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The Law and Neuroscience

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Some of the implications for law of recent discoveries in neuroscience are considered in a new program established by the MacArthur Foundation. A group of neuroscientists, lawyers, philosophers, and jurists are examining issues in criminal law and, in particular, problems in responsibility and prediction and problems in legal decision making.

The Law and Neuroscience

Neuroscience started off over 100 years ago with curious scientists studying a most complex organ—the brain. The overarching interest was and continues to be to determine how the brain does its work. That is, scientists ask how the brain causes human beings to perceive, think, behave, reproduce, eat, drink, and all the rest. Enormous advances have been made toward this goal, and today, the excitement in the field is palpable.

About 20 years ago, another advance expanded the agenda. With the advent of brain-imaging tools of all kinds—from CT, to fMRI, MEG, ERPs, NIRS, and more—the *human* brain itself could be studied. No longer did one have to infer from animal studies what a particular finding might mean for the human condition. Humans were now front and center and directly under the scientist's eye. And in recent years, even those slippery mental constructs, such as moral beliefs, intentions, preferences, self-knowledge, and consciousness itself, are being unpacked. Other fields interested in the study of mind couldn't help but notice the advances in neuroscience.

Basic neuroscientific research was at this time unlocking how and when the brain seemed to be making a person's decisions for action. Such decisions, neuroscientists discovered, are usually made well before an animal, including a human being, is consciously aware of the decision. And the pharmacologists were beginning to see how the human condition itself could be enhanced, modulated, brightened, calmed, and subjected to other modifications. With all of this and much, much more, it became clear that the traditional views of what it meant to be human were under challenge. Were some or all of the implications good?

In this context, the field of neuroethics was born. Neuroethics is undoubtedly a subfield of the more general study of bioethics, but neuroethics has a greater immediacy. The core of the discussions in neuroethics does not deal, for example, with who receives a liver in a transplant case. Neuroethics instead deals with how we are to think of ourselves (Chaterjee, 2004). The questions are endless, and the field is currently abuzz with activity.

None of this was lost on those who believed that the ever-advancing field of neuroscience was beginning to challenge our notions of crime and punishment, the very foundations of the rules regulating our living together in social groups. Were the scientists, it was asked, who were engaged in this field advancing the age-old argument that our actions are wholly determined by physical forces? Were they raising fundamental questions about the nature of what it means to be responsible for one's actions? Some legal scholars hold that determinism undermines legal responsibility and that the law cannot ignore the threat of determinism. Other scholars directly assert that human beings are not responsible for any of our actions (Dan-Cohen, 1992; but see Pereboom, 2001, contra). As Sanford Kadish puts it, "to blame a person is to express moral criticism, and if the person's action does not deserve criticism, blaming him is a kind of falsehood, and is, to the extent the person is injured by being blamed, unjust to him."

These are large and bothersome issues. Of course, they are not new or novel. What is new is that neuroscience may have something to say about them. As we move toward a closer understanding of how the brain enables action (everything from a simple movement to a thought) we seem to be closing in on the idea that human beings are a determined system. That is, indeed, what many people have come to believe, and that is the crux of the problem confronted by the emerging field of law and neuroscience.

To study these problems, the John D. and Catherine T. MacArthur Foundation funded the establishment of the Law and Neuroscience Project in 2007. This project, composed of approximately 40 neuroscientists, legal specialists, and philosophers, has embarked on a 3 year endeavor to engage in pilot research to expand our knowledge in two major areas in this field. The first area addresses the question of criminal responsibility, prediction of criminal behavior, and treatment options. It includes issues concerning psychopathy and drug addiction and how these issues affect our understandings of responsibility and punishment. The second area is focused on the use of neuroscience in legal decision making.

Despite or because of the path described above, several cautionary notes must be provided. The first such note is that one must be on guard against "brain overclaim syndrome," a condition identified by Stephen Morse (Morse, 2006). We have all seen this syndrome in action. To some extent, it is a simple truism that the brain is involved with all things that comprise our human existence. It follows, loosely, therefore, that understanding the brain will help us understand the human condition more fully. However, scientists are well aware that findings may have social or psychological implications but

remain far from being dispositive on larger social questions.

It is a paradox that it is a duty of scientists to present research findings to the public while, at the same time, the public over-accepts the importance of such findings and even prematurely grants the status of sheer truth to some! Recent studies have shown, for example, that the results of a simple experiment in cognitive psychology will be more positively evaluated and considered important if a brain scan or two is thrown into the reporting of those results (Weisberg et al., 2008). In a court of law, the undisciplined use of brain scans is a real concern. The balance between accurate scientific reporting, on the one hand, and the risk of "overclaim syndrome" on the other must be carefully considered. Additionally, over-acceptance on the part of the jury has to be carefully evaluated at all times. Using neuroscience in the courtroom, colored and influenced by modern societies' awe of science, may also strengthen the judge's and jury's deterministic tendencies.

These enigmatic knots, now manifest to us, need to be untangled, and new efforts in law and neuroscience might help us to better do this. In what follows, I will briefly review two main areas of interest that correspond to the research areas in the MacArthur Law and Neuroscience Project. I should add that our research networks considered dozens of other possible projects that could yield rich and meaningful information concerning this skein of questions. In later years, we hope to address many of these issues. For now, as mentioned above, we chose to concentrate on two areas: (1) criminal responsibility and (2) legal decision making in the courtroom. While each of these is a large and complex topic, the specific problems we will preliminarily address are more focused subtopics located within each of these broader areas.

Criminal Responsibility

The most salient characteristic that distinguishes United States criminal law from civil law is the outcome for the defendant. In criminal law, we call that outcome (a sentence) "punishment." In the civil law, the goal is to compensate or make whole the injured party. Punishment, the object of the criminal law, implies the imposition of some form of suffering. At the same time, it is widely believed, that "no human should be made to suffer if such suffering cannot be justified by a concomitant gain to society." (Loewy, 2003; Of course, this view, endorsed in some form by most utilitarians, can be traced back to Jeremy Bentham.) We tend to forget that it is society through the power of the state that metes out a punishment and not the victim of the crime. Criminal conduct is seen as an offense against society, against our norms; it is seen as an offense against all of us.

Punishment here collides with the thinking of the neuroscientifically enlightened. While punishment allegedly has many purposes—such as rehabilitation, deterrence, restraint, and retribution—retribution appears to be preponderant, even if it is not so perceived (Carlsmith, 2008). If determinism is correct, retributive punishment is not only nonsensical, it is immoral. The first order of business in law and neuroscience, then, is to examine determinism and investigate how decisions to act (to produce behaviors) come about. We face the question of whether we blame the antecedent forces working on the brain or whether we blame the person.

Neuroscience is making inroads into understanding how the circuits and logic of neurons carry out behaviors. We understand more about certain thoughts and behaviors than others. One thing we are certain of is that the "work" in the brain happens before we are consciously aware of our mental struggles. Researchers have, since as early as 1965, advanced our understanding of the fact that much of the work is done at the subconscious level (Kornhuber and Deecke, 1965; Libet et al., 1979; Soon et al., 2008). A decision, for example, can be predicted several seconds before the subject consciously decides. If it is simply the brain, working up from its unconscious neural elements, that causes a person to act (even before he or she is aware of making a decision), how can we hold any person liable for his or her mental decisions? To hold someone responsible for his or her actions, one must find a "there" there. Is a little guy pulling the levers in your head producing a free-floating you? Modern neuroscience, of course, tells us the answer is "no."

The brain is a highly parallel and distributed system with literally millions of decisions being made simultaneously. The parallel-processing organism—a human being—appears to other human beings remarkably like a self-motivated, morally coherent, conscious, decision-making agent. This assignment of agency by human beings to complex systems is not limited to other human beings. Every day, we speak of the stock market, a corporation, or even a nation in such personal terms.

This discussion is not, surprisingly, crucial to determining where we locate "responsibility." Responsibility reflects a rule, a rule that emerges out of one or more agents interacting in a social context. Responsibility is not in the brain; it is in the social contract. Responsibility reflects the hope we share that each person will follow certain rules.

Of course, the foregoing is an argument, not, by any means, a settled view. If the foregoing view were adopted, substantial implications for the law would follow. After all, almost anyone—diminished through disease, genetics, and social-cultural forces—can follow a rule. Schizophrenics and felons stop at red lights.

Over the years, the system of United States law, which is derived from English common law, has developed and reified conceptions of what it means to be guilty of a crime. The complex set of ideas that has emerged was largely established during times when few worried about notions of determined brains or social rules. The view of humans, embodied in the law, was simple and straightforward. The human, according to this view, is a practical reasoner functioning in a normal environment. In order to be guilty of a crime, a person must be in a certain mental state, called the *mens rea* (guilty mind), necessary to have committed a crime and have accomplished the criminal act, called the *actus reus.*

From a neuroscientific point of view, the criminal act or *actus reus* component of the crime is of less interest than the *mens rea* concept. The mental state of having a "guilty mind" (largely at the time of the commission of the crime) carries within it the notion that humans have "general intentions" and "specific intentions." Different crimes require different levels of intent for a conviction. Put simply, current law envisions a criminal defendant as a free-willing, rational creature operating in a normal brain environment

with the mental intent (either general or specific) to accomplish a crime. But is this an accurate description of the criminal?

Adding to the intense interest in this subject are new studies suggesting that specific brain areas are activated that are associated with intentions to act (Haynes et al., 2007). If those brain areas are damaged or nonfunctional, does that suggest the person should be held exculpable for a criminal act? In addition, new studies suggest that specific brain circuits are involved in certain moral judgments (Greene et al., 2004). If these circuits are impaired, should such a person be excused under several insanity doctrines as incapable of knowing right from wrong? Other studies show that a sense of fairness can be disrupted by momentarily disabling the right frontal cortex. For example, recent experiments using what is called "the ultimatum game" suggest that disruption of the right dorsolateral prefrontal cortex (DLPFC) by low-frequency repetitive transcranial magnetic stimulation greatly lowers a test subject's ability to reject an intentionally unfair offer (Knoch, 2006). Interestingly, subjects still knew the offers were unfair—they simply couldn't resist taking them.

Such research leads to the question of whether felons who have damage in such regions should be excused for their opportunistic behavior. Finally, should psychopaths, a group that makes up about 20% of our high-security male prison population, be considered as suffering from a brain disorder that prevents them from forming an empathetic response and understanding (even comprehending) the feelings of others? If so, do we want to excuse them under insanity or diminished capacity doctrines and thereby judge them as exculpable and let them go? Do we want the state to house them in a different kind of facility? The issues seem endless. We are at a major crossroads.

Of course, that is not the main objective of the work examining special populations such as psychopaths and addicts. The goal is to understand their abnormal states and attempt to design therapies and other interventions that might lead them to so-called normal status. In a recent electrophysiological study of at-risk children, subjects who came from low socioeconomic environments were found to have a pattern of brain activity similar to adult patients with frontal lobe damage (Kishiyama et al., 2008). Could it be, then, that key social and developmental factors lead to brain abnormalities that then result in a higher risk of criminal activity? Could interventions be developed to stop such a progression?

Untangling all of these interactive complexities is a major charge of the MacArthur Law and Neuroscience Project. How are we to view our very nature? Neuroscientists might, on the one hand, aimlessly continue to engage in research and publish results. They might, on the other hand, be cognizant of the fact that neuroscience itself is located at the center of complex and crucial societal issues. As the philosopher Gary Watson recently reminded us, "we are the law." Our view of what it means to be human is changing, and our view of justice will likely change in conformity with it.

Legal Decision Making

A second major area of research in law and neuroscience, balanced against the long-tem theoretical interests described so far, concerns legal decision making as it currently operates in courtrooms. The first area we have identified—the question of criminal responsibility itself—exists against the backdrop of whether or not and how such research should be allowed in the courtroom. That backdrop defines the second area of our research.

Perhaps of most immediate and practical concern here is the admission into evidence or use of new brain-imaging technologies and the reports they generate. Should information on the specific physical states and capacities of individuals be evaluated by the judge or by the jury? Further—and this is the key issue—is such information probative or prejudicial? Can a brain scan presented in a legal proceeding be over-accepted by a jury (Sinnott-Armstrong et al., 2008)?

While the public considers science as a field dealing with certainties, scientific observations actually reflect probabilities of occurrence. The proper representation of scientific finding is difficult. In a sense, the nature of science has been misinterpreted for years.

How does scientific evidence get into court? Strict criteria regulate the introduction of scientific evidence, but these have changed fairly often as science has evolved. The history of the introduction and evaluation of scientific evidence by United States courts is fascinating and complex (Rakoff, 2008). Federal Judge Jed Rakoff, of the Southern District of New York, recently provided a brilliant analysis of the ever-changing rules concerning the admissibility of scientific evidence.

Over the years, the desire of legal counsel on any side to introduce science in court has grown exponentially. Unfortunately, much of it has been "junk" science. For example, Rakoff describes the history of the rejection of lie-detection procedures in United States courts. This rejection seems justified. A recent report from the National Academy of Sciences deemed lie detection unscientific and unreliable (National Academy of Science, 2003). Even though every jurisdiction except one in the United States prohibits the introduction of lie-detection evidence, it is still extensively used in the government, military, and private enterprise. The risk that science rejected for use in courts, due to the stringent requirements for accuracy, may still be used widely in society for other purposes is always present.

Ensuring that only sound science is used in the courtroom and that such science is used in appropriate ways is a work in progress. At one time, for example, Rakoff reminds us that American courts accepted that psychiatric evidence based on psychoanalytic theory had reached the level of scientific certainty sufficient to allow its introduction into evidence. The way that judges and juries hear scientific evidence is through the admission of expert testimony, often accompanied by the expert's exhibits (charts, diagrams, medical images, and the like). In American courts, the judge has become the "gatekeeper" and allows "good" scientific evidence into the case while preventing "bad" scientific evidence (as well as irrelevant evidence) from entering the case. How should a judge, trained in the law, make such a determination?

The evolution of the insanity defense in the United States shows the development of the process by which a judge decides whether to admit scientific evidence and exemplifies some of the problems related to the intersection of science and law.

Following an assassination attempt against the Prime Minister of the United Kingdom, Robert Peel, Sir Nicolas Conyngham Tindal, Chief Justice of the Common Pleas, established what has become known as the M'Naghten Rule. The jury, under this rule, must consider whether the defendant was laboring under such a defect of reason, from disease of mind, as not to know the nature and quality of the act or that the act was wrong. This definition has gone through several major reinterpretations in various jurisdictions in the United States. You can imagine the avalanche of expert testimony a judge or jury is likely to hear concerning whether a certain defendant is "sane" or "insane."

The current standards for the admissibility of expert testimony in all types of situations come from *Daubert v. Merrell Dow Pharmaceuticals, Inc.* According to *Daubert,* federal judges must screen proposed expert testimony and allow in only that evidence that is relevant and consists of valid scientific information. This "screening" procedure is driven by Federal Rule of Evidence 702. Federal judges (and many state judges applying similar standards) use several criteria to analyze whether expert testimony is, as Judge Rakoff noted, "grounded in the methods and procedures of science." The criteria that govern the admissibility of expert testimony shape the presentation of scientific information. Communicating the subtleties of scientific findings in the context of a courtroom adversarial proceeding (constrained by the rules of admissibility, discussed above) is indeed daunting.

Summary

A long and winding road is unfolding before us. Every day, neuroscience is making advances in understanding the human mind. There are many questions that will be fruitful subjects of research, and many others may be beyond the initial scope of the MacArthur Law and Neuroscience Project. For example, one of the law's principal aims is to regulate behavior by appealing to and relying on intuitive notions of right and wrong and notions of justice. These intuitive notions are, of course, based on a model of the person embedded in legal thinking. Questions about the nature of the person, the bases of moral reasoning, and the effects of punishment have the potential to significantly reshape legal philosophy.

Apart from suggesting what might be seen as earth-shattering adjustments to the legal system, there are numerous questions, as discussed above, on how, within the current framework of the law, to balance the introduction and use of neuroscientific evidence against its potential for "unduly" prejudicing a party. Such evidence is, of course, informative, but we must work to further understand whether jurors, judges, and lawmakers suffer from "brain overclaim" syndrome and how to counter it. Further, the neurological basis of bias, its role in the law in terms of procedural and substantive fairness, and possible means to counteract bias must be studied.

We in the United States are not alone in this enterprise. Other national and transnational efforts are trying to address these questions in light of differing legal systems. For example, the European Science Foundation (ESF) funded a European Neuroscience and Society Network (ENSN) in late 2007. The London School of Economics is also sponsoring Brain, Self, and Society, a 3 year project funded by the Economic and Social Research Council (ESRC) of the United Kingdom. Further, the Oxford Centre for Neuroethics, funded through the Wellcome Trust's Biomedical Ethics Strategic Awards program, recently received funding for a 5 year project on neuroethical research.

It is the human mind that can work in strange ways, ways that produce antisocial behavior such as embezzlement, fraud, theft, assault, rape, and murder, to name only a few crimes with which society is rightly concerned. Neuroscience, like it or not, is enmeshed with the core issues of criminal law. From the fundamental and enduring question of criminal responsibility to the immediate issues of representing science in today's courtroom, the publicly spirited neuroscientist must consider these issues and help guide our society to the proper use of its accurate and growing base of scientific knowledge. Keep an eye on the progress we make by tuning into our website (http://www.lawandneuroscienceproject.org).

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