

Protecting Brain Data in the Age of AI: Constitutional and Neuro-Legal Safeguards

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Abstract

Neurotechnology is quietly reshaping the relationship between human beings and their own minds. Tools that once seemed distant can now observe neural activity and interpret the subtle signals that give rise to thoughts, emotions, memories, and intentions. As this scientific progress grows, the human mind begins to lose the natural protection it once enjoyed. Thoughts that were always private and personal are no longer fully hidden, and the intimate space of inner life becomes more exposed to technological influence.

This article reflects on the importance of protecting brain data in a world where artificial intelligence and brain-interfacing systems are advancing steadily. It examines how constitutional principles, especially those relating to privacy, liberty, and dignity, must respond when the mind becomes accessible to machines. It further considers whether genuine freedom can continue to exist when neural information may be analysed, inferred, or used without meaningful understanding or consent. Through a study of emerging neuro rights, comparative global approaches, and the present position within Indian law, the article highlights the urgent need for safeguards that treat brain data not as routine information but as an extension of human identity itself.

The central argument is that the human mind deserves the highest form of respect and legal protection. Brain data contains the emotional and cognitive essence of a person and therefore requires careful ethical and constitutional attention. Preserving the sanctity of thought is ultimately an affirmation of human dignity and a commitment to ensuring that the inner world of each individual remains protected and free.

Keywords: Brain Data, AI, Constitution, Neuro-Rights, Brain-Computer Interfaces

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I. Introduction

The contemporary technological era is characterised by an unprecedented convergence between human cognition and digital systems. Innovations that once belonged to speculative fiction, machines capable of interpreting, recording, or interfacing with neural activity, have matured into operational brain–computer interfaces (BCIs) that establish direct communication between the brain and external computational environments. Since BCIs are fundamentally designed to enable machine control through cognitive intention, scholarly literature underscores their capacity to substantially improve how individuals with disabilities or injury-related impairments interact with their surroundings.² This emerging domain of neurotechnology is transforming scientific understanding while simultaneously challenging long-standing legal and philosophical assumptions concerning autonomy, identity, and personhood, as well as neural data.

Originally designed as medical interventions, brain–machine interfaces (BMIs) were initially conceptualised to assist individuals affected by paralysis, spinal cord trauma, or neurodegenerative disorders such as amyotrophic lateral sclerosis (ALS). Within therapeutic settings, such systems enable users to operate prosthetic limbs, mobility devices, and communicative platforms solely through neural signals, thereby enhancing functional independence and overall quality of life. Over time, however, the ambit of BMIs has expanded considerably, extending far beyond their original clinical purpose.³

The potential risks associated with BCIs can be illustrated through recent developments in commercial neurotechnology. Elon Musk’s Neuralink project, for instance, demonstrated a monkey operating a video game solely through neural activity transmitted via an implanted chip. In simple terms, the device enabled direct communication between the animal’s brain and an external

² Ishika Garg and Abinand Lagiseti, *Mind the Gap: Advocating for an Indian Legislative Response to Neurotechnology*, 12, NLIU LAW REVIEW, 21, 23, (2023).

³ Dr. Subholaxmi Mukherjee, *Neuro-Law and Brain–Machine Interfaces: Emerging Frontiers of Legal Responsibility, Rights, and Regulation*, 6, ADVANCED INTERNATIONAL JOURNAL FOR RESEARCH (AIJFR), 1, 3, (2025).

machine.⁴ Comparable progress has been reported by Synchron, a neurotechnology company that has begun implanting BCI devices in human subjects, enabling actions such as composing social-media messages through thought alone⁵. The capacity to translate neural impulses into linguistic output represents only an initial stage in what forthcoming neurotechnological systems may be capable of achieving. Neuralink has further asserted that future iterations of its devices could allow individuals with paralysis to navigate a smartphone through cognitive intention at speeds surpassing manual operation.⁶ Although such advancements hold immense promise for enhancing human capability and improving the lives of persons with motor disabilities, they simultaneously generate significant concerns regarding mental privacy violations, cognitive manipulation, and intrusive surveillance into the inner sphere of thought.

Neurotechnology's most-discussed ability is the potential to access and control neural data; this may imperil the very basic elements of human autonomy. For instance, in 2014, a paraplegic man kicked off the FIFA World Cup using a robotic exoskeleton connected directly to his brain⁷. In 2019, researchers enabled a group of individuals to play a similar game. Similarly, a study led to research in which scientists enabled a team of participants to play the equivalent of a simple video game in 2019. Recently, just this year, a fellow could use his thoughts alone to compose a letter by controlling the pointer on his computer to type words onto a monitor thanks to a neural device. Because of these advances, which just a few years ago sounded like science fiction, the boundaries between more general social uses, including entertainment, security,

⁴ Ishika Garg And Abinand Lagiseti, *Mind the Gap: Advocating for An Indian Legislative Response to Neurotechnology*, 12, NLIU LAW REVIEW, 21, 23, (2023).

⁵ Robert Barrie, Synchron's BCI meets primary endpoint in feasibility trial, *clinicaltrialsarena*, (Oct. 1, 2024), Synchron's BCI meets primary endpoint in feasibility trial - Clinical Trials Arena.

⁶ Allhealthtech, Neuralink's latest updates: Brain implants, human trials & what's ahead - All Health Tech, (Last visited Feb 22, 2025).

⁷ TEDBlog, The story of an impossible kick: Miguel Nicolelis at TEDGlobal 2014 | TED Blog, (Last Visited Feb 22, 2026).

and criminal justice, and medical applications are becoming increasingly blurry.⁸

In India, neurotechnology has already moved from theoretical discourse to widespread commercial deployment. Companies such as Neuphony and Nexstem market EEG-based headsets for wellness, productivity, and entertainment, while global manufacturers make consumer neurodevices readily available. These tools collect highly sensitive neural information, attention levels, emotional responses, stress patterns, and potentially latent cognitive impressions. These signals, captured through electroencephalography (EEG), functional magnetic resonance imaging (fMRI), intracortical implants, or other brain-computer interface (BCI) devices, differ fundamentally from conventional personal data, which is called Brain Data, any measurable information generated by neural processes, including electrical impulses, oscillatory patterns, hemodynamic responses, and other physiological signals that reveal mental states, emotional patterns, cognitive processes, or decision-making activity.⁹

As AI-driven healthcare systems, neuro-marketing practices, workplace monitoring tools, and cognitive-enhancement products become more common, the legal question is no longer whether mind-reading technologies are theoretically possible; the crucial question is how the law can protect individuals from the misuse of the most intimate category of data: their thoughts. This gives rise to foundational questions regarding the ownership of neural information, the standards governing its lawful processing, and whether brainwave-derived data may be compelled or admitted as evidence. This trajectory ultimately foregrounds a fundamental question: *how can individuals safeguard themselves against the intrusive potential of emerging neurotechnologies?*

⁸ Niharika Talan, *Neurorights Legal and Ethical Considerations and Brain Data Privacy*, 8, INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES, 835, 837, (2025).

⁹ Nar Hari Singh, *Brain Data in India: Taking it From Your Head to the Courtroom and Dealing with All the Legal Stuff*, LEXTALKWORLD, (JULY 8, 2025) *Brain Data in India: Taking it From Your Head to the Courtroom and Dealing with All the Legal Stuff*.

A possible response emerges through the developing framework of *neuro-rights*. Neuro-rights denote the legal and ethical protections that safeguard an individual's cognitive and mental sphere. This body of principles seeks to guard against the risk that advances in neurotechnology may be exploited to manipulate a person's thoughts, preferences, or decision-making patterns. At the core of this framework lies the right to mental privacy, which affirms an individual's authority over the access, use, and interpretation of their neural data. By securing such control, the concept of mental privacy directly addresses the concerns posed by the intrusive potential of modern neurotechnological systems.¹⁰

Across the world, legal systems are beginning to recognise the profound implications of neurotechnology and are developing safeguards to address them. India, however, is only at the early stage of confronting these questions. This paper, therefore, considers how far Indian law can protect individuals from intrusions into their neural and cognitive spheres. It examines the current legislative landscape, alongside constitutional protections such as the privilege against self-incrimination under Article 20(3) and the privacy framework articulated in *K.S. Puttaswamy v. Union of India*¹¹. Developments in other jurisdictions, including Chile's constitutional recognition of neurorights, the inclusion of brainwave-based data under privacy laws in certain U.S. states, and ongoing deliberations in Europe on regulating neural information within AI governance, highlight a growing global commitment to safeguarding cognitive autonomy.

India presents a contrasting picture. The Digital Personal Data Protection Act of 2023, while an important milestone, does not expressly recognise neural data as a category requiring heightened protection, nor does it address concerns regarding mental privacy or cognitive liberty. Similarly, constitutional doctrine has yet to clarify how freedom of thought or protections against compelled self-incrimination apply when neurotechnology can decode or record mental states. This paper, therefore, explores the constitutional, regulatory, and ethical implications of brain-data processing in India, identifies key gaps in the

¹⁰ Vidhya Lakshmi A, *Mental Firewalls: The Next Human Right*, Record Of Law, (August 29, 2025), *Mental Firewalls: The Next Human Right - Record Of Law*

¹¹ *K.S. Puttaswamy v. Union of India*, AIR 2018 SC (SUPP)1841.

existing framework, and proposes a structured approach for recognising cognitive liberty as an essential component of human autonomy in an era of rapidly advancing neurotechnological capabilities.

II. Neuro Rights

Advances in neurotechnology have opened new and extraordinary possibilities for accessing, monitoring, and even influencing the human brain. Although these innovations hold immense promise for medical treatment and cognitive support, they simultaneously introduce complex ethical and legal concerns. As neurotechnological systems become more refined, there is growing unease about the possibility that essential elements of human thought and agency may be appropriated or manipulated by external actors, including artificial intelligence systems and autonomous machines.

In response to these concerns, scholars and ethicists have begun advocating for the recognition of a new category of fundamental rights, commonly referred to as **neuro-rights**.

‘The term neurorights was coined by Marcello Ienca and Roberto Andorno (2017), proposing the standardization of four new human rights – the right to mental privacy, the right to mental integrity, the right to psychological continuity, and the right to cognitive liberty. These are rights that partially follow the four ethical priorities, also identified as “four areas of concern that call for immediate action”. As brain-computer interfaces (BCIs) and other neurotechnologies evolve, they raise significant ethical, legal, and social concerns.’¹²

Since 2017, academic and policy debates have emphasized the need to safeguard individuals against the unique threats posed by neurotechnology. Among the proposed neuro-rights are: (i) **cognitive freedom**, the right to control one’s own mental processes; (ii) **mental privacy**, the right to keep one’s thoughts and brain data protected; (iii) **mental integrity**, the right to be free from unwanted intrusions or alterations of neural activity.

¹² Krishna Ravi Srinivas, As thoughts become digitised, who will protect our neurorights?, The Hindu, (July 17, 2024 05:00 am IST) Neurorights: An Emerging Ethical and Legal Frontier · UPSCprep.com.

At present, bioethicists and legal scholars are advocating for a new category of rights known as Neuro-Rights. Prominent proposals in this area, spearheaded by thinkers like Rafael Yuste, include

- **Mental Privacy:** Protection against the unauthorized collection, use, or dissemination of brain data
- **Liberal right to cognitive liberty:** The right to employ or refuse the use of neurotechnologies in a non-forced manner.
- **Right to psychological continuity:** He or she should not be deprived of his psychological continuity in person, memory, and the mental identity should also be absolute.
- **Right to equal enjoyment of the benefits of cognitive enhancement:** Preventing a new divide in society because of access to neurotechnological enhancement.

These neuro-rights protect the individual against a wide spectrum of neurotechnology threats, including monitoring of brainwaves, tampering of memory, and predictive analytics that infer thought or intent.¹³

III. Lack of Right to Cognitive Liberty- Possible Effects on Rights

A. Freedom of Thought and Liberty

A specialist from the RAND Corporation, a well-known public policy research organisation, has noted a growing emphasis in China on developing tools that can influence how people think and make decisions. These efforts include research into methods such as “brainwave interference” and “infrasound weapons,” which are designed to disturb neural activity. Technologies of this nature can subtly alter perception, disrupt mental clarity, and shape the choices a person ultimately makes.¹⁴

Such developments strike at the very heart of an individual’s freedom of thought, a principle deeply embedded within the protection granted under

¹³ Rafael Yuste et al., Four Ethical Priorities for Neurotechnologies and AI, 551, *Nature* 159 (2017).

¹⁴ Bill Gertz, Chinese ‘brain control’ warfare work revealed, *The Washington Times*-Wednesday, (Dec. 29, 2021), China ‘brain control’ warfare work revealed - *Washington Times*.

Article 19(1)(a)¹⁵. Freedom of thought requires that a person's mind remain their own, free from external manipulation, whether political, psychological, or technological. When technologies aim to interfere with a person's inner reasoning or cognitive independence, they challenge not only personal liberty but also the constitutional promise that one's thoughts must remain inviolable.

B. Right to Privacy

Mind-reading technologies, including certain EEG-based bike helmets, evoke concerns reminiscent of George Orwell's idea of a "thought police." One such device, developed by Veritas Scientific, relies on analyzing brain waves through event-related potentials. When a person recognises a face, a location, or even a familiar name, the brain produces a measurable change in electrical activity. This specific pattern allows the technology to infer recognition, which effectively turns an individual's neural responses into a form of readable data.¹⁶

Concerns about the use of such devices have become more prominent due to incidents involving consumer products. Nita A. Farahany, in her book *The Battle for Your Brain*, discusses how the MindRider EEG bike helmet created by Multimer gathered information that extended far beyond what users believed they were consenting to. The accumulated brain data was later utilised to generate detailed city maps, offering insights into ideal locations for commercial establishments. The episode demonstrated how easily brain-derived information can be repurposed for objectives unrelated to the user's initial intention.¹⁷

The constitutional right to privacy recognised in *K. S. Puttaswamy v. Union of India*¹⁸ expressly protects the sanctity of the mind. The judgment affirms that informational privacy encompasses an individual's mental domain, including

¹⁵ INDIA CONST. art. 19, cl. 1(a).

¹⁶ Darlene Storm, Orwell's Thought Police made real: Mind-reading helmet invades privacy of the mind, (JULY 12, 2012), COMPUTERWORLD, Orwell's Thought Police made real: Mind-reading helmet invades privacy of the mind – Computerworld.

¹⁷ Sinchana M.R. & R.S. Sanjanaa, Right to cognitive liberty in a Transhumanism Era: A Case for Integration within Indian Legal Framework, NUALS LAW JOURNAL, (June 29, 2023), Right to cognitive liberty in a Transhumanism Era: A Case for Integration within Indian Legal Framework – NUALS LAW JOURNAL.

¹⁸ AIR 2018 SC (SUPP) 1841.

the right to decide which personal information should remain private. It underscores that the information belonging to a person is fundamentally her own and that she alone possesses the authority to disclose or retain it. A similar approach appeared in *Jordan and Others v. State*¹⁹, where the court described privacy as beginning with the “inviolable inner self.”

India’s White Paper on Data Protection also reinforces this understanding. While acknowledging that data can be used for public benefit, it warns that unregulated use of personal information threatens autonomy and individual freedom. Mind-reading helmets that extract cognitive signals during routine activities, such as cycling, clearly intrude into this protected sphere. They collect thoughts and mental associations that were never meant to be shared and then convert them into commercially useful datasets. Such practices undermine the individual’s right to privacy and compromise the freedom of thought that lies at the core of personal liberty.

IV. Right Against Self-Incrimination

The constitutional protection against self-incrimination assumes renewed significance in the age of neurotechnology. In 2008, an Indian trial court relied on neuro-experiential indicators produced through a brain electrical oscillation signature test to convict an accused woman of homicide and impose a life sentence.²⁰ Similar developments have emerged globally; for instance, private entities such as No-Lie-MRI claim the ability to detect deception solely through neural activity patterns. The increasing dependence on such technologies raises profound concerns regarding compelled testimony, particularly when neural data are extracted without a person’s free and informed consent.

The Supreme Court examined similar issues in *Selvi v. State of Karnataka*²¹, ruling that techniques like narco-analysis amount to coercion, as they strip individuals of volitional control over their responses. Building on the reasoning

¹⁹ [2002] ZACC 22; 2002 (6) SA 642 (CC), S v Jordan and Others (Sex Workers Education and Advocacy Task Force and Others as Amici Curiae (CCT31/01) [2002] ZACC 22; 2002 (6) SA 642 (CC); 2002 (11) BCLR 1117 (CC); 2002 (2) SACR 499 (CC) (9 Oct. 2002).

²⁰ State of Maharashtra v. Aditi Baldev Sharma & Pravin Premswarup Khandelwal, Sessions Case No. 508/07 (Court of Sessions, Pune, June 12, 2008).

²¹ Selvi v. State of Karnataka, (2010) 7 S.C.C. 263 (India).

in *State of Bombay v. Kathi Kalu Oghad*²² The Court held that involuntarily obtained neuroscientific evidence qualifies as ‘testimonial’ under Article 20(3) of the Constitution. Additionally, referencing *Maneka Gandhi v. Union of India*²³ The judgment emphasized that constitutional safeguards apply regardless of whether formal criminal proceedings have been initiated, and that compulsory use of such methods infringes upon the right to personal liberty guaranteed under Article 21.

Although the Court observed that information derived from involuntary neuroscientific procedures cannot be treated as a confession and is admissible only as material akin to a statement supplied to the police, the evidentiary impact remains significant. The use of such invasive methods, even when framed as corroborative, still introduces brain-based evidence into judicial reasoning, demonstrating the need for stronger cognitive-rights safeguards in contemporary criminal justice processes.

V. Free Consent to Contract

The validity of a contract under Section 14 of the Indian Contract Act, 1872 rests upon the principle of free consent. Although neurotechnological tools have not yet been implicated in contractual disputes, they present the potential to influence an individual’s mental processes in ways that may undermine voluntary agreement. Techniques such as transcranial magnetic stimulation have demonstrated the ability to modify cognitive functions and decision-making patterns. If employed to guide or manipulate choices, such interventions would raise serious questions as to whether consent was genuinely free or subtly engineered through external influence.

VI. A Global Perspective on Neurorights Regulation

With the rapid development of neurotechnology, some jurisdictions have started regulating mental privacy directly or by drawing broad implications of existing privacy statutes. In contrast to India, where mental privacy is trapped in a legal gap, a few have gone a long way toward developing constitutional guarantees concerning the mental aspect of personhood.

²² *State of Bombay v. Kathi Kalu Oghad*, AIR 1961 S.C. 1808 (India).

²³ *Maneka Gandhi v. Union of India*, AIR 1978 S.C. 597 (India).

A. Chile: World's First "Neuro-Rights" Law

Chile has positioned itself at the forefront of global mental privacy jurisprudence. In October 2021, the nation undertook a constitutional reform to recognize neuro-rights, encompassing mental privacy, the autonomy of thought, and the protection of personal identity. Article 19 of the Chilean Constitution now explicitly enshrines the right to mental integrity, thereby shielding individuals from technological interventions that seek to alter neural activity without their informed consent.²⁴

This constitutional safeguard was rigorously examined and affirmed in the landmark 2023 Supreme Court case, *Girardi v. Emotiv*. The dispute arose when Senator Guido Girardi employed an "Insight" EEG headset manufactured by the U.S. company Emotiv. Emotiv subsequently collected his anonymized brainwave data for research purposes without securing his specific consent. Girardi contended that this constituted a violation of his rights to privacy and psychological integrity.

The Supreme Court ruled decisively in favour of Girardi, issuing the world's first judicial determination on neuroprivacy. The Court underscored that "neurodata represent the most intimate aspects of human personality" and ordered Emotiv to expunge all brain data obtained from him. This judgment established a landmark precedent, equating neural signals with sensitive biometric information meriting the highest degree of protection, and unequivocally affirmed that Chile's constitutional framework prohibits the unauthorized extraction of mental data.²⁵

B. United States:

The American legal system is sectorial. Although mental privacy is not explicitly protected under federal law in the United States, various state statutes

²⁴ GOKUL. B, NEUROTECH AND THE INDIAN CONSTITUTION, Record Of Law, (Aug. 29, 2025), NEUROTECH AND THE INDIAN CONSTITUTION - Record Of Law

²⁵ Nar Hari Singh, Brain Data in India: Taking it From Your Head to the Courtroom and Dealing with All the Legal Stuff, LEXTALKWORLD, (JULY 8, 2025) Brain Data in India: Taking it From Your Head to the Courtroom and Dealing with All the Legal Stuff.

and established legal doctrines afford indirect safeguards. For instance, the California Consumer Privacy Act provides limited rights concerning personal data, while the Health Insurance Portability and Accountability Act (HIPAA) govern the use of health-related neural information within clinical contexts.

In 2023, Senator Ron Wyden introduced legislation entitled the Mind Your Own Business Act, aimed at enhancing protections against the unauthorized surveillance of biometric and cognitive data. While the bill was not enacted, it sparked significant debate regarding the necessity of a comprehensive federal framework for neuro-rights.

Furthermore, constitutional protections enshrined in the Fourth and Fifth Amendments, addressing unreasonable searches and seizures, and the right against self-incrimination, have been invoked in legal challenges involving brain fingerprinting, polygraph examinations, and other cognitive inference technologies. These developments underscore the growing tension between the preservation of mental privacy and the imperatives of law enforcement in the face of emerging neurotechnologies.²⁶

C. United Kingdom: Relying on Existing Frameworks

The United Kingdom has not enacted specific neurorights legislation, instead relying on existing medical device and data protection frameworks. BCIs intended for medical diagnosis or treatment are regulated under the UK's Medical Devices Regulation (MDR). However, consumer neurotechnologies, such as EEG headsets for gaming or wellness, often fall outside the MDR and are governed only by general product safety laws.

Brain data collected in healthcare contexts is classified as "health data," a special category under the UK GDPR and Data Protection Act, providing enhanced safeguards. Neural data from consumer BCIs, however, may not qualify for these protections. Experts have called for interpreting the UK Human Rights Act, particularly Articles 8 and 9, on privacy and freedom of

²⁶ B. Gokul, *Neurotech and The Indian Constitution*, Record Of Law, (Aug. 29, 2025), [NEUROTECH AND THE INDIAN CONSTITUTION - Record Of Law](#)

thought, to explicitly protect brain-derived data, reflecting public recognition of EEG data as deeply personal information.²⁷

D. European Union:

Regarded as one of the most advanced data protection frameworks worldwide, the General Data Protection Regulation (GDPR) does not explicitly cover neural data but provides robust safeguards for personal information. It is applied to any “personal data,” and legal theorists have started to argue that brainwave and neurodata exist in this category as biometric or health data. The GDPR enshrines principles of purpose limitation and data minimization, emphasizing that consent must be specific, informed, and freely given.

High-risk AI, such as that that might manipulate human behaviour or emotional conditions, is regulated further in the EU by the AI Act (adopted in 2024). Employing BCIs and neurotechnologies in the hiring, education, or law enforcement setting would fall under the category of being high-risk, which would mean that many regulatory compliance rules and transparency would be involved.²⁸

E. UNESCO and Global Ethical Instruments

UNESCO and Global Ethical Instruments At the multilateral level, UNESCO’s Universal Declaration on Bioethics and Human Rights (2005) and the International Bioethics Committee (IBC) Report on Neurotechnology (2021) advocate for a global normative framework emphasizing dignity, justice, and informed consent. The IBC proposes the explicit recognition of four emerging neuro-rights:²⁹

1. The right to personal identity,
2. The right to free will,

²⁷ Nar Hari Singh, Brain Data in India: Taking it From Your Head to the Courtroom and Dealing with All the Legal Stuff, LEXTALKWORLD, (JULY 8, 2025) Brain Data in India: Taking it From Your Head to the Courtroom and Dealing with All the Legal Stuff.

²⁸ *Id*

²⁹ Eliza Strickland, Worldwide Campaign for Neurorights Notches Its First Win, IEEE Spectrum, (18 Dec 2021), Worldwide Campaign for Neurorights Notches Its First Win - IEEE Spectrum.

3. The right to mental privacy, and
4. The right to equal access to mental augmentation.

These principles aim to ensure that technological innovation enhances human flourishing rather than eroding selfhood.³⁰

VII. The Role of International Institutions in Neurorights Protection

Since 2017, the term *neurorights* has gained significant attention in academic literature as scholars searched for an adequate concept to describe the emerging protections associated with the human mind and brain. The term now represents a set of ethical, legal, social, and natural principles that seek to safeguard the mental sphere of an individual. It refers to the fundamental normative rules that aim to preserve the integrity of human cognition, thought processes, and personal identity.³¹

Although neurorights appear to be a recent development, their foundations are rooted in well-established human rights instruments. Article 12 of the Universal Declaration of Human Rights of the year 1948 protects individuals from arbitrary interference with privacy, family life, home, or correspondence, and guarantees the right to legal protection against such interference. Article 3, paragraph 1 of the Charter of Fundamental Rights of the European Union of the year 2016, similarly affirms the right of every person to respect for physical and mental integrity.

Provisions of the International Covenant on Civil and Political Rights contain related protections. Article 17 concerning the right to privacy and Article 19 concerning freedom of expression can be interpreted in ways that cover concerns relating to the human brain and mental processes. However, the absence of clear terminology and a distinct conceptual framework previously made such interpretations difficult to use in practice. The emergence of the term neurorights has provided the necessary vocabulary to connect contemporary

³⁰ Bryan Johnson, A New Era for Exploring the Brain, Medium (Mar. 7, 2023), <https://bryan-johnson.medium.com/a-new-era-for-exploring-the-brain-1a413d7ecc30>.

³¹ Niharika Talan, *Neurorights Legal and Ethical Considerations and Brain Data Privacy*, 8, INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES, 835, 837, (2025).

developments in neurotechnology with the broader tradition of human rights protection and has created a clearer pathway for addressing issues related to cognitive liberty, mental privacy, and personal autonomy.

VIII. Legal Framework in India

India lacks specific legislation addressing neural data, leaving its governance dispersed across constitutional safeguards, data protection laws, and medical device regulations, none of which were originally designed to address the unique challenges posed by neurotechnologies.

A. Information Technology Act, 2000, and SPDI Rules, 2011

The Information Technology Act, 2000, together with the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011, provides a limited statutory framework for personal data protection. These instruments recognise certain categories such as passwords, biometrics, medical records, and financial information as sensitive personal data. However, they do not acknowledge or regulate **neural or cognitive data**, such as electrical brain signals, thought patterns, affective states, or neural inferences increasingly produced by wearable neurotechnology and brain–computer interfaces (BCIs). As neuro-devices capable of decoding mental states proliferate, the absence of a statutory category for brain data renders the existing framework normatively inadequate and technologically obsolete.

B. Digital Personal Data Protection Act, 2023

The Digital Personal Data Protection Act, 2023, represents India’s most recent attempt to establish a comprehensive data governance architecture. While the Act advances structured mechanisms relating to data fiduciaries, consent requirements, processing limitations, and localisation obligations, it nevertheless omits any classification of **brain-related or cognition-derived data** as sensitive personal data. This legislative silence becomes increasingly problematic against the backdrop of rapid neurotechnological developments, including the rise of neurotech start-ups, consumer-level EEG interfaces, and invasive BCI implants—such as Neuralink’s human clinical trials and expanding implantation targets. The absence of explicit statutory protection for

neural data leaves a regulatory vacuum at the very moment when such information is most vulnerable to commodification, monitoring, and misuse.

C. Constitutional Conflicts and Fundamental Freedoms

This regulatory lacuna creates significant tension with core constitutional freedoms. Neural data inherently implicates the freedom of thought protected under Article 25, the freedom of speech and expression under Article 19(1)(a), and the protection against self-incrimination under Article 20(3). In criminal justice contexts, the extraction or analysis of BCI-generated cognitive outputs raises the question of whether such data constitutes a voluntary confession. Within employment relationships, employer-driven monitoring of neural activity to assess productivity or emotional engagement could amount to an infringement of human dignity, autonomy, and bodily integrity. The possibility of cognitive surveillance challenges the very structure of constitutional protections.

D. Bharatiya Sakshya Adhiniyam, 2023

Bharatiya Sakshya Adhiniyam 2023 provides no guidance on the admissibility, probative value, reliability, or voluntariness of neural data. It lacks doctrinal standards for evaluating neuro-evidence, particularly brain-signal outputs generated by neuroimaging, BCIs, or neuro-wearable technologies. As a result, the evidentiary framework remains ill-equipped to address due process concerns, safeguards against coercion, or scientific validity requirements. The absence of structured evidentiary principles poses risks to both procedural fairness and constitutional rights when neurotechnology intersects with investigative practices.

IX. Judicial Intervention

The emergence of neurotechnology introduces not only data protection concerns but also profound challenges for Indian criminal procedure. The debate surrounding the constitutional limits of scientific techniques in criminal investigation was sharply articulated in the Supreme Court's judgment in *Selvi v. State of Karnataka*³² the case examined the legality of investigative tools such as polygraph examinations and the Brain Electrical Activation Profile

³² *Selvi v. State of Karnataka*, AIR 2010 SC 1974.

(BEAP), techniques that sought to detect deception or cognitive familiarity through physiological responses and neural activity. Polygraph tests record changes in heart rate, respiration, and perspiration as markers of stress associated with deception, while BEAP brain mapping measures electrical responses to crime-related stimuli to determine whether an individual recognises specific cues.

In *Selvi*, the Supreme Court held that compelling an accused to undergo such procedures violates the constitutional protection against self-incrimination under Article 20(3). The Court reasoned that these techniques amount to testimonial compulsion, particularly because the information extracted is neither consciously produced nor voluntarily communicated by the subject. Further, the judgment broadened the understanding of Article 21 by affirming that mental privacy and bodily integrity are indispensable components of personal liberty. The normative principles articulated in *Selvi*, therefore, remain deeply relevant today, especially as emerging neurotechnologies- brain-computer interfaces, neural implants, cognitive monitoring devices, and affective computing systems- possess the potential to infer intentions, decode mental states, and even reconstruct mental imagery. The Court's reasoning effectively forms a constitutional shield against the involuntary extraction of neural data in criminal processes.

The constitutional foundation for mental privacy was further strengthened by the Supreme Court's 2017 decision in *Justice K.S. Puttaswamy v. Union of India*³³, which recognised the right to privacy as a fundamental right under Article 21. Although the Court did not address neurotechnology specifically, the judgment's expansive interpretation of privacy as encompassing dignity, bodily integrity, and decisional autonomy logically extends to the protection of cognitive and neural processes. Despite this, no Indian court has yet adjudicated a case directly involving the collection, processing, or admissibility of neural data, creating an unresolved doctrinal space at the intersection of neuroscience and constitutional law.

The jurisprudence on the horizontal application of fundamental rights adds a further layer of complexity. In *Kaushal Kishor v. State of Uttar Pradesh*³⁴ the

³³ Justice K.S. Puttaswamy v. Union of India, AIR 2018 SC (SUPP) 1841.

³⁴ Kaushal Kishor v. State of Uttar Pradesh, AIR (2023) 4 SCC 1; 2023 INSC 4.

Supreme Court held that fundamental rights are enforceable not only against the State but, in certain circumstances, also against private actors. This development is significant for neurotechnology governance, as it opens the theoretical possibility of individuals seeking remedies against corporations, neurotech companies, or employers that misuse brain-derived data. However, the contours of this doctrine remain unsettled, rendering the protection against corporate neurosurveillance uncertain and heavily dependent on future judicial interpretation.

Read together, *Selvi*, *Puttaswamy*, and *Kaushal Kishor* establish the preliminary constitutional scaffolding for mental privacy in India. They collectively articulate the principles of voluntariness, cognitive autonomy, bodily integrity, and the impermissibility of compelled extraction of mental content. Yet, with neurotechnology advancing rapidly and the capacity to infer thought patterns, emotions, and intentions becoming increasingly sophisticated, Indian law remains only partially equipped to respond. The absence of clear legislative standards, evidentiary rules, and regulatory oversight leaves neural information vulnerable to misuse within both criminal investigations and private-sector environments. Consequently, the constitutional values identified by the Supreme Court must be translated into a dedicated legal framework that explicitly protects neural data, governs neuro-investigative techniques, and ensures that cognitive liberty remains inviolable in the emerging neuro-digital landscape.

X. Key Legal Challenges in the Indian Context

The convergence of law and neurotechnology in India poses pressing legal and ethical challenges that remain unresolved.

- **Mental Privacy and Cognitive Liberty:** A key legal issue in India is whether a person's thoughts and brain activity are protected under law. While Article 21 ensures life and personal liberty, it is unclear whether this applies to brainwave data collected without consent. The concept of "cognitive liberty," or the right to think freely without intrusion, is not formally recognized, leaving mental privacy legally uncertain.
- **Valid Consent and Responsible Use of Neural Data:** Neurotechnology directly accesses brain activity, making genuine and informed consent essential. Traditional consent models, typically

embedded in lengthy and complex terms and conditions, are insufficient in this context. Individuals cannot realistically anticipate or understand how their highly sensitive neural data might be used in the future, including potential applications such as AI training or targeted advertising. This raises serious concerns about whether such consent can truly be considered voluntary and informed.

- **Admissibility of Brainwave Evidence:** The use of brain-based techniques in criminal trials raises serious concerns. In a 2008 Pune murder case, EEG-based “brain fingerprinting” was used, but the conviction was later overturned due to doubts about its scientific reliability. Moreover, compelling an individual to undergo such testing could violate the protection against self-incrimination under Article 20(3).
- **Ownership and Control of Neural Data:** A key unresolved issue concerns the ownership of an individual’s brain data. Without specific legal regulation, rights over such data are generally governed by contractual terms. This allows technology companies to secure extensive permissions through user agreements, potentially enabling them to use, commercialize, and profit from neural information.
- **Workplace Neuro-Surveillance and Misuse:** The workplace presents a high risk for the misuse of neurotechnology, as employers could use brain-computer interfaces (BCIs) to track employee attention, fatigue, or productivity. Currently, Indian labour laws do not provide any regulations to address this form of neurological monitoring, leaving employees vulnerable to potential privacy violations.

XI. Recommendations for a Neuro-Secure India

To effectively tackle these complex challenges, India needs a forward-looking and comprehensive regulatory approach, with the following key recommendations:

i. Formal Recognition and Codification of Neuro-Rights:

Legal systems must move beyond general privacy protections and explicitly recognise mental privacy, cognitive liberty, and mental integrity as enforceable rights. Embedding such protections either

constitutionally or through dedicated legislation would provide a clear normative basis for regulating neurotechnology. Chile's constitutional reform offers a significant point of reference, demonstrating how mental autonomy can be safeguarded within a modern rights framework.

ii. **Reconceptualising Informed Consent for Neural Interventions:**

Given the complexity and potential irreversibility of certain neural interfaces, informed consent should be understood as a continuous and evolving obligation rather than a one-time formality. Regulatory frameworks must require transparent communication regarding risks, data flows, reversibility of interventions, and long-term monitoring, with heightened protections for minors, persons with disabilities, and other vulnerable groups.

iii. **Protection, Ownership, and Classification of Neural Data:**

Neural data warrants the highest degree of legal protection and should be expressly categorised as sensitive personal information. Individuals must retain ownership and decision-making authority over their neural outputs, with stringent restrictions on commercial use, data brokerage, and algorithmic profiling. Adopting standards comparable to global regimes such as the GDPR would help create a rights-centric data environment.

iv. **Creation of Independent Neurotechnology Oversight Bodies:**

Governments should establish autonomous Neuroethics and Neurotechnology Commissions to provide supervision across research, healthcare, and commercial deployment. These bodies would set ethical benchmarks, review safety protocols, monitor emerging risks, and ensure institutional compliance with neurorights. Independent oversight is critical to preventing misuse and maintaining public trust in neurotechnological innovation.

v. **Comprehensive Liability and Accountability Structures:**

With the increasing convergence of human biology, software systems, and artificial intelligence, liability rules must reflect this hybrid reality.

Legislatures should develop clear accountability standards for users, device manufacturers, software developers, and AI components. Liability frameworks must also address malfunction, data breaches, hacking, and unintended neurocognitive effects, ensuring predictable remedies for rights violations.

vi. **Global Coordination and Harmonisation of Standards:**

Cross-border cooperation is essential to prevent regulatory loopholes and uneven protection of mental autonomy. International guidelines or treaties developed under the auspices of UNESCO, WHO, or other multilateral organisations could standardise ethical norms, technical requirements, and neurorights protections. Harmonised global standards would help ensure that neurotechnology develops responsibly and equitably.

vii. **Promoting Equity and Access to Neurotechnology:**

Without deliberate regulatory intervention, advanced neural technologies may disproportionately benefit economically privileged groups, creating a “neural divide.” Public policy should guarantee access to therapeutic neurotechnologies, subsidise essential interventions, and integrate neurotech within public healthcare systems. Ensuring equitable access is integral to maintaining social justice in an era of enhanced cognition.

viii. **Judicial Preparedness and Legal Capacity-Building:**

Courts will increasingly confront cases involving neuro-evidence, neural data, and neurotechnological harms. Judicial training programs—covering neuroscience, cognitive data interpretation, algorithmic assessment, and ethical considerations—are essential to ensure fair adjudication. Similar capacity-building initiatives should be extended to lawyers, prosecutors, and law enforcement agencies to promote informed and constitutionally compliant decision-making.

ix. **Strengthening Domestic Regulation of Neurodevices:**

In the Indian context, it is vital to ensure clear and consistent regulatory guidance from the Central Drugs Standard Control Organisation

(CDSCO). Consumer neurodevices capable of recording EEG signals or making health-related claims should fall within the medical device regulatory framework, subject to rigorous safety, efficacy, and performance evaluations.

x. **Explicit Classification of Neural Data Under Indian Data Law:**

Indian data protection legislation must expressly recognise neural signals and cognitive profiles as sensitive personal data. This would mandate explicit consent, impose enhanced security obligations, and restrict processing to clearly defined lawful purposes, thereby aligning domestic law with global best practices.

xi. **Regulating Neuro-Surveillance in the Workplace:**

The government should establish strict limitations on the use of neural monitoring in employment contexts. Any deployment of cognitive or affective monitoring should be voluntary, narrowly tailored to essential safety requirements, and subject to robust consent protocols. Such safeguards are necessary to prevent coercive or exploitative workplace practices.

xii. **Public Education and Awareness Initiatives:**

Legal reforms will be effective only if citizens understand the nature of neural data and the implications of neurotech usage. Public education campaigns can help individuals make informed decisions about consumer neurodevices, data-sharing practices, and their rights under emerging neurorights legislation. An informed public is foundational to a democratic neuro-governance framework.

XII. Conclusion

Neurotechnology is clamouring to be addressed as a matter of urgency, and at times quite prophetically, on the ethical and legal fronts of mental privacy and cognitive liberty. Conceptually, neuro-rights emerge as a fundamentally significant framework within which to protect individuals against any possible expropriations and violations. Neuro-rights encompass essential protections, including mental privacy, cognitive liberty, and mental integrity, which are becoming increasingly vital as technology increasingly interfaces with human

cognitive processes.³⁵ The enforcement of neuro-rights presents complex legal, ethical, and regulatory challenges across jurisdictions. Rapid advances in neurotechnology, increasingly integrated into daily life, necessitate continuous legislative updates to safeguard cognitive liberty, mental privacy, and other fundamental rights. The transnational nature of neurotechnology, multinational corporate involvement, and cross-border data flows exacerbate the inconsistencies in national regulation, creating vulnerabilities for individuals unless enforcement occurs through coordinated international frameworks.

Neuro-rights must move beyond theoretical discourse to become actionable legal protections against potential misuse. This requires strengthening regulatory frameworks, promoting international cooperation, and establishing ethical standards for all stakeholders engaged in neurotechnology development and application. Recent legislative initiatives in Chile, Brazil, and France illustrate growing recognition of the need to protect neural data and mental integrity; however, the global regulatory landscape remains fragmented and incomplete. Variability in legal protections exposes individuals to unauthorized access to neural data or invasive interventions in jurisdictions lacking safeguards.

Effective neuro-rights governance demands collaboration among lawmakers, ethicists, and legal scholars to develop adaptable, yet rigorous, standards that respect human autonomy while accommodating technological innovation. Integrating neuro-rights with data protection regimes can reinforce mental integrity and personal freedom in the digital age. Furthermore, clarifying neuro-rights violations and establishing legal remedies for affected individuals are essential for accountability and restitution. Interdisciplinary research and cross-jurisdictional engagement will be critical to constructing comprehensive, enforceable frameworks that ensure neurotechnology advances serve the common good without compromising fundamental human rights.

³⁵ Niharika Talan, *Neurorights Legal and Ethical Considerations and Brain Data Privacy*, 8, INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES, 835, 846, 2025.