

COGNITIVE LIBERTY IN THE DOCK: THE EVIDENTIARY AND CONSTITUTIONAL LIMITS OF NEURO-CRIMINOLOGY IN INDIA

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ABSTRACT

Neuro-criminology is growing quickly and offering new options for understanding criminals because it shifts the attention of investigators from not just what people did to how their brains work. Technologies such as brain electrical oscillation signature profiling and functional magnetic resonance imaging give great promise of improving the accuracy of detecting facts, but at the same time, they bring the risk of undermining the basic principles of criminal law. This paper will investigate the constitutional and evidentiary limitations of applying these neuroscientific techniques in the criminal justice system of India. Taking the Selvi v. State of Karnataka case and Puttaswamy's right to privacy into account, the article maintains that using neuro-criminology to find the offender is an infringement of self-incrimination and of the right to mental privacy. Moreover, the article considers how neuro-evidence is supposed to help reduce punishment and support the ideas of biological determinism during sentencing. The article argues that although the law should be adapted to scientific progress, the constitutional provisions must be prioritised over anything else and offers (1) some serious regulation concerning neuro-scientific evidence admissibility, (2) some protection of human minds from the obtaining of forensic truth.

Keywords - Neuro-criminology, Cognitive Liberty, Self-Incrimination, Mental Privacy, Biological Determinism.

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INTRODUCTION

Criminal law relied on two oppositional ideas for centuries, looking at how someone did something (external action) to gain an understanding of the person's desire or plan (internal intent). With rapidly growing advancements in neuroscience, those boundaries are disappearing.² They fundamentally change how criminal investigations are conducted. Forensic investigators are literally moving their focus from examining physical evidence from a crime scene to examining how a person's brain operates.³ Technologies such as fMRI, BEOS profiling and neuro-mapping will help decode the specific memory and thought structures of a suspect. Moreover, this shift in focus from using physical evidence (blood, fingerprints, etc.) to using neuro-related data (e.g. information about the brain) represents a completely new way of thinking about evidence, consciousness and truth under the law.

This new technology has created a significant conflict with our Constitution. On one side, we have the State trying to take advantage of advancements in neuroscience in order to help find the truth more accurately, to make investigations faster and to give a better chance to convict people who commit increasingly complicated criminal acts. Those who want to use this technology believe that a "neurologically objective" system could eliminate all of the inherent weaknesses, biases and lies associated with human testimony.⁴ On the other hand is the sacred right of an accused person to maintain the privacy of their minds. If we allow the government to invade the most solid, last bastion of individual freedom, that is, the mind, then we will have destroyed the most important principles of personal freedom, human dignity and the presumption of innocence.⁵

This paper puts forth a thesis that although neuro-criminology has great potential as an investigative tool, using it to substantiate or identify a person as guilty without proper laws in place would be a serious violation of the Constitution of India and international human rights law. The extraction and interpretation of neuro-data without limits would be a way to circumvent the right against self-incrimination under **Part III**, Article 20(3) of the Constitution of India and

² Nita A. Farahany, *Incriminating Thoughts*, 64 STAN. L. REV. 351, 354–56 (2012).

³ Owen D. Jones et al., *Brain Imaging for Legal Thinkers: A Guide for the Perplexed*, 2009 Stan. Tech. L. Rev. 5, (2009).

⁴ Jane Campbell Moriarty, *Visions of Deception: Neuroimages and the Search for Truth*, 42 AKRON L. REV. 739, 758-61 (2009).

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would result in the accused being used as an involuntary means of providing evidence against themselves.⁶ Such use would also violate the developing international human rights principle of “cognitive liberty”. This analysis reviews the legal precedents set down in important Supreme Court cases, including *Selvi v. State of Karnataka* and *Justice Puttaswamy* and the right to privacy, to determine the legitimate boundaries of neuro-criminology.⁷ This paper concludes by advocating that India’s criminal justice system needs to create strong statutory walls between obtaining forensic truth and completely restricting someone’s cognitive freedom.

THE SCIENCE AND THE STANDARD OF PROOF: NAVIGATING THE EVIDENTIARY LABYRINTH

Prior to evaluating the constitutionality of using neuro-criminology as evidence, it makes sense to better understand how the technology works and whether it meets the admissibility standards of the *Bharatiya Sakshya Adhiniyam* (BSA), 2023. In its current form, there are three major applications of the technologies available to investigators in India today; these technologies include but are not limited to: narcoanalysis, functional magnetic resonance imaging (fMRI), and brain electrical oscillation signature (BEOS) profiling. The narcoanalysis process uses sodium pentothal, a barbiturate administered via intravenous injection, to induce a state between wakefulness and sleep, which should cause a subject to have a decreased cognitive filter; therefore, allowing investigators to obtain previously repressed material from subjects. The second major technology used for investigating crimes is fMRI. An fMRI machine has the ability to detect where in the brain blood is flowing through blood-oxygen-level-dependent (BOLD) signals, thus allowing an investigator the ability to visually link activity in a particular region of the brain to cognitive effort and internal conflict. Both narcoanalysis and fMRI have been used successfully; however, BEOS profiling is unique in its use within forensic evidence in India, as BEOS does not measure blood flow to and from the brain, but rather uses the electrode signatures of the P300 brain wave pattern from the electroencephalogram (EEG) device; hence, it can provide an investigator with a distinguishing measure of autonomic response to auditory stimuli and/or images presented to a subject. Some researchers in the area of BEOS profiling believe that the technology can differentiate between conceptual knowledge (i.e., awareness of the commission of a crime via secondary sources) and experiential knowledge (i.e., the actual

⁶INDIA CONST. art. 20, cl. 3.

⁷*Selvi v. State of Karnataka* (2010) 7 SCC 263 (India); *K.S. Puttaswamy v. Union of India*, (2017) 10 SCC 1,

memory of committing a crime) by measuring the autonomic responses of the subject to auditory and/or visual stimuli.⁸

Even with their seemingly advanced technologies, transferring these technologies from the controlled environment of the laboratory to an adversarial trial has many complications in terms of the types of admissible evidence. Under section 39 of the BSA, the testimony of a “person specially skilled in science” is considered an admissible fact.⁹ However, Indian courts have consistently held that expert medical or scientific evidence is generally supplementary and is not a substantive basis upon which to find guilt or impose a penalty. The heart of the legal dispute concerns the legal definition of reliability, as jurisdictions around the world rely predominantly upon the strict standards outlined in Daubert (i.e., empirical testability, whether there has been peer-reviewed publication of the scientific principle, and whether the scientific principle has been sufficiently established so that error rates can be produced) when considering whether to admit scientific evidence.¹⁰ Conversely, Indian courts often apply a more discretionary approach when evaluating forensic science, which requires a significant amount of judicial labour on the part of judges as gatekeepers of the admissibility of scientific evidence due to the highly technical nature of neuro-data.

Judicial deference to science’s novelty may lead to the “CSI effect,” where judges and juries develop a cognitive bias due to their awe over the technology’s complexity. This could lead to a dangerous trend of considering neural imaging as true photographs of the crime. Brain imaging images are based on group averages, but are not definitive evidence of the mental state of a specific individual. For example, an fMRI scan showing activation in the prefrontal cortex does not automatically mean that the individual is lying; it may also reflect an incredible amount of fear, stress, or confusion while questioned by law enforcement.¹¹

Additionally, the uncritical attribution of unquestioned authority to neuro-evidence creates a large ontological gap between neuroscience and the fundamental principles underlying criminal liability. Criminal liability hinges upon mens-rea, the contemporaneous, conscious and subjective intention to engage in a prohibited act, whereas neuroscience identifies biological anomalies or

⁸ Henry T. Greely & Anthony D. Wagner, *Reference Guide on Neuroscience*, 2011.

⁹ Bharatiya Sakshya Adhiniyam, No. 47 of 2023, § 39, India Code (2023).

¹⁰ *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 593–94 (1993).

neural predispositions for a particular action. For example, a structural deficit in an individual's amygdala or impaired functioning of the individual's frontal lobe could explain a propensity toward aggression or lack of impulse control; however, demonstrating that an individual has an anatomical or functional anomaly fails to demonstrate either legally or logically that the individual possessed a specific, deliberate intent to commit a crime at the precise point in time as the actus reus was committed.¹²

Neuro-reductionism presents a perilous fallacy by equating a physiological brain state with a subjective mental state. This fallacy takes biological determinism and merges it into the legal definition of free will, as if the way a person is neurologically wired shall take precedence over a person's legal conception of free will. While neuro-criminology is extraordinary at mapping the physical world of the brain, it cannot define with any scientific validity the subjective architecture of the guilty mind.¹³ By not acknowledging the limits mandated by neuro-criminology, the legal system opens itself to elevating a probabilistic, experimental science into an indisputable witness, greatly diminishing the evidentiary burden of proof beyond a reasonable doubt.

THE CONSTITUTIONAL CONUNDRUM

In Indian law, there is a serious doctrinal problem at the point where advanced neuro-criminology meets the Constitution of India. Forensic technology has begun to make use of neural pathways to probe the accused without any external act, bringing it into collision with two provisions of Part III of the Constitution: Article 20(3) prohibits self-incrimination, and the personal freedoms guaranteed by Article 21. Resolving this conflict requires a re-examination of the major precedents to determine whether the human mind remains a protected sanctuary against state intrusion.

1. Article 20(3) and The *Selvi* Paradigm: Redefining Testimonial Compulsion

The right against self-incrimination in India has a strong base in Article 20(3), which states clearly that “no person accused of any offence shall be compelled to be a witness against

¹² Stephen J. Morse, *Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic Note*, 3 OHIO ST. J. CRIM. L. 397, 398–400 (2006).

¹³ Michael S. Pardo & Dennis Patterson, *Philosophical Foundations of Law and Neuroscience*, 2010 U. ILL. L. REV. 1211, 1214 (2010).

himself.”¹⁴ The Supreme Court, in the case of *State of Bombay v. Kathi Kalu Oghad*, made a practical distinction between providing evidence and being a witness.¹⁵ The Court found that requiring an accused person to provide physical evidence (e.g., fingerprints, handwriting samples, DNA) does not violate Article 20(3) because the individual's physical traits are fixed or permanent and exist regardless of whether the accused wants to provide them.

With the development of the science of neuro-criminology, this simple distinction became much more complicated. The Supreme Court of India addressed this change in technology in the case of *Selvi v. State of Karnataka*.¹⁶ The Court had to determine whether the use of narcoanalysis, Brain Electrical Activity Patterns (BEAP), Brain Electrical Oscillation Signature (BEOS) or the Polygraph test, as a method of obtaining evidence, could be constitutional. In confirming the right to civil liberties, the Court found that the forced administration of these tests by the state is “testimonial compulsion.”

Selvi is legally significant because the distinction it draws between taking a blood sample and extracting neuro-scientific (BEOS) data captures the essential difference between the two kinds of evidence. The state does not just take the blood of an accused person; it also takes from their consciousness and memory through BEOS profiling and narco-analysis. The court held that these technologies negate the conscious control of the subject and, therefore, cause them to be a passive and involuntary source of information against themselves. The Supreme Court has determined that the same prohibition found in Article 20(3) applies to compelled oral testimony as to the use of drug-induced revelations and the capturing of brainwaves, and, as such, that the internal cognitive process of the accused is also protected from being compelled as testimony against themselves through those means.

2. Article 21 and the Impregnable Sanctuary of Mental Privacy

In criminal investigations, Article 20(3) protects a specific procedure, but the more philosophical

basis exists under Article 21: the right to life and personal liberty.¹⁷ The involuntary extraction of neural data goes beyond self-incrimination, and it represents a serious invasion of one's dignity

¹⁴ Supra note 6.

¹⁵ *State of Bombay v. Kathi Kalu Oghad*, AIR 1961 SC 1808 (India).

¹⁶ *Selvi v. State of Karnataka*, (2010) 7 SCC 263 (India).

¹⁷ INDIA CONST. art. 21.

and “cognitive liberty” — the term cognitive liberty has been defined as an emergent international human rights concept that asserts that every individual possesses an inalienable right to determine their mental self-determination and the exclusive right to govern their own brain activity.¹⁸

The Supreme Court of India implicitly recognised the boundaries of cognitive liberty in its decision in *Selvi*, where it found that an individual cannot be compelled to disclose his innermost thoughts as part of the “substantive due process” guarantee under Article 21. The nine-judge bench's opinion in *K.S. Puttaswamy v. Union of India* (2017)¹⁹ firmly established that mental privacy protection is doctrinally most strongly evidenced by the protection of privacy, which is defined by the Supreme Court as a basic constitutional right. This prominent recognition of the protection of privacy has forever changed the neuro-criminology dialogue.

According to the *Puttaswamy* ruling, “mind” and “mental privacy” are aspects of an individual's autonomy; if privacy is the right to be left alone, the mind must be regarded as the last space that ought to remain free from governmental interference. Physical spaces can be entered and searched under a court-ordered warrant; the internal landscape of human thought cannot be interfered with merely because the state has the technological ability to do so. Applying the *Puttaswamy* proportionality test to neuro-criminology exposes a major failure to meet constitutional standards: even where a legitimate state objective — the prosecution of crime — exists, the involuntary mapping of an accused's brain waves is a disproportionate and excessive means of pursuing that objective, one that profoundly discounts the inherent worth and dignity of the individual concerned. In this context, the individual is transformed from a rights-bearing citizen into a mere biological repository of information for the state to extract at will.

3. The “Consent” Loophole: The Illusion of Voluntariness in Custody

Although the *Selvi* Judgment provides strong protections for constitutional rights, it does include

a highly contested caveat allowing neuro-scientific tests with informed and voluntary consent from the accused. Furthermore, the judgment stipulates that consent must be obtained according

¹⁸Marcello Ienca & Roberto Andorno, *Towards New Human Rights in the Age of Neuroscience and Neurotechnology*.

¹⁹*K.S. Puttaswamy v. Union of India*, (2017) 10 SCC 1 (India).

to the National Human Rights Commission (NHRC) Guidelines from an accredited Judicial Magistrate, with a qualified lawyer present.²⁰

However, a close analysis of the legal framework shows that there are serious issues regarding this “consent loophole,” along both practical and philosophical lines. The most serious problem with allowing consensual neuro-testing is the structural realities of the Indian criminal justice system. By legislative definition, consent is only valid when it is given without force, undue influence and/or fraud. Since the coercive atmosphere of police custody cannot allow for the exercise of free will, it follows that an accused cannot give voluntary consent. The concept of free will does not exist in the context of this large power imbalance between the custodial state and the detained person. Therefore, the concept of voluntary consent is fundamentally flawed.

The idea of offering “consent” is a way for investigators—along with the judicial system—to create psychological coercion on the accused. When an accused exercises their constitutional right under Article 20(3) to refuse a BEOS (Brain Electrical Oscillation Signature) test, investigators (and, implicitly, the judicial system) may draw a ‘negative inference’ against them, relying on the flawed reasoning that ‘an innocent person would have nothing to hide.’ This creates an impossible situation for the accused: either surrender their mental privacy, or exercise their fundamental right and risk being treated as though they were guilty.

Furthermore, the complexity of neuro-technologies makes it highly unlikely that any average person would fully comprehend all the scientific nuances involved in how an fMRI scans brain activity, and how those probabilities could be incorrectly used against the accused at trial. Thus, using consent to serve as the basis for the validity of using neuro-criminology is a weak legal fiction; it creates a façade of procedural fairness while actually eliminating very real absolute protections afforded by the Constitution.

India does not operate in a jurisdiction-lacking environment. To comprehend the implications that arise for individuals as a result of having their brains profiled by the state, it is necessary to understand how domestic law functions within an international human rights paradigm. With technology outpacing traditional forms of law, it is important to use international treaties as a

²⁰ Nat'l Hum. Rts. Comm'n, *Guidelines for the Administration of Polygraph Test (Lie Detector Test) on an Accused* (2000) (India).

means of anchoring the law's normative foundation to assess how the use of neuro-criminological methods is violated as a result of extracting neural data against an individual's will in a manner that is against their dignity as an individual on an international level; this evaluation will show that the process used to collect and utilise an individual's neural data is a violation of their rights and constitutes a breach of their dignity by virtue of being forced into acceptance or participation through coercive means.

The ICCPR Framework: Expanding the Shield Against Coercion

The ICCPR (International Covenant on Civil and Political Rights) provides meaningful protections under international law and is relevant to the ongoing neuro-criminology discussion, as India is a signatory to this treaty, which places India under the obligation to adhere to these provisions as they relate to its citizens' rights. Interestingly, this right, as described in Article 14(3)(g), guarantees an individual the absolute right "not to be compelled to testify against himself or to confess guilt".²¹ Historically, Article 14(3)(g) has been interpreted as protecting against the use of forced oral or written confessions by the state. The teleological or purpose-oriented interpretation of 14(3)(g) is intended to protect the autonomy and rights of those accused against the coercive power of the state. The use of fMRI by investigators to obtain information or conduct interrogation, by bypassing the vocal cords and directly interrogating the brain, is a direct affront to the right protected by 14(3)(g) and would ultimately be an unconstitutional means of transforming an accused's subconscious or neurological reaction to stimuli into a hostile witness against their will.

The involuntary use of neuro-technologies must be examined under Article 7, ICCPR, which

prohibits torture and cruel, inhuman, or degrading treatment.²² While BEOS profiling and fMRI scans may not cause pain like older ways of Torture using pain, they are a shocking transformation of psychological pressure. Forcible neuro-extraction eliminates the ultimate psychological authority of a person. Having one's most private thoughts, memories and reflex reactions mined without consent and subsequently displayed to the state for prosecution is extraordinarily degrading to the person. This act diminishes the sanctity of human consciousness

²¹ International Covenant on Civil and Political Rights art. 14, 3(g), Dec. 19, 1966, 999 U.N.T.S. 171.

²² International Covenant on Civil and Political Rights art. 7, Dec. 19, 1966, 999 U.N.T.S. 171.

to that of simply being a form of biological information being stored, thus being a modern, sophisticated form of degrading treatment.

“Neurolaw” and the Vanguard of Human Rights

With the rapid advancement of neurolaw, an interdisciplinary field has arisen as a result of developments in neurotechnology, whose unprecedented capabilities have created new challenges for existing frameworks for global human rights law as impacted by advances in neuro and brain-reading technologies. International legal scholars and bioethicists have called for the establishment of a new set of rights—the so-called “neuro-rights”—in order to protect individuals’ rights to cognitive liberty (i.e., an individual’s right to control one’s own mental state).²³

Based on the right to cognitive liberty are two specific rights that define the limits of the law in the context of criminal investigations: (a) the right to mental integrity, and (b) the right to psychological continuity.

Mental Integrity was originally understood as a mental health issue in the past; however, mental integrity has recently been defined by international rights-based organisations as a negative right, so it will protect an individual from unconsented intrusions or manipulations of their neural data without consent. The new definition of mental integrity also suggests that brain states for an individual are unprotected; therefore, if the government uses neuro-criminology to forcibly

decode (i.e., the brain's autonomic reaction) a person's reaction to a crime, then there has been a significant interference with that person's mental integrity.

Psychological Continuity exists when a right to protect the core identity and unified conscious experience of a person exists against outside interference. Even though neuro-profiling is used to read the brain, it does not alter the brain. However, when a subject is forcibly made to externalise their internal cognitive processes, their psychological autonomy is disrupted and fundamentally changes the relationship between the citizen and the government.

A legal and ethical approach to criminal justice must accept that the mind is the last realm of human freedom. Furthermore, human rights law must evolve to say the state can only investigate

²³ Supra note 18.

individuals up to their skulls, irrespective of technology or other issues. Operationalising these new neuro-rights domestically is not an intellectual pursuit, but a need to ensure that while finding forensic truth, the state does not destroy fundamental cognitive rights.

THE DOUBLE-EDGED SWORD: NEURO-CRIMINOLOGY IN SENTENCING

Not only does the law-related narrative generally portray the utilisation of neurology-related data as an instrument of charging individuals, but it also provides a powerful but unstable source of protection during sentencing for the defence's case. Once a person has been found guilty beyond a reasonable doubt by a court for an offence such as murder or robbery, neuroscience evidence may be brought before the judge as a means of demonstrating substantial mitigating factors, which can change how the judge assesses culpability in arriving at a sentencing decision.²⁴

Neuro-imaging methods such as fMRI and PET scans can be used to provide objective biological evidence of behavioural deficits within the criminal justice system in India (the "rarest of rare" death penalty standards as decided in *Bachan Singh*).²⁵ Evidence of significant frontal lobe damage, neural abnormalities due to injury, and/or lack of transparent development can be medically validated and support evidence of reduced impulse control and impaired decision-making.²⁶ As a result, once a defendant's inherent malice has been supplanted with evidence of neurological impairment, this evidence will serve as a significant barrier against the death penalty by instructing courts to consider these significant biological deficiencies when making their decision about whether to impose the ultimate punishment.

Using neuroscience evidence to support a person's defence can be dangerous because it opens the door to biological determinism - the belief that a person's behaviour is determined by their biology. If defence attorneys try to prove that someone is biologically predisposed to aggression and cannot control themselves, lawyers may also be able to argue that the person will always be a mechanical (i.e. unpredictable) threat. How the courts will interpret an argument based on the idea of a "broken brain" is very unpredictable. The "broken brain" argument can be used to negate the valid moral basis for executing someone; however, it may be used against an individual by the state to claim that they cannot be rehabilitated. As a result, it may not lead to an

²⁴ O. Carter Snead, *Neuroimaging and the "Complexity" of Capital Punishment*, 82 N.Y.U. L. REV. 1265, 1290–93 (2007).

²⁵ *Bachan Singh v. State of Punjab*, (1980) 2 SCC 684, 715 (India).

²⁶ Robert M. Sapolsky, *The Frontal Cortex and the Criminal Justice System*, 359 PHIL. TRANS. R. SOC. LOND. B 1787 (2004).

appropriate therapeutic intervention, but may instead be used to justify harsher and longer forms of preventative detention (i.e. indefinite imprisonment) or the systematic denial of parole under the guise of public safety. Thus, the application of neuro-criminology as a basis in sentencing represents a true double-edged sword that requires a great deal of strategic caution in order to ensure that efforts at mitigation do not inadvertently result in a permanent, irredeemable form of stigma for an individual.²⁷

CONCLUSION

An inescapable epistemological shift is found where the intersecting disciplines of criminology and neuroscience converge. The Indian system of Criminal Justice cannot take a Luddite position in disavowing the forensic usefulness of sophisticated brain mapping technologies. Nevertheless, empirical forms of science must have strict inferiority to constitutional morality. The unbridled application of neuro-criminology constitutes a direct violation of the Right Against Self-Incrimination under Article 20(3) and further violates the Safe Haven of Mental Privacy guaranteed by Article 21. In order to ensure that cognitive liberty is not violated, it is imperative for India to implement a comprehensive bespoke statutory framework regulating neuro-evidence instead of relying on the uncertain "consent loophole".

The legislature must create an exclusive law that clearly lowers the potential use of neuro-science data from its ambiguous evidentiary status. The use of methods such as BEOS profiling and

fMRI should only be used as a source of initial leads for investigation or to locate physical evidence under Section 23 of the Bharatiya Sakshya Adhiniyam, 2023.²⁸ Additionally, there must be a law in place that prohibits the use of any of these types of neuroscience data as substantive and inculpatory evidence of guilt against the accused during a trial, regardless of whether they consented or not.

To combat the perception of voluntary consent while in police custody, the proposed framework establishes an Independent Neuro-Ethical Medical Board (INEMB) for this purpose. If the accused consents to a neuro-test, the INEMB must conduct a pre-test formal review of the test to determine that there was a complete absence of coercion before the test is performed. Any

²⁷ Deborah W. Denno, *The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases*, 56 B.C. L. Rev. 493, 501-2 (2015).

²⁸ Bharatiya Sakshya Adhiniyam, No. 47 of 2023, § 23, India Code (2023).

consent or testing shall be performed outside of police custody in a clinical environment in order to remove the scientific procedure from the coercive location of state interrogation.

While prosecuting complex crime is a compelling state interest, it cannot be achieved at the expense of human dignity. By creating robust statutory firewalls, India will be able to utilise the investigative benefits of neuro-criminology, while also preserving the mind as the ultimate, sacred frontier of human autonomy and rights.

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