Articles

Naturalizing Responsibility

The Role of Neuroscience in Addressing the Question of Moral Responsibility in Law and Clinical Practice

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Abstract: In the contemporary debate on the use of the neurosciences in ethics and law, numerous arguments have been bandied about among scientists and philosophers looking to uphold or reject the reliability and validity of scientific findings obtained by brain imaging technologies. Among the most vexing questions is, *Can we trust that technology?* One point of disagreement is whether brain scans offer a window through which to observe the functioning of the mind, in such a way as to enable lawyers, judges, physicians, and lawmakers to detect anomalies in brain function that may account for criminal unconscious behavior. Those who stand behind brain imaging believe that this can indeed be achieved, whereas those in opposition stress that brain scans are highly open to interpretation and that the data they provide is insufficient to establish causal connections. The question essentially comes down to whether technology can reliably be used to determine the intentions of the individual, thus establishing mens rea, for example, and hence responsibility. This article focuses on the latter notion and explores whether we can rely on the neurosciences to shed light on a complex form of moral and legal reasoning, as well as the role of the neurosciences in reawakening a philosophical and legal interest in trying to set responsibility on an empirical basis.

Keywords: brain imaging; criminal law and responsibility; neurosciences; moral reasoning

Introduction

The contemporary debate on the application of the neurosciences and their impact on law, morals, and clinical practice raises many critical questions and has brought several competing views into focus. A central concern is that of tests based on new brain imaging technologies, such as functional magnetic resonance imaging (fMRI), with scientists and philosophers arguing over the question of how reliable these tests are, while also debating the social, legal, and moral implications of their use.

Particularly contentious, for example, is the use of brain scans. Proponents argue that they open a window of observation onto the functioning of the mind, thereby enabling legal practitioners and clinicians to identify anomalies in brain functioning that may account for certain criminal behaviors. Critics of that view respond that we have little understanding of how the data provided by brain scans can be associated with specific psychiatric disorders, much less an understanding of the specific ways in which the same data can point to the impaired cognitive faculties or behaviors that matter in a court of law. It is one thing to take data from a brain scan; it is completely different to *interpret* that data, especially when judging the moral and legal import of someone's behavior. We cannot so easily move from the premise that the brain is damaged in a certain way to the conclusion that this accounts for a given cognitive dysfunction or errant behavior, or that a certain psychiatric diagnosis should follow.

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It is true that we now have a better understanding than in the past of the relation between brain activity and mental events. (We owe this to advances in biology and molecular genetics, investigations done with neuroimaging techniques on the living and active brain, the discovery of many neurotransmitters that modulate the activity of synapses, experiences in clinical neurology, and the study of the functioning of the so-called association cortex.) But this does not yet tell us what to make of that correlation in the practical realm.

There are numerous cases today in which behavior is interpreted in light of data provided by neuroimaging.[1] The challenges are great, and the issue essentially concerns the claim or the expectation that once we have all the scientific evidence we need about an individual, we know how to interpret his or her intention or volition. The idea is that in this way we can even assign a mens rea to this person. We can appreciate how sensitive the issue is. For example, when speaking of criminal responsibility in the law, we would want to know whether or not a violent crime can be attributed to a brain injury that made it impossible for the individual to even *choose* some other course of conduct. But even that determination (about what one can *will* to do) would be insufficient to determine whether the individual is at fault or is guilty of the crime, because, in drawing that conclusion, we would also have to consider the individual's foresight, that is, his ability to foresee the likely *consequences* of an action and make a practical decision on that basis.

The main task of current neuroscience in law is "evidentiary," in that it consists in pointing out any pathologies the accused may be suffering from, while highlighting any causal link these pathologies may have with the crime in question. In a strictly clinical setting, the task at hand is rather more concerned with validation. Data emerging from a bedside assessment of the consciousness of patients who have suffered serious brain damage and are in a coma, vegetative state, or minimally conscious state can now be validated with the help of new medical technologies (such as electrophysiology and functional neuroimaging), thus making it possible to "quantify" any residual conscience.

However, the new neurotechnological clinical instruments reveal that we are limited in our ability to carry out bedside assessments of the residual consciousness of patients with consciousness disorders, because the underlying neurological condition is often too difficult to understand on a behavioral basis alone.[2] One wonders, therefore, whether the instrumental assessment of patients with consciousness disorders is destined to displace a behavioral assessment, and whether this may change the way we go about treating and caring for these patients. Even if that does not turn out to be the case, it is no doubt incumbent on medicine to take into account the significant advances made in the instrumental measurement of consciousness.

As we can see, the neuroscientific advances of recent decades have reignited a question that first came up a century ago, namely, the question of whether criminality can be characterized as biological deviance. Indeed, the uptake of these technologies has prompted the social sciences and the humanities to revisit old ethical dilemmas and traditional legal, jurisprudential, and philosophical concepts, such as liberty, rationality, responsibility, intentionality, and free will.[3]

This debate has brought into focus several points that are worth briefly mentioning. For one, we have come to critically appreciate that, even granting that the mind expresses itself through the brain, this does not mean that all mental content can thereby be equated with a brain state or function. In addition, we have gained

a deeper sense of the gap between the first-person experience of moral judgment and the third-person angle with which the neurosciences must work in trying to understand that judgment. In short, the qualitative experience of engaging in moral judgment seems essential to that activity, and yet that is precisely what the neurosciences cannot capture.

This brings up the related point that in taking a behavioral approach to the investigation of moral judgment and responsibility, the neurosciences have so far largely ignored the role that each person's unique life experience plays in forming any judgment. This, too, is a uniqueness that cannot be captured by the behavioral model—and it may, in fact, be impossible for us to engage in moral reasoning, and maybe even in reasoning at large, without bringing our individual experience to bear on the judgments we make.

On a broader note, we have learned to be more skeptical of the attempt to set ethics on a scientific foundation. As much as we may be able to validate or falsify the premises that go into moral reasoning, and even observe what happens in the brain as we engage in such reasoning, this does not warrant the conclusion that moral judgments and norms can be empirically grounded.[4]

Neurocognitive scientists like Jean-Pierre Changeux have taken the study of the cognitive brain to the limit of reductionism, down to the level of neuronal molecules.[5] They point out to philosophers that even if it is difficult to establish an exact causal relation between nervous activity and mental states, there is no reason to reject reductionism. Even if we do not know exactly what happens in the interim between an electrochemical stimulus and a content of consciousness, this does not show that consciousness can happen on its own, without any neurons in the background.

In reply to these arguments, the philosopher Colin McGinn has underscored what he takes to be the natural limits of knowledge and the error of confusing the mind with brain states, as if the mind were an empty box only waiting to be filled by mental content as a result of observable brain mechanics. He thus calls into question the reductionist denial that there can be any consciousness independent of brain states.[6]

In what follows, the critical points just raised are discussed not separately on their own merits but rather as a whole insofar as they bear on the question of legal and moral responsibility. The purpose will be to assess whether neuroscience can improve our ability to correctly assess the concept of responsibility or whether the renewed interest in approaching that notion from a neuroscientific angle holds more promise than it can deliver. I highlight what appear to be some insurmountable limits in trying to reduce responsibility to its neuroscientific substrate.

Responsibility as a Legal and Moral Concept: A Snapshot History of the Effort to Set It on a Scientific Foundation

We can go back to the positivism of the late nineteenth and early twentieth centuries to see the first sustained attempt to construct a scientific theory of criminal responsibility. This effort drew on the insights afforded by the psychology and sociology of law. Subsequently, the question of responsibility turned analytical. Instead of an interest in connecting responsibility with law or psychology, the effort shifted to investigating responsibility as an abstract concept. This was the program that took hold in the Anglosphere, where it continued to flourish well

into the mid-1950s, when dissatisfaction began to be expressed with its sterility. Thus, in 1962, in "Freedom and Resentment,"[7] Peter Strawson made a compelling argument against treating responsibility within the framework of a discussion on determinism and free will, with the focus falling on the question of whether the view of universal determinism could be reconciled with metaphysically free action.

Philosophers today continue to be concerned with the question of whether our action is free and, if so, how. The discussion has moved forward by bringing new philosophical, normative, intentional, and phenomenological concepts into the picture and attempting to account for them within the framework of the natural sciences. But it seems that we can only advance so far in solving this problem, because there appears to be a deep categorical distinction at play. None of the concepts in question appear to have an ontological counterpart in the natural sciences. This may be why attempts to explain these concepts using the language of science will fail by inevitably falling back on language that is somehow normative. This continues to be the main sticking point in the contemporary debate surrounding the effort to naturalize philosophical concepts. Indeed, the question remains whether these ideas can be resolved into neuroscientific or biological—or even psychological—concepts, considering that the attempt is often to render them in the language of evolutionary psychology.

The problem becomes even more intractable when we close in on the question of personal responsibility, and because this question is bound up with that of free will, the surrounding debate has proved to be particularly contentious, with a wide array of positions ranging from hard determinism to a qualified compatibilism. Many philosophers argue that normative ethics can never be reduced to innate emotional responses or inclinations. It may well be that certain psychobiological conditions act as enablers of morality, but this does not mean that morality can be described without using intrinsically normative concepts. After all, the question of determinism has always been a challenge not only in morality but also in law, considering that these two areas of human activity both assume free will as an essential background condition. The assumption is that we cannot be regarded as moral agents unless we have the ability and the opportunity to freely choose a course of action—one we are prepared to justify by offering reasons for that decision. It is the same in the law, in which a penalty for breaking a law only makes sense on the assumption that the lawbreaker could have freely chosen to act otherwise; and, when two parties bring a case to court, they are assumed to be able to offer reasons to defend their actions.

In a well-known article of 2004, Joshua Greene and Jonathan Cohen[8] argued that neuroscience may have a role to play, but only if we can rid ourselves of folk psychology, in such a way as to move past some of our commonsense moral intuitions. Their perspective will enable us to revisit our approach to criminal justice, embracing a utilitarian model as opposed to a retributive one. This we can do because, as Greene and Cohen argue, the law implicitly assumes that those who fall subject to a penalty are free to decide for themselves to act in a way that would not incur that penalty.

Taking quite the opposite stance is the well-known jurist Stephen Morse, who, also in 2004, argued that even if we manage to somehow solve the problem of free will, the neurosciences still could not serve as a tool for making better law, not even where criminal responsibility is concerned.[9] According to Morse, the law does not

make punishment dependent on whether the accused acted out of his or her own free will, without being in any way compelled to do the act in question. The neurosciences, he argues, are simply the latest addition to the long-standing debate on the question of responsibility and determinism, but they do not significantly advance that debate, except to bring into sharper focus the overlap and distinction between moral and legal responsibility. What most concerns us here is *personal* responsibility and, in particular, the way responsibility is attributed, inquiring into the *reasons* why we deem someone responsible for past actions, which is the question at the center of the conflicting arguments advanced by Morse, Greene, and Cohen.

The two main methods used to tackle this question in the contemporary debate on neurolaw are the retributive and the consequentialist approaches, the latter supported in particular by Greene and Cohen.[10] According to both methods, to attribute responsibility is to consider someone as worthy of praise or punishment (be it moral or legal), such that he or she will be harmed or rewarded for the act in question. On the retributive approach, the purpose of punishment is to make amends for an injury by making the injured party whole, and the punishment itself is considered appropriate when commensurate with the injury. On the consequentialist approach, by contrast, punishment is viewed in light of its outcome and is accordingly considered appropriate when it maximizes social utility. We are then faced with the difficulty of figuring out what it means to maximize social utility and how to achieve that goal. Even assuming that the goal is to make society as safe as possible, we still have to decide how best to achieve it: by crime prevention and imprisonment or by addressing the root causes of crime from a social perspective.

The retributive approach is based on commonsense notions of punishment and what it means to ascribe responsibility, but because it is based on the idea of offsetting one action (the injury) by a commensurate action (the corresponding punishment), it comes up against the difficulty of quantifying the two so as to achieve an even balance. But a consequentialist approach also runs into some paradoxes. If punishment is justified in view of its consequences, even an innocent person might be punished if that leads to consequences deemed to be useful. It stands to reason, therefore, that some mixed conceptions have been advanced in an effort to pick out the best elements of each approach while avoiding its pitfalls.[11] But if responsibility is a normative question, whatever conception of responsibility we decide to adopt must necessarily rest on an underlying moral conception. If that is the case, then we must ask: In what way can neuroscience advance the discussion on responsibility and determinism and, in particular, on whether any compatibility can be found between the two? To answer this question we have to see what happens to responsibility when we try to fit it into a naturalized conception of law.

Legal Responsibility between Causal Determinism and Compatibilism

In the recent debate, the question of whether responsibility is compatible with determinism has been framed by proceeding from a retributive conception of responsibility. On this conception, no responsibility can be attributed to someone unless the person can be understood to have acted out of his or her own free will, for otherwise—in a situation in which the agent was somehow *compelled* to act in

a certain way—we should have to say that "if he or she could *not* have avoided it, then they are not responsible for the act," such that it makes no sense to inflict a punishment in compensation for an injury.[12]

In contrast, the consequentialist conception of responsibility would seem to fare better than the retributive approach in making the case that responsibility is compatible with determinism. According to the consequentialist conception, freedom does not figure as an essential condition of responsibility. What counts is not the praise or blame that we can ascribe to an agent who has freely chosen to act in one way or another but, rather, the outcome of the agent's act. Hence responsibility can coexist with determinism. It is no coincidence, therefore, that this has been the conception of responsibility most often upheld by determinist philosophers.

An interesting characteristic of determinists has always been that, on their view, although determinism is incompatible with freedom, it is, by contrast, compatible with attributions of responsibility. This semicompatibilist stance can be ascribed, for example, to some thinkers working in the liberal tradition. Significant among them is John Martin Fischer,[13] who is known precisely for his keen analyses of responsibility and who, in describing semicompatibilism, states that causal determinism is compatible with moral responsibility, even if it rules out alternate possibilities. Fischer's model, also supported by Morse, proceeds from an assumption of responsiveness to reasons, meaning that agents can be held responsible only so long as they have the mental capacity required to respond to moral reasons. This capacity is understood in the manner of H. L. A. Hart to mean that it encompasses an ability to understand and proffer reasons for action and act accordingly.[14] For Fischer, this is an integral part of the deterministic package.

The neurosciences we are dealing with here are those of moral cognition, concerned with investigating the psychological mechanisms at the basis of moral thought and conduct. They can be placed into two broad categories: those that pursue normative investigations, aimed at identifying the cognitive processes through which the mind constructs a system of values, and those concerned with social cognition, which study the neuropsychology involved in the ascription of responsibility. This involves the study of the way acts are socially constructed and clearly connects with some legal concepts of individual responsibility that we find across all legal systems: negligence, willful wrongdoing, and strict liability. Some of the cognitive processes identified in social psychology can be seen to have always been at work in the law, where they are formalized. If we move from the normative perspective to the neurosciences of social cognition, we may be able to gain fresh insights into social interaction. For example, the discovery of a neural system through which we are able to establish an emotional and intentional connection with others would appear to offer scientific backing for the idea of shared opinion. By the same token, morality and law can be said to have been possible owing to the evolution of certain emotive mechanisms underlying our moral and legal practices.

At this point, we should be able to appreciate that the question whether criminal law can be naturalized depends on the extent to which we can rely on the neuroscientific investigations discussed thus far. In other words, we have to decide whether we can do away with our classic legal understanding of an agent as someone who freely chooses to deliberately act in one way or another, or at least we have to see how that understanding can be reconciled with the idea that an agent's action may be part of a causal fabric.

Certainly, one of the most controversial assumptions in neuroscience today is the ontological and epistemological identification of the mind with the brain. Although we know that neural networks play an essential role in the formation of moral judgment, there is not a great deal more that we can positively assert. Even science recognizes that a variety of factors contribute to the construction of the self. There is a biological basis, to be sure, but it does not account for everything. It works in combination with our biography and social relationships; cognitive processes exist along with our conscious experience. The decisions we make are the outcome of brain processes shaped in part by forces in our social environment. We can see this in the law as an institution in flux that continually adapts to evolving social behaviors, insofar as appreciation tends to favor a retributive conception of punishment as a result of the evolution of social cooperation.

On the other hand, deviant behavior can be investigated within the framework of cognitive neuroscience, and that suggests rejecting the notion of individual responsibility, tipping the balance in favor of consequentialism as the theory of punishment most consistent with currently available empirical findings. As noted, Greene and Cohen put forward a sanctionative consequentialist model on which punishment only serves the purpose of contributing to a safe social environment, arguing that this would be more consistent with the implications of neuroscientific findings.[15] Even Morse concedes that we are very far from subverting our current system of law,[16] recognizing that we cannot yet causally explain an agent's action as the outcome of internal forces working in combination with external stimuli—and on that basis, we cannot determine when someone should be held responsible for a crime. According to Morse, very few cerebral anomalies incapacitate the minimum rationality that the criminal system deems necessary and sufficient to hold someone responsible for a criminal act. It is also true that the theory of law relies on a mechanistic anthropology according to which the threat of punishment exerts a deterrent force capable of bringing people into compliance. To be sure, the neurosciences could play a role by scientifically capturing or "photographing" the process by which behavior is enacted; but, in that case, we would face the greater difficulty of having to purge the sanctionative theory of the vestige of free will that it still harbors.

Thus, with respect to the current system of law, the most promising path seems to revolve around the discussion of the compatibilist idea of capacity-responsibility, a matter that the philosopher and theorist of law Ronald Dworkin places in harmony with compatibilist theories. Dworkin argues that moral responsibility is independent of scientific or metaphysical truths and instead inquires into the capacities that enable human beings to take part in the moral community. Recognizing that people possess these capacities to varying degrees, Dworkin states that the principle of capacity supposes that there is a threshold, such that many of the discussions between jurists on when it is right to consider someone responsible for his or her behavior are in fact discussions on where that threshold should be set.[17]

Framing a Concept of Responsibility in View of Our Theoretical Assumptions and Applicative Realities

Advancements made over the last decade in the neurosciences and the neurotechnologies have transformed our way of "doing medicine" and our conception of

illness and of illnesses. At the same time, they have broadened the scope of our reflection on medicine, encouraging us to think about issues extending well beyond the application of medicine strictly understood. As we have seen, the discussion has also extended beyond the strictly legal implications of the use of medicine. Consider, for example, the current experiments on the use of magnetic stimulation of specific cortical areas. In healthy subjects in the waking state, this stimulation generates an electrical signal recorded across various cortical areas, whereas in comatose or vegetative subjects the response is localized.

Neurophysiological and neuroimaging advancements of this kind make it possible to describe consciousness disorders with greater and greater accuracy, potentially reducing the percentage of incorrect diagnoses—still a high percentage exists when the diagnosis is made using obsolete clinical standards, and when other assessment criteria are not taken into account.[18] From the perspective of ethical-legal regulation, these advancements have already highlighted that, in neurology, the traditional definition of the vegetative state fails to take into account the evidence provided by new diagnostic methods. We therefore have to clarify our neurological language: terms such as "behavior," "awareness," and "consciousness" prove to be inaccurate and hence in need of clarification in light of neuroscientific advances. Where the law is concerned, neuroimaging data on conscious phenomena still need to be validated by cognitive science. If it becomes possible to identify "traces of intention" or "fragments of consciousness," then it will be necessary to determine which functions and behaviors may become significant in deciding how to treat and manage patients in a vegetative state or in a minimally conscious state. In addition, if we assume that conscious experience can be identified on the basis of observable behavior, we will have to distinguish between "physical" behaviors and "mental" ones.

In recent years, in light of the aforementioned neuroscientific advances, we have come to appreciate that in order to have a proper understanding of the decisions we make and the actions we take, we have to investigate the conscious experience of those actions and decisions, or how our *awareness* of them works. This means that we have to be able to "record" the neuronal "mechanics" that enable individuals to act autonomously, making individuals the prime and undisputed sources of their own action; and this carries all sorts of ethical, social, and legal implications.

This kind of investigation into the mechanics of consciousness assumes that when we decide on some course of action, for the most part we do so consciously and deliberately, meaning that we are in control of our own decision-making process. But as has been demonstrated by scientists such as Benjamin Libet, our decisions are in large part the outcome of *unconscious* processes,[19] such that we might reasonably ask: How is it possible to control cerebral activities of which we are not even aware? In fact, Libet did not believe that his work could demonstrate that we have no free will and hence no moral responsibility. His position was more nuanced. He found that by the time we decide to act in a particular way, the brain process leading to that decision has already begun. For him, the initial part takes place without our conscious awareness, so any lack of free will consists in our inability to put a veto on our decisions while they are in process. It follows that we are responsible not for *initiating* the decisions we make but for *reversing* them once—unbeknownst to us—they have already been made.

As much as these findings may suggest that we cannot be held responsible for our actions in quite the same way as common sense dictates, we still do not have the scientific evidence needed to warrant the conclusion that we should diminish that sense of responsibility. As Morse has aptly put it, "Brains are not held responsible. Acting people are."[20]

These neuroscientific findings have sparked renewed interest in the very concepts of consciousness and agency, as the implications of those findings are significant and wide ranging, not only in the law but also in clinical practice. Consider, for example, what it means to define a vegetative patient as a moral agent, because on that definition hangs the way the patient will be treated. Consider, too, the difficulty involved in *applying* that definition (or the web of related definitions involved in making a judgment of moral agency). This is done by administering "consciousness tests" to patients and seeing how they respond. But how should we properly interpret those responses? On the basis of what moral premises? And in light of what moral and practical implications?[21]

For the reasons discussed, the problem of defining consciousness has engaged philosophers, theologians, and doctors for centuries, and now cognitive neuroscientists have a joined the debate, realizing the difficulty of arriving at an agreed-upon definition. To recognize this, we need only consider the varying interpretations offered by noted scholars, such as Michael Gazzaniga, Gerald Edelman, and Daniel Dennett, all of whom have denied that our phenomenal experiences correspond to any ontological reality, claiming that they are instead the outcome of subjective accounts.[22]

Even so, the investigation of the neurocognitive bases of our decisionmaking capacity does have something to offer that can be worked into a functional definition of consciousness. For example, we now know (1) that the association among stimulus, cognition, and the body's motor response varies depending on needs, contexts, and situations; (2) that human behavior is the result of these constant interactions, although the physiological processes are still not understood; (3) that there are cognitive processes that support our overall capacity to act (involving our reasoning and our ability to process information); and (4) that the abilities we need to make decisions may differ depending on the decision required—for example, moral decisions involve different abilities than legal ones.

All these findings have converged toward a new appreciation of the decisionmaking process. This is now understood to be a *dynamic* process in which our awareness or consciousness is not a static component but, rather, forms part of a context of interaction among cognitive functioning, individual psychological response, and the social and environmental context.[23] This is further evidence supporting the view that our ability to act intentionally, in a moral as well as a legal sense, involves processes at once cognitive (such as counterfactual reasoning) and moral, and that intention is not a clear-cut decision to do something. Because intention is key to any ascription of responsibility, at least in the law, that ascription turns out to be more problematic than one might otherwise suspect. In fact, as much as the neurosciences have revealed the anatomical structures that are essential to consciousness, as well as the mechanisms by which those structures can be altered (at least in clinical settings), we still do not understand the relation between consciousness and the brain, and this is precisely the "difficult problem" David Chalmers refers to in investigating how brain processes can give rise to subjective experience.[24]

Conclusion

We have seen that because our personal and social histories play a significant role in our decisionmaking, a proper investigation of moral and legal responsibility requires us to understand the psychic mechanisms through which we *construct the social phenomenon*. Additionally, biographical and environmental reconstructions, coupled with neuroscientific findings, may provide probative elements in the legal process. This could lead to a practical solution to the problem of responsibility that would not require us to choose between retributive and consequentialist approaches. Thus, a neuroscientific approach to responsibility may have to take into account not only the neuronal processes underlying volition but also the cerebral systems in virtue of which individuals can use their cognitive capacities. This makes it possible to appreciate the way in which society limits volition and how to adjust to this limitation, thus averting the risk of predicating the law, its prescriptions, and its corrective purpose on a set of processes presumed to be "natural." The cognitive neurosciences have enabled us to arrive at a deeper understanding of the intentional and decisionmaking processes thought to be essential to what it means to be held responsible for our actions. That very understanding has brought out the complexity involved in the concept of intentional action and decisionmaking. By a kind of paradox, what can be said to have begun as a scientific enterprise, aimed at naturalizing intentionality, decisionmaking, and responsibility, wound up underscoring the irreducible social, biographical, and normative aspects of those concepts.

In light of the previously described developments in the biological sciences, we can bring into focus the need to revise some of our current clinical and legal practices, especially in criminal law.[25] As concerns clinical practice, for example, neuroscience and cognitive science have underscored the need to clarify what it means for neural activity to be "absent." How much absence counts? Does the brain as a whole have to be nonfunctional, or are there special regions (such as the cerebral cortex) whose functioning is essential? And in determining whether a patient in a persistent vegetative state has the required level of neuronal activity, we are left to ask: Is this individual still a person? Clearly, these questions are not just scientific but require us to engage in moral and philosophical reflection, while also making practical considerations such as those involving the social costs of maintaining brain-dead individuals.

In conclusion, although neuroscience has advanced our understanding of the human brain, it has not been able to supplant the need to reflect on responsibility in a broader sense than what science itself can encompass. After the century of the gene, after the Human Brain Project, the current decade of investigations on the mind and the brain is highlighting significant moral, social, and legal implications that need to be considered in the attempt to understand our behavior and the ways in which we can be held accountable for it.

Notes

1. See Flickering MJ. Admissibility: Neuroimaging evidence in the US courts. *Behavioral Sciences & the Law* 2008;26:29–49; Illes J. Neuroethics in a new era of neuroimaging. *American Journal of Neuroradiology* 2003;26:1739–41.
2. See Stins JF, Laureys N. Thought translation, tennis and Turing tests in the vegetative state. *Phenomenology and the Cognitive Sciences* 2009;8:361–70.
3. The revived interest in these questions actually goes back to the early 1980s in response to the neuroscientific findings on free will owed in large part to the work done by the neurobiologist

Benjamin Libet. What these findings suggest is that we are not as free as we might like to think in making the choices we make, for the range of available choices has already been selected for us in the brain before we even become aware of the decisionmaking situation at hand. See Libet B, Gleason CA, Wright EW, Pearl DK. Time of conscious intention to act in relation to onset of cerebral activity (readiness-potential): The unconscious initiation of a freely voluntary act. *Brain* 1983;106:623–42.

4. For a discussion of the roots of moral knowledge, see Churchland PM. Rules, know-how, and the future of moral cognition. In: Campbell R, Hunter B, eds. *Moral Epistemology Naturalized*. Calgary: University of Calgary Press; 2000: 291–306; and Churchland PS. Our brains, our selves: Reflections on neuroethical questions. In: Roy DJ, Wynne BE, Old RW, eds. *Bioscience and Society*. New York: Wiley; 1991:77–96. All the decisions we make involve some evaluation of the consequences we expect them to have. This evaluation is driven by a range of factors: the brain's reward system; the complex networks supporting emotions, appetites, and moods; our background knowledge of the way the world works; and our varying capacity to act in a world so constructed. See Illes J, Raffin T. Neuroethics: A new discipline is emerging in the study of brain and cognition. *Brain and Cognition* 2002;50:341–4.
5. See Changeux JP. *The Good, the True, and the Beautiful: A Neuronal Approach*. New Haven, CT, and London: Yale University Press; 2012.
6. See McGinn C. What can your neurons tell you? *New York Review of Books* 2013 July 11.
7. See Strawson PF. *Freedom and Resentment and Other Essays*. London: Methuen; 1974, at 1–25. With his "reactive attitude" model, Strawson draws attention to the moral sentiments, introducing a naturalistic alternative to the question of responsibility that makes a break with its treatment in the modern tradition as a concept to be treated within a philosophy of free will.
8. Greene J, Cohen J. For the law, neuroscience changes nothing and everything. *Philosophical Transactions of the Royal Society of London: Biological Sciences* 2004:1775–85.
9. Morse S. New neuroscience, old problems. In: Garland B, ed. *Neuroscience and the Law: Brain, Mind, and the Scales of Justice*. New York: Dana Press; 2004.
10. The consequentialist approach views punishment as a technique for ensuring a safe social environment. The argument for this view draws on neuroscientific findings pointing to the fallacy of the naïve psychology on which rests the legal understanding of the person.
11. A case in point is H. L. A. Hart, who in *Punishment and Responsibility* stresses the need to distinguish two problems and to gauge their solutions accordingly: On the one hand is the problem of justifying punishment, and here he advocates a consequentialist approach predicated on the preventive purpose of punishment. On the other hand is the problem of who is to be punished, and here he advocates a retributive approach based on the assumption that punishment is to be inflicted on the offender. See Hart HLA. *Punishment and Responsibility*. Oxford: Clarendon Press; 1968.
12. On this question, see the compelling criticism the moral philosopher Harry Frankfurt has raised against the so-called alternate possibilities principle, under which you are morally responsible for something only if you could have acted otherwise. Frankfurt argues that even if this condition is not met, there is still a compensatory responsibility that can be attributed. See Frankfurt H. Alternate possibilities and moral responsibility. *Journal of Philosophy* 1969;23:829–39, at 830.
13. See Fischer JM. *Deep Control: Essays on Free Will and Value*. New York and Oxford: Oxford University Press; 2011; Fischer JM. Frankfurt-type examples and semi-compatibilism. In: Kane R, ed. *The Oxford Handbook of Free Will*. Oxford: Oxford University Press; 2002: 281–307; and Fischer JM, Ravizza M. *Responsibility and Control: A Theory of Moral Responsibility*. Oxford: Oxford University Press; 1999.
14. See note 11, Hart 1968, at 256.
15. From a consequentialist perspective, our consideration of attenuating circumstances and moral desert in dealing with criminal responsibility should yield to greater stress on punishing itself as a tool by which to attain greater social well-being. See note 8, Greene, Cohen 2004.
16. See Morse S. Moral and legal responsibility and the new neuroscience. In: Illes J, ed. *Neuroethics: Defining the Issues in Theory, Practise, and Policy*. Oxford: Oxford University Press; 2006:33–50.
17. See Dworkin R. *Justice for Hedgehogs*. Cambridge, MA: Harvard University Press; 2011, at 260.
18. See Monti MM, et al. Willful modulation of brain activity in disorders of consciousness. *New England Journal of Medicine* 2010;362:579–89.
19. See note 2, Stins, Laureys 2009; See note 3, Libet, Gleason, Wright, Pearl. 1983.
20. Morse S. Brain overclaim syndrome and criminal responsibility: A diagnostic note. *Ohio State Journal of Criminal Law* 2006;3:397–412, at 405.

21. On this whole question, see Savulescu J, Levy N. Moral significance of phenomenal consciousness. *Progress in Brain Research* 2009;177:361–70.
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