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Neurolaw: A New Horizone Of Neuroscience And Law

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ABSTRACT: Neurolaw, the inter-disciplinary study of neuroscience and law, establishes a relationship of Brain with Law. The achievements of neuroscience shall co-operate better formulation of law and judicial decisions for a fairer judicial system. Emerging from the study of the human nervous system as a new legal phenomenon in the 1990s, Neurlaw promises to address various age-old legal questions and is fast expanding its frontier in diversified areas of law.

KEY WORDS: *Neurolaw, Neuroscience, Healthlaw, Neuro-jurisprudence*

1. INTRODUCTION

Scientific theories evolve. The theories have their expansions. In their evolution, they lean towards other aspects of the subjects to integrate their propositions in a comprehensive manner. Law is also one of those subjects. And neuroscience is one of the most emerging sciences with fast new horizons of research. The effect of law and its consequences are linked to neurological issues. Therefore, understanding the neuroscience dimension which has implications with the law is inevitable. The expansion of the horizon of normative science and Neuroscience is the matter of Neurolaw. This paper confines an attempt to show an intersection Neuroscience and Law.

2. NEUROLAW: THE INTERSECTION OF LAW AND NEUROSCIENCE

Scientists have made significant improvement in understanding the human brain, its functions, and malfunctions. The scientific study of the nervous system, neuroscience, has made a revolution in medical practices. Biology is the study of what happens when genes and environments interact, which is the only way brains—or any other physiological feature for that matter—get built. Neuroscience is a branch of biology. It is currently an interdisciplinary

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science that collaborates with other fields. Neuroscience shows an understanding of how the nervous system works. Therefore, it has the potential to influence Neurolaw where-ever functions of the mind affects the behavioural rules of society. There is a truly enormous corpus, growing daily, on many causal pathways by which biological processes influence behaviours in all species, including humans [1]. Neurolaw is a novel attempt to find assimilation between neuroscience, law and the brain, taking into accounts the latest findings in the discipline of neuroscience. Considering the importance of Brain, which we may associate with for the formulation of Reasoning and also Mens Rea or guilty mind, a sine qua non for convicting an accused person, in the field of criminal law, the relationship between Neuroscience and Law, gives scope for the interdisciplinary study of Neurolaw and begs for inclusive and appropriate approach to the phenomena and events of operation of law. Neurolaw as a discipline tries to make the evidence more accurate and enhances the weight of evidence before a court of law and shall result in making justice fairer. It is, in fact, the explorations of the effects of discoveries in the domain of neuroscience on the law. It also indicates an exploration and expansion of the scope of jurisprudence and to encourage precocious comprehension of the legal issues thereof. The expansion of the horizon of normative science and Neuroscience is the matter of Neurolaw. For an accurate understanding of the legal issues, neuroscientific data might be of significance. Lots of cases with diversified legal contexts bearing relationship with neuro-scientific evidence are increasingly reaching to the court of law. It is believed that Neurolaw would generate a better juridical system. The achievement of neuroscience could radically change the legal provisions, process and customs.

In the legal field, if one utters a term called Neurolaw, one may rethink if there a possibility of association of law and neuroscience, given the fact that the enterprises of both the disciple are diversified. Neuroscience is a natural science. It bases its findings on the experiment to find the absolute truth on a proposition. Whereas, legal science or normative science is relative in its statement of truth. In natural science to find the casual association between two facts, invariability of a sequence is sought. In normative science, the causal association is not the invariability of sequence but the highest possibility of sequence or order of facts. Law is the creation of humans to regulate the individual behaviours and conducts whereas in natural science the behaviour and the conduct are themselves natural law in the happening. Considering that the ultimate goal of the law is regarding the dignity of human being and respecting human rights; better rules in the society with a fair legal system would help achieve legal science of its objectives. In this regard, the service of neuroscience would be to analyse the legal phenomena with accurate neurological explanations. This shall help legal science to be more accurate on its rules and its realisation. So the potential of Neurolaw lies on throwing light on the concept of justice in her specific scientific area. It can help the legislature to make some specific action as a crime; can help the judge to decide about an accused and to have a more comprehensive view on legal matters. It shall make the judgement more equitable and fair. The neuroscience perspective can help an advocate to understand human behaviour or conduct as conduct, past or post, always is a relevant fact for the consideration before the court. The past conduct tantamount to previous conviction also helps the judge at the time of hearing of sentence. Also, conduct showing the state of the

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body or bodily feelings and contemporaneous statement to that effect is relevant to show the existence of the Mens Rea under the rules of evidence. Therefore, "it really matters to law's success, and to the thriving of citizens law governs, that law's efforts to guide and change human behavior are informed by accurate and useful models of where behavior comes from, and why it manifests in the ways that it does"[2]. So, understanding of human behaviour shall potentially shape future legal processes.

The understanding of human behaviour with a functional association of human brain is deliberated to a great deal in the field of neuroscience with the latest medical technology using imagery and radiology. Neuro-imaging creates visual brain delineation which is interpreted by imaging specialist. Imaging specialist and also researchers examine the neurological correlates of the human behaviours. Since the law is mostly concerned with regulating the behaviour of the people, human behaviour is understood and deciphered through understanding the mental processes shown by Neuroscience. Therefore, there is immense potential to shape the interdisciplinary scientific study of Neuroscience and Law, Neurolaw. The Neurolaw scientists attempt to expose neuro-scientific findings to the legal rule, as a result, the legal norms and conducts get revised for more accuracy and fairer legal system.

Earlier neuroscience has been more resourcefully used for the procedural law in civil and criminal cases. However, these days, neuro-scientific findings are considered in various areas like Tort, Intellectual Property, Consumer, Health, Constitution, Criminal and Employment Law. Also, neurolaw critically analyses the scope of other related science like psychiatry, behavioural ecology, sociology, political science, economics with primarily emphasize on criminology.

3. NEUROLOGY AND CRIMINOLOGY

Criminology has many sub-disciplines. Neuro-criminology is an adjunct discipline of criminology applying techniques of neuroscience to find and explain the causes and diagnosis of an offence is. The mental make-up and composition of the brain are carefully studied and learnt to establish the correlations and association between the characteristics of the mind and the deviant behaviour. Now a day, new approaches in the area of responsibilities of a deviant, his retribution, understanding and leniency on the deviant are taking place considering the latest developments of brain-image science. The crime causation is seen through the neuro-developmental contribution by the neuro-criminologists. The study of structural and functional impairments i.e comparing the impairments of brain circuits of the offenders and the part of the brain that helps in moral decision making to control it is conducted on white-collar criminals, the antisocial, violent and psychopathic individuals. Latest researches in the neuro-criminology are also shedding lights on the free-will and moral responsibility of the criminals. The relationship between belief in free will, the autonomy of an individual and his legal responsibility for violations of criminal law have been the topic of intense discussion among jurisprudential philosophers, criminologists, and neuroscientists.

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Neuro-criminologists using latest technology, debate if it is morally and legally wrong to punish an accused whose, neural circuitry underling, the legality is impaired. These days, the neuro-criminologists studies are far developed from the classical sense and are considering, probing, pondering and interpreting the brain-images, to find the responsibility of an offender. In the case of Third-Party Punishment, a healthy subject is asked the quantum of punishment a hypothetical offender should be imposed for a set of prototypical offences. The offences are diversified from body to property to sexual crimes consist of different scale in terms of its severity. To test the hypothesis the neuro-criminologists combine fMRI along with the questionnaire. Owen D. Jones tries to probe, assess and debate using fMRI, as to how much harm an accused has caused. He also evaluates the blameworthiness of an accused, as a function of his mental state. Considering these two, then he tries to integrate the information about harm and blameworthiness to decide how much the accused should be punished. Using fMRI Owen tries to isolate the brain regions which are responsible for these judgements of an accused. Also “the work of Greene suggests that this(right doroslateral prefrontal cortex, rDLPFE) brain region is involved in normative evaluations involving conflicting moral goals” [3].

4. RECENT STUDIES IN NEUROLAW

The term Neurolaw is coined by Sherrod J. Taylor in his scientific paper titled "Neuropsychologists and Neurolawyers" in 1991 [4]. The Gruter Institute of Law and Behavioral Research and the Dana Foundation were first groups to provide funding for the interdisciplinary field. The intersection of Neurolaw and ethics was able to be better scrutinized by the initiation of the Law and Neuroscience Project in 2007” [5]. These days, neuroscientists and lawyers are trying to spread Neurolaw in the USA, UK and Various European Countries. Clear identification of the issues at the intersection of these domains are necessary, there is a steep rise of scholarly journals, articles, thesis and symposium. MacArthur Foundation has invested over $ 15,000,000 in creating Law and Neuroscience project (2007-11, headquartered at University of California, Santa Barbara) and the Research Network on Law and Neuroscience(2011-14, headquartered at Vanderbilt University). There are researches in Neurolaw both practical and theoretical aspects. Practical Research in Neurolaw is emphasizing on the challenges of documenting neuro-scientific data as evidence in the courtroom. It also concentrates on the civil and criminal responsibility in litigation. "Neuroscience and Legal Responsibility" is one of the leading current works. The author argues how the neuroscience, behavioural genetics and psychology would challenge the traditional conception of free-will and its legal responsibilities. Also emerging potential of development in brain science concerning adolescents, where law those implicate the adolescents are considered for information in the light of new development. There are other works like Neuro-Law for Trial Lawyers, Law and Neuroscience: Current Legal Issues, Neuroscience in Courtroom, A Primer on Criminal Law and Neuroscience and International: A Comparative Analysis. Some of the pertinent issues discussed in these works of practical researches are the challenges to the neuro-litigation, neuro-scientific instruments for the proving and disproving a case, neuro-criminology in procedural law among other things. The approaches of the theoretical researches are mostly on understating the function of the brain

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and its importance on behavioural impact. It also recognises the new rules to regulate the behaviour which shall be in the legal system. The studies are in relation to the feasibility of applying neuroscience result in law. The concepts of brain and law, the relationships between brain and law, brain disease, mental illness and associated responsibilities, privacy rights and autonomy or free-will on the responsibility of a person are also the debate of the theoretical research on Neurolaw. The Cognitive Neuroscientists probes the complex links between the brain and the mind using new technologies like fMRI and EEG, electroencephalography. By the uses of these sophisticated technologies, the neuro-scientific researches influencing legal rules and its processes. The theoretical researchers are more in favour of the increasing use of neuroscience in the field of law and also trying to see the integration of neuroscientific research in the substantive doctrine of legal laws. Some of these works are Mind, Brains and Law; Materials on Neurolaw; Law and the Brain; and Neurobiology of Criminal Behaviour. Also, discussions are taking place as to the role of neuroscience in shaping the juvenile justice laws of a state. “Increasingly, policymakers have turned to developmental science, particularly neuroscience, to inform justice policy through a more sophisticated understanding of how dimensions of adolescent development affect juveniles’ criminal activity as well as their response to justice-system interventions” [6].

5. SOME HARD QUESTIONS IN NEUROLAW

A lot of Jurists, legal academician, lawyers, scholars in entertain the thought that neuroscience can help to answer some of the perennial questions which in every day's affairs of the legal field is faced. Questions like if a person is responsible for the alleged behaviour or conduct if the accused is competent, etc. It also bothers them to know what is the mental state of accused at the time of the commission of an offence, what are the facts known to the accused, what are the facts suppressed by the accused, what is the accuracy of the remembrance of the accused, whether the accused is telling lie or truth. What is the extent brain affect the behaviour of human being having legal consequence? What should be the norm and judicial decisions to be in tune with this dimension of conducts to have a fairer and more equitable legal system? How neuroscience should influence criminal and civil law?

Since it appears that in a wide way neuroscience and law intersect, there is a possibility that neuroscience can offer values by way of Buttressing, Challenging, Detecting, Shorting, intervening, Predicting, and Explaining the law and legal circumstances.

6. CHALLENGES IN NEUROLAW

Underlying the importance of the neuroscience in legal discipline Owen D Jones opines, "The extent to which the legal system can avail itself of the best of neuroscience has to offer, will depend in part on the extent and quality of the engagement of neuroscientists with the myriad researchable issues that already exist within the arena as well as the many new issues that will inevitably arise, only some of which can currently be foreseen" [7].

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When two diversified discipline come together, there bound to arise various challenges. The challenges range from conceptual to literal in nature. The very term Neurolaw, in legal jurisprudence it is more often taken awkwardly as there is no such law which is legislated with these terms. Here the law is considered through the prism of the positive school of law which means law legislated by the sovereign backed by sanction. Any approach of neuroscience to the law shall inevitably to go through the churning of jurisprudence and often difficulty will arise in its approach and assignments in any school of thoughts. Each school of law in jurisprudence has its enterprise and its methodologies to deal with its objectives. That apart the enterprise of science and law are diffident broad objectives. Also, a school of law that more prominently dealing with the reasoning of the mind of a person, how it works and how it should work would an appropriate filed for the neuroscience to be fit in. Also, the legal theories and concepts using the ordinary understanding and ideas of mind and psychological life, it is challenging to identify the association between Brain, Mind, and Law. The conceptual and methodological approach tries to answer what is Mind, Brain and Law and how they function in the respective sphere and understanding those in the real true sense would lead to a better comprehension of foresight of behaviour and conducts.

Also, Lingua Franca is one of the literal challenges ahead in Neurolaw as both these disciplines use a different domain of languages for their understanding and comprehension of the subject matters. The proof the legal rights, duties and liabilities in legal filed or in a courtroom should be accurate, certain, reasonable. The forensic problem that arises is generally probable in nature or of neurological inferences in nature which an advocate tries to make relevant under the recognised rule of evidence in the court of law. A neuroscientist expounds the neuro-scientific data of the cognitive study of brain-imaging which are potential to be used by lawyers to its legal effect in the courtrooms. The challenge lies in the interpretation of these data and neuro-images basing upon the hermeneutic interpretation of behaviour. So, not only the discrepancies in the language of the courtroom room where the law becomes functional is to be addressed but also in framing the legal rules for its implementation special caution is needed to avoid ambiguity.

Joshua W Buckholtz, while reflecting the promises of neuroscience for the law showed tried to show the gap in both the disciplines which needs to be abridged. She states, "neuro-science holds the promise of detecting liars; objectively determine criminal responsibility, quantifying suffering and predicting violence...These promises elide a fundamental and perilous chasm between the aims and methods of scientific research and how the courts might use that research. The relationship between neuroscience and law is fraught with fundamental differences, the implications of which we are only beginning to understand... The argument that neuroscience data could form a constitutionally valid basis for involuntary commitment is profoundly misguided. Indeed, it illustrates the perilous gap between how neuroscientists think about neuro-scientific data and how some in the law might like to use these data" [8].

That apart there are various issues in this emerging discipline and many may emerge in future. Some of the issues are discussed by Francis X Shen in symposium papers the states around 15 different issues, possibilities of engagements. The engagements are the challenges

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of the Neurolaw that may come before us to address. He states," there are fifteen different possibilities or issues. These are " Regulations of Mobile Consumer Neuro-technology, Conclusions in Youth and Professional Sports, Legal Implications of Early-Onset Dementia Detection, Brain Bio-markers and Brain-Based Prediction, Admissibility of Novel Neuro-scientific Evidence, Revisiting Brain-Based Memory Recognition, Addressing Mind-Body Dualism in Legal Doctrine and Practice, Revisiting Brain Death and Disorders of Consciousness, Cognitive Enhancement Through Direct Brain Intervention, Governance of Induced Pluripotent Stem Human Chimeras Research, Privacy and Brain Hacking, Artificial Intelligence, Virtual Reality and Law, Non-Human Animal and Non-Human Animal Rights, Global Neuro-law. Many of these issues will be resolved in the legislative and policymaking arenas, not in the courtrooms. These fifteen are a handful of possibilities for Law and Neuroscience 2.0" [9].

However, in the courtroom exercise, if the challenges for the Neuroscience are to be identified, Christopher Slobogin suggests, "There are 5 types of neuroscience evidence. They are Evidence of Abnormality, Cause-of-an-effect-evidence, Effect-of-a-cause-evidence, Individualised neuropsychological findings compared against known performance baseline Psycho neurological testing results showing that the defendant has behaviour impairments that are legally relevant" [10]. All these indicative areas give us a scope to explore and concentrate more on Neuroscience and Legal Science to find relevant solution and direction between propositions of these two disciplines. This shall pave the way for new Neurolaw rules to help both jurisprudence and science for the development of an understanding of human behaviour.

7. CONCLUSION

The interaction of neuroscience and law, i.e Neurolaw is considered to offer fairness to the law in a practical sense and can help the legal instrument that regulates the human behaviour to hold justice to make it more reasonable. The Neurolaw shall help lawyers to show before the judge the functioning of the brain and its associated behavioural correlates which is relevant to the case at hand. It shall also help lawyers to produce neuro-scientific data to assist an expert in offering his opinion most scientifically to make justice fairer. However, there are many challenges ahead in the field of Neurolaw which by way of constant research can be addressed to see, in short, how the neuroscience affecting jurisprudence. Even if there are uncertainties about progression of Neurolaw, is shall help, for the proof of a liability, to expand the scope of law, enhancing the knowledge of a judge in respect to a legal right, to gain mature understanding of normative phenomena in terms of brain, mind, psychological insights to revisit various legal concepts and various rules of liabilities and rights. It shall also help expand the frontier of jurisprudence.

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Conflict of Interest
The authors declare no conflict of interest in this study

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