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# BRAIN STUDIES AND LEGAL SCHOLARSHIP

*Peter D. Junger\**

*In this comment, Professor Junger discusses the possible contributions that interdisciplinary studies of the human brain may make to legal scholarship. He suggests that knowledge about the cognitive and purposive functions of the brain would aid our understanding of legal constructs, the operation of legal rules, and the function of law in society. In concluding he observes that legal scholarship can reciprocate by providing a context in which to study goal identification and formation.*

LAST YEAR I found, somewhat to my embarrassment, that I was deeply involved with a group at Case Western Reserve University, who, at the instigation of Dr. Branimir Simic-Glavaski, were attempting to establish a program that would facilitate and encourage interdisciplinary research and scholarship about all aspects of the brain, from the molecular level of neurons, through neural anatomy and intelligence (both natural and artificial), to the global level of philosophy. What embarrassed me was the nagging question: What contribution can a lawyer make to such important issues?

Our discussions have now borne fruit in the form of a lecture series known as Program Brain and in at least one research project funded by the National Science Foundation. And I am still asked: What do lawyers have to do with the brain? Weary of suggesting that we should be studied as examples of artificial stupidity or mumbling learnedly about the Uniform Brain Death Act, I finally wrote the following response.

In relation to studies about the workings of the brain, the discipline of law is peripheral. The relation is, however, asymmetrical since a case can be made that an understanding of the workings of the brain should be central to studies about law. Although it is not yet possible to say that an understanding of the brain is central to legal studies, this merely reflects the unfortunate fact that such an understanding is not available. We pursue legal studies in the

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absence of that understanding, making more use of myth and ritual than of scientific knowledge. This is not to denigrate myth and ritual in the workings of law—or anywhere else. The fact remains, however, that one level of understanding, scientific understanding, is almost totally absent from the law.

It is probable that one cannot meaningfully ask, "What is Law?", without a better understanding than we now have of human nature and of human intelligence. Certain primitive suggestions can, however, be made. The term "law" is applied to a small proportion of human activities that involve highly complex social relations. Its workings are typified by the use of verbal formulas which are manipulated in a fashion that—though perhaps ultimately stupid—is likely to be labeled "intelligent." Law is a human phenomenon, a social phenomenon, and an "intelligent" phenomenon. Thus, the workings of law can only be understood in the context of human nature, social behavior, linguistic behavior, and the nature of intelligence, that is, the nature and functions of the human brain, including the ability to create myth and ritual and law.

It is a characteristic of our times—the saving characteristic, if we are to be saved—that workers in many disciplines have come to realize that nothing makes sense in isolation. It is improbable that one could understand a neuron without knowledge of its function within the greater system of the brain and the still greater system of the organism. It is unlikely that today anyone would seriously pursue the study of pure law, law stripped of all context. By the same token, it would hardly be congenial to the times to study the workings of individual legal rules without also considering the workings of the greater legal system that is composed, not only of the individual laws, but also of their interactions with each other and with the social and ecological systems of which they are also a part.

It is another characteristic of our times—the one that may damn us—that we are compelled to manipulate anything that we can get our hands on: our environment, ourselves. Law is not immune from this process.<sup>1</sup> Although law undoubtedly retains

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1. The major difficulty that arises from our efforts to manipulate the law is that the manipulations often come to nothing and as often to undesired results. The failures arise from at least two causes. We are incapable of predicting how other systems, of which law itself is the least, will react to the perturbations induced by our changes of a legal rule. More important, we cannot agree upon and, in fact, do not know the states of affairs that we desire. See text accompanying note 5 *infra*.

much of its mythic nature, the myth of immutable, God-given law, which can be discovered and refined but not improved, has been replaced by the legislative myth—the belief that the appropriate act of legislation, the appropriate incantation, can compel into existence any desired state of affairs. In this respect we perceive law and science in much the same fashion, as rites that can control the world.

Confronted with the two tendencies, one toward multidisciplinary perspectives, the other toward manipulations, legal studies have turned of late to other disciplines which, the lawyers hope, will supply the answers that are needed if the manipulations are to work. In such circumstances it is not surprising that a better understanding of the workings of human intelligence, of the human brain, might illuminate some of the conundrums of the law. The most obvious link between legal studies and those involving the brain is that certain legal formulas are, or at least appear to be, phrased in terms of functions of the brain. Almost every field of law has some rules couched in terms of intent; the criminal bar goes further and speaks at unintelligible length of *mens rea*. In fact it is a commonplace for some dispeptic judge to announce that “the state of a man’s mind is as much a fact as the state of his stomach.”<sup>2</sup> If such terminology does relate to states of the brain, it would be extremely useful to have some knowledge, other than judicial knowledge, about those states. If, on the other hand, it should eventuate that a word like “intent” cannot be meaningfully interpreted in terms of the functions of the brain, that too would be a useful bit of knowledge. The dependency of law upon the workings of the brain is, however, far more complex and far more fundamental than the examples just given.

The word “fact” is one of the undefined bases of legal analysis. The law is applied to facts. What facts are is a troublesome problem. Undoubtedly they are related to the events of a physicist, but one would be exceptionally perverse if one pretended that they can be fully described in terms of locations in time and space. The facts to which the law is applied are not the results of experiments; they are not replicable; they cannot be compared with con-

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2. *Edgington v. Fitzmaurice*, 29 Ch. D. 459, 483 (1885); cf. *Angus v. Clifford*, [1891] 2 Ch. 449, 470-71 (Bowen, L.J.):

A man may tell a lie about the state of his own mind, just as much as he can tell a lie about the state of the weather, or the state of his own digestion. . . . So far from saying that you cannot look into a man’s mind, you must look into it, if you are going to find fraud against him; and unless you think you see what must have been in his mind, you cannot find him guilty of fraud.

trols. Legal rules are applied to facts; they cannot be inferred from, or substantiated by, facts. And legal facts often refer to events that, if they have any spatial location, can only be found beneath a human skull. These matters suggest that facts may be quite as much a product of the brain as they are of external reality. The manner in which the brain structures the raw stuff from which facts are formed may be more important to the creation of those facts than is the stuff itself. The facts, whatever they may be, are undoubtedly in some way dependent upon the processes of perception and introspection, processes that appear to be dependent upon the workings of the neurological system of the brain. For lawyers, moreover, facts almost always come clothed in words. It may even be that facts are in the ultimate analysis little more than linguistic states of affairs. And linguistic states of affairs are surely, at least in part, related to states of the human brain, or perhaps more precisely, to the state of a system composed in part of many human brains.

It thus seems probable that an understanding of the function of the brain could aid in the unraveling of the mystery that now veils the very concept of a fact. If facts are to any extent a linguistic phenomenon, studies both in linguistics as an aspect of the human neurophysiological system and in machine intelligence as it relates to language could be of critical importance to an understanding of the processes by which law is applied to facts. If facts are related to perception, studies in both organic and machine perception are likely to reveal the structure of those facts as they are perceived within a legal system. If facts are to be understood in part in terms of perception and intelligence, law itself would appear to be purely a creature of human intelligences. Law is as human and as cognitive as language is, though certainly not as fundamental.

The very push toward some sort of logical consistency that seems to underlie the very meaning of law must surely be located within, or at least be explainable in terms of, human neurophysiology. It is hard to conceive of law without thinking at the same time of rules of law, and these rules cannot easily be separated from the rules of thought. It is probable that the rules of legal thought differ, perhaps radically, from those of, say, mathematics. But both categories of rules are almost certain to be regulated by the structure of the human brain. Studies about the brain and researches into machine intelligence can perhaps suggest answers

to the question: "What does it mean to follow a rule?"<sup>3</sup> a question that should be far more puzzling and far more crucial to a lawyer than it is, for example, to a physicist. The physicist can test his rules in ways that will forever be beyond a lawyer's capabilities. When a lawyer argues that a certain result must follow from a given rule, he does not mean that the contrary result cannot, or will not, occur. He means that the result would somehow violate some cognitive structure, a structure like a rule of grammar, that is located, if it is located anywhere, within the interacting neurophysiological systems of the members of the legal profession. The two strongest justifications that can be given for a legal conclusion are either that it is self-evident or that the contrary conclusion is unthinkable. This being so, an investigation into cognitive processes, into the questions of what can and cannot be thought, of what must be thought, of the very "how" of thoughts, may be the only way in which law can be liberated from the burdens of inappropriate myth and ritual. Contemplation of physical reality can compel one to twist the very axioms of geometry until parallel lines are, unthinkably to some, conceived as intersecting. It may well be that only the contemplation of cognitive systems themselves can supply a similar liberating function for law.

Although the dependency of both facts and law upon the structures of the brain would justify the claim that an understanding of the cognitive functions of the brain is a precondition for the understanding of legal systems, there is an additional reason why the study of the brain may be crucial to an understanding of law. Law is inevitably conceived as being teleological, as being purposive. The god may have been kicked out of the machine of physics, but no similar change has taken place with respect to law. At the most, we have replaced him with ourselves. To think of law without purpose remains almost unthinkable and psychologically undesirable in a society which is dedicated to a separation of theology from politics and which, for reasons that are perhaps historical, is disinclined to accept the inexorable reasons of the historical process. Now the purposes of the law are to be found within the minds of men. An understanding of those minds, an understanding of the workings of our brain, must be of critical importance both to the discovery and to the fulfillment of our purposes.

As has been mentioned, legal scholars have of late turned to other disciplines in the search for an understanding of how legal

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3. L. WITTGENSTEIN, REMARKS OF THE FOUNDATIONS OF MATHEMATICS 3 (1956).

rules satisfy or fail to satisfy human desires. In particular, academic lawyers have been fascinated by the theoretically elegant mechanisms deduced by welfare economists from the simple psychological axiom: A rational being has transitive tastes whose satisfactions he attempts to maximize. If the world, including the legal system, were structured so that the various equations that describe the world, including individual desires, possessed the independence and convexity and all the other mathematical requirements necessary to insure a maximum, then, in theory, we should be able to construct a legal regime that would allow each of us to get to the maximum satisfaction that is consonant with the scarcity of desiderata and the like maxima of others.<sup>4</sup> Research in "artificial intelligence" could do a great deal to clarify the implications of a maximizing creature with transitive tastes. Such research might even confirm—though the opposite conclusion seems far more likely—that human behavior can be described as the actions of such creatures.<sup>5</sup> Research into the workings of the human brain would also afford some insights into such neo-utilitarian models of human nature. More important, such research might result in psychological hypotheses that could supply a basis for a more reasonable model of the laws that should govern society.

Legal studies, on the other hand, may have some small contribution to make toward the study of the brain. As is true of every area of human concern, the problems associated with law may supply questions—if not answers—that are of interest to students of the brain. The concerns of legal scholars may even be useful in suggesting the range of research that will be necessary to a satisfactory understanding of the workings of the brain. For example, a study of a machine that is programmed to maximize its transitive desires would not be sufficient to give an understanding of how such machines behave. One would have to study the interactions between several such machines. Nothing can be understood in isolation. Certainly the workings of the brain cannot be understood in isolation from its environment and the brain of a social

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4. Leaving aside the absence of the necessary independence and convexity and the fact that the necessary calculations can be performed only in theory, this seductive answer to the legislator's question as to what the goals of law should be is valid only if men are maximizers of transitive tastes and nothing more. For a critique of efforts to apply this type of theorizing to the legal rules relating to water pollution, see Junger, *A Recipe for Bad Water: Welfare Economics and Nuisance Law Mixed Well*, 27 CASE W. RES. L. REV. 3 (1976).

5. For another example, see McCarty, *Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning*, 90 HARV. L. REV. 837 (1977).

animal cannot be understood except in the context of a society of similar organisms.<sup>6</sup>

There is a related question to which legal scholars should be particularly sensitive—although for the most part they are not. This is the question of the sources of human goals. The asking of this question is, I believe, the most important contribution that legal scholarship can bring to studies of the brain. Since law is perceived as a purposive activity striving for human goals, the nature of those goals is of fundamental importance to legal studies. It would seem that in some way the nature and formation of those goals must be controlled, at least in part, by the structure of the brain. A complete understanding of the nature of human desires will undoubtedly never be available to us. But any clue would be of value and even the simplest organism that has any sort of nervous system will demonstrate behavior that can be described in terms of goals. It may be that there is a discontinuity between the goals of such simple organisms and the goals of man—consciousness may be the mark of such a discontinuity—but even the realization that such a cleavage exists would be of incalculable value in our struggle to attain our human ends.

A key perception that a legal scholar has brought to the question of human goals and values is the recognition by Professor Tribe that the methods of “instrumental rationalism,” including

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6. This perception, however, is not one that is peculiar to legal scholarship. Any discipline that is concerned with the social aspects of human behavior would be sensitive to the fact that one cannot understand the brain simply by studying a brain in a bell jar. Linguistics comes to mind as the most obvious example. Unfortunately, as one of the participants in Program Brain has pointed out: “Somehow, in most current discussions of language, language acquisition, meaning, and reference, the fact that language is a social, communicational phenomenon has been lost sight of.” Nelson, *The Competence-Performance Distinction in Mental Philosophy*, 39 SYNTHESE 337, 346 (1978).

Professor Nelson points out that beyond this denial that language is a social phenomenon

lies a pervasive concept of the isolated individual, a pre-nineteenth century idea that has somehow gotten reinstated into western philosophy. According to the principle of the isolated (except for the epistemic connotations, I would say solipsistic) person, an individual human being learns, knows, wills, acts, and moralizes in purely adventitious relation to other individuals. Each person is a metaphysical unit, somehow ready made to enter into relationships with other persons and outer material objects, but not in any essential way being informed by those entrances.

*Id.* at 347.

This false concept of the isolated person also underlies almost all the recent theorizing in law journals about “law and economics.” One of the key axioms of welfare economic models is the assumption that human beings are “independent” in the sense that no individual’s well-being depends on the well-being of any other individual. See Junger, *supra* note 4, at 131.



those of welfare economics, will never be sufficient to allow us to fulfill our purposes so long as our pursuit of our desires changes those desires, so long as we are creatures destined to create our own values.<sup>7</sup> This perception poses some interesting questions for those who would study the workings of the brain. How does a creature with the ability, the necessity of changing its desires behave? How do we choose our goals and create our values? What values should determine our choice of goals? These are not easy questions, but they confront those concerned with law at every turn. It is conceivable that research into the brain might actually suggest some answers. If that were to happen, all who are concerned with our values and our purposes—not just the lawyers—would be greatly profited.

It is, in short, hard to conceive of any area of research that has more to offer to legal scholarship than does the effort to describe the cognitive and purposive functions of the brain. And, as has been suggested, legal scholarship may be able to reciprocate by presenting those who conduct research into such matters with one or two nontrivial questions.

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7. Tribe, *Technology Assessment and the Fourth Discontinuity: The Limits of Instrumental Rationality*, 46 S. CAL. L. REV. 617 (1973).