Toward Human Behavior Sciences from the Perspective of Neurolaw

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Abstract

One of the most effective paths to improve the quality of human behavior sciences is to integrate each overlapping edge of them together. In other words, interdisciplinary studies have to achieve more accurate and favorable outcomes. Neurolaw, as an interdisciplinary field which links brain to law, facilitates the pathway to better understanding of human behavior in order to regulate it accurately through incorporating neuroscience achievements in legal studies. Since 1990's, this newly born field, by studying human nervous system as a new dimension of legal phenomena, leads to a more precise explanation for human behavior to revise legal rules and decision-makings. This paper strives up front to bring about significantly a brief introduction to neurolaw so as to take effective steps toward exploring and expanding the scope of law and more thorough understanding of legal effects resulting from individuals' behaviors in the field at hand. Neurolaw, will bring a bright future to conduct researches upon human behavior.

Keywords
Neurolaw, Human Behavior, Neuroscience, Law, Legal Rules

Introduction

Relationship between law and neuroscience, with brain lying in as their similar correlative factor, gives rise to neurolaw as an interdisciplinary field, offering more comprehensive, accurate approach to legal phenomena; that all put forward a more accurate evidence for legal process, and a fairer justice system; moreover, the expansion of both sciences is a matter of neurolaw.

When one does something, this will result some legal effects by their consequences, raise legal responsibility; his/her act may be in conflict with legal norms, so will eventuate certain legal punishment under the violation problem. Law, in a narrow range, glances to the behaviors on the absolute sense and analyzes consequences just by *de jure* view on the basis of legal rules' orders. But today we are witnessing the expansion of legal analysis scope to have a better and wiser rules or verdicts to legal phenomena. Nowadays, Law by a *de facto* view over the behaviors based on other sciences' achievements and analysis, attempts to order accurate rules for more justice realization; One of this sciences is neuroscience.

There are plenty of cases in which neuroscientific data might be of significance to more accurately understand legal issues. This is why lots of neuroscientific evidences are increasingly reaching courts in a number of legal contexts in practice. Neuroscience achievements could change legal provisions, along with Procedural law and customs, or even alter them radically to a new different one. Neuroscience sheds light on enquiry that how the brain and

certain mental processes can work and it follows understanding structure and function of the brain. It gives us an insight into the mental processes that underpin human behavior as the law is primarily concerned with regulating people's behavior. Neurolaw is based on brain images examination and neuroscientific data investigation; it is a new born pathway in the field of Law to more precise and fairer understanding of human behaviors for legal decision-making relating to them. This paper strives up front to bring about significantly a brief introduction to neurolaw so as to take effective steps toward exploring and expanding the scope of law and more thorough understanding of legal effects resulting from individuals' behaviors in the field at hand.

I. Neurolaw perspective to legal phenomena

Scientists with many investigations on human brain have learned a tremendous amount about how it works, how it malfunctions, and how it can be repaired or altered. This emerging neuroscience, namely the scientific study of the nervous system, has already revolutionized medical practices. Neuroscience as a branch of biology is currently an interdisciplinary science that collaborates with other fields.[1] It also proved to be an immediate and powerful catalyst to understand how the nervous system works and also exerts influence upon neurolaw[2]. Neurolaw is an attempt to know relationship between law and brain by taking into account neuroscience findings[3]. In fact, Neurolaw explores the effects of discoveries in neuroscience on legal rules[4].

The most fundamental question among neuroscientists and lawyers is possibility of relationship between law and neuroscience. Neuroscience is a natural science which based on experiment and indicative statements; while law is a humanities science according to obligations,

arising from the collective wisdom, and abstract propositions. As more legal scientists believe, actually, law is a social phenomenon which has been formed by the social contract. So law based on relative propositions, while neuroscience is on absolute ones. This leads our mind to real challenge that how it possible to propose and defend "Neurolaw"? In fact, law is humans' creative[5] to regulate individuals' conducts in secure and excellence society, Instead of natural community in which there is no law, no state, people do whatever they want and security minimalized[6]. The ultimate goal of law is respecting to human dignity, in order to realization of humanity of a person and real justice; this purpose is achievable if we have better and more accurate rules in society, In other words, have a more fair legal system. Neuroscientific statements, with an open eye on neurological phenomenon, help law to have more accurate rules on this sense. More clearly, neurolaw shed light on justice way for law in its specific scientific area. For example, when legislators want to adopt a specific Act, which related to punish offenders, or when judges want to decide about an accused, neuroscience achievements give precise glasses to lawyers, to have a more comprehensive view and consequently decide more equitable and fair legal decisions.

Drawing from neuroscience, neurolawyers try to understand human behavior, and will potentially shape future aspects of legal processes. Practically, they deliberate on human brain and nervous system image by medical technology scanning such as radiology, psychiatry, neurology, and clinical neuropsychology[7]. With these new imaging techniques, researchers interested in the function of the human brain were presented with an unprecedented opportunity to examine the neurobiological correlates of human behaviors. Essentially, neuroimaging methods create visual

brain delineation and the imaging specialist interprets it[8]. Initially, neuroscience has been more exploited for Procedural law to stand criminal and civil liability complaint in court. Despite this pragmatic application of neuroscience, it has been applied to many legal subfields. Today, we are witnessing the development of neuroscientific considerations in various areas of law; such as Intellectual Property Law, Tort Law, Consumer Law, Health Law, Employment Law, Constitutional Law, and Criminal Law[9]. Even Neurolaw perforate to scope of other related sciences; such as psychiatry, sociology, political science, behavioral ecology and economics that mainly emphasize on criminology.[10]

Intersection of law and neuroscience shapes an interdisciplinary science known as Neurolaw. Because of huge differences among individuals' brains[11], however, there is no direct mapping of mental function to specific areas of it[12]. This is a fundamental challenge in the neurolaw. Neurolaw scientists attempt to expose neuroscience results to legal rule and system; thereby, revise legal standards, norms and conducts to a more accurate one. More precisely, the novel neuroscientific approach toward legal rules and consequences brings about a more perfect and better realization of legal effects; hereby, mutates the rules governing them so that a fairier legal system can be followed up.

People display bounded rationality: They suffer from certain biases, such as over-optimism and self-serving conceptions of fairness; they follow heuristics, such as availability, that lead to mistakes; and they behave in accordance with prospect theory rather than expected utility theory. People also have bounded willpower; they can be tempted and are sometimes myopic. They take steps to overcome these limitations. Finally, people are (fortunately!) bounded self-interested. They are concerned about the wellbeing of others,

even strangers in some circumstances, and this concern and their self-conception can lead them in the direction of cooperation at the expense of their material self-interest. Most of these bounds can be and have been made part of formal models. All these show human bounded rationality, which are so emphasize in our legal regulation, could be a ground for another legal approach; For example, leading people to self-regulate (which has been arisen in nowadays) or imposing control-and-control system in our social or economic legal system (such as Check and Balance in USA legal system) and etc. A behavioral approach to law, offers a host of novel prescriptions regarding how to make the legal system work well. Cognitive difficulties and motivational distortions undermine or alter conventional legal prescriptions.

II.Behavioral science sheds light on individuals' legal responsibility and required rules

Behavioural science, such as psychology, psychobiology, and cognitive science, by the systematic analysis and investigation of human and behavior through controlled and naturalistic observation, and disciplined scientific experimentation, attempts to accomplish legitimate, objective conclusions through rigorous formulations and observation.[13] The law and behavioral science approach consciously chooses to emphasize its external usefulness in analyzing legal problems rather than either its internal elegance or universal applicability. Its ultimate goal, quite simply, is to understand the incentive effects of law; Applying behavioral models more nuanced and sophisticated than rational choice theory to legal rules and systems will require a broader range of academic forms than is traditionally found in legal scholarship, in addition to a broader theoretical base. [14] In the early stages of the movement, legal scholars have

been able, by and large, to make important strides by hypothesizing that empirical and experimental findings published by social science researchers apply to actors subject to legal commands.[15]

By bounded rationality, an idea first introduced by Herbert Simon, we know obviously that human cognitive abilities are not infinite. We have limited computational skills and seriously flawed memories. People can respond sensibly to these failings; thus it might be said that people sometimes respond rationally to their own cognitive limitations, minimizing the sum of decision.[16] This could be occurred on the basis of an obligated pressure by legal or even behavioral norm. It's so important to know about how law (as well as other forces) affects behavior and *Vise Versa*. There is a main factor here: Behaviors. Law perusing to regulate this behaviors and behavioral science want to understand it. So the interdisciplinary way, which has been raised here, is Neurolaw; a new born way which connected Law to behavioral science; in order to regulate human behaviors in a legal way by scientific accurate view to behaviors. Individuals' behaviors will result some legal effects and responsibilities. So understanding human behavior can help us to get a better legal decision about his/her responsibility; also conclude a better regulation for regulating these behaviors in social relations.

The mechanisms underlying our behaviors in the content of law are simple and conventional. Legislators are maximizes interested in their own reelection. Legislators interested in their own reelection will be responsive to the preferences and judgments of their constituents and those of powerful interest groups. If constituents believe that a certain practice is unfair or dangerous, and should be banned or regulated, self-interested legislators will respond, even if they do not share these views. Likewise, if a mobilized group holds such views, legislators' response will be affected, in much the same way as if the group sought

legislation to serve a narrowly defined financial self-interest, as posited by the standard account.[17] So it's so important in content of Law.

One of the goals of law is to explain the content of law— what the law allows and what it prohibits. The traditional approach provides two tools for this analysis. First, laws may be efficient solutions to the problems of organizing society; such laws can be thought of as regulatory solutions to optimal contracting problems with all of the affected parties at the table.[18] Second, laws may come about because of the rent-seeking activities of politically powerful actors; many laws that benefit farmers and concentrated industries, the positive theory of law reflected in the conventional account predicts that the legal rules we observe will be rules that either maximize social wealth or redistribute wealth to interest groups able to influence the legislative process. In the both way, we need to know on ultimate level, what are the responsive rules that can be able to grant human fair and justice society? For this purpose, we need to have a comprehensive view on human wants, behaviors, goals and society norms. This a very complex, and of course an extent scientific interdisciplinary, study that lead us to understand human behaviors, then regulate them, and eventually, consider behaviors in this social network legal regulation. Thus, altering regulatory methods and norms in society by new approach, has been reached by behavioral science, means revising legal rules and norms in a substantial way; a way to change old rules by new one, which is required for nowadays social, economic and political relations.

III. Psycho-socio legal approach to individuals' violations

Law affectivity, in fulfilling regulatory role, is depending on citizens' obedience to legal order. Laws and the legal authorities' directives restrict the ability of citizens to behave as the wish.

Consequently, people resist them and the acceptance of the dictates of the law is always problematic. Actually, Psychology and sociology, by understanding the foundation (such as wants, norms, customs, traditions, ideas and etc.), can clarify the way in which the rule of law will be effectively maintained; also Illuminate public compliance with the law in a facilitated way. Today, classical efficiency of law (imposing external controls on people by threat of punishment) has been descended and we are witnessing the bolding role of consent to obey factor which, instead, turns us to creating a society in which people willingly abide by the laws; in other word, socialization of individuals into law-abidingness by psycho-socio legal attitude. This leads us to creating a self-obedience society to legal norm.

Psychologists and sociologists can expand the understanding of the motivations for human behavior that informs the thinking of legal authorities and individuals' responsibility for their legal actions. Law embodies theories of behavior. Legal rules, doctrines and procedures necessarily reflect basic assumptions about human nature.[19] It is so important to know why a person beaches the law and become a wrongdoer? Many factors and human diseases are involved and contributing to offense and violation; mainly because the essential element in legal responsibility is *free will*. Nowadays, scientists find that symptoms and psychosis can lead directly to criminal behavior.[20] However, distinguishing between symptoms that are specific to major mental disorder and features that may be found among offenders without mental illness can be difficult; but The findings in psycho-socio legal study indicate that effective mental health treatment may prevent a minority of crimes from occurring, but would likely not improve criminal justice outcomes for the vast majority of offenders with mental illness. They found that serious mental illness directly causes

criminal justice involvement in which offenders has mental illness. Also, offenders with mental illness had significantly more general risk factors for recidivism than offenders without mental illness and these general risk factors significantly predicted recidivism, with no incremental utility added by risk factors unique to mental illness.[21] This is why mental health courts have become widespread in the United States as a form of diversion for justice-involved individuals with mental illness. Mental health courts link offenders who would ordinarily be prison-bound to long-term community-based treatment; They rely on mental health assessments, individualized treatment plans, and ongoing judicial monitoring to address both the mental health needs of offenders and public safety concerns of communities. Like other problem-solving courts such as drug courts, domestic violence courts, and community courts, mental health courts seek to address the underlying problems that contribute to criminal behavior. These courts are emerging as a critical element in effort to counter overcrowding in legal system and more adequately address the plight of offenders who are diagnosed with a mental illness.[22]

The problems of crime and violation as a social phenomenon have always been in the focus of attention of all civilized societies. In modern societies these has attained global dimensions and is taxing the resistance capacity of politicians, legislators, and specialized state organs alike. The emergence of new forms of criminal and violation behavior at the end of the 20th and beginning of the 21st century has even provoked changes in the terminology of specialists in criminology and has raised the need for uniting efforts in the search for adequate methods of counteracting these particularly dangerous social phenomenon. More specifically, crime and its concrete forms are viewed within the framework of the theory of the social structure of society, together with its

particular set of categories, which are at times quite different from that of legal positivism. Moreover, legal-sociological analysis, having many points in common with the criminological approach, offers after all the possibility, even though as a matter of convention in scientific classification, to delimit more clearly the three basic research spheres: law (the legal approach), criminology (the criminological approach), and legal sociology (the legal-sociological approach). Such an approach is also needed for identifying and distinguishing the basic forms of counteraction against crime and other forms of social deviance. In this sense legal-sociological analysis is indisputably the widest conceptual framework for encompassing various social phenomena, including the phenomenon of crime.[23]

So, the both study (sociology and psychology) give legal scientists a wide view to considering behavior in three diverse dimensions: socio, psycho and legal aspect. This has paved the path to new accurate legal rules on context of Law, which is on the basis of rational and admitted norms, subjugates individuals in legal order framework.

IV.Neurocriminology and future human behavior regulation

Neurocriminology is a sub-discipline of criminology which applies neuroscience techniques to probe the causes and cures of crime. Neurocriminology studies the makeup and composition of the brain and looks for correlations between characteristics of the brain and criminal behavior. The very rapid developments taking place in brain-imaging science are creating a new approach to our concepts of responsibility and retribution on the one hand, and understanding and mercy on the other.[24] Neurocriminology is documenting structural and functional brain impairments not just in antisocial, violent, and psychopathic

individuals, but also in spouse abusers and white collar criminals. Neurocriminologists are proposing a neurodevelopmental contribution to crime causation. By Neurocriminology researches, it is clarified that the brain circuits found to be impaired in offenders parallel the brain circuits found to underlie moral decision-making in controls. Recent researches in neurocriminology, are outlining implications not just for the field of criminology, but also for concepts of legal and moral responsibility, free will, and punishment. To this end, the legal implications of brain research, free will and the neural bases of antisocial or criminal behavior are of central importance. Understanding responsibility, free will, and punishment and their relationship profound debate brewed in neurocriminology; if the neural circuitry underling legality is compromised in offenders, is it morally and legally wrong of us to punish prisoners as much as we do? The relationship between belief in free will and third-party punishment of criminal norm violations have been the subject of great debates among philosophers, criminologists, and neuroscientists.

Neurocriminology reflect a paradigm shift in criminology informed by neuroscience. Neurocriminology has led to our development of a new model for interventions designed for the prevention and rehabilitation of antisocial behavior and the acquisition of prosocial competence. The neurocriminology model integrates recent research on neurodevelopment factors with knowledge on the social environmental factors, experiential factors, and cognitive/emotional factors that are known to be associated with antisocial behavior. It is designed to foster prosocial neurodevelopment. Neurocriminology is not a "Faulty Brain" model. It focuses not on undoing neurological damage but on promoting prosocial neurological development. The neurocriminology model

refines and extends the cognitive behavioral model based on recent empirical research not only on the relationship between antisocial behavior and cognition; but also on the role of emotion in prosocial competence; the development of empathy; prosocial emotional values; research on desistance from an antisocial lifestyle and research in social cognitive neuroscience. It is the neuro-legal scientific study of the nature, extent, management, control, consequences, and prevention of criminal behavior, both on the individual and social levels.

Free will is the often unspoken centerpiece of the criminal law, which presumes humans are responsible agents, who are free to choose to comply with social norms or violate them. While many texts discussing the forensic implications of neuroscience refer to cases where brain damage such as that caused by an accident, a tumor, or surgical resection is related to alleged criminal behavior; this is the idea thoughts criminal, antisocial, sociopathic, or psychopathic behavior is linked to focal lesions of the brain[25]. Today, by neurocriminology studies, ((Legal Responsibility)) is far away from its classical sense. Neurocriminologists by considering, pondering and interpreting brain-imaging, endeavor to prove Relative offenders responsibility. There are multiple neuroscientific documents that imply the truth of their claims. To test their hypotheses, neurocriminologists combined functional MRI (fMRI) with a third-party punishment task, asking healthy subjects to estimate how much punishment a hypothetical offender deserved for a set of prototypical offenses ranging across severity of crime from property destruction and theft to rape and murder[26].

Conclusion

The law is not valuable *per se*. Instead, it is instrumentally used to regulate human behavior due to getting hold of justice; for this purpose we need a comprehensive understanding of legal rules from different scientific standpoints, to be recognized by legal system; one of these most effective sciences which gives hand to law mainly in practical sense, is neuroscience. Neuroscience, exploring brain functions and structures, throws light on a way to better understanding of human behavior. A blend of these two subject-matters (neuroscience and law) has paved the way for neurolaw, in 1990's. There are two main methods in neurolaw: theoretical and practical. Until now, most of neurolawyers have been working on brain functions and neuroscientific data to have a more accurate and fairer justice system, keeping an open staring eye upon successful neurolitigation over several cases in courtrooms. These all highlighted the practical aspect of the subject-matter. However, there were uncertainties about neurolaw but now neurolaw scientists have properly found out that neuroscientific achievements can assist law to have a more reliable decision and rules, and it has shown itself in the field of Procedural law specially civil and criminal responsibility. Of course, neurolaw, while crucial in our legal studies, would help us to apply medical knowledge and technology in legal area to achieve a more equitable legal system. So to prove liability, to improve the knowledge of the judge with respect to claims, to expand the scope of law, to have a better perception of legal phenomena, even to comprehend the brain and mind to revise the concept of right and many more are windows opened toward our scholarship through neurolaw. It will even associate with jurisprudence propositions such as those which are discussed in responsibilities, judicial issues and etc.

Neurolaw by linking sociology, psychology, Law, neuroscience, criminology and other related sciences to human behavior give us a extent view to considering behavior in plural diverse dimensions. This has paved the path to new

accurate legal rules on context of Law, which is on the basis of rational and admitted norms, subjugates individuals in legal order framework. Today, classical efficiency of law (imposing external controls on people by threat of punishment) has been descended and we are witnessing the bolding role of consent to obey factor which, instead, turns us to creating a society in which people willingly abide by the laws; in other word, socialization of individuals into fair law-abidingness by neuro-legal attitude. This leads us to creating a self-obedience society to legal norm in a more real justice system.

References

1. Bear F,Connors B, Paradiso M. *Neuroscience*. Lippincott Williams & Wilkins, 2007:4-22
2. Wolf M. Neurolaw: The big Question. The American Journal of Bioethics 2008; 8:22-23
3. Pardo S, Patterson D. Minds, Brains, and Law: The Conceptual Foundations of Law and Neuroscience. Oxford University Press, 2013:23-24
4. Shafi N. Neuroscience and Law: The Evidentiary Value of Brain Imaging. Graduate Student Journal of Psychology 2009;11:27
5. Hart HLA. The Concept of Law. Oxford University Press, 2012
6. Montesquieu CSB. Montesquieu: The Spirit of the Laws. Cambridge University Press, 1989
7. Bigler D. Neuropsychological assessment, neuroimaging, and clinical neuropsychology: A synthesis. Archives of Clinical Neuropsychology 1991; 6:113-32
8. Baskin H, Edersheim G, Price H. Is a picture worth a thousand words? Neuroimaging in the courtroom. American Journal of Law & Medicine 2007; 33:249
9. Tovino A. Functional neuroimaging and the law: Trends and directions for future scholarship. The American Journal of Bioethics 2007; 7:44-56
10. Takahashi T. Molecular neuroeconomics of crime and punishment: implications for neurolaw. Neuro Endocrinol Lett. 2012; 33:667-73
11. Poldrack. Mapping Mental Function to Brain Structure: How Can Cognitive Neuroimaging Succeed? Perspectives on Psychological Science 2011; 5:753–761
12. Mohr, Nagel. Variability in brain activity as an individual difference measure in neuroscience. The Journal of Neuroscience 2009; 30:7755–7757
13. Klemke, E. D., Hollinger, R., and Kline, A. D., , Introduction to the book in 'Introductory Readings in the Philosophy of Science': Buffalo, New York, Prometheus Books, 1980, pp. 11-12
14. Russell B. Korobkin, Thomas S. Ulen, Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics, 88 Cal. L. Rev. 1051, 2000, p.1058
15. Donald C. Langevoort, Behavioral Theories of Judgment and Decision Making in Legal Scholarship: A Literature Review, 51 VAND. L. REv. 1499, 1502, 1998, pp.1506-19
16. Herbert A. Simon, A Behavioral Model of Rational Choice, 69 Q.J. ECON. 99, 1955
17. Christine Jolls, Cass R. Sunstein and Richard Thaler, A Behavioral Approach to Law and Economics, STANFORD LAW REVIEW, Vol. 50, 1998, 1545-1547
18. Eric A. Posner, Contract Law in the Welfare State: A Defense of the Unconscionability Doctrine, Usury Laws, and Related Limitations on the Freedom to Contract, 24 J. LEGAL STUD, 1995, p.569
19. Haney, C. Criminal Justice and the Nineteenth-century Paradigm. Law and Human Behavior, 6, 1982, 191

20. Jillian K. Peterson and others, How Often and How Consistently do Symptoms Directly Precede Criminal Behavior Among Offenders With Mental Illness? Law and Human Behavior, Vol. 38, No. 5, 2014, p. 447

21. Skeem, Jennifer L and others, Offenders with mental illness have criminogenic needs, too: Toward recidivism reduction. Law and Human Behavior, Vol 38(3), Jun 2014, 212-224.

22. Leslie Roberts, Mental Health Courts: An Interface Between Social Work and Criminal Justice, Columbia Social Work Review, Volume I, 2010, pp.36-42

23. Freeman michael, Law and Sociology: current legal issues, oxford university press, 2005

24. Robert R. Rehabilitating Rehabilitation: Neurocriminology for Treatment of Antisocial Behaviour. Cognitive Centre of Canada, 2008:5-38

25. Schleim S. Brains in context in the neurolaw debate: the examples of free will and dangerous brains. International Journal of Law and Psychiatry 2012; 35:104–111

26. Krueger F, Hoffman M, Walter H, et al. An fMRI investigation of the effects of belief in free will on third-party punishment. Soc Cogn Affect Neurosci 2014; Feb 10

Neurolaw: The big Question. The American Journal of Bioethics 2008; 8:22-23

[3] Pardo S, Patterson D. Minds, Brains, and Law: The Conceptual Foundations of Law and Neuroscience. Oxford University Press, 2013:23-24

[4] Shafi N. Neuroscience and Law: The Evidentiary Value of Brain Imaging. Graduate Student Journal of Psychology 2009;11:27

[5] Hart HLA. The Concept of Law. Oxford University Press, 2012

[6] Montesquieu CSB. Montesquieu: The Spirit of the Laws. Cambridge University Press, 1989

[7] Bigler D. Neuropsychological assessment, neuroimaging, and clinical neuropsychology: A synthesis. Archives of Clinical Neuropsychology 1991; 6:113-32

[8] Baskin H, Edersheim G, Price H. Is a picture worth a thousand words? Neuroimaging in the courtroom. American Journal of Law & Medicine 2007; 33:249

[9] Tovino A. Functional neuroimaging and the law: Trends and directions for future scholarship. The American Journal of Bioethics 2007; 7:44-56

[10] Takahashi T. Molecular neuroeconomics of crime and punishment: implications for neurolaw. Neuro Endocrinol Lett. 2012; 33:667-73

[11] Poldrack. Mapping Mental Function to Brain Structure: How Can Cognitive Neuroimaging Succeed? Perspectives on Psychological Science 2011; 5:753–761

[12] Mohr, Nagel. Variability in brain activity as an individual difference measure in neuroscience. The Journal of Neuroscience 2009; 30:7755–7757

[13] Klemke, E. D., Hollinger, R., and Kline, A. D., , Introduction to the book in 'Introductory Readings in the Philosophy of Science': Buffalo, New York, Prometheus Books, 1980, pp. 11-12

[14] Russell B. Korobkin, Thomas S. Ulen, Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics, 88 Cal. L. Rev. 1051, 2000, p.1058

[15] Donald C. Langevoort, Behavioral Theories of Judgment and Decision Making in Legal Scholarship: A Literature Review, 51 VAND. L. REv. 1499, 1502, 1998, pp.1506-19

[16] Herbert A. Simon, A Behavioral Model of Rational Choice, 69 Q.J. ECON. 99, 1955

[17] Christine Jolls, Cass R. Sunstein and Richard Thaler, A Behavioral Approach to Law and Economics, STANFORD LAW REVIEW, Vol. 50, 1998, 1545-1547

[18] Eric A. Posner, Contract Law in the Welfare State: A Defense of the Unconscionability Doctrine, Usury Laws, and Related Limitations on the Freedom to Contract, 24 J. LEGAL STUD, 1995, p.569

[19] Haney, C. Criminal Justice and the Nineteenth-century Paradigm. Law and Human Behavior, 6, 1982, 191

[20] Jillian K. Peterson and others, How Often and How Consistently do Symptoms Directly Precede Criminal Behavior Among Offenders With Mental Illness? Law and Human Behavior, Vol. 38, No. 5, 2014, p. 447

[21] Skeem, Jennifer L and others, Offenders with mental illness have criminogenic needs, too: Toward recidivism reduction. Law and Human Behavior, Vol 38(3), Jun 2014, 212-224.

[22] Leslie Roberts, Mental Health Courts: An Interface Between Social Work and Criminal Justice, Columbia Social Work Review, Volume I, 2010, pp.36-42

[23] Freeman michael, Law and Sociology: current legal issues, oxford university press, 2005

[24] Robert R. Rehabilitating Rehabilitation: Neurocriminology for Treatment of Antisocial Behaviour. Cognitive Centre of Canada, 2008:5-38

[25] Schleim S. Brains in context in the neurolaw debate: the examples of free will and dangerous brains. International Journal of Law and Psychiatry 2012; 35:104–111

[26] Krueger F, Hoffman M, Walter H, et al. An fMRI investigation of the effects of belief in free will on third-party punishment. Soc Cogn Affect Neurosci 2014; Feb 10