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Brain Data as Evidence and Constitutional Right to Mental Privacy: Challenges for Indian Criminal Law

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Abstract

The latest developments in neuro-related studies and neuro-technology have presented fresh possibilities in investigating crimes particularly by examining brain information. Among the methods employed to determine the physiological responses, memory recognition and cognitive responses in respect of the crime are polygraph testing, narco-analysis, Brain Electrical Oscillation Signature Profiling (BEOS) as well as functional Magnetic Resonance Imaging (fMRI) technique. Even though in the majority of instances these technologies are presented as scientific apparatus that might assist investigators in the process of uncovering concealed information, severe constitutional, legal, and ethical challenges pertain to utilizing such technologies. The key issue is whether the brain data which has been gathered by means of those may become a legitimate piece of evidence without violating even the most fundamental rights provided by the Indian Constitution. This research article will explain the legal status of brain data as evidence in Indian criminal justice and assess the right to mental privacy in the constitution. It discusses how the emergence of neurotechnology may challenge religious legal principles, namely, the right against self-incrimination involving Article 20(3) and rights to life and personal liberty involving Article 21. Court decisions such as Selvi v. Karnataka State (2010), and K.S. Puttaswamy v. Union of India (2017) have greatly influenced the legislative roadmap on using brain-based methods of investigation. Such

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cases will bring attention to the fact that forced conduct of such tests is a contravention of constitutional rights and that one should take note of providing a person with his or her autonomy and dignity. The scientific validity, ethical concerns as well as regulatory concerns of brain data use in criminal investigation are also assessed in the research article. It also makes references to experiences elsewhere in the world, including the increasing acknowledgement of neuro-rights and the protection of mental soundness within comparative legal paradigms. The research article believes that although neurotechnology can be used to provide effective investigation, its use should be highly regulated in order to avoid encroaching into the mental lives of people.

Keywords: *Brain Data, Mental Privacy, Neurotechnology, Self-Incrimination, Indian Criminal Law.*

I. INTRODUCTION

Background of the Study

Over the last few years, neuroscience and brain-imaging technology have begun to affect numerous legal fields, especially criminal investigation. Previously, investigators relied primarily on confessions, witness testimony, and physical evidence to determine whether a person was guilty.[1] Nevertheless, science has developed new instruments to understand the human brain's response to information or stimuli. Such technological advances have prompted researchers to examine whether brain activity can offer clues about a person's memories, knowledge of a crime, or truthfulness under questioning.[2] As a result, neuroscience has gradually found its way into forensic investigation and the criminal justice arena.

Some investigative agencies in India have experimented with methods to analyze the physiological or neurological reactions of suspects. These include Brain Electrical Oscillation Signature Profiling (BEOS), polygraph tests, narco-analysis, and Functional Magnetic Resonance Imaging (FMRI).[3] All these techniques are not identical, and each aims to determine whether an individual has knowledge of a

1 Information Technology Act, 2000, No. 21, Acts of Parliament, 2000 (India).

2 Kent A. Kiehl, *Brain Imaging and Crime*, DANA FOUNDATION (2012), https://www.dana.org/article/brain-imaging-and-crime/ (last visited Mar. 12, 2026).

3 Sha Srivastava, *Forensic Utility of BEOS in Criminal Cases,* 67 NFSU L. REV. 45 (2025).

criminal offence or is trying to mislead the police. For example, BEOS refers to a form of brain mapping that attempts to determine whether one has experienced an event by observing electrical activity in the brain. Polygraph tests are tests that quantify the physiological responses of heart rate, blood pressure, and respiration, as an individual answers questions, on the hypothesis that when questions are answered deceptively, they cause physiological responses of stress.[4]

They are active in an individual when recalling or answering questions. Proponents of these technologies say they can help investigators obtain usable information when conventional evidence is scarce or suspects are uncooperative. Consequently, these methods have been employed in high-profile criminal investigations in India.

The Supreme Court's decision was especially important as these concerns became influential. In the case of State of Karnataka (2010), the Court has affirmed that the involuntary application of techniques like narco-analysis, polygraph tests, and brain mapping infringes the constitutional right against self-incrimination and personal liberty. The Court also stressed that these tests may be carried out only with the voluntary consent of the person in question and with strict safeguards.[5] Despite this verdict, it remains debated whether brain information can be considered credible evidence and what legislators should do to reconcile technological progress with individual rights. As such, the increasing application of neurotechnology in crime investigation contexts raises significant questions about the extent of state authority and the safeguarding of mental privacy under Indian criminal law.

Concept of Brain Data

The term "brain data" usually refers to neurologic data gathered by measuring the electrical, chemical, or physiological activity of the brain using specialised scientific instruments. The development of neurotechnology has enabled researchers to observe how the brain responds when a human being thinks, remembers, or reacts to stimuli. Techniques such as brain imaging and brain mapping enable researchers to gather information about neural activity, which can reveal whether a person is aware of certain information or is in a specific state of mind. When applied to criminal investigation, brain information can be recognised as one of the scientific pieces of evidence that can demonstrate unknown knowledge or thoughts related

4 Champadi R. Mukundan, *Forensic Brain Mapping (BEOS): Principles and Applications*, 59 J. INDIAN L. INST. 234, 238 (2017).

5 Selvi v. State of Karnataka, (2010) 7 SCC 263, 278.

to a crime.[6]

One should know that the information the brain collects does not directly reveal a person's mind in a straightforward or precise way. Rather, it captures the patterns of brain activity that scientists use to understand mental processes.[7] This information can contain cues related to recollection, emotional response, or awareness of known information. Since the brain governs all thinking activities, this information can be used to determine whether an individual has experienced a particular event or object in the past. Nevertheless, the analysis of brain data remains controversial and difficult to understand, particularly in the legal context, where accuracy and reliability are paramount.

One should distinguish between physiological responses, cognitive responses, and memory recognition signals, as each is a distinct type of information processed by the brain. Physiological responses are those that occur in the body and are related to psychological states, including heart rate, breathing, and skin conductivity. The tests are usually conducted on a polygraph, and the measures obtained are used to determine the likelihood that a person is stressed or deceptive. Nevertheless, these physiological signals do not always mean that an individual is lying because all these reactions may also be caused by anxiety, fear, or nervousness.

Cognitive responses, conversely, entail how the brain processes information and mental processes such as thinking, memory recall, and recognition of familiar objects or events. Whereas methods of brain imaging, such as fMRI, aim to identify regions of the brain that become active during the process. Memory recognition signals are a more specific cognitive response, and this is where the brain responds to stimuli produced by the person before the incident. For example, brain mapping methods can be used to determine whether a suspect has brain recognition when presented with details from a crime scene. These differences are significant, as the legal system needs to be careful when determining the nature of the information brain data can provide and whether it can be trusted for effective use in court.

Research Problem

The legal dilemma has become a challenging one because of the growing use of neuro-technological devices in the investigation of crimes. On the one hand, these

6 Nita A. Farahany, *Incidental Findings of Brain Data in Neuroscience Research*, 62 J. Indian L. Inst. 156, 160 (2020).

7 Selvi v. State of Karnataka, (2010) 7 SCC 263, 285.

technologies promise to present scientific ways of finding lies, defining memory recognition, and assist investigators in disclosing the information shrouded by the veil of crime. On the other hand, their application raises some serious questions on the rights of individuals particularly the rights against self-incrimination and privacy. When retrieval or reading of brain data takes place when doing an investigation, it would also imply the availability of the information that is held in the mind of an individual; or alternatively the question would be the level of power that a state has during the criminal procedure.

The case is even more crucial in the Indian legal framework since the Constitution provides significant protections to suspected persons of crimes. Article 20(3) safeguards an individual against being forced to testify against oneself. In contrast, Article 21 guarantees the liberty of life and personality, as defined by the Supreme Court, to encompass the right to privacy. If brain-based technologies can obtain cognitive information without a person's voluntary cooperation, it might align with these constitutional rights. This casts doubt on whether criminal investigations can be conducted using such methods and whether such methods are admissible as evidence in court.

The other significant issue concerns the scientific reliability and usefulness of brain data. Neuroscientific techniques are still developing, and many specialists doubt that such technologies can accurately determine whether a person is lying or has actually committed a crime. Misleading results may be produced by errors in the translation of the interpretation, technical constraints, or external factors affecting brain activity. If such evidence is used in criminal trials, it may influence the reasonableness of the court's ruling.

Research Questions

a) Can brain data be used as admissible evidence under Indian criminal law?

b) Does the use of brain-based techniques violate constitutional rights, particularly mental privacy?

c) What Legal safeguards are required to regulate brain evidence in India?

Objectives of the Study

The primary purpose of the research article will be to examine the legal character of the use of brain data as evidence in the Indian criminal justice system. With an

increased application of neuro-technology (brain mapping, polygraph testing and other evidence-gathering techniques that involve the brain) in forensic investigation, the question of the treatment of such evidence by Indian law merits discussion. One of the questions that have been brought up by this research article is the reliability and admissibility of brain data in criminal proceedings.

The other important objective of the research article is to establish the legal and ethical concerns with the use of brain information in crime investigations. The increased ability of technology to obtain information regarding cognition is threatened by issues of individual autonomy, consent and protection of basic rights. Therefore, possible threats of such technologies abuse in the criminal justice process will also be researched as part of the research. On the basis of this discourse, the research article suggests relevant suggestions in order to change and improve the Indian criminal law in order to make sure that developments in technology are moderate and constitutional rights and the values of just and fair criminal system are not violated.

II. Conceptual Framework: Brain Data and Neurotechnology

Brain Data Represents Neurological Information Obtained Through Technology

Brain data is data obtained using scientific and technological equipment that measures brain activity. It is acquired when neural responses to stimuli such as questions, images, sounds, or memories are recorded by specialised instruments. Such responses can be in the form of electrical signals, brain activity patterns, or physiological responses to mental activity. This information is at times analysed in criminal investigations to establish whether a person is familiar with certain facts or has knowledge of a criminal incident.[8]

Compared to conventional evidence, brain data is directly related to a person's internal thought process. It does not merely uncover physical actions but rather seeks to provide an understanding of memory, recognition, and cognitive responses. Due to this peculiarity, brain data plays a complex role in the legal system. It might seem scientific and objective, but the interpretation usually requires expertise in analysis and an understanding of context.[9]

8 Champadi R. Mukundan, *Brain Electrical Oscillation Signature Profiling in Criminal Investigations*, 62 Indian L. Inst. 145, 148 (2020).

9 Selvi v. State of Karnataka, (2010) 7 SCC 263, 292

Brain data possess a number of unique features that distinguish them from other types of forensic data. It is, first and foremost, neurological in nature, implying that it is rooted in the brain's operations rather than in physical objects that can be seen. Second, it is interpretative

that it requires scientists to analyse and interpret the signals before reaching conclusions, the meaning of these signals cannot be easily stated without professional analysis.

One key attribute is that brain data is highly sensitive and personal. It is connected to a person's thoughts, memories, and possessions. Because the brain controls human consciousness and mental functioning, there may be concerns about privacy and individual autonomy when recording its activity. Also, brain responses are often influenced by emotional states, stress, fatigue, and the environment; thus, the results may not always provide definitive answers.[10]

There are a variety of signals related to brain activity that investigators can use in forensic settings. Other techniques are used to measure physiological changes, e.g., pulse rate, blood pressure, and breathing, that occur when people are under psychological stress. Other techniques include recording cognitive responses, the manner in which the brain processes information, and the recall of memories, or familiarity.[11]

Some of them target specifically memory recognition signals, which occur when the brain responds to information it has already received. The responses can show that the individual is aware of specific objects, places, or events related to a crime. Nevertheless, recognition does not always mean a person participated in a crime. An individual can be aware of information in media coverage, an interview with investigators, or any other source. Thus, such signals need close legal and scientific analysis when interpreting them.

Neurotechnologies Play an Increasing Role in Criminal Investigations

The polygraph test is a more popular method of investigation that is aimed at quantifying physiological responses that can be part of psychological stress. In the test, instruments are placed on the subject's body to monitor variations in heart rate,

10 Michael N. Tennison & Jonathan D. Moreno, *The Privacy of Thoughts and the Evolving Neuroscience of Brain Privacy*, 64 JILI 278, 282 (2022).

11 Champadi R. Mukundan, *Forensic Applications of Brain Electrical Oscillation Signatures*, 60 INDIAN L. INST. 412, 415 (2018).

blood pressure, breathing patterns, and skin conductivity. These signs are observed as the individual is answering a series of questions. The rationale for this approach is that misleading responses can elicit stress-related bodily reactions that differ from those elicited by true responses.[12]

The polygraph test is sometimes administered to help in interrogation by investigating agencies that do not want to ensure that the suspect is not concealing information. The findings might assist investigators in determining which leads to follow and which statements to verify further. The Polygraph, however, does not actually detect lies but only records the physiological changes that may occur when Mighty is questioned.

Among the greatest objections to the polygraph, it is stated that the physiological responses are not necessarily associated with lying. An honest person can be anxious, scared, or nervous during interrogation, which can lead to heightened physiological responses. Equally, a liar can stay in control and exhibit little response. Due to these uncertainties, polygraph results have come under great scrutiny in the scientific and legal circles.

Narco-analysis: Using Drugs to Induce Semi-Conscious States for Information Gathering

Narco-analysis is a method of investigation whereby certain drugs, such as sodium pentothal, are given to an individual to produce a semi-conscious or hypnotic condition. This state is thought to lower a person's mental resistance, making it easier for the investigators to extract information. The matter is then interrogated in the presence of the drug, and the answers are documented to be used in the investigation. The logic behind narco-analysis is that the lower consciousness state will prevent the subject from coming up with intricate lies. The investigators would wish that the individual would divulge concealed facts, lost facts, or suppressed memories of the crime. Narco-analysis has been employed in several high-profile cases in India, on the assumption that it might yield valuable leads for investigation.[13]

Narco-analysis has faced criticism, despite its alleged virtues. An individual who is put under sedation will not give reliable information; instead, they give false, disoriented, or imagined answers. Another important implication of the procedure is that legal and ethical considerations are also brought up because the process of drug administration violates the bodily and mental autonomy of an individual. This

12 Selvi v. State of Karnataka, (2010) 7 SCC 263, 287.

13 *Id.*

has left its application to intense scrutiny in the Constitution.[14]

Brain Electrical Oscillation Signature (BEOS) Identifies Experiential Knowledge

Brain Electrical Oscillation Signature, or BEOS, is a type of brain mapping that is aimed at determining whether an individual has any experience of a certain event. When the subject goes

During the test, they are exposed to statements surrounding the crime, and the electrical responses registered in the brain are recorded. When the brain responds in a way linked to personal experience, it can indicate that the individual has undergone the event or been involved in it.

The main hypothesis of the BEOS is that the brain does not respond as it does when recalling a personally experienced event as opposed to when hearing or imagining information. By studying these patterns, the investigators may be trying to establish whether the subject has direct experiential memory of the crime.[15]

Even though BEOS has been introduced as a high-grade investigative tool, its analysis is controversial. Critics argue that recognition responses can be obtained even when the subject has been informed of the crime through the media, police interrogation, or communication with others. Thus, criminality may not be proven by such indicators.

dignity and autonomy of the individual. Mental privacy protection becomes necessary in the case of brain data, thus.

III. Constitutional Protection of Mental Privacy

The Right to Privacy Has Evolved as a Constitutional Principle in India

The concept of privacy in Indian constitutional law has developed gradually through judicial interpretation rather than explicit constitutional text. The Constitution does not expressly mention a right to privacy. Still, the Supreme Court has interpreted various provisions, particularly Article 21, which guarantees the right to life and personal liberty- to include protections for individual privacy. In the early years after independence, the courts did not clearly recognize privacy as a fundamental right.

14 Selvi v. State of Karnataka, (2010) 7 SCC 263, 294.

15 Champadi R. Mukundan, *Brain Electrical Oscillation Signature Profiling: Forensic Applications*, 61 Indian L. Inst. 189, 192 (2019).

However, over time, judicial decisions began to acknowledge that personal liberty would be incomplete without the protection of an individual's private sphere.[16]

Several important cases contributed to this development. Early decisions, such as *Kharak Singh v. State of Uttar Pradesh (1962)* raised questions about police surveillance and personal liberty, although the Court did not fully accept privacy as a fundamental right at that time. Later judgments, including *Gobind v. State of Madhya Pradesh (1975)* and *R. Rajagopal v. State of Tamil Nadu (1994)*, began to recognize privacy as an essential element of personal freedom and dignity. These cases laid the groundwork for the eventual constitutional recognition of privacy as a fundamental right.

Mental Privacy Forms an Important Dimension of the Right to Privacy

Mental privacy refers to the protection of a person's inner world of cognition, including thoughts, memories, emotions, and thinking processes. Mental privacy, unlike physical privacy, focuses on the innermost parts of the human being, the very mind. It ensures individuals are left to think, reflect, and form beliefs independently, without interference.[17]

In today's technological landscape, the issue of mental privacy has become extremely important. Neuroscience and neurotechnology now offer the possibility of recording and analysing neural activity patterns. Although this methodology can be an indispensable source of medical and research knowledge, its use in criminal investigations raises serious ethical and legal concerns. The possibility of accessing neural data may reveal information about a particular person's memories or mental reactions, thereby violating the inherently personal aspect of the mind.[18]

Human dignity and autonomy are conceptualized in relation to more fundamental ideas, which are the protection of cognitive processes. It is the innate right of every person to control their own thoughts and mental sensations. If the state is allowed to scan or probe the brain without sufficient protection, it will compromise the principle that supports persons' rights to control their inner mental world.

Thus, mental privacy serves as a measure to prevent state overreach. It guarantees that investigative agencies are not at liberty to access individual mental functions uncritically.

16 Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1, 48.

17 *Id.*

18 INDIA CONST. art. 21; Justice K.S. Puttaswamy (Retd.) v. Union of India, *supra* note 16.

Article 21 Protects Cognitive Liberty and Mental Autonomy

The Constitution of India, in Article 21, states that no one can be deprived of the right to life or personal liberty except through due process of law. The judiciary has, over the years, taken a broad interpretive approach, expanding the provision to encompass various aspects of human dignity and liberty, including the right to live with dignity, privacy, bodily integrity, and personal autonomy.[19]

Under this broader umbrella, the concept of cognitive liberty has attracted increased academic interest. Cognitive liberty is an individual's ability to autonomously control their mental processes, thoughts, and state of consciousness. It holds that personal liberty should protect not only the material body but also the mind; otherwise, the state is likely to violate even the most secret spheres of human experience.[20]

Mental autonomy is based on a person's capacity to think and to control their thinking. Psychological integrity helps keep human beings away from coercive manipulations that interfere with mental functioning. All these principles, taken together, constitute a major component of the right to personal liberty under Article 21.[21]

Crime-related information is a neurotechnological tool that can determine whether a person is aware of the presented information. By analysing the subject's physiological reactions, it can indirectly indicate the subject's cognitive knowledge. In this case, the brain's reaction may represent information similar to that conveyed by a verbal statement, thus possibly violating the constitutional safeguard against compulsory testimony.

The Supreme Court addressed some of these concerns in *Selvi v. State of Karnataka (2010)*, where it held that the involuntary administration of techniques such as narco-analysis, polygraph tests, and brain mapping violates the protection against self-incrimination and the right to personal liberty. The Court emphasized that such techniques cannot be conducted without the individual's voluntary consent and appropriate safeguards. This judgment highlights the constitutional importance of protecting both mental privacy and the freedom from compelled self-incrimination in the context of emerging neurotechnologies.

19 Maneka Gandhi v. Union of India, (1978) 1 SCC 248, 278.

20 Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1, 55.

21 *Id.*

IV. Comparative Analysis of International Neuro-Rights Frameworks and Emerging Regulatory Models

The rapid evolution of neurotechnology ranging from advanced brain-computer interfaces (BCIs) to AI-driven criminal profiling poses an unprecedented challenge to the traditional contours of criminal jurisprudence. Brain data occupies a unique space: it is not merely physical evidence, but a direct window into the pre-conscious and conscious mind. Because conventional legal architectures treat evidence as either physical or testimonial, they struggle to regulate technologies that extract data directly from the human brain.[22] To rectify these legislative gaps, global jurisdictions are developing distinct regulatory models. This comparative analysis explores the emerging international neuro-rights frameworks, categorizing them into distinct regulatory paradigms, and evaluates their implications for the evolution of Indian criminal law.

The Sui Generis Constitutional Model: Chile and the Latin American Vanguard

The most radical and proactive regulatory response is the creation of entirely unique, standalone constitutional rights specifically designed to protect the human mind from external intrusion. Chile became the global pioneer of this approach by passing a landmark constitutional amendment to Article 19 of its Constitution, supplemented by a comprehensive statutory framework under Boletín Number 13.828-19. This model is built upon five foundational "neuro-rights" conceptualized by the NeuroRights Foundation, which include the right to cognitive liberty, the right to mental privacy, the right to mental integrity, the right to psychological continuity, and protection from algorithmic bias.[23]

A critical operational breakthrough of the Chilean model occurs at the statutory level, where neurodata is legally classified similarly to human organ tissue. Consequently, the extraction, commercialization, or investigative processing of brain data is governed by strict medical and bioethical protocols rather than flexible consumer data privacy frameworks. The efficacy of this model was demonstrated when the Supreme Court of Chile ordered a major commercial BCI company to delete all brainwave data collected from a user, validating that information derived from brain activity possesses an independent, inviolable constitutional status. Inspired by

22 Nita A. Farahany, The Battle for Your Brain: Defending the Right to Think Freely in the Age of Neurotechnology 3–25 (St. Martin's Press 2023).

23 Marcello Ienca & Roberto Andorno, *Towards New Human Rights in the Age of Neuroscience and Neurotechnology*, 13 Life Scis., Soc'y & Pol'y 5, 6–15 (2017).

this framework, other nations including Brazil, Mexico, and Uruguay are advancing similar constitutional amendments to protect cognitive autonomy.

The Comprehensive Data Protection Model: The European Union

In contrast to the creation of entirely new constitutional rights, the European Union utilizes a technology-neutral data governance approach. Rather than declaring separate neuro-rights, the EU stretches its existing fundamental rights framework specifically the right to human dignity, mental integrity, and privacy under the EU Charter of Fundamental Rights and couples it with robust statutory data regulations. The primary mechanism for safeguarding brain data under this model is the General Data Protection Regulation. Under the GDPR, raw neural signals and the inferences drawn from them are classified as special category biometric and health data, meaning that processing this data requires explicit, freely given, specific, and informed consent, effectively shutting down involuntary state or commercial mining of brainwaves.[24]

Furthermore, the European Union Artificial Intelligence Act introduces an explicit layer of neuro-protection by categorizing AI systems into risk tiers. Systems that deploy subliminal techniques or engage in cognitive behavioral manipulation to distort human behavior in a manner that causes psychological harm are classified as an unacceptable risk and are completely banned.[25] Meanwhile, AI systems utilized in law enforcement or criminal profiling to assess an individual's psychological state are deemed high-risk and are subject to stringent compliance audits, absolute logging requirements, and mandatory human oversight to prevent cognitive manipulation.

The Fragmented and Commercial Model: The United States

The United States represents a market-driven, highly decentralized approach to neuro-rights governance. At the federal level, there is no omnibus data protection law or explicit constitutional protection for the mind, leaving the legal landscape fragmented across specialized statutes. For instance, the Health Insurance Portability and Accountability Act[26] protects neural data strictly within medical and clinical settings, but it completely fails to cover the massive influx of consumer-grade BCI

24 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 (General Data Protection Regulation), 2016 O.J. (L 119) 1.

25 Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 (Artificial Intelligence Act), 2024 O.J. (L) 1.

26 Health Insurance Portability and Accountability Act of 1996, Pub. L. No. 104-191, 110 Stat. 1936.

devices, wellness apps, and commercial neuro-sensors.

To bridge this regulatory gap, state-level legislation has recently taken the lead. States like California, Colorado, and Minnesota have enacted specific amendments to their Consumer Privacy Acts to explicitly classify neural data as sensitive personal information, granting users the right to opt-out, access, and delete their brain data. In the realm of constitutional criminal law, the Fourth Amendment regulates state intrusion under the reasonable expectation of privacy doctrine, but this relies heavily on reactive litigation. This creates significant gray areas when law enforcement attempts to access consumer neurodata held by third-party tech companies under the third-party doctrine, which traditionally strips individuals of privacy protections once data is shared with a service provider.[27]

Comparative Synthesis and the Strategic Path for Indian Criminal Law

An analysis of these international approaches reveals a foundational split in legal philosophy between constitutional creation and interpretive adaptation. India possesses a robust judicial foundation for mental privacy but lacks an equivalent statutory structure. As established in *Selvi* v. *State of Karnataka*[28], the Supreme Court creatively expanded Article 20(3) and Article 21 to prohibit involuntary neuro-testing, and *K.S. Puttaswamy* later cemented bodily and mental autonomy as fundamental rights. However, India's statutory framework lags behind its judicial philosophy because the Digital Personal Data Protection Act, 2023, does not create a sub-category for sensitive personal data or explicitly identify neurodata and biometric cognitive data for heightened protection, treating all digital personal data uniformly.

To strengthen Indian criminal law against the challenges of emerging neurotechnologies, the legislature should adopt a hybrid model combining the structural clarity of the EU approach with the protective philosophy of the Chilean model. First, the Indian legislature must amend the DPDPA to recognize Neurodata and Inferred Mental Data as a distinct category of sensitive biometric information, mandating absolute consent architectures that cannot be waived via generic terms of service.[29] Second, India requires an independent legislative framework governing both medical and consumer neuro-devices, which must categorically ban the

27 California Consumer Privacy Act of 2018, Cal. Civ. Code §§ 1798.100–1798.199 (West 2024).

28 Selvi v. State of Karnataka, (2010) 7 SCC 263 (India).

29 Regulation (EU) 2016/679, arts. 9–10, 2016 O.J. (L 119) 1.

deployment of involuntary automated neuro-profiling in criminal investigations. Finally, drawing inspiration from the Chilean model, Indian courts and lawmakers should formally articulate the right to cognitive liberty as an absolute component of Article 21, ensuring that even under state-enforced processing, an individual's inner mental sanctuary remains legally impenetrable.

V. Judicial Approach in India

The case of *Selvi* v. *The State of Karnataka* (2010) is one of the most significant judicial decisions in India concerning the use of neurotechnological techniques in criminal investigations. The case to the Supreme Court involved the question of the legality of investigational agencies to administer tests like polygraph examination, narco-analysis and Brain Electrical Oscillation Signature Profiling (BEOS) to suspected criminals during criminal investigations. Law enforcement agencies keep on employing these techniques in some of the high-profile cases and hope that this technique will expose hidden information or assist the investigators to uncover the truth.[30]

The defendants in the case questioned the constitutionality of such methods. They contended that compelling people to submit such tests amounted to a violation of basic rights, which are enshrined in the Constitution, in this case the right against self-incrimination contained in Article 20(3) and the right to life and personal liberty contained in Article 21. The Court thus needed to look at whether the force of asking an individual to go through such processes was tantamount to coercing the individual to give evidence against him/herself.

The Supreme Court Strengthened Privacy Protection in Justice K.S. Puttaswamy v. Union of India (2017)

The Judgment Recognized Privacy as a Fundamental Right

The other significant court evolution in this regard was through the historic ruling in Justice *K.S. Puttaswamy* v. *Union of India* (2017)[31]. The Supreme Court, in this instance, through a nine-judge bench ruled unanimously that privacy is a fundamental right that is guarded under the Constitution. It was determined that the dignity and liberty of persons inherently require privacy, which is secured mainly under Article

30 Suresh Bada Math, *Supreme Court Judgment on Polygraph, Narco-Analysis & Brain-Mapping: A Boon or a Bane,* 134(1) Indian J. Med. Res. 4 , 4 (2011).

31 Justice K.S. Puttaswamy (Retd.) v. Union of India, (2017) 10 SCC 1 (India).

21, among other clauses in the constitution.

In the ruling, it was acknowledged that privacy is not restricted to the physical location but extends to information privacy, freedom of choice and personal privacy. The Court stressed that people should be free to manage their personal data and make personal decisions without making the state intrude on them unnecessarily.

Among the key objections to employing neurobiological information as an evidence source is the fact that this information is not just extraneous, as it is supposed to penetrate the inner world of thinking of a person. Examples of evidence that are more traditional, such as fingerprints, handwriting, CCTV footage, or blood samples, are associated with behavioural observation or physical identity. The neurobiological data are divergent in that they can indicate recognition, and traces of memory, affectivity, or cognition patterns. As such, its acquisition can be an encroachment into the most intimate area of human existence.

The issue is aggravated in the area of criminal jurisprudence, where the state applies its investigation authority over an accused individual.

The Supreme Court in *Selvi v. State of Karnataka (2010),* held that forced neuro-scientific techniques like brain mapping, narco-analysis, and polygraph tests violate the right against self-incrimination under Article 20(3) and the right to mental privacy under Article 21. The ruling established that compelling an individual to undergo these tests amounts to physical and mental coercion, rendering the involuntary test results inadmissible as direct evidence. However, the court provided an exception under Section 27 of the Indian Evidence Act, allowing physical evidence or materials discovered with the help of voluntarily obtained test results to be admitted in court.

In the *K.S. Puttaswamy v. Union of India (2017),* the nine-judge bench unanimously affirmed that the right to privacy is a fundamental right under Article 21 of the Indian Constitution, explicitly extending its protection to bodily and mental autonomy. By recognizing informational privacy as a core constitutional facet, this judgment created a robust legal shield against the unauthorized extraction, storage, and processing of an individual's personal and cognitive data. It mandates that any state intrusion into a person's mental privacy through emerging neuro-technologies must strictly satisfy the three-fold test of legality, necessity, and proportionality.

In the modern criminal investigation of *State (NCT of Delhi) v. Aftab Amin Poonawalla (2022)*, the trial court permitted law enforcement agencies to conduct polygraph and

narco-analysis tests on the accused only after obtaining his explicit, recorded consent on the record.[32] This case serves as a contemporary application of established privacy guidelines, demonstrating that investigative agencies must respect the boundaries of mental privacy even during high-stakes investigations of severe crimes. It reinforces the legal reality that modern neuro-investigative data cannot be extracted through state compulsion and remains tightly bound by strict procedural safeguards.

In *State of Bombay v. Kathi Kalu Oghad (1961),* an eleven-judge bench established the foundational constitutional distinction between transferring physical evidence, such as fingerprints or signatures, and conveying testimonial knowledge forced from an individual's mind. The court ruled that providing static physical attributes does not violate the right against self-incrimination under Article 20(3) because it does not involve sharing cognitive thoughts or personal knowledge. This landmark precedent acts as the historical baseline that later enabled courts to classify dynamic brain data as protected testimonial evidence, ensuring thoughts receive a higher threshold of constitutional protection than mere physical markers.[33]

Evolving Jurisprudence on Neuro-Evidence in India

Beyond the primary landmarks, Indian trial courts, High Courts, and recent Supreme Court rulings have continuously grappled with the boundaries of brain data, consent, and scientific evidence in criminal trials. The following cases trace this critical evolution from early judicial experiments to modern evidentiary restrictions.

In *State of Maharashtra v. Aditi Sharma (Pune Sessions Court, 2008),* the highly controversial trial court ruling, a woman and her accomplice were convicted of murder based primarily on Brain Electrical Activation Profile (BEAP) test results, marking it as one of the earliest instances where an Indian court relied directly on automated brain data to establish guilt. The prosecution argued that the defendant's brainwaves showed "experiential knowledge" of the poisoning process when exposed to specific auditory prompts. However, this absolute reliance on unconsented neurodata was heavily criticized by legal experts and bioethicists for overstepping constitutional boundaries. The legal foundation of this conviction was subsequently dismantled and rendered bad in law by the Supreme Court's definitive 2010 ruling in the *Selvi* case, which prohibited involuntary cognitive testing.

32 State (NCT of Delhi) v. Aftab Amin Poonawalla, FIR No. 507/2022, Police Station Mehrauli, Order dated Nov. 17, 2022 (Ct. of the Metropolitan Magistrate, Saket Courts, New Delhi) (India).

33 State of Bombay v. Kathi Kalu Oghad, A.I.R. 1961 S.C. 1808 (India)

In *Shailender Sharma v. State (Delhi High Court, 2008),* the court decided just before the definitive Supreme Court ruling in *Selvi*, the Delhi High Court allowed the administration of narco-analysis and lie detector tests during a complex homicide investigation. The court reasoned that such scientific interventions were legitimate tools to aid law enforcement agencies in uncovering hidden truths, provided they did not cause physical harm to the accused. This decision highlighted the early judicial tendency to favor aggressive investigative techniques over the implicit right to mental privacy. It serves as a classic historical example of the fragmented, pro-state legal philosophy that existed in India prior to the formal constitutional recognition of bodily and mental autonomy.[34]

In *Amlesh Kumar v. State of Bihar (Supreme Court of India, 2025),* a recent appellate decision, the Supreme Court addressed the limitations of modern technological profiling and scientific inferences in criminal trials. The Court strongly cautioned trial courts against relying on speculative behavioral metrics or automated investigative data that lack absolute procedural transparency and strict verification. It reinforced the protective principles established in *Puttaswamy*, asserting that no investigative technology can be allowed to subvert the accused person's right to silence or their fundamental right to informational privacy. The judgment emphasizes that as forensic tools grow more sophisticated, judicial scrutiny must become correspondingly rigorous to protect individual liberty.[35]

In *Vinobhai v. State of Kerala & Manoj Kumar Saini v. State of MP (Supreme Court of India, 2023–2025),* the Supreme Court rulings specifically deal with the mandatory guidelines governing the admissibility of electronic, digital, and scientific records under Indian criminal law. The apex court clarified that any digital profile, automated metric, or forensic data extracted from an individual must strictly adhere to the updated statutory certification processes to prevent tampering or misinterpretation.[36] These rulings collectively establish that scientific evidence cannot bypass traditional checks like cross-examination and explicit judicial oversight simply by virtue of being complex or technologically advanced. They build a vital modern barrier against the state's attempt to introduce automated neuro-profiling or algorithmic data through back-door channels without establishing a bulletproof chain of custody.[37]

34 Shailender Sharma v. State, W.P. (Crl.) No. 532/2008, (Del. H.C. 14, 2008) (India).

35 Amlesh Kumar v. State of Bihar, 2025 INSC 810 (India).

36 Vinobhai v. State of Kerala, 2025 INSC 119, (India).

37 Manoj Kumar Soni v. State of Madhya Pradesh, 2023 SCC OnLine SC 984 (India).

In *Indrakunwar v. State of Chhattisgarh (Supreme Court of India, 2023),* the Supreme Court directly addressed the deep relationship between a person's dignity, privacy, and their right against self-incrimination during custodial interrogation. The Court ruled that compelling an individual to answer questions or undergo tests that expose their inner mental state under the guise of an investigation is an explicit violation of human dignity.[38] This judgment firmly connects the right to mental privacy with the core principles of a fair trial, reminding lower courts that the state cannot weaponize an individual's silence or internal cognitive processes against them. It stands as a vital defense of mental autonomy, making it clear that a person's mind remains an absolute sanctuary that cannot be plundered by law enforcement agencies.

VI. Ethical Safeguards Are Difficult to Maintain in Criminal Investigations

Use by Law Enforcement establishes a Real Potential of Abuse

The ethical dangers of brain data collection and processing are enormous, especially when they occur in coercive contexts, such as police custody and criminal investigations. Although legal systems may define informed consent within their frameworks, the environment may undermine true voluntariness. Suspects are subject to acquiescence through fear, pressure, confusion, or avoidance of further treatment. In this case, the consent is usually neither legal nor ethical.

Investigative services might also use brain-based approaches not only to generate leads but also to create pressure, build on psychological advantage, or influence what people are told about guilt. This possible abuse is of particular concern in systems where custodial abuse, forceful interrogation, or media-based investigations are already of concern.

Ethical Concerns Extend Beyond Consent to Dignity and Cognitive Autonomy

The moral question does not stop at the individual's positive answer; it also challenges the appropriateness of state intervention in psychological affairs and the fact that such intervention is permitted only in the most strictly limited circumstances. The process of gathering brain data raises issues of dignity, body integrity, psychological integrity, and cognitive autonomy. A legal system that cherishes constitutional principles ought to take care to avoid reducing the man to an extractable mental

38 Indrakunwar v. State of Chhattisgarh, 2023 INSC 934 (India).

data.[39]

VII. Recommendations for Regulating the Use of Brain Data in Criminal Justice

India should pass a complete law on Neurotechnology Regulation:

India should consider establishing a dedicated legislative framework to govern the implementation of neurotechnological approaches in criminal investigations and court proceedings. Today, the legal environment is largely governed by references to constitutional principles and jurisprudential decisions, particularly the judgment in Selvi v. State of Karnataka. However, this case law does not provide detailed guidance to investigators, courts, and forensic specialists alone. An inclusive law regulating neurotechnology would clarify the circumstances under which a neuro-based method can be used and outline the necessary protections to prevent abuse.

Legislation of that sort ought to establish the concept of brain data, the scope of authorised neurotechnological testing, and the protocol for obtaining voluntary, informed consent. In addition, it ought to control how the brain-related data is stored, kept in confidence, and finally, destroyed to avoid unauthorized access or abuse.

Mental Privacy should be noted as a separate constitutional right:

Although the Supreme Court recognizes the right to privacy as a prerogative under Article 21, the continued growth of neurotechnology is prompting a need for official recognition of mental privacy. Mental privacy is the right to keep an individual's thoughts, memories, and thinking to oneself. Since brain-based technologies can reveal hidden mental processes, mental privacy is necessary to maintain individual autonomy and dignity.

Categorizing mental privacy as a special constitutional interest would further shield against intrusions into investigative practices.

Ethical Review Pursuant to the Use of Neuroscientific Evidence:

Neuroscientific methodology in the law should be ethically regulated, and be run independently. Whether brain-based investigative processes are conducted in a responsible, constitutionally attuned approach, can be determined by just ensuring

39 *Id.*

that ethical review boards or regulatory committees are set. They should have specialists in law, neuroscience, medicine, psychology, and ethics and thus such bodies can fairly evaluate the suggested testing protocols.

With the help of ethical review systems, the use of neurotechnological instruments can be prevented unjustifiably or by force. They are able to determine whether a given approach has enough scientific rationale, whether the process of agreement is truly voluntary and whether the procedure observes the dignity and rights of the subjects on which it is applied. This would make the work of investigative agencies more accountable and minimize abuse possibilities

VIII. Conclusion

Neuroscience and neurotechnology have introduced novel possibilities in criminal investigation processes, especially the purchase and examination of data of the brain. With these developments, there is a new frontier in the criminal justice system where scientific methods attempt to describe cognitive reactions, recall of memories and physiological reactions. Even as an investigational tool, these technologies come with legal, constitutional, and ethical concerns, which should be considered.

The application of brain data as evidence has put down long legal principles on privacy, autonomy, and protection against self-incrimination to test. Any attempt to tap into the mechanisms of the neurons will run the danger of tapping into the inner mental world of the people whose thoughts, memories and mental reactions would not have been voluntarily disclosed. As such, application of these techniques must be well-fanned within the bounds of constitutional rights. In a rule of law democracy, mental privacy and cognitive liberty must be prioritised. The human mind happens to be among the most personal aspects of personal identity and the effort to access or research it using technology must be well safeguarded by law. Individual dignity and the freedom of choice can very well end up being consumed and used up by science without these safeguards in place.



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