

University of Pennsylvania Carey Law School

Penn Law: Legal Scholarship Repository

Faculty Scholarship at Penn Law

4-20-2016

Law, Responsibility, and the Sciences of the Brain/Mind

Stephen J. Morse

University of Pennsylvania Carey Law School

Follow this and additional works at: https://scholarship.law.upenn.edu/faculty_scholarship



Part of the [Behavior and Behavior Mechanisms Commons](#), [Criminal Law Commons](#), [Ethics and Political Philosophy Commons](#), [Genetic Phenomena Commons](#), [Genetics Commons](#), [Law and Psychology Commons](#), [Medical Jurisprudence Commons](#), [Mental Disorders Commons](#), [Neurosciences Commons](#), [Philosophy of Mind Commons](#), [Public Law and Legal Theory Commons](#), and the [Science and Technology Law Commons](#)

Repository Citation

Morse, Stephen J., "Law, Responsibility, and the Sciences of the Brain/Mind" (2016). *Faculty Scholarship at Penn Law*. 1642.

https://scholarship.law.upenn.edu/faculty_scholarship/1642

This Article is brought to you for free and open access by Penn Law: Legal Scholarship Repository. It has been accepted for inclusion in Faculty Scholarship at Penn Law by an authorized administrator of Penn Law: Legal Scholarship Repository. For more information, please contact PennlawIR@law.upenn.edu.

Law and the Sciences of the Brain/Mind

Stephen J. Morse

©2016

To appear in: Oxford Handbook on Law and the Regulation of Technology
DO NOT CITE WITHOUT PERMISSION

I. Introduction

A crucial question for all human beings, as Socrates advised, is how we should live. We are social creatures and law is one of the many institutions we humans have devised to guide our interpersonal lives. It shares this primary function with many other institutions, including morality, custom, etiquette, and social norms. Each gives us reasons to behave one way or another as we pursue our lives together. Laws tell us what we may do and what we must and must not do. Although law is similar to these other institutions, in a liberal democracy it is the most democratic because it is created by democratically-elected officials or their appointees who represent all the people in a jurisdiction. Law is also the only one of these institutions that is backed by the coercive power of the state, so it plays a central role in and applies to the lives of all.

The account of law just given explains why the law is a thoroughly folk-psychological enterprise.¹ Doctrine and practice implicitly assume that human beings are agents, creatures who act intentionally for reasons, who can be guided by reasons, and who in adulthood are capable of sufficient

rationality to ground full responsibility unless an excusing condition obtains. We all take this “standard picture” for granted because it is the foundation not just of law but of interpersonal relations generally, including how we explain ourselves to others and to ourselves.

The law’s concept of the person and responsibility has been under assault throughout the modern scientific era, but in the last few decades dazzling technological innovations and discoveries in the brain/mind sciences, especially the new neuroscience and to a lesser extent behavioral genetics, have put unprecedented pressure on the standard picture. For example, in a 2002 editorial published in *The Economist*, the following warning was given: “Genetics may yet threaten privacy, kill autonomy, make society homogeneous and gut the concept of human nature. But neuroscience could do all of these things first (The Economist 2002).” Consider the following statement from a widely noticed chapter by neuroscientists Joshua Greene of Harvard and Jonathan Cohen of Princeton, which I quote at length to give the full flavor of the claim being made:

[A]s more and more scientific facts come in, providing increasingly vivid illustrations of what the human mind is really like, more and more people will develop moral intuitions that are at odds with our current social practices . . . Neuroscience has a special role to play in this

process for the following reason. As long as the mind remains a black box, there will always be a donkey on which to pin dualist and libertarian intuitions. . . . What neuroscience does, and will continue to do at an accelerated pace, is elucidate the “when”, “where” and “how” of the mechanical processes that cause behaviour. It is one thing to deny that human decision-making is purely mechanical when your opponent offers only a general, philosophical argument. It is quite another to hold your ground when your opponent can make detailed predictions about how these mechanical processes work, complete with images of the brain structures involved and equations that describe their function. . . . At some further point . . . , [p]eople may grow up completely used to the idea that every decision is a thoroughly mechanical process, the outcome of which is completely determined by the results of prior mechanical processes. What will such people think as they sit in their jury boxes? . . . Will jurors of the future wonder whether the defendant . . . *could have done otherwise?* Whether he really *deserves* to be punished . . . ? We submit that these questions, which seem so important today, will lose their grip in an age when the mechanical nature of human decision-making is fully appreciated. The law will continue to punish misdeeds, as it must for practical reasons,

but the idea of distinguishing the truly, deeply guilty from those who are merely victims of neuronal circumstances will, we submit, seem pointless (Greene and Cohen 2006: 217-18).

These are thought provoking claims from serious, thoughtful people.

This is not the familiar metaphysical claim that determinism is incompatible with responsibility (Kane 2005), about which I will say more below.² It is a far more radical claim that denies the conception of personhood and action that underlies not only criminal responsibility but the coherence of law as a normative institution. It thus completely conflicts with our common sense. As the eminent philosopher of mind and action, Jerry Fodor, has written:

[W]e have . . . no decisive reason to doubt that very many commonsense belief/desire explanations are—literally—true.

Which is just as well, because if commonsense intentional psychology really were to collapse, that would be, beyond comparison, the greatest intellectual catastrophe in the history of our species; if we're that wrong about the mind, then that's the wrongest we've ever been about anything. The collapse of the supernatural, for example, didn't compare; theism never came close to being as intimately involved in our thought and our practice . . . as belief/desire explanation is.

Nothing except, perhaps, our commonsense physics—our intuitive commitment to a world of observer-independent, middle-sized objects—comes as near our cognitive core as intentional explanation does. We'll be in deep, deep trouble if we have to give it up.

I'm dubious . . . that we *can* give it up; that our intellects are so constituted that doing without it (. . . *really* doing without it; not just loose philosophical talk) is a biologically viable option. But be of good cheer; everything is going to be all right (Fodor 1987: xii).

The central thesis of this chapter is that Fodor is correct and that our commonsense understanding of agency and responsibility and the legitimacy of law generally and criminal law in particular are not imperiled by contemporary discoveries in the various sciences, including neuroscience and genetics. These sciences will not revolutionize law, at least not anytime soon, and at most they may make modest contributions to legal doctrine, practice, and policy.

For the purposes of brevity and because criminal law has been the primary object of so many of these challenges, I shall focus on the criminal law. But the argument is general because the doctrines and practices of, say, torts and contracts, also depend upon the same concept of agency as the criminal law. Moreover, for the purpose of this chapter, I shall assume that behavioral

genetics, including gene by environment interactions, is one of the new brain/mind sciences (hereinafter, “the new sciences”).

The chapter first proceeds by examining why so many commentators seem eager to believe that the law’s conception of agency and responsibility is misguided. Then it turns to the law’s concepts of personhood, agency and responsibility and to various common attacks on them that are as misguided as they are frequent. In particular, it demonstrates that law is folk psychological and that responsibility is secure from the familiar deterministic challenges that are fueled by the new brain/mind sciences. The following section briefly canvases the empirical accomplishments of the new brain/mind sciences, especially cognitive, affective, and social neuroscience. The full frontal assault on responsibility exemplified by the Greene/Cohen quote above is addressed next. I conclude that the empirical and conceptual case for a radical assault on personhood and responsibility is not remotely plausible at present. The penultimate section provides a cautiously optimistic account of modest changes to law that might follow from the new sciences as they advance and the data base becomes more secure. A brief conclusion follows.

II. Scientific Overclaiming

Advances in neuroimaging since the early 1990s and the complete sequencing of the human genome in 2000 have been the primary sources of making exaggerated claims about the implications of the new sciences. Two neuroscientific developments in particular stand out: the discovery of functional magnetic resonance imaging (fMRI), which allows noninvasive measurement of a proxy for neural activity, and the availability of ever-higher-resolution scanners, known colloquially as “magnets” because they use powerful magnetic fields to collect the data that are ultimately expressed in the colorful brain images that appear in the scientific and popular media. Bedazzled by the technology and the many impressive findings, however, too many legal scholars and advocates have made claims for the relevance of the new neuroscience to law that are unsupported by the data (Morse 2011) or that are conceptually confused (Pardo and Patterson 2013; Moore 2011). I have termed this tendency “brain overclaim syndrome (BOS)” and have recommended “cognitive jurotherapy (CJ)” as the appropriate therapy (Morse 2013, 2006).

Everyone understands that legal issues are normative, addressing how we should regulate our lives in a complex society. How do we live together? What are the duties we owe each other? For violations of those duties, when is the state justified in imposing the most afflictive—but sometimes

justified—exercises of state power, criminal blame, and punishment?³ When should we do this, to whom, and how much?

Virtually every legal issue is contested—consider criminal responsibility, for example—and there is always room for debate about policy, doctrine, and adjudication. In a recent book, Professor Robin Feldman has argued that law lacks the courage forthrightly to address the difficult normative issues that it faces (Feldman 2009). The law therefore adopts what Feldman terms an “internalizing” and an “externalizing” strategy for using science to try to avoid the difficulties (Feldman 2009: 19-21, 37-39). In the internalizing strategy, the law adopts scientific criteria as legal criteria. A futuristic example might be using neural criteria for criminal responsibility. In the externalizing strategy, the law turns to scientific or clinical experts to make the decision. An example would be using forensic clinicians to decide whether a criminal defendant is competent to stand trial and then simply rubberstamping the clinician’s opinion. Neither strategy is successful because each avoids facing the hard questions and impedes legal evolution and progress. Professor Feldman concludes, and I agree, that the law does not err by using science too little, as is commonly claimed (Feldman 2009: 199-200). Rather, it errs by using it too much, because the law is insecure about its resources and capacities to do justice.

A fascinating question is why so many enthusiasts seem to have extravagant expectations about the contribution of the new sciences to law, especially criminal law. Here is my speculation about the source. Many people intensely dislike the concept and practice of retributive justice, thinking that they are prescientific and harsh. Their hope is that the new neuroscience will convince the law at last that determinism is true, no offender is genuinely responsible, and the only logical conclusion is that the law should adopt a consequentially based prediction/prevention system of social control guided by the knowledge of the neuroscientist-kings who will finally have supplanted the platonic philosopher-kings.⁴ Then, they believe, criminal justice will be kinder, fairer, and more rational. They do not recognize, however, that most of the draconian innovations in criminal law that have led to so much incarceration—such as recidivist enhancements, mandatory minimum sentences, and the crack/powder cocaine sentencing disparities—were all driven by consequential concerns for deterrence and incapacitation. Moreover, as C.S. Lewis recognized long ago, such a scheme is disrespectful and dehumanizing (Lewis 1953). Finally, there is nothing inherently harsh about retributivism. It is a theory of justice that may be applied toughly or tenderly.

On a more modest level, many advocates think that the new sciences may

not revolutionize criminal justice, but they will demonstrate that many more offenders should be excused or at least receive mitigation and do not deserve the harsh punishments imposed by the United States criminal justice system. Four decades ago, the criminal justice system would have been using psychodynamic psychology for the same purpose. The impulse, however, is clear: jettison desert, or at least mitigate, judgments of desert. As will be shown below, however, these advocates often adopt an untenable theory of mitigation or of excuse that quickly collapses into the nihilistic conclusion that no one is really criminally responsible.

III. The Concept of The Person and Responsibility in Criminal Law

This section offers a “goodness of fit” interpretation of current Anglo-American criminal law. It does not suggest or imply that the law is optimal “as is,” but it provides a framework for thinking about the role the new sciences *should* play in a fair system of criminal justice.

Law presupposes the “folk psychological” view of the person and behavior. This psychological theory, which has many variants, causally explains behavior in part by mental states such as desires, beliefs, intentions, willings, and plans (Ravenscroft 2010). Biological, sociological and other psychological variables also play a role, but folk psychology considers mental states fundamental to a full explanation of human action. Lawyers,

philosophers and scientists argue about the definitions of mental states and theories of action, but that does not undermine the general claim that mental states are fundamental. The arguments and evidence disputants use to convince others itself presupposes the folk psychological view of the person. Brains don't convince each other; people do. The law's concept of the responsible person is simply an agent who can be responsive to reasons.

For example, the folk psychological explanation for why you are reading this chapter is, roughly, that you desire to understand the relation of the new sciences to agency and responsibility, you believe that reading the chapter will help fulfill that desire, and thus you formed the intention to read it. This is a "practical" explanation rather than a deductive syllogism.

Brief reflection should indicate that the law's psychology must be a folk-psychological theory, a view of the person as the sort of creature who can act for, and respond to, reasons. Law is primarily action-guiding and is not able to guide people directly and indirectly unless people are capable of using rules as premises in their reasoning about how they should behave. Unless people could be guided by law, it would be useless (and perhaps incoherent) as an action-guiding system of rules.⁵ Legal rules are action-guiding primarily because they provide an agent with good moral or prudential reasons for forbearance or action. Human behavior can be modified by means other than influencing

deliberation, and human beings do not always deliberate before they act. Nonetheless, the law presupposes folk psychology, even when we most habitually follow the legal rules. Unless people are capable of understanding and then using legal rules to guide their conduct, the law is powerless to affect human behavior. The law must treat persons generally as intentional, reason-responsive creatures and not simply as mechanistic forces of nature.

The legal view of the person does not hold that people must always reason or consistently behave rationally according to some preordained, normative notion of optimal rationality. Rather, the law's view is that people are capable of minimal rationality according to predominantly conventional, socially constructed standards. The type of rationality the law requires is the ordinary person's commonsense view of rationality, not the technical, often optimal notion that might be acceptable within the disciplines of economics, philosophy, psychology, computer science, and the like. Rationality is a congeries of abilities, including, *inter alia*, getting the facts straight, having a relatively coherent preference-ordering, understanding what variables are relevant to action, and the ability to understand how to achieve the goals one has (instrumental rationality). How these abilities should be interpreted and how much of them are necessary for responsibility may be debated, but the debate is about rationality, a core folk psychological concept.

Virtually everything for which agents deserve to be praised, blamed, rewarded, or punished is the product of mental causation and, in principle, is responsive to reasons, including incentives. Machines may cause harm, but they cannot do wrong, and they cannot violate expectations about how people ought to live together. Machines do not deserve praise, blame, reward, punishment, concern, or respect because they exist or as a consequence of the results they cause. Only people, intentional agents with the potential to act, can do wrong and violate expectations of what they owe each other.

Many scientists and some philosophers of mind and action might consider folk psychology to be a primitive or prescientific view of human behavior. For the foreseeable future, however, the law will be based on the folk-psychological model of the person and agency described. Until and unless scientific discoveries convince us that our view of ourselves is radically wrong, a possibility that is addressed below, the basic explanatory apparatus of folk psychology will remain central. It is vital that we not lose sight of this model lest we fall into confusion when various claims based on the new sciences are made. If any science is to have appropriate influence on current law and legal decision making, the science must be relevant to and translated into the law's folk-psychological framework.

Folk psychology does not presuppose the truth of free will, it is consistent with the truth of determinism, it does not hold that we have minds that are independent of our bodies (although it, and ordinary speech, sound that way), and it presupposes no particular moral or political view. It does not claim that all mental states are conscious or that people go through a conscious decision-making process each time that they act. It allows for “thoughtless,” automatic, and habitual actions and for non-conscious intentions. It does presuppose that human action will at least be rationalizable by mental state explanations or that it will be responsive to reasons under the right conditions. The definition of folk psychology being used does not depend on any particular bit of folk wisdom about how people are motivated, feel, or act. Any of these bits, such as that people intend the natural and probable consequences of their actions, may be wrong. The definition insists only that human action is in part causally explained by mental states.

Legal responsibility concepts involve acting agents and not social structures, underlying psychological variables, brains, or nervous systems. The latter types of variables may shed light on whether the folk psychological responsibility criteria are met, but they must always be translated into the law’s folk psychological criteria. For example, demonstrating that an addict has a genetic vulnerability or a neurotransmitter defect tells the law nothing

per se about whether an addict is responsible. Such scientific evidence must be probative of the law's criteria and demonstrating this requires an argument about how it is probative.

Consider criminal responsibility as exemplary of the law's folk psychology. The criminal law's criteria for responsibility are acts and mental states. Thus, the criminal law is a folk-psychological institution (Sifferd 2006). First, the agent must perform a prohibited intentional act (or omission) in a state of reasonably integrated consciousness (the so-called "act" requirement, usually confusingly termed the "voluntary act"). Second, virtually all serious crimes require that the person had a further mental state, the *mens rea*, regarding the prohibited harm. Lawyers term these definitional criteria for prima facie culpability the "elements" of the crime. They are the criteria that the prosecution must prove beyond a reasonable doubt. For example, one definition of murder is the intentional killing of another human being. To be prima facie guilty of murder, the person must have intentionally performed some act that kills, such as shooting or knifing, and it must have been his intent to kill when he shot or knifed. If the agent does not act at all because his bodily movement is not intentional—for example, a reflex or spasmodic movement—then there is no violation of the prohibition against intentional killing. There is also no violation in cases in which the further

mental state required by the definition is lacking. For example, if the defendant's intentional killing action kills only because the defendant was careless, then the defendant may be guilty of some homicide crime, but not of intentional homicide.

Criminal responsibility is not necessarily complete if the defendant's behavior satisfies the definition of the crime. The criminal law provides for so-called affirmative defenses that negate responsibility even if the prima facie case has been proven. Affirmative defenses are either justifications or excuses. The former obtain if behavior otherwise unlawful is right or at least permissible under the specific circumstances. For example, intentionally killing someone who is wrongfully trying to kill you, acting in self-defense, is certainly legally permissible and many think it is right. Excuses exist when the defendant has done wrong but is not responsible for his behavior. Using generic descriptive language, the excusing conditions are lack of reasonable capacity for rationality and lack of reasonable capacity for self-control (although the latter is more controversial than the former). The so-called cognitive and control tests for legal insanity are examples of these excusing conditions. Both justifications and excuses consider the agent's reasons for action, which is a completely folk psychological concept. Note that these excusing conditions are expressed as capacities. If an agent possessed a

legally relevant capacity but simply did not exercise it at the time of committing the crime or was responsible for undermining his capacity, no defense will be allowed. Finally, the defendant will be excused if he was acting under duress, coercion or compulsion. The degree of incapacity or coercion required for an excuse is a normative question that can have different legal responses depending on a culture's moral conceptions and material circumstances.

It may appear that the capacity for self-control and the absence of coercion are the same, but it is helpful to distinguish them. The capacity for self-control or "will power," is conceived of as a relatively stable, enduring trait or congeries of abilities possessed by the individual that can be influenced by external events (Holton 2009). This capacity is at issue in "one-party" cases, in which the agent claims that he could not help himself in the absence of an external threat. In some cases, the capacity for control is poor characterologically; in other cases it may be undermined by variables that are not the defendant's fault, such as mental disorder. The meaning of this capacity is fraught. Many investigators around the world are studying "self-control," but there is no conceptual or empirical consensus. Indeed, such conceptual and operational problems motivated both the American Psychiatric Association (1983) and the American Bar Association (1989) to

reject control tests for legal insanity during the 1980s wave of insanity defense reform in the United States. In all cases in which such issues are raised, the defendant does act to satisfy the allegedly overpowering desire.

In contrast, coercion exists if the defendant was compelled to act by being placed in a “do-it-or-else,” hard-choice situation. For example, suppose that a miscreant gunslinger threatens to kill me unless I kill another entirely innocent agent. I have no right to kill the third person, but if I do it to save my own life, I may be granted the excuse of duress. Note that in cases of external compulsion, like the one-party cases and unlike cases of no action, the agent does act intentionally. Also, note that there is no characterological self-control problem in these cases. The excuse is premised on how external threats would affect ordinary people, not on internal drives and deficient control mechanisms. The agent is acting in both one-party and external threat cases, so the capacity for control will once again be a folk psychological capacity.

In short, all law as action-guiding depends on the folk psychological view of the responsible agent as a person who can be properly be responsive to the reasons the law provides.

IV. False Starts and Dangerous Distractions

This section considers four false and distracting claims that are sometimes made about agency and responsibility: 1) the truth of determinism undermines genuine responsibility; 2) causation, and especially abnormal causation, of behavior entails that the behavior must be excused; and, 3) causation is the equivalent of compulsion.

The alleged incompatibility of determinism and responsibility is a foundational issue. Determinism is not a continuum concept that applies to various individuals in various degrees. There is no partial or selective determinism. If the universe is deterministic or something quite like it, responsibility is possible or it is not. If human beings are fully subject to the causal laws of the universe, as a thoroughly physicalist, naturalist worldview holds, then many philosophers claim that “ultimate” responsibility is impossible (e.g., Pereboom 2001; Strawson 1989). On the other hand, plausible “compatibilist” theories suggest that responsibility is possible in a deterministic universe (Vihvelin 2013; Wallace 1994). Indeed, this is the dominant view among philosophers of responsibility and it most accords with common sense. When any theoretical notion contradicts common sense, the burden of persuasion to refute common sense must be very high and no metaphysics that denies the possibility of responsibility exceeds that threshold.

There seems no resolution to this debate in sight, but our moral and legal practices do not treat everyone or no one as responsible. Determinism cannot be guiding our practices. If one wants to excuse people because they are genetically and neurally determined or determined for any other reason to do whatever they do in fact, one is committed to negating the possibility of responsibility for everyone.

Our criminal responsibility criteria and practices have nothing to do with determinism or with the necessity of having so-called “free will” (Morse 2007). Free will, the metaphysical libertarian capacity to cause one’s own behavior uncaused by anything other than oneself, is neither a criterion for any criminal law doctrine nor foundational for criminal responsibility. Criminal responsibility involves evaluation of intentional, conscious, and potentially rational human action. And few participants in the debate about determinism and free will or responsibility argue that we are not conscious, intentional, potentially rational creatures when we act. The truth of determinism does not entail that actions and non-actions are indistinguishable and that there is no distinction between rational and non-rational actions or compelled and uncompelled actions. Our current responsibility concepts and practices use criteria consistent with and independent of the truth of determinism.

A related confusion is that, once a non-intentional causal explanation has been identified for action, the person must be excused. In other words, the claim is that causation *per se* is an excusing condition. This is sometimes called the “causal theory of excuse.” Thus, if one identifies genetic, neurophysiological, or other causes for behavior, then allegedly the person is not responsible. In a thoroughly physical world, however, this claim is either identical to the determinist critique of responsibility and furnishes a foundational challenge to all responsibility, or it is simply an error. I term this the “fundamental psycholegal error” because it is erroneous and incoherent as a description of our actual doctrines and practices (Morse 1994). Non-causation of behavior is not and could not be a criterion for responsibility because all behaviors, like all other phenomena, are caused. Causation, even by abnormal physical variables, is not *per se* an excusing condition. Abnormal physical variables, such as neurotransmitter deficiencies, may cause a genuine excusing condition, such as the lack of rational capacity, but then the lack of rational capacity, not causation, is doing the excusing work. If causation were an excuse, no one would be responsible for any action. Unless proponents of the causal theory of excuse can furnish a convincing reason why causation *per se* excuses, we have no reason to jettison the criminal law’s responsibility doctrines and practices just because a causal account can be provided.

An example from behavioral genetics illustrates the point. Relatively recent, justly celebrated research demonstrates that a history of childhood abuse coupled with a specific, genetically produced enzyme abnormality that produces a neurotransmitter deficit increases the risk nine-fold that a person will behave antisocially as an adolescent or young adult. Does this mean that an offender with this gene by environment interaction is not responsible or less responsible? No. The offender may not be fully responsible or responsible at all but not because there is a causal explanation. What is the intermediary excusing or mitigating principle? Are these people, for instance, more impulsive? Are they lacking rationality? What is the actual excusing or mitigating condition? Causal explanations can provide only evidence of a genuine excusing condition and do not themselves excuse.

Third, causation is not the equivalent of lack of self-control capacity or compulsion. All behavior is caused, but only some defendants lack control capacity or act under compulsion. If causation were the equivalent of lack of self-control or compulsion, no one would be responsible for any criminal behavior. This is clearly not the criminal law's view.

As long as compatibilism remains a plausible metaphysics—and it is regnant today—there is no metaphysical reason why the new sciences pose a uniquely threatening challenge to the law's concepts of personhood, agency and

responsibility. Neuroscience and genetics are simply the newest determinisms on the block and pose no new problems, even if they are more rigorous sciences than those that previously were used to make the same arguments about the law.

V. The Current Status of the New Sciences

The relation of brain, mind, and action is one of the hardest problems in all science. We have no idea how the brain enables the mind or how action is possible (McHugh and Slavney 1998: 11-12; Adolphs 2015: 175). The brain-mind-action relation is a mystery not because it is inherently not subject to scientific explanation, but because the problem is so hard. For example, we would like to know the difference between a neuromuscular spasm and intentionally moving one's arm in exactly the same way. The former is a purely mechanical motion, whereas the latter is an action, but we cannot explain the difference between the two. The philosopher, Ludwig Wittgenstein, famously asked: "Let us not forget this: when 'I raise my arm', my arm goes up. And the problem arises: what is left over if I subtract the fact that my arm goes up from the fact that I raise my arm?" (Wittgenstein 1953: ¶ 621). We know that a functioning brain is a necessary condition for having mental states and for acting. After all, if your brain is dead, you have no mental states and are not acting. Still, we do not know how mental states and action are caused. The rest

of this section will focus on neuroscience because it currently attracts vastly more legal and philosophical attention than do the other new sciences. The relation of the others, such as behavioral genetics, to behavior is equally complicated and our understanding is as modest as the relation of the brain to behavior.

Despite the astonishing advances in neuroimaging and other neuroscientific methods, we still do not have sophisticated causal knowledge of how the brain enables the mind and action generally, and we have little information that is legally relevant. The scientific problems are fearsomely difficult. Only in the present century have researchers begun to accumulate much data from non-invasive fMRI imaging, which is the technology that has generated most of the legal interest. New artifacts are constantly being discovered.⁶ Moreover, virtually no studies have been performed to address specifically legal questions. The justice system should not expect too much of a young science that uses new technologies to investigate some of the most fearsomely difficult problems in science and that does not directly address questions of legal interest.

Before turning to the specific reasons for modesty, a few preliminary points of general applicability must be addressed. The first and most important is contained in the message of the preceding section. Causation by biological variables, including abnormal biological variables, does not *per se* create an

excusing or mitigating condition. Any excusing condition must be established independently. The goal is always to translate the biological evidence into the law's folk-psychological criteria. Neuroscience is insufficiently developed to detect specific, legally relevant mental content or to provide a sufficiently accurate diagnostic marker for even a severe mental disorder (Morse and Newsome 2013: 159-60, 167). Nonetheless, certain aspects of neural structure and function that bear on legally relevant capacities, such as the capacity for rationality and control, may be temporally stable in general or in individual cases. If they are, neuroevidence may permit a reasonably valid retrospective inference about the defendant's rational and control capacities and their impact on criminal behavior. This will, of course, depend on the existence of adequate science to do this. We currently lack such science⁷ but future research may provide the necessary data. Finally, if the behavioral and neuroscientific evidence conflict, cases of malingering aside, we must always believe the behavioral evidence because the law's criteria are acts and mental states. Actions speak louder than images.

Now let us consider the specific grounds for modesty about the legal implications of cognitive, affective, and social neuroscience, the sub-disciplines most relevant to law. At present, most neuroscience studies on human beings involve very small numbers of subjects, although this

phenomenon is rapidly starting to change as the cost of scanning decreases. Future studies will have more statistical power. Most of the studies have been done on college and university students, who are hardly a random sample of the population generally. Many studies, however, have been done on other animals, such as primates and rats. Whether the results of these studies generalize to human animals is an open question. There is also a serious question of whether findings based on human subjects' behavior and brain activity in a scanner would apply to real-world situations. This is known as the problem of "ecological validity." For example, does a subject's performance in a laboratory on an executive function task in a scanner really predict the person's ability to resist criminal offending?

Consider the following example. The famous Stroop test asks subjects to state the color in which a color word is written rather than simply to read the word itself. Thus, if the word "red" is written in yellow, the correct answer is yellow. We all have what is known as a strong prepotent response (a strong behavioral predisposition) simply to read the word rather than to identify the color in which it is written. It takes a lot of inhibitory ability to refrain from the prepotent response. But are people who do poorly on the Stroop more predisposed to commit violent crimes even if the associated brain activation is consistent with decreased prefrontal control in subjects? We do not know.

And in any case, what legally relevant, extra information does the neuroscience add to the behavioral data with which it was correlated?

Most studies average the neurodata over the subjects, and the average finding may not accurately describe the brain structure or function of any actual subject in the study. Replications are few, which is especially important for law. Policy and adjudication should not be influenced by findings that are insufficiently established, and replications of findings are crucial to our confidence in a result, especially given the problem of publication bias. Research design and potentially unjustified inferences from the studies are still an acute problem. It is extraordinarily difficult to control for all conceivable artifacts. Consequently, there are often problems of over-inference.

Finally, the neuroscience of cognition and interpersonal behavior is largely in its infancy and what is known is quite coarse-grained and correlational, rather than fine-grained and causal.⁸ What is being investigated is an association between a condition or a task and brain activity. These studies do not demonstrate that the brain activity is a sensitive diagnostic marker for the condition or either a necessary, sufficient, or predisposing causal condition for the behavioral task that is being done in the scanner. Any language that suggests otherwise—such as claiming that some brain region is the neural substrate for the behavior—is simply not justifiable based on the methodology

of most studies. Such inferences are only justified if everything else in the brain remained constant, which is seldom the case (Adolphs 2015: 173), even if the experimental design seems to permit genuine causal inference, say, by temporarily rendering a brain region inactive. Moreover, activity in the same region may be associated with diametrically opposite behavioral phenomena—for example, love and hate. Another recent study found that the amygdala, a structure associated with negative behavior and especially fear, is also associated with positive behaviors such as kindness (Chang and others 2015).

Over time, all these problems may ease as imaging and other techniques become less expensive and more accurate, as research designs become more sophisticated, and as the sophistication of the science increases generally. For now, however, the contributions of the new sciences to our understanding of agency and the criteria for responsibility is extremely modest.

VI. THE RADICAL NEUROCHALLENGE: ARE WE VICTIMS OF NEURONAL CIRCUMSTANCES?

This section addresses the claim and hope raised earlier that the new sciences, and especially neuroscience, will cause a paradigm shift in the law's concepts of agency and responsibility by demonstrating that we are "merely victims of neuronal circumstances" (or some similar claim that denies human agency). This claim holds that we are not the kinds of intentional creatures we

think we are. If our mental states play no role in our behavior and are simply epiphenomenal, then traditional notions of responsibility based on mental states and on actions guided by mental states would be imperiled. But is the rich explanatory apparatus of intentionality simply a post hoc rationalization that the brains of hapless homo sapiens construct to explain what their brains have already done? Will the criminal justice system as we know it wither away as an outmoded relic of a prescientific and cruel age? If so, criminal law is not the only area of law in peril. What will be the fate of contracts, for example, when a biological machine that was formerly called a person claims that it should not be bound because it did not make a contract? The contract is also simply the outcome of various “neuronal circumstances.”

Before continuing, we must understand that the compatibilist metaphysics discussed above does not save agency if the radical claim is true. If determinism is true, two states of the world concerning agency are possible: agency exists or it does not. Compatibilism assumes that agency is true because it holds that agents can be responsible in a determinist universe. It thus essentially begs the question against the radical claim. If the radical claim is true, then compatibilism is false because no responsibility is possible if we are not agents. It is an incoherent notion to have genuine responsibility without agency. The question is whether the radical claim is true.

Given how little we know about the brain-mind and brain-mind-action connections, to claim that we should radically change our conceptions of ourselves and our legal doctrines and practices based on neuroscience is a form of “neuroarrogance.” It flies in the face of common sense and ordinary experience to claim that our mental states play no explanatory role in human behavior and thus the burden of persuasion is firmly on the proponents of the radical view, who have an enormous hurdle to surmount. Although I predict that we will see far more numerous attempts to use the new sciences to challenge traditional legal and common sense concepts, I have elsewhere argued that for conceptual and scientific reasons, there is no reason at present to believe that we are not agents (Morse 2011: 543-54; 2008).

In particular, I can report based on earlier and more recent research that the “Libet industry” appears to be bankrupt. This was a series of overclaims about the alleged moral and legal implications of neuroscientist Benjamin Libet’s findings, which were the primary empirical neuroscientific support for the radical claim. This work found that there was electrical activity (a readiness potential) in the supplemental motor area of the brain prior to the subject’s awareness of the urge to move his body and before movement occurred. This research and the findings of other similar investigations led to the assertion that our brain mechanistically explains behavior and that mental states play

no explanatory role. Recent conceptual and empirical work has exploded these claims (Mele 2009, 2014; Moore 2011; Nachev and Hacker 2015; Schurger and others 2012; Schurger and Uithol 2015). In short, I doubt that this industry will emerge from whatever chapter of the bankruptcy code applies in such cases. It is possible that we are not agents, but the current science does not remotely demonstrate that this is true. The burden of persuasion is still firmly on the proponents of the radical view.

Most important, contrary to its proponents' claims, the radical view entails no positive agenda. If the truth of pure mechanism is a premise in deciding what to do, no particular moral, legal, or political conclusions follow from it.⁹ This includes the pure consequentialism that Greene and Cohen incorrectly think follows. The radical view provides no guide as to how one should live or how one should respond to the truth of reductive mechanism. Normativity depends on reason, and thus the radical view is normatively inert. Reasons are mental states. If reasons do not matter, then we have no reason to adopt any particular morals, politics, or legal rules or to do anything at all.

Suppose we are convinced by the mechanistic view that we are not intentional, rational agents after all. (Of course, what does it mean to be "convinced" if mental states are epiphenomenal? Convinced usually means being persuaded by evidence and argument, but a mechanism is not persuaded,

it is simply physically transformed. But enough.) If it is really “true” that we do not have mental states or, slightly more plausibly, that our mental states are epiphenomenal and play no role in the causation of our actions, what should we do now? If it is true, we know that it is an illusion to think that our deliberations and intentions have any causal efficacy in the world. We also know, however, that we experience sensations—such as pleasure and pain—and care about what happens to us and to the world. We cannot just sit quietly and wait for our brains to activate, for determinism to happen. We must, and will, deliberate and act. And if we do not act in accord with the “truth” that the radical view suggests, we cannot be blamed. Our brains made us do it.

Even if we still thought that the radical view was correct and standard notions of genuine moral responsibility and desert were therefore impossible, we might still believe that the law would not necessarily have to give up the concept of incentives. Indeed, Greene and Cohen concede that we would have to keep punishing people for practical purposes (Greene and Cohen 2006). The word “punishment” in their account is a solecism, because in criminal justice it has a constitutive moral meaning associated with guilt and desert. Greene & Cohen would be better off talking about positive and negative reinforcers or the like. Such an account would be consistent with “black box” accounts of economic incentives that simply depend on the relation between inputs and

outputs without considering the mind as a mediator between the two. For those who believe that a thoroughly naturalized account of human behavior entails complete consequentialism, this conclusion might be welcomed.

On the other hand, this view seems to entail the same internal contradiction just explored. What is the nature of the agent that is discovering the laws governing how incentives shape behavior? Could understanding and providing incentives via social norms and legal rules simply be epiphenomenal interpretations of what the brain has already done? How do we decide which behaviors to reinforce positively or negatively? What role does reason—a property of thoughts and agents, not a property of brains—play in this decision?

Given what we know and have reason to do, the allegedly disappearing person remains fully visible and necessarily continues to act for good reasons, including the reasons currently to reject the radical view. We are not Pinocchios, and our brains are not Geppettos pulling the strings. And this is a very good thing. Ultimately, I believe that the radical view's vision of the person, of interpersonal relations, and of society bleaches the soul. In the concrete and practical world we live in, we must be guided by our values and a vision of the good life. I do not want to live in the radical's world that is stripped of genuine agency, desert, autonomy, and dignity. For all its imperfections, the law's vision of the person, agency and responsibility is

more respectful and humane.

VII. THE CASE FOR CAUTIOUS NEUROLAW OPTIMISM

Despite having claimed that we should be cautious about the current contributions that the new sciences can make to legal policy, doctrine, and adjudication, I am modestly optimistic about the near and intermediate term contributions these sciences can potentially make to our ordinary, traditional, folk-psychological legal doctrine and practice. In other words, the new sciences may make a positive contribution even though there has been no paradigm shift in thinking about the nature of the person and the criteria for agency and responsibility. The legal regime to which these sciences will contribute will continue to take people seriously as people—as autonomous agents who may fairly be expected to be guided by legal rules and to be blamed and punished based on their mental states and actions.

In general, my hope is that over time there will be feedback between the folk-psychological criteria and the neuroscientific data. Each might inform the other. Conceptual work on mental states might suggest new neuroscientific studies, for example, and the neuroscientific studies might help refine the folk-psychological categories. The ultimate goal would be a reflective, conceptual–empirical equilibrium.

At present, I think much of the most promising legally relevant research concerns areas other than criminal justice. For example, there is neuroscientific progress in identifying neural signs of pain that could make assessment of pain much more objective, which would revolutionize tort damages. For another example, very interesting work is investigating the ability to find neural markers for veridical memories. Holding aside various privacy or constitutional objections and assuming that we could detect counter-measures being used by subjects, this work could profoundly affect litigation. In what follows, however, I will focus on criminal law.

More specifically, there are four types of situations in which neuroscience may be of assistance: (1) data indicating that the folk-psychological assumption underlying a legal rule is incorrect; (2) data suggesting the need for new or reformed legal doctrine; (3) data that help adjudicate an individual case; and (4) data that help efficient adjudication or administration of criminal justice.

Many criminal law doctrines are based on folk-psychological assumptions about behavior that may prove to be incorrect. If so, the doctrine should change. For example, it is commonly assumed that agents intend the natural and probable consequences of their actions. In many or most cases it seems that they do, but neuroscience may help in the future to demonstrate that this assumption is true far less frequently than we think because, say, more apparent

actions are automatic than is currently realized. In that case, the rebuttable presumption used to help the prosecution prove intent should be softened or used with more caution.

Such research may be fearsomely difficult to perform, especially if the folk wisdom concerns content rather than functions or capacities. In the example given just above, a good working definition of automaticity would be necessary and “experimental” subjects being scanned would have to be reliably in an automatic state. This will be exceedingly difficult research to do. Also, if the real world behavior and the neuroscience seem inconsistent, with rare exception the behavior would have to be considered the accurate measure. For example, if neuroscience was not able to distinguish average adolescent from average adult brains, the sensible conclusions based on common sense and behavioral studies would be that adolescents on average behave less rationally and that the neuroscience was not yet sufficiently advanced to permit identification of neural differences.

Second, neuroscientific data may suggest the need for new or reformed legal doctrine. For example, control tests for legal insanity have been disfavored for some decades because they are ill understood and hard to assess. It is at present impossible to distinguish “cannot” from “will not,” which is one of the reasons both the American Bar Association and the American Psychiatric Association

both recommended abolition of control tests for legal insanity in the wake of the unpopular *Hinckley* verdict (American Bar Association 1989; American Psychiatric Association Insanity Defense Working Group 1983):

Perhaps neuroscientific information will help to demonstrate and to prove the existence of control difficulties that are independent of cognitive incapacities (Moore 2016). If so, then independent control tests may be justified and can be rationally assessed after all. Moore, for example makes the most thorough attempt to date to provide both the folk-psychological mechanism for loss of control and a neuroscientific agenda for studying it. I believe, however, that the mechanism he describes is better understood as a cognitive rationality defect and that such defects are the true source of alleged “loss of control” cases that might warrant mitigation or excuse (Morse 2016). These are open questions, however, and more generally, perhaps a larger percentage of offenders than we currently believe have such grave control difficulties that they deserve a generic mitigation claim that is not available in criminal law today.¹⁰ Neuroscience might help us discover that fact. If that were true, justice would be served by adopting a generic mitigating doctrine. I have proposed such a generic mitigation doctrine that would address both cognitive and control incapacities that would not warrant a full excuse (Morse 2003), but such a doctrine does not exist in English or United States law. On the other hand, if

it turns out that such difficulties are not so common, we could be more confident of the justice of current doctrine.

Third, neuroscience might provide data to help adjudicate individual cases. Consider the insanity defense again. As in *United States v. Hinckley*, there is often dispute about whether a defendant claiming legal insanity suffered from a mental disorder, which disorder the defendant suffered from, and how severe the disorder was (U.S. v Hinkley 1981: 1346). At present, these questions must be resolved entirely behaviorally, and there is often room for considerable disagreement about inferences drawn from the defendant's actions, including utterances. In the future, neuroscience might help resolve such questions if the various methodological impediments to discovering biological diagnostic markers of mental disorders can be overcome. In the foreseeable future, I doubt that neuroscience will be able to help identify the presence or absence of specific mental content because mind reading seems nearly impossible, but we may be able to identify brain states that suggest that a subject is lying or is familiar with a place he denies recognizing (Greely 2013: 120). This is known as "brain reading" because it identifies neural correlates of a mental process rather than the subject's specific mental content. The latter would be "mind reading." For example, particular brain activation might reliably indicate whether the subject was adding or subtracting, but it could not show what

specific numbers were being added or subtracted (Haynes and others 2007).

Finally, neuroscience might help us to implement current policy more efficiently. For example, the criminal justice system makes predictions about future dangerous behavior for purposes of bail, sentencing (including capital sentencing), and parole. If we have already decided that it is justified to use dangerousness predictions to make such decisions, it is hard to imagine a rational argument for doing it less accurately if we are in fact able to do it more accurately (Morse 2015). Behavioral prediction techniques already exist. The question is whether neuroscientific variables can add value by increasing the accuracy of such predictions considering the cost of gathering such data. Two recent studies have been published showing the potential usefulness of neural markers for enhancing the accuracy of predictions of antisocial conduct (Aharoni and others 2013; Pardini and others 2014). At present, these must be considered preliminary, “proof of concept” studies. For example, a re-analysis of one found that the effect size was exceedingly small.¹¹ It is perfectly plausible, however, that in the future genuinely valid, cost–benefit, justified neural markers will be identified and, thus, prediction decisions will be more accurate and just.

None of these potential benefits of future neuroscience is revolutionary. All are reformist or perhaps will lead to the conclusion that no reforms are

necessary. At present, however, very little neuroscience is genuinely relevant to answering legal questions, even holding aside the validity of the science. For example, a recent review of the relevance of neuroscience to all the doctrines of substantive criminal law found that with the exception of a few already well-characterized medical disorders such as epilepsy, there was virtually no relevant neuroscience (Morse and Newsome 2013). And the exceptions are the old neurology, not the new neuroscience.

Despite the foregoing caution, the most methodologically sound study of the use of neuroscience in criminal law suggests that neuroscience and behavioral genetic evidence is increasingly used, primarily by the defense, but that the use is haphazard, ad hoc and often ill-conceived (Farahany 2016). The primary reason it is ill-conceived is that the science is not yet sound enough to make the claims that advocates are supporting with the science. I would add further that even when the science is reasonably valid, it often is legally irrelevant because it doesn't help answer the question at issue and it is used more for its rhetorical impact than for its actual probative value. There should not be a ban on the introduction of such evidence, but judges and legislators will need to understand when the science is not sound or is legally irrelevant. In the case of judges, the impetus will come from parties to cases and from judicial education.

Again despite the caution, as the new sciences advance and the data become

genuinely convincing, and especially if there are studies that investigate more legally-relevant issues, these sciences can play an increasingly helpful role in the pursuit of justice.

VIII. Conclusion

In general, the new sciences are not sufficiently advanced to be of help with legal doctrine, policy and practice. Yet the new sciences are already playing an increasing role in criminal adjudication in the United States and there needs to be control of the admission of scientifically weak or legally irrelevant evidence. Although no radical transformation of criminal justice is likely to occur with advances in the new sciences, the new sciences can inform criminal justice as long as it is relevant to law and translated into the law's folk-psychological framework and criteria. It could also more radically affect certain practices such the award of pain and suffering damages in torts. Most important, the law's core view of the person, agency and responsibility seem secure from radical challenges by the new sciences. As Jerry Fodor counseled, "[E]verything is going to be all right" (Fodor 1987: xii).

ENDNOTES

1. I discuss the meaning of folk psychology more thoroughly in *infra* section III.

2. See Kane (2005: 23-31) explaining incompatibilism. I return to the subject in Parts III and V below. For now, it is sufficient to note that there are good answers to this challenge.

³ See, e.g., *In re Winship* (1970), holding that due process requires that every conviction be supported by proof beyond reasonable doubt as to every element of the crime.

4. Greene & Cohen (2006) are exemplars of this type of thinking. I will discuss the normative inertness of this position in Part VI.

5. See Sher (2006: 123) stating that although philosophers disagree about the requirements and justifications of what morality requires, there is widespread agreement that “the primary task of morality is to guide action” as well as Shapiro (2000: 131-32) and Searle (2002: 22, 25).

This view assumes that law is sufficiently knowable to guide conduct, but a contrary assumption is largely incoherent. As Shapiro writes:

Legal skepticism is an absurd doctrine. It is absurd because the law cannot be the sort of thing that is unknowable.

If a system of norms were unknowable, then that system would not be a legal system. One important reason why the law must be knowable is that its function is to guide conduct.

Shapiro (2000: 131). I do not assume that legal rules are always clear and thus capable of precise action guidance. If most rules in a legal system were not sufficiently clear most of the time, however, the system could not function. Further, the principle of legality dictates that criminal law rules should be especially clear.

6. E.g., Bennett and others (2009), indicating that a high percentage of previous fMRI studies did not properly control for false positives by controlling for what is called the “multiple comparisons” problem. This problem was termed by one group of authors “voodoo correlations,” but they toned back the claim to more scientifically respectable language. Vul and others (2009). See, e.g., Lieberman and others (2009). As any old country lawyer knows, when a stone is thrown into a pack of dogs, the one that gets hit yelps.

7. Morse and Newsome (2013: 166–67), explaining generally that, except in the cases of a few well-characterized medical disorders such as epilepsy, current neuroscience has little to add to resolving questions of criminal responsibility.

8. See, e.g., Miller (2010), providing a cautious, thorough overview of the scientific and practical problems facing cognitive and social neuroscience.

9. This line of thought was first suggested by Professor Mitchell Berman in the context of a discussion of determinism and normativity.(Berman 2008: 271 n. 34).

10. I have proposed a generic mitigating condition that would address both cognitive and control incapacities short of those warranting a full excuse (Morse 2003).

11. For example, a re-analysis of the Aharoni study by Russell Poldrack, a noted “neuromethodologist,” demonstrated that the effect size was tiny (Poldrack 2013). Also, the study used good, but not the best, behavioral predictive methods for comparison.

BIBLIOGRAPHY

In re Winship, 397 U.S. 358, 364 (1970)

U.S. v Hinckley, 525 F. Supp. 1342 (D.D.C. 1981)

Adolphs R, ‘The Unsolved Problems of Neuroscience’ (2015) 19 Trends in Cognitive Sciences 173

Aharoni E, and others, ‘Neuroprediction of Future Rearrest’ (2013) 110 Proceedings of the National Academy of Sciences 6223

American Bar Association, *ABA Criminal Justice Mental Health Standards*

(American Bar Association 1989)

American Psychiatric Association Insanity Defense Working Group,
'Statement on the Insanity Defense' (1983) 140 American Journal of
Psychiatry 681

Bennett CM, and others, 'The Principled Control of False Positives in
Neuroimaging' (2009) 4 Social Cognitive and Affective Neuroscience 417

Berman M, 'Punishment and Justification' (2008) 118 Ethics 258

Caspi A, and others, 'Role of Genotype in the Cycle of Violence in Maltreated
Children' (2002) 297 Science 851

Chang SWC, 'Neural Mechanisms of Social Decision-Making in the Primate
Amygdala' (2015) 112 PNAS 16012

Farahany NA, 'Neuroscience and Behavioral Genetics in US Criminal Law:
An Empirical Analysis' (2016) Journal of Law and the Biosciences 1

Feldman R, *The Role Of Science In Law* (Oxford University Press 2009)

Fodor JA, *Psychosemantics: The Problem of Meaning in the Philosophy of Mind* (MIT Press 1987)

Greely HT, 'Mind Reading, Neuroscience, and the Law' in SJ Morse and AL Roskies (eds), *A Primer on Criminal Law and Neuroscience* (Oxford University Press 2013)

Greene J, and J Cohen, 'For the Law, Neuroscience Changes Nothing and Everything' in Semir Zeki and Oliver Goodenough (eds), *Law And The Brain* (Oxford University Press 2006)

Haynes J-D, and others, 'Reading Hidden Intentions in the Human Brain' (2007) 17 *Current Biology* 323

Holton R, *Willing, Wanting, Waiting* (Oxford University Press 2009)

Kane R, *A Contemporary Introduction to Free Will* (Oxford University Press 2005)

Lewis CS, 'The Humanitarian Theory of Punishment' (1953) 6 Res Judicatae
224

Lieberman MD, and others, 'Correlations in Social Neuroscience Aren't
Voodoo: A Commentary on Vul et al.' (2009) 4 Perspectives on Psychological
Science 299

McHugh P and P Slavney, *Perspectives of Psychiatry* (2d edn, Johns Hopkins
University Press 1998)

Mele AR, *Effective Intentions: The Power Of Conscious Will* (Oxford
University Press 2009)

Mele AR, *Free: Why Science Hasn't Disproved Free Will* (Oxford University
Press 2014)

Miller GA, 'Mistreating Psychology in the Decades of the Brain' (2010) 5
Perspectives on Psychological Science 716

Moore, MS, 'Libet's Challenge(s) to Responsible Agency' in W Sinnott-Armstrong and L Nadel (eds), *Conscious Will And Responsibility* (Oxford University Press 2011)

-- 'The Neuroscience of Volitional Excuse' in D Patterson (ed), *Law and Neuroscience: State Of The Art* (2016) (forthcoming)

Morse SJ, 'Culpability and Control' (1994) 142 *University of Pennsylvania Law Review* 1587

-- 'Diminished Rationality, Diminished Responsibility' (2003) 1 *Ohio State Journal of Criminal Law* 289

-- 'Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic Note' (2006) 3 *Ohio State Journal of Criminal Law* 397

-- 'The Non-Problem of Free Will in Forensic Psychiatry and Psychology' (2007) 25 *Behavioral Sciences and the Law* 203

-- 'Determinism and the Death of Folk Psychology: Two Challenges to

Responsibility from Neuroscience' (2008) 9 Minnesota Journal of Law, Science and Technology 1

-- 'Lost in Translation? An Essay on Law and Neuroscience' in M Freeman (ed) (2011) 13 Law and Neuroscience 529

-- 'Brain Overclaim Redux' (2013) 31 Law and Inequality 509

-- 'Neuroprediction: New Technology, Old Problems' (2015) 8 Bioethica Forum 128

-- 'Moore on the Mind' in KK Ferzan and SJ Morse (eds), Legal, Moral And Metaphysical Truths: The Philosophy Of Michael S. Moore (2016) (forthcoming)

-- and WT Newsome, 'Criminal Responsibility, Criminal Competence, and Prediction of Criminal Behavior' in SJ Morse and AL Roskies (eds), A Primer On Criminal Law And Neuroscience (Oxford University Press 2013)

Nachev P, and P Hacker, 'The Neural Antecedents to Voluntary Action:

Response to Commentaries' (2015) 6 Cognitive Neuroscience 180

Pardini DA, and others, 'Lower Amygdala Volume in Men Is Associated with Childhood Aggression, Early Psychopathic Traits, and Future Violence' (2014) 75 Biological Psychiatry 73

Pardo MS, and D Patterson, *Minds, Brains, And Law: The Conceptual Foundations Of Law And Neuroscience* (Oxford University Press 2013)

Pereboom D, *Living Without Free Will* (Cambridge University Press 2001)

Poldrack R, 'How Well Can We Predict Future Criminal Acts from fMRI Data?' (Russpoldrack, 6 April 2013) <<http://perma.cc/X5TP-LGZ8>> accessed 27 January 2015

Ravenscroft I, 'Folk Psychology as a Theory' (Stanford Encyclopedia of Philosophy, 12 August 2010) <<http://plato.stanford.edu/entries/folkpsych-theory/>> accessed 28 January 2016

Schurger A, and S Uithol, 'Nowhere and Everywhere: The Causal Origin of

Voluntary Action' (2015) Review of Philosophy and Psychiatry 1
<<http://perma.cc/7DJL-5BWZ>> accessed 27 January 2015

Schurger A, and others, 'An Accumulator Model for Spontaneous Neural Activity Prior to Self-Initiated Movement' (2012) 109 Proceedings of the National Academy of Sciences E2904

Searle JR, 'End of the Revolution' (2002) 49 New York Review of Books 33

Shapiro SJ, 'Law, Morality, and the Guidance of Conduct' (2000) 6 Legal Theory 127

Sher G, *In Praise of Blame* (Oxford University Press 2006)

Sifferd K, 'In Defense of the Use of Commonsense Psychology in the Criminal Law' (2006) 25 Law and Philosophy 571

Strawson G, 'Consciousness, Free Will and the Unimportance of Determinism' (1989) 32 Inquiry 3

The Economist, 'The Ethics of Brain Science: Open Your Mind' (25 May 2002) Economist <<http://perma.cc/3DKJ-9GAZ>>accessed 27 January 2015

Vihvelin K, *Causes, Laws and Free Will: Why Determinism Doesn't Matter* (Oxford University Press 2013)

Vul E, and others, 'Puzzlingly High Correlations in fMRI Studies of Emotion, Personality, and Social Cognition' (2009) 4 Perspectives on Psychological Science 274

Wallace RJ, *Responsibility and the Moral Sentiments* (Harvard University Press 1994)

Wittgenstein L, *Philosophical Investigations* (GEM Anscombe tr, Basil Blackwell 1953)
