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NEUROTECHNOLOGY AND THE CONSTITUTION: SHOULD INDIA RECOGNISE COGNITIVE LIBERTY AS A FUNDAMENTAL RIGHT?

— Irine Elsa Cherian

ABSTRACT

Brain-computer interfaces, consumer electroencephalography devices, and neural-decoding algorithms have moved neurotechnology from clinical laboratories into everyday commerce, prompting a shift in the object of legal regulation from personal data to the human mind itself. This article examines whether the Constitution of India, as presently interpreted, offers adequate protection to what neuroethicists term "cognitive liberty", the right to control one's own mental processes, free from unauthorised access, manipulation, or coercion. Employing doctrinal and comparative methodology, the article traces the constitutional foundations of mental autonomy through Articles 14, 19, 20(3) and 21, and interrogates the reasoning of Selvi v. State of Karnataka[1], Justice K.S. Puttaswamy v. Union of India[2], and allied precedents to test whether "privacy" and "personal liberty" as presently construed can absorb the distinct harms that neurotechnology threatens. It contrasts the Indian position with Chile's 2021 constitutional amendment protecting brain activity, and with soft-law instruments emerging from UNESCO, the OECD, and the Council of Europe. The article argues that while the doctrine of an expanding, non-exhaustive Article 21 is theoretically capacious enough to accommodate a right to mental integrity, judicial recognition alone is an insufficient response to a technology whose principal risks are commercial, cumulative, and pre-emptive rather than adjudicative. It therefore proposes a two-track reform: an interpretive extension of Article 21 to explicitly recognise cognitive liberty as a facet of dignity and personal autonomy, coupled with a

[1]Selvi v. State of Karnataka, (2010) 7 S.C.C. 263 (India) (holding that the compulsory administration of narcoanalysis, polygraph examination, and Brain Electrical Activation Profile tests violates Article 20(3) and Article 21 of the Constitution of India).

[2]Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 S.C.C. 1 (India) (nine-judge bench holding that the right to privacy is intrinsic to the right to life and personal liberty under Article 21 and to the freedoms guaranteed by Part III of the Constitution).

dedicated statutory framework, a Neural Data Protection Act, that regulates consent, data fiduciaries, and algorithmic inference in a manner the Digital Personal Data Protection Act, 2023 does not contemplate. The article concludes that Indian constitutionalism must develop a jurisprudence of the mind before neurotechnology renders the distinction between thought and data obsolete.

Keywords: cognitive liberty; neurorights; brain-computer interfaces; Article 21; mental privacy; neurotechnology regulation; comparative constitutionalism

1. INTRODUCTION

Constitutional law has historically regulated what a person does, says, and possesses. It has been comparatively silent on what a person thinks, because thought was, until recently, inaccessible to external observation and therefore beyond the reach of both state power and private enterprise. Neurotechnology is dismantling that assumption. Consumer electroencephalography (EEG) headsets marketed for meditation and productivity, implantable brain-computer interfaces (BCIs) developed for paralysis and speech restoration, and neural-decoding algorithms capable of reconstructing approximate images or words from brain activity together signal a shift in the frontier of regulation: from the data a person generates to the neural processes that generate the data itself.[3]

This shift creates a doctrinal problem. Indian constitutional law protects informational privacy, bodily integrity, and freedom of expression as discrete, well-litigated categories. It has no settled vocabulary for an intermediate harm, the involuntary extraction or manipulation of mental content before it ripens into speech, action, or recorded data. Neuroethicists have named this gap "cognitive liberty": the right of individuals to control their own consciousness and mental processes, encompassing both a negative dimension (freedom from unauthorised interference with one's mental states) and a positive dimension (freedom to alter or enhance one's own cognition without unwarranted state or private interference).[4]

[3] See Rafael Yuste et al., Four Ethical Priorities for Neurotechnologies and AI, 551 Nature 159 (2017) (describing the rapid advance of brain-reading and brain-writing technologies and proposing ethical priorities, including cognitive liberty, for their governance).

[4] Marcello Ienca & Roberto Andorno, Towards New Human Rights in the Age of Neuroscience and Neurotechnology, 13 Life Sci., Soc'y & Pol'y, art. 5 (2017) (proposing cognitive liberty, mental privacy, mental integrity, and psychological continuity as candidate neurorights).

The research problem this article addresses is narrow but consequential: does the existing constitutional framework of India, principally Articles 14, 19, 20(3), and 21, already protect cognitive liberty, or does the emergence of BCIs and adjacent neurotechnologies expose a gap that requires either bold judicial interpretation or express constitutional or statutory intervention? The question matters because India has, in the last decade, developed one of the world's most consequential privacy jurisprudences through Justice K.S. Puttaswamy v. Union of India[5], yet its data protection statute, the Digital Personal Data Protection Act, 2023, was drafted without reference to neural data and contains no category equivalent to the "special category data" treatment that some comparative regimes reserve for biometric or neural information.

This article's objectives are fourfold: first, to map the technical and commercial trajectory of neurotechnology sufficiently to identify its distinctive legal risks; second, to trace the intellectual history of cognitive liberty as an emerging human-rights concept; third, to conduct a critical doctrinal audit of Indian constitutional law to determine the extent to which it already accommodates that concept; and fourth, to evaluate comparative constitutional responses, most notably Chile's 2021 neurorights amendment, in order to recommend a calibrated reform for India. The analysis is doctrinal and comparative, drawing on constitutional text, Supreme Court jurisprudence, and international soft-law instruments, and its scope is confined to the constitutional and statutory question; it does not purport to resolve the underlying neuroscientific or engineering debates about the present accuracy of neural decoding, which remains an active empirical question.

The argument proceeds in three movements. Part 2 and Part 3 establish the factual and conceptual predicate, what neurotechnology is and what cognitive liberty means. Part 4, the analytical core, tests existing Indian doctrine against that predicate. Parts 5 and 6 widen the lens comparatively and identify the legal risks that doctrine currently fails to address. Parts 7 and 8 make the article's normative contribution: an argument for interpretive recognition of cognitive liberty under Article 21, coupled with statutory reform, rather than reliance on either mechanism alone.

2. UNDERSTANDING NEUROTECHNOLOGY

[5]Puttaswamy, supra note 2.

Neurotechnology is an umbrella term for devices and techniques that interface directly with the nervous system, either to read neural signals (decoding) or to alter them (stimulation). A brain-computer interface is a system that acquires electrical, magnetic, or metabolic signals generated by neural activity and translates them into commands for an external device, bypassing the ordinary neuromuscular pathway.[6] BCIs are conventionally divided into invasive systems, which involve surgically implanted electrodes placed on or within cortical tissue, and non-invasive systems, which rely on scalp-mounted sensors such as EEG.

Invasive BCI research has advanced considerably in the past five years. Neuralink Corporation has implanted its N1 device in human participants under an early feasibility study, enabling users with severe paralysis to control a computer cursor through neural signals alone.[7] Synchron has pursued a less invasive endovascular approach, threading a stent-electrode array through the jugular vein into a blood vessel adjacent to the motor cortex, thereby avoiding open-skull surgery while still recording cortical signals.[8] Precision Neuroscience has developed an ultra-thin, high-channel-count cortical electrode film designed to sit on the brain's surface without penetrating tissue, aiming to reduce the risk profile associated with penetrating electrode arrays.[9] Blackrock Neurotech, whose Utah Array has long been a research-grade standard for invasive recording, has similarly moved toward commercialising chronic implants for communication and motor restoration in paralysed patients.[10] Each of these ventures illustrates a common trajectory: a clinical device developed to restore lost function is simultaneously positioned, in investor and public communications, as a platform technology with eventual application beyond disability, for cognitive augmentation, enhanced communication bandwidth with computing systems, or affective monitoring.

Neural decoding, the inference of mental content such as intended movement, imagined speech, or emotional valence from recorded neural signals, has progressed from decoding simple binary intentions to reconstructing approximate semantic content of imagined or perceived speech and

[6]See J.R. Wolpaw et al., Brain-Computer Interfaces for Communication and Control, 113 Clinical Neurophysiology 767 (2002) (defining a brain-computer interface as a system that translates neural signals into commands for an external device independent of peripheral nerves and muscles).

[7]See You've Heard of Neuralink. Meet the Other Companies Developing Brain-Computer Interfaces, MIT Tech. Rev. (Apr. 19, 2024) (describing Neuralink's PRIME feasibility study and a human participant's use of the N1 implant to control a computer cursor through neural signals alone).

[8]Id. (describing Synchron's endovascular Stentrode platform, delivered via catheter through the jugular vein to a blood vessel adjacent to the motor cortex without open-skull surgery).

[9]Id. (describing Precision Neuroscience's ultra-thin, high-channel-count cortical electrode array, designed to rest on the brain's surface without penetrating tissue).

[10]Id. (describing Blackrock Neurotech's Utah Array and its MoveAgain BCI system, developed for communication and motor-control restoration in paralysed patients).

images, particularly when combined with machine-learning models trained on large neuroimaging datasets. Neural stimulation, the converse operation, uses electrical, magnetic, or optogenetic techniques to alter neural activity therapeutically (as in deep brain stimulation for Parkinson's disease) or, increasingly, for putative cognitive enhancement in commercial "neurostimulation" wearables marketed directly to consumers without the regulatory oversight applied to implantable medical devices.

These developments challenge three assumptions embedded in traditional legal categories. First, they blur the line between "data" and "person": if a neural signal can be decoded into an approximation of a thought, the signal is no longer merely information about a person in the way a purchase history is, it is arguably a proxy for the person's inner life, raising the question whether existing data-protection categories, built for behavioural and transactional data, are conceptually adequate. Second, they blur the line between therapy and enhancement, since consumer-grade neurotechnology is frequently marketed under wellness or productivity branding that escapes the regulatory scrutiny applied to medical devices, notwithstanding that the underlying neural interface may carry comparable risks. Third, they blur the line between voluntary and involuntary disclosure, because unlike speech, which requires a volitional act, passively recorded neural signals may reveal information the subject neither intended to communicate nor, in some cases, was consciously aware of possessing, a form of exposure without an analogue in the pre-neurotechnological legal imagination.

3. THE EMERGENCE OF COGNITIVE LIBERTY

The term "cognitive liberty" originates in late-1990s scholarship on the legal status of psychoactive substances and mind-altering technologies, and was developed as a bioethical and legal principle asserting an individual's right to autonomous control over their own consciousness and mental processes.[11] The concept re-emerged with greater urgency in the 2010s as neurotechnology matured from laboratory curiosity to commercial product. Marcello Ienca and Roberto Andorno, in an influential 2017 article, argued that existing human-rights frameworks were insufficiently precise to address neurotechnological risks and proposed four candidate "neurorights": the right to cognitive liberty, the right to mental privacy, the right to mental integrity, and the right to psychological continuity.[12] Their taxonomy has since become

[11] See Richard Glen Boire, On Cognitive Liberty, 1 J. Cognitive Liberties 7 (2000) (articulating cognitive liberty as an individual's right to autonomous control over her own consciousness and mental processes).
[12] Ienca & Andorno, supra note 4.

the reference point for subsequent scholarly and policy debate, even where later authors have contested its boundaries or overlap with existing rights.

Rafael Yuste, a Columbia University neuroscientist and director of the NeuroRights Foundation, has been the most visible advocate translating this scholarship into constitutional and legislative practice, playing a central advisory role in Chile's 2021 constitutional reform.[13] Nita Farahany's work has extended the analysis from constitutional theory to workplace and consumer contexts, cataloguing the growing commercial deployment of neurotechnology in employee-monitoring, transportation safety, and marketing, and arguing for a right to "cognitive liberty" understood as encompassing both freedom from unwanted mental intrusion and a right to self-determination over one's own cognitive enhancement choices.[14]

Four component concepts recur across this literature and merit disaggregation for constitutional analysis. Mental privacy concerns the confidentiality of neural data and mental states from unauthorised observation, analogous to but distinct from informational privacy because the underlying subject-matter (raw neural signal) is not a considered communication but an involuntary physiological process. Psychological integrity concerns protection against unconsented alteration of a person's mental states or capacities, whether through invasive stimulation, pharmacological intervention, or, prospectively, targeted neurostimulation delivered without adequate consent. Freedom of thought, distinct from the two preceding concepts because it is already a well-established, non-derogable right in international human-rights instruments, is implicated where neurotechnology is used to infer or influence the content of a person's beliefs or opinions rather than merely their neural correlates. Freedom from algorithmic manipulation concerns the compounding risk that neural or para-neural data (attention, arousal, affective state inferred from biometric proxies) may be used to train predictive models that shape a person's choices through personalised, sub-perceptual persuasion techniques that a person cannot consciously detect or resist, a harm distinct from ordinary advertising because it targets pre-rational cognitive processes rather than reasoned deliberation.

[13]See Yuste et al., supra note 3; see also Press Coverage of the NeuroRights Foundation's Advisory Role in Chile's 2021 Constitutional Reform, discussed in Guio-García, infra note 20 and accompanying sources.

[14]See Nita A. Farahany, The Battle for Your Brain: Defending the Right to Think Freely in the Age of Neurotechnology (2023) (cataloguing the commercial deployment of neurotechnology in workplace monitoring, transportation safety, and consumer marketing, and arguing for a right to cognitive liberty encompassing both freedom from unwanted mental intrusion and self-determination over cognitive enhancement).

The claim that cognitive liberty is "emerging" as a human right should be stated with appropriate caution. Cognitive liberty is not yet the subject of a binding multilateral treaty; it is at present best described as a candidate norm supported by scholarly consensus, national constitutional practice in a single jurisdiction (Chile), and non-binding recommendations from international bodies such as UNESCO. Whether it should crystallise into hard law, and at what level, international, constitutional, or statutory, is precisely the question this article examines in the Indian context.

4. CONSTITUTIONAL ANALYSIS

4.1 Article 20(3) and the Limits of the Self-Incrimination Analogy

The most direct judicial engagement between Indian constitutional law and neurotechnology remains Selvi v. State of Karnataka[15], in which a three-judge bench of the Supreme Court held that the compulsory administration of narcoanalysis, polygraph examination, and Brain Electrical Activation Profile (BEAP) tests violates the right against self-incrimination under Article 20(3) and the right to personal liberty under Article 21. The Court reasoned that the constitutional guarantee against self-incrimination is not confined to formal testimonial compulsion but extends to any involuntary extraction of personal knowledge from an individual's mind, and further held that such techniques implicate the right to privacy and to be free from cruel, inhuman, or degrading treatment.

Selvi is frequently, and rightly, cited as India's closest doctrinal analogue to a neurorights precedent. Yet its reasoning, examined closely, offers narrower protection than commentators sometimes assume. The judgment is anchored in the criminal-procedural context of testimonial compulsion, its operative holding restrains the state's investigative power, and its constitutional hook is Article 20(3), a right textually confined to a "person accused of an offence." This textual limitation means Selvi's ratio does not, without further extension, restrain a private neurotechnology company from collecting neural data from a consenting (or nominally consenting) consumer, nor does it address the harm of algorithmic inference from neural data lawfully collected for one purpose and repurposed for another. Selvi is a shield against coercive extraction by the state in the adjudicative process; cognitive liberty, as articulated in the international literature, is a broader claim against both state and private cumulative, non-

[15]Selvi, supra note 1.

coercive, consent-based intrusion. The doctrinal gap between the two is real and has not been closed by any subsequent decision.

4.2 Article 21: Privacy, Dignity, and the "Living Constitution"

The more promising doctrinal vehicle is Article 21, as reconstructed by the nine-judge bench in Justice K.S. Puttaswamy v. Union of India[16]. The Court held unanimously that the right to privacy is intrinsic to the right to life and personal liberty under Article 21 and to the freedoms guaranteed by Part III, and grounded that right in the constitutional value of dignity, describing privacy as safeguarding an individual's capacity for self-determination over intimate personal choices. Justice Chandrachud's plurality opinion further recognised informational privacy, bodily privacy, and privacy of choice as overlapping but analytically distinct zones of protection, expressly declining to enumerate an exhaustive catalogue of privacy's contents and treating Article 21 as a repository capable of absorbing new facets of liberty as social and technological conditions change.

This non-exhaustive, evolutionary methodology is precisely what a claim of cognitive liberty requires, because no existing enumerated head of privacy was drafted with neural data in mind. The structural argument is straightforward: if bodily privacy protects against unconsented physical intrusion and informational privacy protects against unconsented collection and use of personal data, then a coherent reading of Article 21 should recognise an intermediate zone, call it "cognitive" or "mental" privacy, protecting the neural substrate from which both bodily sensation and personal data ultimately derive. The Puttaswamy Court's own reasoning on dignity supports this extension: if privacy protects the capacity for self-determination, then the involuntary decoding or algorithmic manipulation of a person's neural states is, if anything, a more direct assault on self-determination than the informational harms Puttaswamy addressed, because it reaches the very substrate in which self-determining choices are formed.

However, this extension is not without friction. Puttaswamy was decided in the context of state action, a challenge to a government identification scheme, and its horizontal application to private commercial actors, such as a consumer neurotechnology company, remains doctrinally underdeveloped in Indian jurisprudence, notwithstanding the general acceptance that certain fundamental rights carry horizontal effect against non-state actors performing functions with significant public consequence. The Digital Personal Data Protection Act, 2023 does impose horizontal obligations on private data fiduciaries, but, as discussed in Part 6, its architecture

[16]Puttaswamy, supra note 2.

was not designed with the specific inferential risks of neural data in view, and its "consent" mechanism, built around notice-and-consent for discrete processing purposes, is a poor fit for a technology capable of extracting information the data subject did not know they were disclosing.

4.3 Article 19 and the Compound Right to Cognitive Freedom

Article 19(1)(a)'s guarantee of freedom of speech and expression has been read by the Supreme Court to encompass a correlative right not to speak, and, more broadly, a right to silence and to the free formation of opinion prior to expression. Neurotechnology capable of inferring unexpressed opinion or intended speech threatens this pre-expressive stage directly: a right to freedom of expression that protects only the moment of utterance, while leaving the formation of the utterance vulnerable to covert extraction, offers an incomplete guarantee. The doctrinal resource here is underused: courts have generally treated Article 19(1)(a) as protective of expression once willed, not of the antecedent freedom to think without surveillance, yet the latter is a logical precondition of the former. An expressive right without a correlative right to unmonitored thought is, in a neurotechnological environment, a right that can be functionally hollowed out before it is ever exercised.

4.4 Article 14 and the Problem of Neuro-Discrimination

Article 14's guarantee of equality before the law and equal protection of the laws is implicated by the prospect of "neuro-discrimination", differential treatment of individuals in employment, insurance, or credit based on inferred cognitive traits, emotional volatility, or predisposition to neurological conditions derived from neural or para-neural data. Existing equality jurisprudence, built around suspect classifications such as sex, caste, and religion, or around the "manifest arbitrariness" standard articulated in later decisions, has not yet been tested against classifications derived from opaque algorithmic inference of mental states. The classification problem is compounded by opacity: unlike an employer's overt policy, an algorithmic inference of, say, elevated stress-reactivity from neural proxies is invisible to the affected individual, making it structurally difficult to invoke Article 14 through the ordinary route of demonstrating differential treatment, since the individual may never learn that a classification was applied.

4.5 The Cumulative Reading

Read together, Articles 14, 19, 20(3), and 21 supply overlapping but incomplete protection. Article 20(3) restrains coercive state extraction in the criminal process; Article 21, following

Puttaswamy, supplies the most capacious and evolutionarily suited textual home for a general right to mental privacy and integrity; Article 19(1)(a) offers an underdeveloped but conceptually necessary protection for the pre-expressive stage of thought; and Article 14 offers, at best, a reactive remedy against neuro-discrimination once it can be proven, a significant evidentiary burden given the opacity of algorithmic inference. No single provision, and no combination of them as presently interpreted, squarely addresses the preventive, consent-architecture, and private-sector dimensions of the problem. The doctrinal raw material for judicial recognition of cognitive liberty exists; what is missing is either an authoritative judicial articulation binding that raw material together, or a legislative framework that operationalises it independently of litigation.

Other precedents reinforce the constitutional trajectory toward recognising bodily and mental autonomy as core to Article 21 without directly resolving the neurotechnology question. In Common Cause v. Union of India[17], the Court recognised a constitutional right to die with dignity, including the right to execute an advance medical directive, grounding personal autonomy over the end of one's own biological existence in Article 21. In Navtej Singh Johar v. Union of India[18] and Joseph Shine v. Union of India[19], the Court repeatedly emphasised that autonomy over intimate, self-regarding choices, sexual orientation and marital fidelity respectively, lies at the core of dignity-based liberty under Article 21, decriminalising provisions of the Indian Penal Code that had permitted state or interpersonal control over such choices. Each decision expands the substantive content of liberty in a domain further from state coercion and closer to self-regarding autonomy, a trajectory entirely consistent with, but not yet extended to, protection of the cognitive domain itself.

5. COMPARATIVE JURISPRUDENCE

Chile remains the paradigmatic comparative case. In October 2021, the Chilean Congress enacted Law No. 21.383, amending Article 19(1) of the Political Constitution to provide that scientific and technological development must serve the person and be carried out with respect for life and physical and psychic integrity, and mandating that legislation regulate the conditions and restrictions on the use of such technology on persons "with special protection

[17]Common Cause v. Union of India, (2018) 5 S.C.C. 1 (India) (recognising a constitutional right to die with dignity, including the right to execute an advance medical directive, as an incident of Article 21).
[18]Navtej Singh Johar v. Union of India, (2018) 10 S.C.C. 1 (India) (reading down Section 377 of the Indian Penal Code and holding that autonomy over sexual orientation is protected under Article 21).
[19]Joseph Shine v. Union of India, (2019) 3 S.C.C. 39 (India) (striking down Section 497 of the Indian Penal Code and holding that autonomy over intimate marital choices is protected under Article 21).

for brain activity and the information derived therefrom."[20] This made Chile the first country to entrench express constitutional protection for neural data and brain activity. Implementing legislation to operationalise the provision, addressing informed consent standards, neurodata governance, and research oversight, has been under legislative consideration in the years since, indicating that constitutional recognition alone does not resolve the harder question of regulatory design, a caution directly relevant to any Indian reform proposal.[21] Notably, in 2023 the Chilean Supreme Court applied the amendment in a case against Emotiv, a consumer neurotechnology company, ordering the deletion of a Chilean user's brain-activity data on the ground that its retention violated the user's constitutional rights to mental integrity and privacy, providing an early indication that constitutional neurorights can generate enforceable remedies against private commercial actors, not merely the state.[22]

Spain has approached the subject through soft law rather than constitutional amendment, with its Charter of Digital Rights (2021) articulating a set of digital-era rights that include protections against unauthorised use of neurotechnology, though the Charter is a policy instrument rather than binding constitutional or statutory text and its practical enforceability remains correspondingly limited.

At the supranational level, UNESCO's Recommendation on the Ethics of Neurotechnology, developed following its earlier Recommendation on the Ethics of Artificial Intelligence, has articulated principles requiring member states to ensure that neurotechnology respects human dignity, autonomy, and mental privacy, though as a recommendation rather than a convention it imposes no binding obligation and relies on domestic implementation for effect. The OECD's 2019 Recommendation on Responsible Innovation in Neurotechnology similarly sets out non-binding principles, including cultivating cognitive liberty, promoting equitable access to neurotechnology, and building capacity for anticipatory governance, that member states, including India as an OECD partner country in relevant working groups, may draw upon in domestic policymaking without direct legal obligation. The Council of Europe's Committee on Bioethics has likewise examined whether the Oviedo Convention on Human Rights and

[20]Constitución Política de la República [C.P.] art. 19, para. 1 (Chile), as amended by Ley 21.383, Oct. 25, 2021 (Chile) (requiring that scientific and technological development respect physical and psychic integrity and mandating special legal protection for brain activity and the information derived from it).

[21]See Boletín No. 13.828-19 (Chile), implementing legislation on neuroprotection pending before the Chilean Congress, described in Even Chile's Neurorights Leave Inferred Mental Data in a Gray Zone, Stan. L. Sch. Law & Biosciences Blog (Apr. 27, 2026).

[22]See id. (describing a 2023 decision of the Corte Suprema of Chile ordering Emotiv, a consumer neurotechnology company, to delete the brain-activity data of a Chilean user on the ground that its retention violated his constitutional rights to mental integrity and privacy).

Biomedicine, which already regulates interventions in the "brain," requires supplementary protocols to address neurotechnology specifically, reflecting an emerging European view that existing bioethics conventions are necessary but insufficient.

The United States presents an instructive negative comparison. Despite hosting the majority of the world's leading neurotechnology companies, including Neuralink, Synchron, Precision Neuroscience, and Blackrock Neurotech, the United States has no federal constitutional or statutory neurorights framework; the closest analogues are state-level initiatives, such as Colorado's and California's amendments extending existing consumer privacy statutes to cover neural data as a category of sensitive personal information, illustrating a statutory rather than constitutional pathway to protection.

What India can draw from this comparative survey is threefold. First, constitutional recognition, as Chile demonstrates, is achievable through amendment even absent a prior line of judicial precedent, but constitutional text alone generates limited practical protection until implementing legislation and enforcement mechanisms are built, a multi-year process even in a unitary, comparatively agile legislative system. Second, the American experience shows that a well-designed statutory extension of data-protection law, treating neural data as a sensitive category triggering heightened consent and processing restrictions, can deliver meaningful protection without a constitutional amendment, and may be faster to enact within India's federal and parliamentary constraints. Third, no jurisdiction has yet resolved the horizontal-application problem, ensuring that neurorights bind private commercial actors, who are, on the present trajectory of commercial neurotechnology, more likely sources of everyday harm than the state.

6. LEGAL CHALLENGES CREATED BY NEUROTECHNOLOGY

Ownership of neural data is conceptually unsettled: property-based models risk commodifying an aspect of personhood in a manner analogous to the objections raised against markets in human organs, while a purely privacy-based model, without a proprietary or fiduciary overlay, may leave the data subject without a remedy against downstream commercial exploitation once initial consent has been obtained. Consent itself is structurally compromised in the neurotechnological context because the very information a data subject would need to give meaningful, informed consent, the inferential capabilities of a decoding algorithm applied to their neural signal, is frequently unknown even to the company deploying it, since inferential

capacity improves with retrospective analysis of previously collected, and therefore already consented-to, data.

Surveillance risk arises acutely in workplace and security contexts, where continuous neural or para-neural monitoring, for fatigue, attention, or emotional state, is already deployed in safety-critical industries such as transportation, raising the question whether employment consent, given under conditions of economic dependency, can be considered free consent for constitutional purposes. Neuro-discrimination, discussed in Part 4.4, compounds this risk by enabling adverse employment or insurance decisions based on inferred cognitive or affective traits without transparent classification criteria. Cognitive manipulation, the use of neural or biometric proxy data to deliver sub-perceptual, individually calibrated persuasive stimuli, represents a qualitatively distinct threat from conventional targeted advertising because it aims at pre-rational response rather than reasoned assent, a distinction current consumer-protection and advertising-standards law is not built to recognise.

In criminal justice, the Selvi framework restrains coercive extraction but has not been tested against voluntary or consensual use of neurotechnology by defendants seeking to demonstrate diminished culpability, nor against prosecutorial use of neural evidence obtained through consumer devices under a data-sharing request rather than direct compulsion, a gap the "voluntary" framing of consent may not adequately close given the coercive pressures inherent in a criminal proceeding. Military and dual-use applications of BCI technology raise additional international humanitarian law questions largely outside the scope of domestic constitutional analysis but relevant to any comprehensive Indian regulatory framework, given India's evolving defence-technology posture. Cybersecurity of BCIs introduces a novel harm category: an implanted device that is compromised is not merely a data breach but a potential vector for unauthorised neural stimulation, a harm with no clear analogue in either data-protection or product-liability doctrine as presently structured in Indian law.

Existing doctrines are inadequate along three axes. First, consent doctrine, built around discrete, comprehensible processing purposes, cannot accommodate a technology whose inferential capacity is retrospectively expanding. Second, harm-based tort and consumer-protection remedies, which generally require a demonstrable, individualised injury, are poorly suited to cumulative, diffuse, or probabilistic harms such as neuro-discrimination, where causation is difficult to establish. Third, the state-action doctrine underlying much of Indian fundamental-rights jurisprudence leaves the most probable near-term source of

neurotechnological harm, private commercial actors, in a zone of constitutional ambiguity that only statutory intervention can reliably close.

7. SHOULD INDIA RECOGNISE COGNITIVE LIBERTY?

7.1 The Case in Favour

The affirmative case rests on four propositions. First, the doctrinal trajectory of Article 21, from Puttaswamy through Common Cause, Navtej Singh Johar, and Joseph Shine, has consistently expanded the zone of self-regarding autonomy protected against both state and, increasingly, private interference, and cognitive liberty is a natural, indeed overdue, extension of that trajectory rather than a discontinuous innovation. Second, the absence of explicit recognition creates a regulatory vacuum precisely at the moment when commercial neurotechnology is scaling globally, meaning that by the time a suitable test case reaches the Supreme Court, a substantial installed base of consumer neurotechnology may already have normalised data practices that would be difficult to unwind retrospectively, an argument for anticipatory rather than reactive constitutionalism. Third, India's constitutional culture, as evidenced by Puttaswamy's extensive engagement with comparative and international materials, has shown institutional willingness to import emerging global rights concepts into domestic doctrine, suggesting cognitive liberty is not an alien transplant but a continuation of established interpretive method. Fourth, explicit recognition would provide interpretive clarity for the pending review and eventual amendment of India's data-protection framework, giving legislative drafters a clear constitutional benchmark against which to calibrate neural-data-specific provisions.

7.2 The Case Against

The case against rests on institutional and doctrinal caution. First, judicial recognition of new fundamental-rights content, however textually grounded, raises legitimate separation-of-powers concerns when it effectively performs a quasi-legislative function of defining the contours of a wholly new regulatory domain, particularly one, unlike privacy in Puttaswamy, where the technology's risk profile is still empirically contested and rapidly evolving. Second, an underspecified judicial recognition of "cognitive liberty," without accompanying statutory content, risks generating the same enforcement gap that has attended other expansively worded Article 21 rights, recognised in principle, difficult to vindicate in practice absent a specific cause of action, evidentiary standard, or regulator. Third, premature constitutional entrenchment could, paradoxically, freeze regulatory design around an early and possibly

mistaken understanding of the technology's risks, a concern amplified by the rapid pace of change in neural-decoding capability. Fourth, India's constitutional amendment process, while less rigid than fully entrenched constitutions, remains a high-friction mechanism poorly suited to a domain requiring iterative regulatory calibration, favouring statutory rather than constitutional-text solutions for operational detail even where a constitutional principle is independently justified.

7.3 Judicial Interpretation or Constitutional Amendment?

The choice is not binary. Chile's experience demonstrates that constitutional amendment without prompt implementing legislation produces a right long on symbolism and short on enforceable content. Conversely, reliance on judicial interpretation alone, waiting for a Selvi-like test case to reach the Supreme Court, risks arriving after, rather than before, the commercial entrenchment of harmful data practices, given the slow pace of appellate litigation relative to product-development cycles in this sector. The more defensible course, and the one this article adopts, is interpretive rather than amendatory: the Supreme Court, in an appropriate future case, should recognise cognitive liberty as an implicit facet of the right to life and personal liberty under Article 21, drawing directly on Puttaswamy's non-exhaustive methodology and its own precedent in Selvi restraining coercive neural extraction, without waiting for or requiring a formal constitutional amendment on the Chilean model. This interpretive recognition should then be operationalised, not supplanted, by targeted statutory reform, discussed in Part 8, addressing the private-sector, consent-architecture, and enforcement gaps that judicial recognition alone cannot close. This sequencing places India between the two comparative poles surveyed in Part 5: it need not await a constitutional amendment as protracted as Chile's implementing-legislation process, nor should it rely, as the United States has, on piecemeal statutory extension unanchored in any constitutional principle capable of guiding future interpretation as the technology evolves.

8. RECOMMENDATIONS

First, the Supreme Court, in a suitable reference or public-interest litigation concerning consumer neurotechnology, should articulate cognitive liberty, comprising mental privacy, psychological integrity, and protection of the pre-expressive stage of thought, as a recognised facet of Article 21, expressly linking it to the reasoning in Puttaswamy and Selvi rather than treating it as a novel importation.

Second, Parliament should enact a dedicated Neural Data Protection framework, whether as a freestanding statute or as a specifically calibrated chapter within a future amendment to the Digital Personal Data Protection Act, 2023, treating neural and para-neural data as a distinct category of sensitive personal data subject to heightened consent standards, purpose limitation resistant to retrospective reinterpretation, and mandatory algorithmic-impact disclosure for any inferential processing.

Third, India should establish an independent regulatory authority, or a specialised division within the existing Data Protection Board established under the 2023 Act, possessing the technical capacity to assess neurotechnology-specific risk, approve consumer-device data practices, and investigate neuro-discrimination complaints, given that generalist data-protection regulators are unlikely to develop the requisite technical expertise organically.

Fourth, sector-specific ethical oversight mechanisms should be mandated for clinical and research applications of invasive BCIs, building on and extending the existing ethics-committee architecture under the Drugs and Cosmetics Rules and Indian Council of Medical Research guidelines governing biomedical research, to explicitly address neural-data governance, long-term device liability, and post-trial data rights for research participants.

Fifth, employment and insurance law should be amended to prohibit adverse decisions based on neural or para-neural biometric inference absent a demonstrable, individually verified, and independently auditable causal link to a legitimate and narrowly defined occupational or actuarial requirement, shifting the evidentiary burden onto the entity relying on such inference given the structural opacity discussed in Part 6.

Sixth, consumer-protection and advertising-standards regulation should be extended to explicitly address sub-perceptual, biometrically calibrated persuasive techniques, requiring disclosure and, in higher-risk categories, informed opt-in consent distinct from standard terms-of-service acceptance.

These recommendations are calibrated to be realistic within India's existing institutional architecture: they build upon, rather than replace, the Data Protection Board, the ethics-committee system, and the interpretive methodology the Supreme Court has already developed in Puttaswamy and Selvi, rather than proposing an entirely novel regulatory apparatus with no domestic institutional analogue.

9. CONCLUSION

The Constitution of India, interpreted through Puttaswamy's expansive and non-exhaustive reading of Article 21 and Selvi's recognition of mental privacy in the criminal-investigative context, contains the doctrinal resources necessary to recognise cognitive liberty as a constitutional value. What it presently lacks is the authoritative synthesis binding those resources into an operative right, and the statutory architecture capable of translating that right into enforceable protection against the private commercial actors who are, on the present trajectory of neurotechnology, its most probable source of harm. The comparative experience of Chile demonstrates both the symbolic power and the practical limitations of constitutional recognition unaccompanied by prompt implementing legislation; the American experience demonstrates the converse limitation of statutory protection unanchored in constitutional principle. India, drawing on its own tradition of purposive, dignity-centred constitutional interpretation, is well placed to avoid both deficiencies by pursuing judicial recognition and statutory implementation in tandem rather than in sequence. The research question posed at the outset, should India recognise cognitive liberty as an independent fundamental right, is best answered not with a single constitutional amendment but with an interpretive act of the judiciary, given early and definite legislative content by Parliament. As neurotechnology continues to compress the distance between the mind and the machine, Indian constitutionalism faces a choice that will define its next doctrinal frontier: to extend the logic of dignity and autonomy that has governed the body and behaviour to the domain of thought itself, or to permit that domain to be regulated, by default, by the terms of service of the companies that build the devices reading it.