

Open Access 



The Future of Law: How Neuroscience is Reshaping the Legal System

Amir Latif Bhatti¹ Sardar Ali Shah² Abdul Rehman Bhatti³ Saba Karim⁴

Abstract: *A fascinating new field: Neuro-law is the branch of study that coordinates the brain and the law. This area has recently become quite popular because of finding new phenomena and changes that have occurred in the course of the latest neuroscience that allow making the existing general laws and improve the justice system. Neuro-law is the branch that developed its popularity at the beginning of the 1990s when people started discovering how their brain operates. It is almost imperative today in many a legal field to address complex problems with Balances of modern concepts. One of the major concerns of neuro-law is to establish what can neuroscience do for law and how can judges decide cases in a more rational and just manner. The work explores how human minds and actions entwined with legal concepts such as accountability of innocence and guilt are interconnected. This research is committed to having balanced laws and having a deeper understanding of how our mind functions. Neuro-law has led to a very important shift in science and society. Many times people are learning how their brain plays a role in dictating their actions. That is due to its impact on the law-making process, how justice is handled in the court of law, and how the society is built to be equal.*

Key Words: Neuro-Law, Neuroscience, Jurisprudence, Justice System, Legal Dilemmas, Human Cognition, Court Rulings

Introduction

Science as a field of research studies is ceaselessly developing and expanding while integrating information from various fields to form a system. This kind of growth appears completely logical and results in people blending their ideas from other subjects, meaning the acquisition of broader knowledge. In this way, the study of law is now beginning to connect deeply with the study of the brain and nervous system: neuroscience which is a field that seems to be gaining a lot of new information. Studying how the brain is involved in: how people behave and how they reason is slowly emerging as vital in understanding the precepts of law. But this is where the new field of Neuro-law comes in (Petoft & Abbasi, 2019). It intends to blend the legal rules with the findings of science, particularly neuroscience. This research intends to find out how these two different fields, "law and neuroscience", are blending. The goal is to demonstrate how what is learned about the brain assists man with legal concepts and how man puts these ideas into practice. In hopes of contributing to the discussion of how the law may evolve, we will explore where neuroscience and law meet. Our purpose of this paper is to improve and advance the knowledge that the law may lack in its understanding of the brain and the functions it performs in the body (Chandler et al., 2019).

Brain Meets Gavel: The Evolving Dialogue between Neuroscience & Legal Theory

Neuroscience which examines the brain and the nervous system has done this and that to the concept of health and the human body. Otherwise known as genomics, it is a branch of biology that focuses on how genes and environments affect the human brain and every aspect of the human physique. Today, neuroscience interacts with a large number of various sciences and disciplines. Its findings of how the

¹ Assistant Sessions Judge, Karachi South, Sindh, Pakistan.

² Assistant Professor, Incharge Director, Institute of Law, University of Sindh, Jamshoro, Sindh, Pakistan.

³ Dean, Faculty of Law, Shah Abdul Latif University, Khairpur, Sindh, Pakistan.

⁴ LLM Scholar, Institute of Law, University of Sindh, Jamshoro, Sindh, Pakistan.



nervous system functions are guiding Neuro-law, where neurology and legal systems intersect. More so there is increasing literature on the genetic relationship between biology and behaviour exhibited by many species including human beings. In the foreground, Neuro-law synchronizes rich information from neuroscience and a legal system based on rules and structures. It will describe how the/head of the human brain works in terms of thinking and decision-making/ making as well as the intentions of the actor in the commission of the crime. Such a phenomenon instigates more interdisciplinary research by merging two areas and requires a more reflective approach to the legal aspects (Mora, [2019](#)).

Neuro-law aims to make the evidence in courtrooms more precise, helping to create a fairer justice system. The way neuroscience is coming into legal situations opens up new ways to think about and expand the field of law. Neuro-law does not just give a better understanding of legal problems but lets people look at them through the latest findings about the brain. In legal battles where many issues can be related to brain evidence, such data is becoming very important. What people learn from neuroscience is pushing the legal system toward a more informed and fair future. This science can change legal rules, how courts work, and the traditions they follow (Du, [2020](#)). Imagine a future courtroom where neuroscience is part of legal practice. Here, the workings of neurons and synapses might help prove someone is innocent or guilty. With this more profound understanding of the human brain, the legal system will be better at navigating the tricky paths of justice. The combination of neuroscience and law is more than just an academic idea; it could lead to a judicial system that knows both the law and the brain science of the people it judges. This partnership could start a new age for the direction that respects the complexity of human behaviour as much as it respects the law itself (Neri, [2023](#)).

When the idea of neuro-law was introduced into legal discussions, it might make people think twice. At first look, the goals and methods of neuroscience and law seem pretty different. Neuroscience, based on hard science, looks for definite answers through experiments. It seeks clear cause and effect, where each result follows a set pattern. On the other hand, the science of law deals with what might happen; it is about the likely practices of how people act and behave, which society tries to manage through statutes. The regulation establishes the social order, defining right and wrong to guide behaviour (Greely & Farahany, [2019](#)). Meanwhile, natural science is neutral, only describing the 'laws' that happen in nature and behaviour as they naturally occur. However, the ultimate goal of legal systems everywhere is to protect human dignity and human rights. Having a fair and just legal framework is essential for these high aims. This is precisely where neuroscience can be very important for legal theory. By explaining behaviour and thinking processes in terms of brain science, neuroscience gives those in the legal field better tools to understand and regulate these behaviours. The coming together of law and neuroscience can illuminate what justice means (Ade, [2023](#)).

Neuro-law could influence how laws are made, offering a scientifically supported view that helps decide legal or illegal actions. Judges could use neuroscience to better understand the people in their courtrooms, leading to well-informed and balanced decisions. For lawyers, knowing about the brain basis of behaviour, whether from the past or present, provides a strong foundation for their arguments and defenses in court. Consider how a person's past actions can show character and indicate psychological patterns important for judgment and sentencing. Even how a person shows stress or pressure and the immediate reactions tied to these can be crucial in establishing intent for criminal responsibility (Nair, [2022](#)). In the end, the success of the law in creating a thriving society depends on how well it aligns with accurate and functional models of human behaviour. A deep understanding of where behaviour comes from and what influences it is crucial. This deep understanding is what Neuro-law promises to bring to future legal proceedings, making sure the law not only judges but also understands, not only controls but also empathizes, preparing for a legal system that is as based on science as it is on social justice (Goodenough & Tucker, [2020](#)).

Neuroscientists explore how the brain affects behaviour using advanced technology to show the brain's complex structure. Through brain imaging, experts make detailed pictures of the brain, interpreting the neural activity network underlying how people act and think. This mapping is not just for science's sake but also crucial for law, which aims to guide and regulate human actions. At the center of this is Neuro-law, a growing field that combines brain science knowledge with the structure of legal rules. Neuro-law professionals are creating a new path where brain evidence helps define and refine legal standards, leading

to a legal system that is both more precise and fair (Urai et al., 2022). In the past, neuroscience was mainly used in legal processes to help analyze civil and criminal cases. However, neuroscience research is now reaching into different legal areas—from personal injury to patents, consumer safety to healthcare rules, and even affecting how people interpret the constitution, criminal justice, and labor laws. Therefore, Neuro-law is not merely intertwining neuroscience with legal policies; in fact, it is also the only comprehensive approach to examine how the law interacts with other social sciences especially Psychiatry, Sociology, Political Science, and Economics particularly its impact on the studies of crime (Cavalla, 2021).

Neuro-law's aim is precise: to strengthen the legal bodies by making a deep acquaintance with the influence between the mind and the action. In this way, it tries to make the legal system look at the law and the human beings for whom the law exists. This current and integrated scientific-practical approach is announcing a new paradigm of legal thinking, in which concerns for scientific accuracy and concern for human values are equally balanced and find their synthesis in justice that is equally rational and compassionate.

Neuro-criminology: Examining the Brain's Role in Criminal Behavior

In that diversified field of criminology, there is a branch called neuro-copsychology. It employs methods from neuroscience to analyze and understand why and what criminal actions are all about. Unlike other schemes of analysis, which concentrate on outward behavior, this approach seeks to establish how the mind and brain set up a connection between character traits and unlawful conduct. In recent years, now people have some changes in dealing with accountability, punishment, and even with fellow convicts' empathy through the latest technology in scanning the brain. Neuro-criminology researchers look for how a human's brain may have come to develop a criminal bent by looking at flaws in the connection of the brain's pathways and the functionality of the brain; for instance, the neural circuitry in those who break the law, particularly the areas that are involved in the making of moral decisions. Experts are discovering more about why certain people commit crimes, including those involved in corporate fraud, those who act violently, or those who show no remorse (Anderson, 2021).

The current research in this field also sheds light on the complex discussion about free will and moral responsibility in the legal context. The complicated ties between someone's belief in their own free will, their independence, and their legal obligation after breaking the law have sparked intense discussions among philosophers, criminologists, and neuroscientists. Neuro-criminologists, equipped with the latest technology, are rethinking old notions by asking if it is lawful to penalize someone whose brain functions, the ones related to understanding right from wrong, may not be working correctly. Studies in this area have grown a lot from old theories and now involve intricate examinations and interpretations of brain scans to determine how responsible a criminal might be (Cardoso, 2021).

When deciding on punishments for others, scientists asked participants to recommend punishments for imagined crimes that vary in nature and seriousness. It is important to note that these scientists employ brain scans equating to fMRI and questionnaires to back their claims. A key player in this sort of work, Owen D. Jones, uses fMRI to assess the harm caused by the perpetrator and the extent to which he or she should be held accountable based on the person's state of mind. He then uses these evaluation results to compute a correct penalty while at the same time identifying the parts of the brain that are engaged in such judgment-making (Jones & Wagner, 2020). Further, when scholars like Greene examined a spectrum of choices, brain areas such as the Right dorsolateral prefrontal cortex have been found to be involved in making judgment calls when decision-making on moral dilemmas is required. It is being done in an advanced manner that makes the further and more detailed understanding of neuroscience and criminology ready to reform the legal frameworks of crime punishment with a better perspective of the role of the brain in criminal activity (May et al., 2022).

Neuro-law: The Latest Trends and Research Findings

The term 'Neuro-law' was first introduced to the surface of the academic work through a paper named 'Neuropsychologists and Neurolawyers' written by Sherrod J Taylor for the year 1991 which may be considered as laying a small bridge towards this mixed field of work. At the beginning of this work, key financial support was donated by the Gruter Institute for Law and Behavioral Research and the Dana



Foundation. They helped investigate the moral and ethical debates surrounding the Neuro-law that emerged as a result of the launch of the Law and Neuroscience Project in 2007. Nowadays, the increase in Neuro-law is observed in the US, UK, and other European countries. These growths demonstrate the efforts exerted by brain scientists as well as law experts. The rise in the number of academic articles, papers, and conferences on the subject shows the need to study the prospects and difficulties that appear when neuroscience and legal sciences intersect (Dash et al., [2020](#)). Since receiving over \$15 million dollars from the MacArthur Foundation, projects including the Law & Neuroscience project in Santa Barbara from FY2007-2011 and the MacArthur Foundation Research Network on Law & Neuroscience at Vanderbilt University from 2011-2014 have been central. Research in Neuro-law has two main branches: practical and theoretical. The valuable research focuses on how brain-related evidence is offered in the courts, and how people are made to pay for their legal offenses. Works like Neuroscience and Legal Responsibility have begun asking questions about how the concepts of free will are reflected in law by using concepts from brain science, genetics, and psychology (Sommaggio, [2022](#)).

Further, research into young people's brain development means that the study of the law is heading for new developments. Among such books as "Neuro-Law for Trial Lawyers" and "Neuroscience in the Courtroom", the use of brain science in law is closely explored. On the other hand, theoretical work in neuro-law aims at enhancing the existing knowledge of how human brains influence their behavior and how this knowledge should inform new legal rules. Some experts question the feasibility of translating knowledge about the brain to legal concerns, issues that they discuss include brain well-being, mental conditions, privacy, as well as autonomy, and culpability (Aono et al., [2019](#)). Such technologies as fMRI and EEG are used by brain scientists to explore how legal techniques and rules are connected to our brains and thoughts. Some of these experts have pushed hard for law reform to embrace the findings of brain research. These efforts are presented in publications such as "Mind, Brains, and Law" and "Neurobiology of Criminal Behaviour". More to the point, what the science of the brain has to do with laws affecting youths is gaining increasing attention. Criminal justice stakeholders are today basing laws concerning juveniles and how they handle affairs done to them by the law on knowledge obtained from research on the human brain. Policymaking transcends the existing human brain science to help policymakers develop juvenile justice systems that appropriately account for the concept of growing up (Petoft & Abbasi, [2020](#)).

Relevant Case Laws related to Neuro-Law

The following relevant case laws are related to neuro-law, particularly focusing on mental health assessments, legal procedures concerning mental illness, and their implications in criminal cases.

C.R.P.420 [2016], Mst. Safia Bano v. Home Department, Govt. of Punjab

This case pays more attention to the criteria for diagnosing mental illness where such diagnosis must be done based on the ICD by WHO. The court then concluded that no one should be considered mentally ill based on things such as politico-social status. It is important for neuro-law in this case due to the rule on mental health assessments along with the requirement for a competent court's ruling as to a subject's mental state.

PLD 393 [2006]. Dr. Abdullah Hamid Mehmood v/s The State.

In this case, the accused was ordered to be taken to a neurosurgeon to test his spinal cord complications. That establishes the fact that medical assessments should form part and parcel of legal processes, especially within the competency of an accused person. This is especially the case as the court has maintained that a report from a medical practitioner is necessary this points to the advent of neuro-science in legal matters.

P.Cr.L.J 1693 [2006], Sultan v/s The State

This case touched on this fact and was clear that the convict was initially recognized to be of unsound mind. However, po during the trial, the complainant party altered its position which in effect caused irregularity in the trial process. It affirmed that the result of the trial should not be reached without conducting a preliminary investigation into the mental status of the accused in accordance with the

Criminal Procedure Code. The following case best demonstrates why psychology assessments should be conducted in more cases in criminal trials and the legal requirements of sticking to protocols.

LHC 1829 [2013], Khadim Hussain v/s State

This case related to the accrual of numerous employees' medical evidence after one of the many violent rampages. As the court decision highlighted, questions of fact that need clarification also concern the medical conditions of the participants of the process, both in terms of mental and physical state. The emphasis on medical evidence aggravates the interaction of law and neuroscience with reference to criminal responsibility and mental conditions.

YLR 1699 [1999], Khadam Hussain and others v/s Abdul Rehman

This case examines the process of medical examination of the injured party who had a diffuse axonal injury. The neuro-surgeon report suggested some possible future implications on the cognitive abilities of the victim. This case is relevant to neuro-law as it raises the question of how medical evidence might affect legal decisions, and as an illustration of how the neurological aspects of an accident must be considered where they have an impact on legal proceedings.

SCMR 1708 [1995], Dr. Muhammad Shaft Zehri and another v/s The State

This particular case pertains to the issuance of a medical certificate for a patient with a suspected brain tumor. The court pointed out the importance of medical evidence when legal hearing involves issues pertaining to the human mind. This case calls for the application of neuroscience in its legal application with proper medical examination before coming to a legal judgment.

LHC 9059 [2021], Mst. Rashida Bibi v/s State

The night of the reporting of this case made it appear that the witness' statements were illusory and complicated. The court also pointed out that such a delay can precipitate a motive, and therefore stresses the timeline, in respect of, medical examinations as well as neuro-science when assessing the state of mind of witnesses and accused persons.

Above were the overviews of some of the most important issues at the intersection of neuroscience and law, legal procedures, and the role of mental health in criminal trials. They present the framework for neuro-law and show that neuro-law requires medical fitness assessments accompanied by legal compliance.

Challenging Inquiries in the Realm of Neuro-law

Judges, lawyers, and academics in law and related fields are looking to brain science to help provide answers to some of the basic and/or difficult questions that arise in law. They are interested in applying this science to find out how liable an individual is for an action, or if they had any idea of what was going on when they misbehaved. These experts consider the mental condition presumed guilty, what he or she may know or conceal, how their memory is, and whether they are telling the truth. There is also a growing interest in how our brain's workings affect our actions that have legal consequences. The challenge is figuring out what rules and decisions in courtrooms should consider these insights to ensure the law treats people fairly. They ask how studying the brain can make a difference in criminal and civil law, two main areas of the legal system (Villalba, [2023](#)).

It's becoming evident that the study of the brain and the law overlap in many ways. The contributions that neuroscience can make are varied: it might help to strengthen or question legal arguments, spot lies, make the legal process more efficient, step in to solve legal problems, predict behaviours that are important in law, or help explain why people behave in specific ways when it comes to the law.

Obstacles in the Intersection of Neuroscience and Law

Owen D. Jones, a renowned scholar, emphasizes the significant impact neuroscience could have in legal studies. He believes that for the legal system to benefit from neuroscience fully, scientists must actively engage in various research opportunities within the law, some of which can be predicted and others cannot.



When neuroscience and law are brought together, many challenges can be encountered, ranging from abstract ideas to practical problems. For example, "Neuro-law" is not a familiar term in traditional legal circles, and no specific laws are named (Jones et al., 2022). According to conventional views of law, laws are rules made by leaders and are enforced by the threat of punishment. Therefore, adding neuroscience into legal discussions requires a careful examination and must fit within various legal theories. Different legal viewpoints have ways of doing things, much like scientific methods, which vary considerably. Legal theories that examine why we act the way we do could be an excellent place to merge in neuroscience knowledge. Also, we can better predict behaviour if we can better understand how the mind, brain, and law work independently and together. One big challenge in merging these areas is the difference in language; neuroscience and law each have terms and concepts. This makes it difficult for people in each field to understand each other. In law, where one has to explain rights and responsibilities, using neuroscience evidence clearly can be tricky. Lawyers must figure out how to use complex brain science to meet the strict legal requirements for evidence in court. This means lawyers must work through language issues in court and ensure legal rules are clear and applied correctly (Tamanaha, 2021).

Joshua W. Buckholtz points out a significant divide between neuroscience and its use in law. He notes that while neuroscience could offer new tools for detecting lies or measuring how much someone is suffering, there is a considerable difference between what science aims to do and how the law might use scientific findings. For instance, using neuroscience to force someone into treatment is controversial and shows how the two fields can misunderstand each other (Dalby et al., 2022). Similarly, Francis X. Shen points to a wide range of issues and opportunities for neuroscience to connect with law in the future. These include how we manage new brain-focused consumer products, the legal issues around detecting dementia early, and how to handle new types of brain evidence in court. Some of these will be sorted out through new laws, while the courts must deal with others. Shen highlights fifteen areas where law and neuroscience could work together (Shen, 2021). Besides that, in the courtroom, five types of brain information have been described by Christopher Slobogin, including brain abnormalities and the link between brain conditions and behavior. These areas reveal the significantly uncharted territory from where new Neuro-law principles could emerge. They could enhance knowledge of people's behaviour by integrating law and neuroscience knowledge (Neal et al., 2019).

Conclusion

Neuro-law is the multidisciplinary relationship between cognitive neuroscience and the law and is starting to improve the fairness of legal judgments. This combined field enables the lawyers to tell the judges how a person's brain activity affects their behavior thus introducing a touch of science into the court. With Neuro-law, during trials, one can use brain science, this way an expert can give opinions and help the court come up with the right verdict. However, transcribing neuroscience into law is not as simple as that. Some issues must be approached with caution or, in turn, investigated in-depth. From this integration when this is investigated more deeply the way in which brain science influences people's perception of laws and legal processes can be understood. Even though people don't know everything about how Neuro-law will develop, it's clear that it has a lot to offer. It can provide more depth to our understanding of legal issues, especially when deciding who is responsible for specific actions. Examining how our brains and minds work can also give judges a better experience of people's rights under the law. In this way, Neuro-law encourages us to rethink old legal principles and could lead to new ways of approaching the direction that hasn't been considered.

Finally, it may therefore be concluded that the prospects that Neuro-law is bearing for the ever-evolving legal milieu and enhanced rationalized and humane social justice delivery are extremely promising. As more research is conducted and knowledge of the brain, behavior, and the law is expanded greatly, we will likely find even better ways of handling criminal responsibility and mental capacity, as well as giving the responsible treatment for rehabilitation more attention. By adopting the principles of neuroscience, we can learn how best to shape the system of justice to be one that can better meet the needs of individuals and complex society.

Recommendations

1. Set Parameters for What Constitutes Neural Evidence: Set the standard procedures for admitting neuroscientific evidence both in the prosecution and trial stages of the legal process to reduce the liability of the neuroscientific evidence produced.
2. Enhance Collaboration of Several Fields of Study. Encourage more public cooperation between scientists and lawyers, judges, and policy makers to enhance recognition of relations between neuroscience and law.
3. Create programs on Neuro-law Education and training: Introduce neuro-law education/training. Develop courses and seminars to introduce everyone interested, including lawyers and jurists, neuroscientists, and policymakers, to the principles and uses of Neuro-law.
4. Invest in Neuro-law Research. Give grants for research proposals in the area of neuroscience and law, such as the Neuroscience of decision-making, moral cognition, and effects of neuroscience evidence in law.
5. Address Ethical Concerns. Standardize the ethical appropriate and unethical use of neuroscience in and out of the court by coming up with policies and legislation in relation to; privacy, consent, and prejudice among others.
6. Public Awareness: Increase awareness of Neuro-law and its advantages and disadvantages as an approach, and opportunities for its further application in the sphere of law and in society at large.
7. Policies and Regulations Necessary for the Evolution of Neuro-law. Enshrine codes of conduct that set the conditions under which neuroscientific data can be utilized in court as well as issues concerning the admissibility of such evidence.
8. Neuro-law Courts or Tribunals: Some jurisdictions may need to set up highly specialized courts or tribunals that handle Neuro-law cases with judges and hearing members who have been trained in neuroscience and law.
9. Promote Cross-Cultural Cooperation: Promote cooperation of the academic, political, and legal community at the international level and on a worldwide basis for the enhancement of the concept of Neuro-law.
10. Monitor and evaluate the impact of neuro-law: Continually assess and report on the status of applying and implementing Neuro-law in the legal arena of the society, including analyzing consequences in the aspect of legal decisions, decision-makers, and the dispensation of justice.

References

- Ade, L. (2023). *Neuroscience in the Courtroom: Exploring How Science Can Help Create a More Comprehensive Legal System* (Doctoral dissertation).
- Anderson, N. E. (2021). Neurocriminology. *The Encyclopedia of Research Methods in Criminology and Criminal Justice*, 633–641. <https://doi.org/10.1002/9781119111931.ch122>
- Aono, D., Yaffe, G., & Kober, H. (2019). Neuroscientific evidence in the courtroom: A review. *Cognitive Research: Principles and Implications*, 4(1), 1–20. <https://doi.org/10.1186/s41235-019-0179-y>
- Cardoso, R. C. (2021). Neurolaw and the neuroscience of free will: An overview. *SCIO: Revista de Filosofia*, (21), 55–81. https://doi.org/10.46583/scio_2021.21.843
- Cavalla, M. (2023). NEUROSCIENCE'S IMPACT ON CRIME: A CONTEMPORARY EXPLORATION". *Academic Journal of Legal Studies and Research*, 6(6), 1–13. <https://topjournals.org/index.php/AJLSR/article/view/303>
- Chandler, J. A., Harrel, N., & Potkonjak, T. (2019). Neurolaw today – A systematic review of the recent law and neuroscience literature. *International Journal of Law and Psychiatry*, 65, 101341. <https://doi.org/10.1016/j.ijlp.2018.04.002>
- Dalby, M., Vitezic, M., Plath, N., Hammer-Helmich, L., Jiang, Y., Tian, C., Dhamija, D., Wilson, C. H., Hinds, D., Aslibekyan, S., Auton, A., Babalola, E., Bell, R. K., Bielenberg, J., Bryc, K., Bullis, E., Coker, D., Partida, G. C., & Smoller, J. W. (2022). Characterizing mood disorders in the AFFECT study: A large, longitudinal, and phenotypically rich genetic cohort in the US. *Translational Psychiatry*, 12(1). <https://doi.org/10.1038/s41398-022-01877-2>
- Dash, S. S., Ch, P. H., & Das, B. (2020). *Neurolaw: A New Horizon Of Neuroscience and Law*. Ssrn.com. <https://ssrn.com/abstract=4433460>



- Du, Y. (2020) "The Application of Neuroscience Evidence on Court Sentencing Decisions: Suggesting a Guideline for Neuro-Evidence," *Seattle Journal for Social Justice*, 18(2). <https://digitalcommons.law.seattleu.edu/sjsj/vol18/iss2/19>
- Goodenough, O. R., & Tucker, M. (2020). *Why Neuroscience Matters for Law* (A. D'Aloia & M. C. Errigo, Eds.). Semantic Scholar; Springer International Publishing. https://doi.org/10.1007/978-3-030-38840-9_3
- Greely, H. T., & Farahany, N. A. (2019). Neuroscience and the Criminal Justice System. *Annual Review of Criminology*, 2(1), 451–471. <https://doi.org/10.1146/annurev-criminol-011518-024433>
- Jones, O. D., & Wagner, A. D. (2020). B. INTERSECTIONS WITH LAW. *Law and Neuroscience*, 16.
- Jones, O. D., Marois, R., Farah, M. J., & Greely, H. T. (2013). Law and Neuroscience. *Journal of Neuroscience*, 33(45), 17624–17630. <https://doi.org/10.1523/jneurosci.3254-13.2013>
- LHC 1829 [2013]. *Khadim Hussain v/s State*
- LHC 9059 [2021]. *Mst. Rashida Bibi v/s State*
- May, J., Workman, C. L., Haas, J., & Han, H. (2022). The neuroscience of moral judgment: Empirical and philosophical developments. *Neuroscience and Philosophy*, 17–48. <https://doi.org/10.7551/mitpress/12611.003.0005>
- Mora, M. N. (2019). How law and neuroscience became a new field of study. *Bioethics Update*, 5(2), 75–88. <https://doi.org/10.1016/j.bioet.2018.10.001>
- Nair, A. (2022). Neuroscience in the Courtroom: Unveiling the Mind's Secrets for Just Verdicts. *Jus Corpus LJ*, 3, 54.
- Neri, R. (2023). PREDICTABILITY AND REASONABLENESS OF DOUBT IN THE AGE OF AI-LAW AND NEUROLAW. *The Lawyer Quarterly*, 13(3). <https://tlq.ilaw.cas.cz/index.php/tlq/article/view/557>
- P.Cr.L.J 1693 [2006]. *Sultan v/s The State*
- Petoft, A., & Abbasi, M. (2019). A Historical Overview of Law and Neuroscience: From the Emergence of Medico-Legal Discourses to Developed Neurolaw. *Journal on European History of Law*, 10(2), 15–33. <https://www.ceeol.com/search/article-detail?id=812638>
- Petoft, A., & Abbasi, M. (2020). Current limits of neurolaw: A brief overview. *Médecine & Droit*, 2020(161), 29–34. <https://doi.org/10.1016/j.meddro.2019.11.002>
- PLD 393 [2006]. *Dr. Abdullah Hamid Mehmood v/s The State*
- Riofrío Martínez-Villalba, J. C. (2023). How to deduce human rights from natural law and other disciplines. *Ius Humani. Law Journal*, 12(2), 27–52. <https://doi.org/10.31207/ih.v12i2.327>
- SCMR 1708 [1995]. *Dr. Muhammad Shaft Zehri and another v/s The State*
- SCP 41 [2021] – C.R.P.420 [2016]. *Mst. Safia Bano v/s Home Department, Govt. of Punjab*
- Shen, F. X. (2021). Towards a Definition of "Neurolaw". *U. St. Thomas JL & Pub. Pol'y*, 15, 174.
- Sommaggio, P. (2022). Neuroscience, Neurolaw, and Neurorights. In *Protecting the Mind: Challenges in Law, Neuroprotection, and Neurorights* (pp. 71–84). Cham: Springer International Publishing.
- Tamanaha, B. Z. (2021). *Legal Pluralism Explained: History, Theory, Consequences*. Oxford University Press, USA.
- Urai, A. E., Doiron, B., Leifer, A. M., & Churchland, A. K. (2022). Large-scale neural recordings call for new insights to link brain and behavior. *Nature Neuroscience*, 25(1), 11–19. <https://doi.org/10.1038/s41593-021-00980-9>
- YLR 1699 [1999]. *Khadam Hussain and others v/s Abdul Rehman*