantly exposed to new threats. To be sure, even if state or corporate actors should ever succeed in reading someone's mind—technically, their brain data—they would be breaching not a new human right, but the time-honored *right to privacy*. Just as the advent of new ways of killing does not fundamentally change the essence of the right to life or provide grounds to create new entitlements, attempting to enshrine neurorights in the constitution appears in no way warranted. The redundancy becomes apparent when juxtaposing neurorights with the fundamental rights already protected by the Chilean Constitution, international human rights instruments, and domestic legislation. Indeed, even a cursory look suffices: article 1 of the Constitution asserts the freedom, dignity, and rights of all. Article 19 sets down the rights to life, to physical and mental integrity and to equality before the law; it bars arbitrary privilege and discrimination; requires respect and protection of private life and personal data; recognizes freedom of conscience, individual freedom and security, and the rights to the protection of health and to own property, including intangible

¹⁰ www.uchile.cl/noticias/172289/el-estado-de-la-neurotecnologia [last visited 29 January 2021].

assets. On a legal level, the proposed bills defer to Law 19,628 on the protection of private life and sensitive personal information, including data concerning physical or moral features or private events and circumstances, such as personal habits, political and ideological views, or religious beliefs. The definition is broad and flexible, encompassing a range of private events and circumstances that can readily adapt to new threats. Law 19,628 provides for the security of personal data (art. 11), non-disclosure of data (art. 7), access to information (art. 12), the right to have personal data purged or expunged (art. 6), and even the right to have all treatment of stored sensitive data temporarily suspended.

Information gathered from brain activity falls into the category of biometric data, which is defined as information based on physiological or physical measurements of a part or parts of the human body (Korja, 2006, pp. 196–213) that may eventually help identify an individual. A review of the law shows that biometric data, by exposing physical or moral features (art. 2 of Law 19,628), is to be considered sensitive personal information under Chilean legal doctrine (Garrido & Becker, 2017, pp. 67–91). So does new proposed legislation designed to overhaul and streamline existing data protection laws by, *inter alia*, create a new enforcement authority.¹¹ On the question of neurotechnology-based medical treatments, Chilean law provides sufficient mechanisms to safeguard the interests and rights involved. Article 14 of Law 20,584 on patient rights, for example, enshrines informed consent. Reinforcing horizontal control, article 17 requires an ethics committee to have oversight in specific cases. Article 21 sets rules for experimental work, with special emphasis on genomic research, in turn further regulated under Law 20,120, whose article 2 specifically states that “[T]he freedom to conduct biomedical research in humans is bounded by respect for the essential rights and freedoms recognized in the Constitution and in international instruments ratified by Chile and currently in force and effect.”¹² Law 20,120 also regulates informed consent and creates a National Bioethics Commission to advise government on ethical issues

¹¹ See the Senate discussion at www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=11144-07 [last visited 28 January 2021].

¹² Health Ministry Resolution 656(2002) regulates psychosurgery, e.g., surgery that targets brain tissue. “Most of the NPD [neurosurgery for psychiatric disorders]-specific laws do not distinguish between experimental treatment and established clinical treatments and will apply to both. A couple of laws do address the issue of whether the proposed NPD is an established treatment modality or not. For example, Chile (2002) Decree on Psychosurgery justifies strict regulations of psychosurgery based on a general lack of scientific evidence, lack of consensus about the possible benefits and harms, and international ethical controversy. It allows psychosurgery only for severe treatment-resistant depression or OCD.” (Chandler, Cabrera, Paresh, et al., 2021).

arising from developments in biomedicine and research in humans. These legal provisions and safeguards abundantly confirm the redundant nature of the proposed neurorights bills.



5. Philosophical issues

Finally, from a philosophical standpoint, it is quite apparent that neurorights bill proponents are embracing a *reductionist* theory of cognitive neuroscience (Bennett & Hacker, 2003). Reductionism harks back to an old Cartesian confusion expressed in the mind/body dualism, substituted today for an equally erroneous brain/body dualism. The former requires belief in immaterial substance and the latter in material substance, but both share the same conceptual issues. The most important of these—known as *mereological fallacy* (Bennett & Hacker, 2003)—explains that the mind is neither identical nor distinct from the brain and that ascribing psychological attributes to the brain is preposterous. Thoughts and feelings are *attributes of human beings, not of their brains*—of the whole, not of just a part. A human being is a psychophysical unit, a sentient animal that can perceive, act purposely, reason, show emotions, use language, and be self-aware. It is not a brain inside a skull atop a body. As such, it is a Cartesian reductionist pretension to argue that creating new rights is essential to protect the brain, *a specific part of the human body*, as the purported seat of human identity.

Suggesting a correlation between a subjective and complex whole (i.e., decision-making) and a particular physical part of such a capacity (such as neural firings) is one thing; to insinuate that the part (the brain) is the whole (the individual) is quite another. Such claims are not only specious—as Wittgenstein notes, they are meaningless. Only “[O]f a living human being and what resembles (behaves like) a living human being can one say: it has sensations; it sees; is blind; hears; is deaf; is conscious or unconscious” (Wittgenstein, 1999, §281). As such, when John Searle wrote about the brain’s role in pain, concluding that “[T]he pain in the foot is literally in the physical space in the brain” (Searle, 1992, p. 63), he was engaging in the mereological fallacy of ignoring that experiencing pain can only be ascribed to the human animal as a whole, not to one of its parts.

In line with Rorty’s classic mental experiment (Rorty, 1980), for the “cerebroscope” (a notional device that records all activity of all neurons

in the brain on a millisecond by millisecond basis) “to be able to interpret a particular pattern of neural activity as representing my experience of seeing [a] red bus, it needs more than to be able to record the activity of all those neurons at this present moment, over the few seconds of recognition and action. It needs to have been coupled up to my brain and body from conception—or at least from birth, so as to be able to record my entire neural and hormonal life history. Then, and only then, might it be possible for it to decode the neural information” (Rainey et al., 2020). Consider this example. “Suppose I place my signature on a document. The act of affixing my signature is accompanied by neural firings in my brain. The neural firings do not “explain” what I have done. In signing my name, I might be signing a check, giving an autograph, witnessing a will or signing a death certificate. In each case the neural firing may well be the same. And yet, the meaning of what I have done in affixing my signature is completely different in each case. These differences are “circumstance dependent,” not merely the product of my neural firings. Neural firings accompany the act of signing but only the circumstances of my signing, including the intention to do so, are the significant factors in explaining what I have done” (Patterson, 2003).

Shen similarly notes that just because a specific part of the brain is more active during a certain cognitive state, it does not necessarily follow that, whenever that area is more active, a person is in that cognitive state. This reverse inference fallacy is especially acute in issues of lie detection, as “[I]t is not lying per se that is being decoded from these brain areas but rather the cognitive and emotional processes that are associated with lying” (Shen, 2013, p. 681). Cognitive neuroscience can identify the origin of neural firings, but it has no more idea about their meaning than Google or Facebook do when we “like” a picture. As such, along with Shen, we say: “Don’t panic! Current constitutional protections are sufficiently nimble to allow for protection against involuntary government machine-aided neuroimaging/mind-reading” (Shen, 2013, p. 656).

In short, developing such novel fundamental rights is unnecessary because the present framework of generic human rights is well equipped to cover all conceivable brain privacy interests that should enjoy legal protection. Introducing a specific, additional human right focusing only on the brain is superfluous. “Under this approach, what needs to be done though is specifying the implications of current rights for particular neurotechnologies and purposes” (Michalowski, 2020, pp. 404–414). Specifying such implications is a commonplace legal activity that requires no novel human rights; it

just requires a criminal justice framework for non-consensual brain-reading under the right to respect for private life. On revising freedom of thought, Lighthart notes that “[I]t will not be necessary, because together with the right to respect for private life, the right to freedom of expression covers the non-consensual use of both present and futuristic brain-reading technologies” (Lighthart, 2020, pp. 1–27).



6. Conclusion

The preceding pages have examined two bills recently tabled by Chilean legislators, one seeking to protect neurorights and mental integrity and regulate the development, research and advancement of neurotechnologies (Bulletin 13,828–19), the other aiming to add neurorights to the entitlements enshrined in the Constitution (Bulletin 13,827–19). When scrutinized under the legislative rationale requirements of lawmaking theory, however, both are found wanting. Rationality schemes applied to both yield a less than flattering assessment, a result that should alert the legal community about the underlying motivations and the arguments used to persist in pushing the bills through. Issues may be eye-catching, intriguing, fascinating even, but this is no reason for them to receive treatment in law. Regulating technology, especially when as inchoate as neurotechnologies, poses challenges on many levels. While prudence calls for proceeding with care to prevent unforeseen consequences, such as inhibiting research or hampering funding, the constitution and the law do not appear to be the most adequate venues for such regulations. Given the dynamic nature and global reach of technology, it seems that a more adequate route is the adoption of technical guidelines that would be better positioned to give regulators the needed latitude. Among these, some of the better options include the health or technological guidelines known in some contexts as *regulatory sandboxes*, e.g., mechanisms that can help address ongoing, circumscribed, flexible situations on terms that can be fine-tuned and revised as circumstances dictate.¹³ The U.S. legal culture, which is the source of most worries about the so-called neurorights, may well have good reason to be

¹³ Certain domains are especially well-suited for development of narrow lower-ranking regulations (e.g., trial and error environments) in order to provide more adequate regulatory responses. Finance and technology is one such case, especially as regards the regulation of cryptocurrencies, which have posed a real challenge to monetary authorities around the world (Finck, 2018, pp. 665–692). In Chile, article 5 of Health Ministry Decree 404 on narcotic drugs contains a notable sandbox requiring the Public Health Institute to regulate and control the “use of cannabis, cannabis resin, cannabis extracts and cannabis tinctures for the manufacture of pharmaceutical products for human use.”

concerned, given its less-than-sterling data protection framework.¹⁴ But that is not the case in Chile, where constitutional and legal norms provide more than adequate responses to the risks and dangers posed by neurotechnology, should they ever come to pass.

Ultimately, the bills' technical issues and attempt at constitutionalizing legal positions go back to major open questions that should, on the whole, call for legislative restraint. Lawmaking and new constitutions should focus on improving the lives of people and on meeting their meaningful demands for greater equality and freedom. If and when technological developments merit, it will befit legislators to ask, pursuant to the standards of lawmaking technique, whether creating new subjective rights is a suitable normative tool to ward off the asserted risks. For now, we hold that the powerful technique of fundamental rights is a colossal civilizing achievement that deserves to be celebrated and taken seriously, not trivialized.

As Anil Seth notes, “[W]hat it means to be me cannot be reduced to—or uploaded to—a software program running on an advanced robot, however sophisticated. We are flesh-and-blood biological animals whose conscious experiences are shaped at all levels by the biological mechanisms that keep us alive. Making computers smarter is not going to make them sentient.”¹⁵ Nor, we should add, is it going to allow them to read our minds. This is why, at least for now, the reductionist pretension of legislating *for a part of the body* ought to be set aside, as holding that our mind, identity, and awareness dwell

¹⁴ The United States stands in the antipodes of the European system of personal data protection and those it has inspired, Chile's included. Europe has a General Data Protection Regulation (GDPR) with a special focus on prevention; the United States has sectoral rather than federal regulations whose complaint mechanisms are subsequent to any violations. Much of the European Union's data protection framework is based on an enforcement authority; the United States has no agency or authority to which recourse can be had for unlawful or arbitrary data use. An example of tensions in this regard are the conditions set by the EU for the transfer of data outside the Union, notably that the destination country have an adequate level of protection and meet a number of institutional requirements. In the United States, such transfers have particularities. The 1998 Safe Harbor agreement required data processing organizations to provide all guarantees. However, after the revelations of CIA contractor Edward Snowden (2001), the 2015 European Court of Justice's Schrems I decision (curia.europa.eu/juris/document/document.jsf?docid=169195&doclang=EN) overturned Safe Harbor, noting that it had failed to adequately protect the data of European citizens. This was followed by the introduction of the Privacy Shield, an instrument that must be adopted and negotiated separately by each country. In 2020, the Schrems II decision (curia.europa.eu/juris/document/document.jsf?docid=228677&text=&dir=&doclang=EN&part=1&occ=first&mode=DOC&pageIndex=0&cid=3062335) overturned the Privacy Shield on grounds that certain rules in US law made protection of personal data impracticable.

¹⁵ www.futuro360.com/data/anil-seth-neurocientifico-como-el-cerebro-alucina-con-la-realidad_20190108/ [last visited 29 January 2021].

only in the brain is simply not true. The human rights that currently protect our physical and mental integrity will more than suffice.

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Proposed legislation

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- A bill on the protection of neurorights and mental integrity and advancement of research and neurotechnologies. http://www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=13828-19 [last visited on 12 October 2020].
- A bill to regulate the protection and treatment of personal data and creating the Personal Data Protection Agency. https://www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=11144-07 [last visited on 28 January 2021].