

OXFORD SERIES IN NEUROSCIENCE, LAW, AND PHILOSOPHY

SERIES EDITORS

Lynn Nadel, Frederick Schauer, and Walter P. Sinnott-Armstrong

Conscious Will and Responsibility

Edited by Walter P. Sinnott-Armstrong and Lynn Nadel

Memory and Law

Edited by Lynn Nadel and Walter P. Sinnott-Armstrong

Neuroscience and Legal Responsibility

Edited by Nicole A. Vincent

Handbook on Psychopathy and Law

Edited by Kent A. Kiehl and Walter P. Sinnott-Armstrong

A Primer on Criminal Law and Neuroscience

Edited by Stephen J. Morse and Adina L. Roskies

A Primer on Criminal Law and Neuroscience

*A contribution of the Law and
Neuroscience Project, supported by the
MacArthur Foundation*

EDITED BY

STEPHEN J. MORSE

AND

ADINA L. ROSKIES

OXFORD
UNIVERSITY PRESS

Criminal Responsibility, Criminal Competence, and Prediction of Criminal Behavior

STEPHEN J. MORSE AND WILLIAM T. NEWSOME

1. INTRODUCTION

Readers of this primer will primarily be judges and attorneys actively engaged with criminal cases who are familiar with the doctrines of criminal responsibility and competence, but some readers may be legal novices. To refresh the recollection of sophisticated attorneys and to guide newcomers, we will provide sufficient “black letter” information to make clear the potential relation of neuroscience to those doctrines. We also encourage readers of this chapter to read or reread chapters 1 through 3, which lay much of the necessary basic conceptual and scientific evidence foundation for this chapter.

We begin with general questions concerning criminal responsibility that neuroscience might help answer. These apply to most and perhaps all of the specific doctrinal areas we address in subsection 6. In subsection 3 we explain the underlying model of the person and behavior that the law implicitly adopts. The section draws from the discussion in the last section of the Introduction to this volume, but offers a “shorter form” for those lacking the time to consult the Introduction. Subsection 4 provides a cautionary note on the place of free will and similar issues in criminal law. Subsection 5 turns to a general explanation of the structure of criminal responsibility. Subsection 6 addresses the specific doctrines for *criminal responsibility* (or *culpability* or *liability* or *blameworthiness* or *guilt*; such terms are often used interchangeably). Subsection 7 does the

same for competence. In each case, the doctrine is explained and the potential contribution to it of neuroscience is explored. The issue of predicting future criminal and dangerous behavior is considered at the appropriate points. There is substantial doctrinal variation across jurisdictions, of course, but this chapter proceeds on the assumption that there is sufficient doctrinal similarity to justify a general analysis.

The conclusions in this chapter will be cautious. Brain imaging and other forms of neuroscientific data will seldom be relevant or probative for most criminal law decision-making at present. Even if advocates seek to introduce good science, the science may not be probative because it may not be sufficiently specific. Moreover, as you read this chapter, recall the admonition in the Introduction that “actions speak louder than images.” If the evidence of actions and of inferred mental states is clear, then expensive neuroscience is simply cumulative. And if the “behavior” (construed broadly as the actions and inferred mental states) and the neuroscience are in conflict, the behavior will generally trump the neuroscience because legal criteria are largely behavioral. If the behavior is unclear and if the neuroscience evidence is sufficiently specific to address the legal criterion in issue, then neuroscience will of course be relevant and probative. Finally, recall from Chapters 1 and 2 that most of the knowledge we possess about the relationship of brain and behavior is correlational, not causal.¹ Despite all these cautions, neuroscience is developing so rapidly that modest speculation about future developments is warranted. The final chapter of this volume is more frankly speculative about potential future developments.

2. GENERAL QUESTIONS FOR CRIMINAL RESPONSIBILITY AND COMPETENCE

Before turning to the specifics, we want to raise the most general questions about the relationship of neuroscience and the law to frame the discussion of the rest of the chapter. Concerning criminal responsibility, the first question is whether neuroscientific techniques can help legal decision makers identify the presence or absence of specific legal criteria for criminal guilt, including *prima facie* case and affirmative defense criteria.

The second question concerns the retrospective nature of responsibility assessments, which often address behavior that occurred at a time substantially earlier. Can neuroscientific techniques provide accurate information about a defendant’s brain at some time in the past that would be relevant to the criteria for criminal responsibility? After all, people who commit crimes do not do so wearing a portable scanner—at least not yet.

Criminal competence evaluations, such as competence to stand trial, to plead guilty, to be sentenced, to refuse psychotropic medication, and to be

executed, all address the defendant's present mental capacity. Can neuroscientific techniques help decision makers validly identify the presence or absence of the competency criteria in question?

A crucial issue that will frequently arise is the degree to which we can make valid inferences about an individual defendant from group data for a group of which the defendant is a member. This issue is addressed in Chapter 4 and should be kept in mind as this chapter considers the potential contributions of neuroscience to criminal responsibility and competence adjudication.

Finally, an overarching practical question for all use of neuroscience in criminal law adjudication is whether it is cost-benefit justified. Scanning is currently quite expensive and subject to invalidating maneuvers by savvy subjects, as criminal defendants will learn to be. We already have many behavioral techniques for assessing the presence or absence of legal criteria. The question is what would be the added value of neuroscientific evaluation, and is that value-added worth the additional cost, including the costs of legal objections that might be raised to scanning in some instances?

3. THE LAW'S CONCEPT OF THE PERSON AND BEHAVIOR

Criminal law clearly implicitly adopts the "folk psychological" view of "the person" and "behavior," which in part causally explains behavior by mental states such as desires, beliefs, intentions, willings, and plans. For example, the folk psychological explanation for why you are reading this chapter is, roughly, that you desire to understand how neuroscience relates to criminal responsibility, competence, and prediction; you believe that reading the chapter will help fulfill that desire; and thus you formed the intention to read it. Folk psychology fully accepts that intentional behavior is causally influenced by biological, psychological, and sociological variables. Nonetheless, the folk psychological view is that mental states are genuinely part of the causal explanation for human behavior and that people's behavior cannot be understood if that level of explanation is excluded. The final explanatory pathway for law's understanding of the person must be folk psychological.

We understand that many scientists consider folk psychology to be a primitive or pre-scientific view of human behavior. Some believe that neuroscience is casting considerable doubt on the view that our mental states matter to what we do. Most other informed observers nonetheless disagree with the radically strong form of such skepticism and point to a plethora of experimental evidence and common sense to conclude that mental states do matter. For the purpose of this chapter, we will accept the law's model because it will be the applicable model for the foreseeable future. We discuss the relevance of neuroscience to the law through this framework.²

4. POTENTIAL DISTRACTIONS AND CONFUSIONS

This section of the chapter considers a number of underlying and related issues that are often thought to be relevant to criminal responsibility and competence but that are in fact irrelevant or confusions and distractions: (1) free will, (2) causation as an excuse, (3) causation as compulsion, (4) prediction as an excuse, (5) dualism, and (6) the non-efficacy of mental states (alluded to just above).

(1) Free will: Contrary to what many people believe and what judges and others sometimes say, free will is not a legal criterion that is part of any doctrine and it is not even foundational for criminal responsibility. Criminal law doctrines are fully consistent with the existence of neurobiological mechanisms, causal closure (the view that all physical events have physical causes), and determinism that allegedly undermine the foundations of responsibility. Law addresses problems genuinely related to responsibility, including consciousness, the formation of mental states such as intention and knowledge, the capacity for rationality, and compulsion, but it never addresses the presence or absence of *free will*, understood, roughly, as the ability of people to act uncaused by anything except themselves.

When most people use the term *free will* or its lack in the context of legal responsibility and competence, they are using this term loosely as a synonym for the conclusion that the defendant was or was not criminally responsible. They typically have reached this conclusion for reasons that do not involve free will, such as that the defendant was legally insane or acted under duress, but such usage only perpetuates misunderstanding and confusion. Once the legal criteria for excuse have been met, for example—and no such criteria include lack of free will—the defendant will be excused without any reference whatsoever to free will as an independent ground for excuse.

There is a genuine metaphysical problem about free will, which is whether human beings have the capacity to act uncaused by anything other than themselves and whether this capacity is a necessary foundation for holding anyone legally or morally accountable for criminal conduct. Philosophers and others have debated these issues in various forms for millennia, and there is no consensus resolution in sight. Indeed, some people think the problem is not resolvable. This is a real philosophical issue, but it is not a problem for the law, and neuroscience raises no new challenge to this conclusion. Neuroscience is simply the most recent candidate science for explaining behavior deterministically. It thus joins social structural variables, behaviorism, genetics, and other scientific explanations that have also been deterministic explanations for behavior, but in principle it adds nothing new, even if it appears to address more fundamental issues concerning the causes of behavior than other

sciences. As long as free will in the strong sense is not foundational for just blame and punishment and is not a criterion at the doctrinal level—which it is not—the truth of determinism or universal causation poses no threat to legal responsibility. Neuroscience may help shed light on folk psychological excusing conditions, such as automatism or insanity, for example, but the truth of partial neural causation is not an excusing condition. The law will be fundamentally challenged only if neuroscience (or any other science) can conclusively demonstrate that the law's psychology is wrong and that we are not the type of creatures for whom mental states are causally effective.

(2) Causation as an excuse: A related confusion is that behavior is excused if it is "caused," but causation per se is not a legal or moral mitigating or excusing condition. At most, causal explanations can only provide evidence concerning whether a genuine excusing condition, such as lack of rational capacity, was present. For example, suppose a life history marked by poverty and abuse played a predisposing causal role in a defendant's criminal behavior. Or suppose that an alleged new mental syndrome played a causal role in explaining criminal conduct. The claim is often made that such causes, which are not within the actor's capacity for rational control, should be an excusing or mitigating condition per se, but this claim is false.

All behavior is the product of the necessary and sufficient causal conditions without which the behavior would not have occurred. This includes brain causation, which is always part of the causal explanation for any behavior. If causation were an excusing condition per se, then no one would be responsible for any behavior. Some people welcome such a conclusion and believe that responsibility is impossible, but this is not the legal and moral world we inhabit. The law holds most adults responsible for most of their conduct, and genuine excusing conditions are limited. Thus, unless the person's history or mental condition, for example, provides evidence of an existing excusing or mitigating condition, such as lack of rational capacity, there is no reason for excuse or mitigation.

Even a genuinely abnormal cause is not an excusing condition. For example, imagine an armed robber with clinical hypomania, a mental disorder marked by euphoric mood, overconfidence, and elevated energy and attention. The robber only robs when he is in a hypomanic state because only then does he have the confidence and energy to do so. Thus, the clinical condition is a "but for" cause of his criminal behavior. He would not be excused simply because hypomania played an undoubted causal role. His criminal responsibility would be mitigated or excused only if the hypomania produced a genuine mitigating or excusing condition, such as substantial or extreme loss of rational capacity, which would have to be demonstrated independently. Only then would a legal

excuse such as legal insanity be justified. To assume that a defendant is not responsible when his or her criminal action is caused by a clinical abnormality begs the question of responsibility.

In short, a neuroscientific causal explanation for criminal conduct, like any other type of causal explanation, does not per se mitigate or excuse. It only provides evidence that might help the law resolve whether a genuine excuse existed or that might be a guide to prophylactic or rehabilitative measures.

(3) Causation as compulsion: Compulsion is a genuine mitigating or excusing condition, but causation, including brain causation, is not the equivalent of compulsion. Compulsion may be either literal or metaphorical and normative. If compulsion is literal—say, a person's arm moves because there is a neuromuscular spasm or because a much stronger person pushed the person's arm—the person has not "acted" at all. Metaphorical compulsion is more difficult to understand, but it includes cases in which someone acts in response to a do-it-or-else threat (such as in cases that might raise the excuse of duress) or acts in response to strong internal urges or desires (such as in cases that might raise the control test for legal insanity). In all metaphorical compulsion cases, however, the person acts, and deciding when to mitigate or excuse in such cases is a normative legal question.

It is crucial to recognize that most human action is not plausibly the result of either type of compulsion, but all human behavior is caused by its necessary and sufficient causes, including brain causation. Even abnormal causes are not compelling. Suppose, for example, that a person with pedophilic urges has them weakly and has a weak sex drive in general. If the person molested a child, there would be no ground for a compulsion excuse because yielding to a weak urge hardly qualifies as acting under compulsion even if the urge is an abnormal cause of the molesting behavior. The behavior was not compelled, but it was caused. If causation were per se the equivalent of compulsion, all behavior would be compelled and no one would be responsible. Once again, this is not a plausible account of the law's responsibility conditions. Causal information from neuroscience might help us resolve questions concerning whether legal compulsion existed, or it might be a guide to prophylactic or rehabilitative measures when dealing with plausible legal compulsion. But causation is not per se compulsion.

(4) Prediction: Causal knowledge, whether from neuroscience or any other science, can enhance the accuracy of behavioral predictions, but predictability is also not per se an excusing or mitigating condition, even if the predictability of the behavior is perfect. To understand this, just consider how many things

each of us does that are perfectly predictable, yet for which there is no plausible excusing or mitigating condition. For example, if you have reasonably good dental hygiene, you probably brush your teeth at least once a day, and it is perfectly predictable that you will do so (barring some unforeseen catastrophe that would prevent you). No one considers responsibility in such cases, but suppose you did? There would be no excuse or mitigation. You are fully responsible for brushing your teeth.

Even if the explanatory variables that enhance prediction are abnormal, excuse or mitigation is warranted only if a genuine excusing or mitigating condition is present. For example, recent research demonstrates that a history of childhood abuse coupled with a specific genetically produced variant in neurotransmitter metabolism vastly increases the risk that a person will behave antisocially as an adolescent or young adult.³ Again, such information may be of prophylactic or rehabilitative use for people affected, but no excuse or mitigation is applicable merely because these variables make antisocial behavior far more predictable. If the variables that enhance prediction also produce a genuine excusing or mitigating condition, then excuse or mitigation is justified for the latter reason and independently of the prediction.

(5) Dualism: Most informed people are not “dualists” about the relationship between the mind and the brain. That is, we no longer think that our minds (or souls) are independent of our brains (and bodies more generally), yet can somehow exert a causal influence over our bodies. It may seem, therefore, as if law’s emphasis on the importance of mental states as causing behavior is based on a pre-scientific, outmoded form of dualism, but this is not the case. Although the brain enables our mental states, we have no precise understanding of how this occurs or how action ensues from mental states.⁴ It is clear that, at the least, mental states are dependent upon or supervene on brain states, but neither neuroscience nor any other science has demonstrated that mental states play no causal role in generating behavior.

(6) The non-efficacy of mental states: Despite the lack of understanding of the brain-mind-action relationship, some scientists and philosophers question whether mental states have any causal effect, treating mental states as psychic appendixes that evolution has created but that have no genuine function. A related position is the belief that mental states are nothing but brain states. Such claims may seem extreme or even bizarre to most lawyers who are daily engaged in the life of ordering the relations between acting human beings. But these claims are not strawmen. They are seriously made by serious, thoughtful people.⁵ If accepted, they would create a complete and revolutionary paradigm shift in the law of criminal responsibility and competence (and more widely).

These views are extremely controversial and conceptually and empirically unproven at present, as even honest claimants for them must concede. Thus the law is entirely justified at present in rejecting any radical paradigm shift in legal doctrine or policy based on the view that our mental states are inert. Indeed, we believe that the opportunistic use of such views in individual cases rests on confusions about determinism, causation, and responsibility that this section has already canvassed.

In conclusion, legal actors must always keep the folk psychological view present to their minds when considering claims or evidence from neuroscience, and must always ask the following question: How, precisely, is the science relevant to the law’s action and mental state criteria? Determinism, causation, and predictability do not in themselves answer any doctrinal or policy issue.

5. THE STRUCTURE OF AMERICAN CRIMINAL RESPONSIBILITY: GENERALLY

The structure of American criminal responsibility is facially straightforward. Crimes are defined by their criteria, the elements, that must be proven by the prosecution beyond a reasonable doubt. For our purposes, the most important elements are the requirement of a proscribed act (conduct), often called a “voluntary act,” and an accompanying mental state (or states for some crimes), the *mens rea*. There are also a few mitigating doctrines, such as killing in the heat of passion after legally adequate provocation, that some jurisdictions adjudicate as part of the prima facie case. In others, they are treated as partial affirmative defenses.

Even if the prosecution can prove the elements beyond a reasonable doubt, responsibility may still be defeated if the defendant can establish a complete or partial affirmative defense.⁶ For our purposes, and with extremely limited exceptions, only excusing doctrines are relevant. Excuses arise when the defendant’s conduct is wrongful under the circumstances, but for some reason the defendant has some characteristic that renders the agent not blameworthy or less blameworthy. Infancy, legal insanity, and duress are the prime examples. We think that young people, some people with mental disorders, and people who yield to threats of death or grievous bodily harm do not deserve blame and punishment even if they do something wrong.

In short, criminal responsibility is established if the prosecution can prove all the elements beyond a reasonable doubt and no affirmative defense succeeds. Criminal responsibility is avoided if the defendant casts a reasonable doubt on any criterial element of the crime charged or the defendant is able to establish an affirmative defense.

If the defendant is convicted, in most jurisdictions the sentencing judge will have discretion to impose a sentence within a statutorily imposed range. Judges

often consider evidence of the defendant's psychological, psychiatric, and neurological condition for determining the appropriate sentence. These factors may either mitigate the defendant's responsibility or provide grounds to enhance punishment because they may indicate the defendant is particularly dangerous. In non-capital cases, typically no legal rule specifically guides judges concerning what kinds of abnormalities are mitigating or aggravating or what evidential significance must be given to imaging or other neuroscientific evidence. In jurisdictions with the death penalty, there are statutory mitigating and aggravating factors capital juries must use, but they often are relatively vague. The Supreme Court has held that capital defendants have virtually unfettered opportunity to offer mitigating evidence at sentencing,⁷ and, once again, consideration of psychological and neurological variables is routine for that purpose. Although rigorous data about the use of neuroscientific evidence in criminal cases do not exist, anecdotal evidence suggests that neuroimaging studies are frequently used at capital sentencing and advocates may be increasingly seeking to introduce such evidence at the trial stage of capital and non-capital cases.

6. CRIMINAL LAW DOCTRINES

The question for this chapter, once again, is whether and how neuroscience is relevant to adjudicating the specific doctrines we will now consider. Even good science might not be relevant. How, precisely, does potential neuroevidence help resolve questions concerning criminal responsibility? In what follows, each subsection begins with a brief overview of the legal doctrine followed by the questions for neuroscience that the doctrine raises. Then we describe whether and to what degree neuroscience can answer those questions with sufficient validity to aid legal decision makers. The purpose is to guide practitioners with their work by providing a framework to think about legal relevance. We cite scant neuroscience because the new neuroscience is in its infancy, there are seldom neuroscientific studies that are directly legally relevant to criminal responsibility and competence, and often results are inconclusive for many reasons. We expect that future discoveries may change this cautious assessment, and we hope that this chapter will help practitioners think sensibly about the relevance of the science to their cases.

A. The Prima Facie Case

I. THE "ACT" REQUIREMENT

The definition of every crime requires an *act* (or an omission when there is a duty to act). The term "voluntary act" is often used to describe this requirement, but the word "voluntary" has many meanings in criminal law and can

be confusing. To term an act "voluntary" in this context means nothing more than that the law's criteria for the act requirement have been met. It is simply a conclusion, and as suggested above, it has nothing to do with free will.

Despite the centrality of this requirement, the law seldom provides a positive definition of "an act." Rather, it tends to define what is "not an act." One may infer, however, that the underlying definition is, roughly, *an intentional bodily movement (or intentional lack of movement in the case of a prohibited omission) performed in a state of relatively integrated consciousness*. The meaning of "intentional" in this definition is narrow and means nothing more than a "willed bodily movement" or a "volitional" movement. It does not mean that the defendant acted for any particular reason. For example, completely habitual movements are considered acts. (The following subsection on *mens rea* considers a broader meaning of intention.)

According to this definition, reflexes, spasms, and other purely mechanical bodily movements that are not intentional (or willed or volitional) are excluded. Cases of sleepwalking, epileptic seizures, and other severe impairments of consciousness produced by disease, mental abnormality, trauma, or other causes are also usually excluded. The question in the latter, "actish," cases is what degree of impaired consciousness is sufficient to demonstrate that the agent did not act. Unfortunately, the law provides no clear answer. Habitual and some other seemingly "automatic" movements by fully conscious agents are considered acts, but criminal conduct rarely involves automatic acts in this sense. In most cases, the defendant's behavior uncontroversially satisfies the law's definition of an act.

A claim that a defendant did not act is often termed "automatism," but this term is confusing. Some jurisdictions treat automatism as the name for "no act," but others treat automatism as an affirmative defense. To compound the confusion, some of the jurisdictions that treat automatism as an affirmative defense distinguish between "sane" and "insane" automatism, and often compel the defendant claiming "insane" automatism to raise the issue by pleading legal insanity. The problem is that clear legal definitions of "sane" and "insane" automatism are lacking. This distinction will be examined again below in the section on automatism as an excuse.

a. The potential contributions of neuroscience

At present, neuroscience offers few techniques to validly distinguish an intentional bodily movement from movements that are not acts. Few allegedly criminal events are caused by spasms, reflexes, or the like. If such a case were plausibly raised, however, and if neuroscience is validly able to diagnose a defendant as suffering from damage to or a disorder of the brain or nervous system, such as epilepsy, that is associated with such "unwilled" movements,

this would provide probative evidence. The question, of course, is whether the neuroscience can provide such a valid diagnosis and whether we can be certain that the defendant suffered from the condition at the time of the crime. In some cases there may be a history or prior diagnostic information that aids the inference that the defendant did have such a disorder, but in other cases the claim will be more inferential.

In cases involving claims of “actish” movements, which are the most common, we know that various neurological and psychological abnormalities can cloud consciousness. If the defendant was suffering from such a disorder, it enhances the plausibility that he committed the crime in such a dissociated state. At present, however, no neurobiological diagnostic technique is sufficiently accurate to distinguish those suffering from a mental disorder.⁸ Those disorders will continue to be diagnosed behaviorally. In the future, of course, advances in biological diagnostic techniques may aid such diagnoses.

In the case of disorders arising from damage to the brain or nervous system, neurodiagnostic knowledge may be more valid and probative. In one study, for example, 5400 epilepsy patients were screened in order to identify 19 whose seizures potentially gave rise to involuntary violent behavior. These 19 patients were studied further with combined EEG measurement and videographic analysis of behavior during seizures. Of the 19, 7 were judged on behavioral criteria to exhibit potentially violent behavior during a seizure.⁹ Because such cases appear to be so rare, most experts discount epileptic seizures as a cause of intentional complex violent action.¹⁰ The problem of retrospective evaluation remains for virtually all such cases, however. If the alleged insult to the brain was episodic and transient, determining whether the defendant behaved in a state of clouded consciousness at the time of the crime will be difficult to do. Even if there is a chronic condition with a history and prior diagnostic information, it is still possible that the defendant was not symptomatic at the time of the crime. Moreover, at present there is no valid neurodiagnostic technique for determining how dissociated a person is, even if we are quite sure that some dissociation was present. Once again, the degree of dissociation will have to be assessed behaviorally.

II. MENS REA (THE MENTAL STATE ELEMENT REQUIRED BY THE DEFINITION OF THE CRIME)

Justice Oliver Wendell Holmes once famously observed that even a dog knows the difference between being stumbled over and being kicked. The mental states that accompany our actions are the prime indicators of the person's attitudes towards the objects of our actions and consequently of the person's degree of praiseworthiness or blameworthiness for acting. Moreover, mental states sometimes are important to determine what act someone committed.

For example, perjury requires that the liar knew or was aware of a substantial risk that what he was saying was false. The words uttered were uttered purposely, but the defendant charged with perjury was lying only if he *knew* they were false.

All lawyers know that criminal code provisions and case law defining crimes use a plethora of mental-state terms, many of which are uninformative or misleading. The *Model Penal Code*¹¹ tried to remedy this situation with some success, but confusion remains. The ability of neuroscientific information to provide aid concerning *mens rea* will be hampered by the law's own confusion. For ease of exposition, however, we will focus on the four *mens rea* terms the MPC uses: *purpose*, *knowledge*, *recklessness* (conscious awareness of a substantial and unjustified risk), and *negligence* (failure to be consciously aware of a substantial and unjustified risk that a reasonable person should have been aware of).

The law virtually always conceives of these definitions as questions primarily of fact: Did or did not the defendant actually have one of the required mental states at the time of the crime? Unless the definition of the crime provides otherwise, none of these definitions requires moral capacity or awareness on the part of the defendant and none requires any particular degree of commitment to the crime. A defendant may form a purpose even though he is ambivalent about achieving his goal. These definitions mostly have ordinary-language meanings. For example, *purpose* means what we ordinarily mean when we say that someone did something “on purpose” or did something intentionally.

The typical reasons why *mens rea* may not have been formed include mistake (after careful or careless formation of beliefs), intoxication (by alcohol or other substances), physical or emotional trauma, and mental abnormality. Specific doctrines govern the degree to which defendants can attempt to negate *mens rea* by using these types of evidence. Many jurisdictions entirely and constitutionally exclude various types of evidence, such as voluntary intoxication and mental disorder (e.g., *Clark v. Arizona*,¹² [mental disorder]; *Montana v. Egelhoff*,¹³ [voluntary intoxication]), but then there is no work for neuroscience evidence to do. Therefore, we will assume in what follows that the jurisdiction allows *mens rea* negation to some degree. Because each *mens rea*-negating condition raises somewhat different issues, we will first address the general issue and then turn to the relevance of neuroscience to assessing *mens rea* in each of the specific conditions.

a. The potential contributions of neuroscience

At present there is no neural signature for individual *mens reas*, and the problem of retrospective evaluation may be particularly acute in this case even if such signatures are discovered. Put simply, neuroscience does not have a

technique to determine what mental state accompanied an action. Thus, for example, if a defendant claims that he made a mistake at the time of the crime about whether property he took away belonged to him, or if a motorist who caused an accidental death claims that he did not realize at the time that he was creating an immense degree of risk, no present neuroscientific technique will validly assist in the evaluation of such claims. They will have to be assessed behaviorally.

Now let us turn to the specific *mens rea*-negating conditions, beginning with intoxication. Intoxication arises frequently in criminal law cases and in cases of severe intoxication, it can be the plausible basis for a claim that *mens rea* was not formed in fact. At present, there is no neurodiagnostic technique that can identify in an individual case the degree of cognitive impairment that intoxication produces, but this is a topic of active research, and such techniques may be developed in the future. For now, such claims must be evaluated behaviorally, complemented by standard blood or breath measurements of intoxicating substances. The intoxicated defendant may also be an addict, a condition that can chronically affect cognition. Again, the neuroscience of addiction is insufficiently precise at present to permit a judgment about the degree to which an individual addict suffered from impairments in the ability to form *mens rea* (see Chapter 8 of this volume). At present, researchers are actively investigating whether addicts are capable of forming reasonable-person judgments, which might become probative about the distinction between recklessness and negligence and about whether the defendant was capable of meeting reasonable-person standards. Negligence is largely judged objectively, however. Consequently, even probative neuroevidence that a defendant charged with negligence was incapable of meeting reasonable-person standards would not be admissible, and the defendant could only defeat guilt if an affirmative defense could be established.

Assuming that trauma did not cloud consciousness sufficiently to negate the voluntary-act requirement, it is unlikely that it would sufficiently impair cognition to prevent the formation of *mens rea*. If a plausible case arose, neuroevidence might be able to help demonstrate that trauma did or did not occur. If there was brain damage at the time of the crime, general information concerning the usual sequelae and the capacities of people who have suffered such trauma may be available. The question is whether the information will be specific enough to enable reasonable inferences about whether the charged *mens rea* was formed. This will be a very case-specific issue, and in some cases neuroevidence may have value-added beyond the behavioral evidence.

Mental abnormalities, including mental disorders, may interfere with the defendant's formation of *mens rea*, but such cases are infrequent. More commonly, mental abnormalities give people irrational reasons to form *mens rea*, and

they seek an excuse by raising the affirmative defense of legal insanity. Daniel M'Naghten is a prime example. He intentionally killed the person he thought was the Tory prime minister, Robert Peel, because M'Naghten had a delusional belief that he was the victim of a Tory plot against him and he believed that he needed to kill Peel to prevent further danger. In some cases, however, the claim that a mental abnormality negated *mens rea* will be plausible. Eric Clark, the defendant in *Clark v. Arizona*, killed a police officer in uniform and was charged with the intentional killing of a human being knowing that the victim was a police officer. Clark undeniably suffered from paranoid schizophrenia and was delusional. He claimed that he believed that the police officer was a space alien impersonating a police officer. If Clark's claim about his belief this were true, he did not intend to kill a human being and did not know that the victim was a police officer. (Clark also raised legal insanity as a defense.)

In such plausible cases, the first question is whether Clark suffered from a mental abnormality. On this issue, there is no present neurodiagnostic marker with sufficient accuracy to be used either in law or even in a clinic. There are many studies indicating average neural differences between people suffering from specific disorders, such as schizophrenia, and people without disorders. The problem is that there tends to be too much similarity between the groups to permit the marker to be used to differentiate. Moreover, the neural findings to date tend to be insufficiently specific to a particular disease. The same areas of the brain appear to be associated with many different disorders. Whether a defendant suffers from a mental disorder, and, if so, which one, still must be assessed behaviorally. Once again, future research may provide valid neural diagnostic markers.

A final, common problem faced by courts is that a defendant claiming that he lacked *mens rea* may be lying. Lie detection technologies based on brain imaging or brain electrophysiology (EEG) are being developed by several private companies, and such evidence has even been admitted in a recent capital case in India. Assuming that the defendant would be willing to submit to a brain-based lie detection test and that the result would be admissible, which it would be in some jurisdictions upon stipulation by both the prosecution and defense, the question remains whether neural lie detection is sufficiently accurate to warrant such use. As Chapter 5 discloses, the answer currently is negative. Furthermore, even if it were accurate and admissible, the truth of a defendant's belief about his past mental state is distinguishable from the truth of what his mental state in fact was at the time of the crime, whether or not the defendant is lying. Honest defendants may be mistaken about the latter even if they believe they are accurate.

This subsection has been quite cautionary. This is as it should be concerning *mens rea* and the potential of neuroscience to resolve *mens rea* questions.

Perceptive behavioral evaluation and a healthy dose of common sense are necessary to infer whether a defendant formed *mens rea*. If the ordinary inference is that *mens rea* was formed, only the most profoundly precise neurodata or any other type of data will convincingly indicate that it was not formed. Clear evidence from neuroscience or any other science demonstrating that the defendant suffered from neural or psychological abnormalities is seldom inconsistent with the formation of *mens rea*. Claims about the effects of neural and psychological abnormalities on mental states are virtually always more properly considered as claims about legal insanity, which is discussed below.

B. The Excuses

I. AUTOMATISM

Recall from the subsection on the act doctrine that some jurisdictions treat impaired consciousness as an affirmative defense, often termed “automatism,” and that some jurisdictions distinguish cases of “sane” and “insane” automatism. If the jurisdiction does not draw the “sane/insane” automatism distinction, but nonetheless treats automatism as an affirmative defense, the successful defendant will be released outright. The characterization of automatism as sane or insane depends on the cause of the automatism. There are few clear rules for making the “sane/insane” distinction, however. Criminal behavior during an epileptic seizure, for example, has been treated as both sane and insane. The following general (but imperfect) guideline might help. If the cause is a single event, such as acute physical trauma with transient effects, it is more likely to be treated as sane. If there is a chronic condition, such as psychomotor epilepsy, that makes it likely for dissociation to recur, then it is more likely to be considered insane. There is an important outcome difference depending on how the automatism is characterized. If the defendant is compelled to make the claim of “insane” automatism, he will typically have to raise it by raising an insanity defense and will be committed to a hospital if he is successful. If the defendant claims “sane” automatism, the case will be treated as straightforward automatism, and the successful defendant will be released outright.

a. *The potential contributions of neuroscience*

If the jurisdiction does not employ the sane/insane distinction, then the same considerations that were raised above concerning denial of the act requirement apply. If the jurisdiction does draw the sane/insane automatism distinction, the same considerations also apply for deciding if the defendant’s actions were indeed automatic. Neuroscientific evidence may help identify the cause of the automatism the defendant suffered from if there are sufficiently valid

techniques, as there are in some cases. Psychomotor epilepsy is a good example, as are various forms of traumatic brain injury. In such cases, the neuroscience may be probative about how the defense is characterized.

II. LEGAL INSANITY

The underlying excusing condition that justifies the insanity defense is a deficit in the defendant’s rational capacity or control capacity. Legal insanity is established if at the time of the crime the defendant suffered from a mental disorder and, as a result, did not know what he was doing, did not know that it was right or wrong, or could not control himself. Even if the mental disorder can be proven, the other criteria, such as lack of knowledge or lack of control, must be proven independently. It begs the question of legal insanity to claim that a defendant lacked the requisite knowledge or control simply because he or she suffered from a mental disorder that played a causal role in explaining the defendant’s criminal behavior.

In most cases in which legal insanity is raised, there is little dispute about whether the defendant suffers from a mental disorder. Rather, the dispute is about which mental disorder was present, and about the content and severity of the signs and symptoms. The presence of severe mental disorder, especially including loss of touch with reality (psychosis), is usually required as a practical matter and sometimes is required by statute.

There are numerous officially or quasi-officially recognized mental disorders about which we have gathered substantial neuroscientific information. Some of them, such as schizophrenia or manic-depressive (“bipolar”) disorder can be the basis for an insanity defense. If traumatic brain injury or brain disease causes an organic mental disorder such as delirium or any other recognized mental abnormality, then it may uncontroversially be used to satisfy the mental disorder component of the insanity defense. Finally, a defendant who suffers from a developmental disorder (mental retardation) may raise the defense.

Other disorders, such as addiction and psychopathy (a condition marked, *inter alia*, by emotional abnormalities, such as lack of conscience and empathy, and repetitive antisocial conduct) are generally not considered sufficient or are specifically excluded as the basis for legal insanity by statute or case law. Nevertheless, there are two narrow situations in which defendants who have used alcohol or other substances may raise an insanity defense. First, if as a result of chronic intoxication a defendant has become severely mentally disordered in addition to being addicted, then such an addicted defendant may raise the insanity defense. These are called “settled insanity” cases. In these cases, however, it is a rationality or control deficit independent of the symptoms of addiction that provides the basis for the excuse. Second, if the use

of a substance triggers an underlying psychotic condition (that is, the defendant substantially loses touch with reality), and the disorder is independent of and outlasts the episode of drug use, the law treats these cases, too, as “settled insanity.”

The criteria for legal insanity are independent of the requirement of *mens rea*. Severe mental disorder seldom prevents a defendant from forming the *mens rea* required by the definition of the crime. Rather, it tends to explain why the defendant in fact did form the *mens rea*. For example, a person who kills because he delusionally believes he must do so to save his own life, kills intentionally. In this case, legal insanity may be found because the defendant lacked rational understanding of his situation.

There is considerable interpretive controversy about the meaning of either cognitive or control tests of legal insanity, and especially about control tests. Cognitive tests clearly address some type of defect in rational capacity, but knowledge, for example, can be interpreted broadly or narrowly. Andrea Yates killed her five children on purpose, but she acted “to save them from Satan’s eternal torments.” Did she know what she was doing? Narrowly, it seems that she did (because she knew that she was killing her children and that this was illegal), but broadly it seems that she did not (because she did not know that killing the children would not save them from eternal torment). It is especially difficult to specify what it means to lack the capacity for self-control independently of a person’s capacity for rationality. What does it mean to say that, as a result of mental disorder, the defendant could not help doing what he did, was compelled to do it, was powerless to prevent it, or the like? Once again, simply because mental disorder played a role in explaining the behavior does not mean the behavior could not be controlled. This must be demonstrated independently. Concerns about questions like these explain why control tests are less common. If a workable behavioral test for lack of control were created, such tests might be more widely adopted. In any case, interpretive questions about the meaning of legal insanity hinder the valid use of neuroscience to aid specific legal-insanity decision making.

The capacity for rationality and self control are continua, of course, but the law adopts a binary rule for legal insanity: either the defendant was, or was not, legally insane at the time of the crime. The language of the legal insanity tests does not identify with specificity the amount of capacity that must be lacking. The jury or judge therefore has considerable discretion.

a. The potential contributions of neuroscience

At present, there is no biological diagnostic technique, including neuroscientific tests, to identify whether a person suffers from a mental disorder, and, if so, which one. In short, there are as yet no reliable “biomarkers” for any mental

disorder, although identifying such biomarkers is a paramount goal of current mental health research. As noted above, neuroscience has identified various neural differences between those suffering from mental disorders and normal controls, but none of the differences is sufficiently large and reliable to be diagnostic in individual cases. This situation occurs in part because the definitional criteria for most mental disorders have not been well validated. That is, it is not clear that the categories used by mental health professionals accurately reflect how “nature is carved at the joints.” If these categories are artificial, then it is not surprising that the neuroscience related to them will not be terribly precise. As the refinement of the diagnostic categories and the underlying neuroscience become ever more sophisticated, we can be reasonably sure that more precise diagnostic tools will become available. For now, however, neuroscientific evidence has little diagnostic utility in individual cases beyond what traditional clinical interviews and psychological tests provide.

We can be more optimistic about cases involving brain injury and neurological diseases because there tend to be more valid diagnostic tools for these conditions. Epilepsy, for example, can be diagnosed definitively using electrophysiological measurements, and the exact brain location giving rise to the epileptic activity can frequently be identified with some precision. For other neurological diseases, such as Alzheimer’s, however, behavioral assessment in the clinic continues to be the most reliable basis for diagnosis of living people (as opposed to reliable findings at autopsy). Even if brain images become more valid for diagnosis, it is rare for elderly people to commit violent crimes or property crimes that do not involve planning, whether or not they show signs of cognitive decline arising from the normal and abnormal biological processes that accompany aging. Excellent biomarkers do in fact exist for Alzheimer’s (the famous fibrillary “plaques” and “tangles”), but at present these biomarkers can only be detected by microscopic examination of postmortem tissue, which is of little use to the law. Brain scans are thought to be of increasingly valid diagnostic use, but their major use in such cases is ruling out other potential causes such as tumors.

Tumors or focal brain injury are far more approachable with neuroscientific data. Anatomical brain scans can now identify tumors and injurious conditions such as stroke with great precision, and such data can be potentially useful in judging specific insanity defenses. On postmortem examination, for example, it was found that Charles Whitman, the notorious mass murderer on the University of Texas campus in 1966, had a brain tumor that impinged on the amygdala, a structure that is involved in the regulation of emotion. Had Whitman survived the episode and been brought to trial, structural imaging data might have been relevant to an insanity plea, depending on the precise location of the tumor, especially in conjunction with the material in his remarkable diaries.

Perversely, our techniques for detecting abnormal structural conditions such as small tumors and strokes are now so good that a qualitatively different problem can arise for the court: Is the detected abnormality actually related to the criminal behavior at issue? It is well recognized that many "normal" people (judged by their behavior) have abnormal growths in their brains, many of which are not considered dangerous or relevant to everyday life. In fact, a difficult problem for the growing field of neuroethics is whether otherwise healthy research subjects should be notified about small, abnormal brain conditions detected in scans conducted for research purposes completely unrelated to the health of the subject.¹⁴ The risk of a surgery to "correct" such a condition can be far greater than the risk of simply living with it. Increasingly, therefore, courts will have to judge whether an abnormality detected on a structural scan and presented as evidence is actually relevant to the criminal behavior at issue. This might have been true in the Whitman case discussed above.

More diffuse brain injuries such as those created by concussion or by transient loss of oxygen to the brain are much more difficult to assess, because even our most sophisticated imaging techniques do not have cellular-level resolution. Imagine a condition that leads to the loss of 5 percent of all nerve cells in the brain, but the missing cells, rather than being clumped together focally, are randomly distributed throughout the brain. Such a condition might well lead to serious behavioral problems, but it would be undetectable by modern imaging techniques. Currently, neuroscience can add but little to behavioral criteria for diagnosing such conditions.

The more difficult question for neuroscience is whether it can provide probative evidence concerning the cognitive or control criteria of insanity defense tests. Even if a diagnosis is certain, the behavior displayed by people with that diagnosis is extremely heterogeneous. Thus, the diagnosis alone will not reveal whether the further criteria are met. Of course, they are seldom met for people suffering from milder disorders, and they are more often met with people suffering from more severe disorders, but even in the latter category, most people will not meet the criteria. Thus, evidence addressed specifically to cognitive, and control problems as the law defines them will be necessary.

Neurotests cannot yet "read" mental states, and there is still no neural marker for lack of self-control, although both of these areas are the subject of active experimental research. Thus, probative neuroevidence on these questions would have to be inferred from other neurodiagnostic findings with which the legal criteria might be associated. The most likely candidate is the congeries of abilities that neuropsychologists term *executive function*. People with defects in executive control seem to have trouble inhibiting untoward impulses to action, but it is less clear that they are associated with defects of cognition, such as not knowing right from wrong, or not knowing what one is

doing. Furthermore, such functions seem relatively reliably associated with the portion of the brain, the prefrontal cortex, that is evidently the brain substrate for much of our higher-order, rational capacities. It is therefore likely that neurodata about structural or functional prefrontal cortex defects might become relevant to cognitive and control criteria. There is nonetheless room for caution. Impairments can produce completely opposite behavior, depending on the specific pathology involved. Furthermore, the correlation is weak between performance on neuropsychological tests of executive function, which are the present "gold standard," and real-world behavior.¹⁵ The problem once again is how specific the information would be and to what degree it would permit inferences about the past, actual behavior of individual defendants.

III. INVOLUNTARY INTOXICATION

A defendant who committed a crime while intoxicated through no fault of his own is entitled to a complete excuse for the crime charged, if, as a result of the intoxication, the defendant is able to satisfy the criteria for the jurisdiction's legal insanity test. Although involuntary-intoxication doctrines use the same language as the insanity defense and simply substitute faultless intoxication for mental disorder as the threshold criterion for the defense, this is considered a separate defense. Note that the defendant will not be excused solely because he would not have committed the crime if he had not been intoxicated. Recall that causation *per se* is not an excuse. Rather, the defendant must meet the standard for non-responsibility of a substantial rationality or control deficit.

a. The potential contributions of neuroscience

Neuroscience cannot help us answer the question of whether the defendant's alleged intoxication was legally involuntary. Making this determination requires a factual analysis of how the defendant's intoxication occurred. Can neuroscience help us decide whether a defendant was intoxicated, however, and if so, whether it was to a degree that rendered the defendant the equivalent of legally insane? The issues are thus precisely the same as were raised concerning intoxication in the *mens rea* subsection and concerning lack of rationality or control in the legal insanity subsection. Proper use of neuroscience in such a case would involve testing the defendant in a state of intoxication allegedly similar to that experienced at the time of the crime. Assuming that we could validly determine and re-create that degree of intoxication, then neurodata bearing on rational and control capacities could be obtained and compared to normative data collected on larger samples. Such an investigation is beyond our current level of sophistication, however, and the necessary comparative data do not yet exist. In the future, such techniques may become available and would be useful in resolving close cases. For now, however, the standard type

of blood alcohol determination, behavioral investigation and the inferences drawn therefrom will have to suffice.

IV. DURESS

Duress is established if another person threatened to kill or grievously bodily harm the defendant or another unless the defendant committed a crime, and a person of reasonable firmness would have yielded to the threat under the circumstances. Threats less than death or grievous bodily harm are usually insufficient (in most jurisdictions this defense is unavailable to a defendant who killed a third party intentionally to avoid his/her own death or grievous bodily harm). It is not required that the defendant felt subjectively frightened or unable to resist. It is sufficient if a reasonable person would have yielded to the threat. Note that the agent who acts under duress clearly acts and intentionally commits the crime to avoid the threatened consequence for failing to yield. There is no issue in such cases of defeating the prima facie case unless the stress of the moment affects the person's consciousness, but such cases will be exceptionally rare, if they occur at all.

It is common to speak of such cases as involving "compulsion," but the underlying rationale is unclear. One theory is that we cannot expect people to behave like saints. If the defendant was faced with such a hard, do-it-or-else choice, it asks too much to require the defendant to accept death or serious, bodily injury rather than to commit the crime. This theory focuses on objective features of the situation and does not require that the defendant was actually deprived of the ability to resist. A slightly different way of conceptualizing the issue is as an inability to control oneself in the face of the threat, but the relevant amount of self-control is that possessed by the ordinary person and not by the particular defendant. If the defendant has less than ordinary self-control and yields when a reasonable person would resist, the defense is not available. Thus, the traditional doctrine of duress is completely objective, and neuroscientific evidence would be irrelevant.

There is an argument, however, that the objective nature of the duress excuse is not fair because some people cannot meet the objective standard. Some therefore wish to "subjectivize" or "individualize" the objective, "person of reasonable firmness" standard by endowing the person of reasonable firmness with some of the characteristics of the accused. For example, suppose a particularly fearful person yielded. We might ask whether a particularly fearful reasonable person would yield. Unless the fully objective reasonable person test is subjectivized, neuroscience would have little to add to duress determinations. Consequently, we assume here the validity of some degree of subjectivization. Readers should be aware, however, that most jurisdictions do not "subjectivize," and subjectivization is controversial.

a. The potential contributions of neuroscience

The question for neuroscience is whether it can help identify classes of people and particular individuals who would have great difficulty meeting an objective "person of reasonable firmness" test. For example, some people may have unreasonable fears of physical injury or touching that may arise from pathology rather than from characterological fearfulness. At present, there are no neuroscientific tests to help identify such people, and a careful behavioral and clinical evaluation will be the best, albeit imperfect, guide. This situation could change in the future, however. Neuroscience research groups around the world are examining neural correlates of a remarkably broad range of human behavioral characteristics, including fear, emotional reactivity, and phobias. It is possible to anticipate an era of "personalized psychology"—roughly equivalent to the current movement toward "personalized" medicine—in which genetic, developmental, neural, and psychological traits can be profiled reliably for individual persons. With such scientific developments, subjectivization could become a real option in a number of areas of the law, although the wisdom of this option is highly questionable, as suggested above.

V. MITIGATION AT TRIAL

In all jurisdictions, a defendant charged with intentional murder may be convicted of the lesser crime of manslaughter under two common doctrines. Both are forms of partial excuse that frequently arise and are adjudicated at trial. Traditional doctrine mitigates *murder* to *manslaughter* if the defendant intentionally killed "in the heat of passion" that was provoked by the sort of provocation that would produce the heat of passion in the ordinary, reasonable person, and the killing takes place so close in time to the provocation that the ordinary reasonable person would not have been expected to "cool off" at that point. It does not mean that the reasonable person would kill. It means only that the reasonable person might have been provoked to that degree of rage or similar emotions for that period of time.

There is controversy about the best explanation for this doctrine, but the dominant explanation is that rage diminishes the defendant's capacity for rationality or capacity for self-control, and the rage was not the defendant's fault because an ordinary person might have been similarly provoked under the circumstances. In this case, the excuse is partial because loss of these capacities is considered insufficient for a complete excuse, and the defendant is at least partially responsible for not controlling the consequences of his strong emotion.

Similar to the excuse of duress, there is pressure to subjectivize the reasonable-person standard for provocation/passion and to ask whether a reasonable person with the characteristics of the accused would have been so

provoked. Such an approach is controversial, but in the discussion below, we will consider the potential contribution of neuroscience under either scenario: subjectivization or not.

The Model Penal Code's similar but more expansive doctrine than provocation/passion has been adopted by a small minority of states. According to this doctrine, the defendant accused of murder may be convicted only of manslaughter if the defendant killed in a state of extreme mental or emotional disturbance for which there is reasonable explanation or excuse. No provocation or lack of cooling time is required. Again, the rationale for the doctrine is that extreme mental or emotional disturbance compromises the defendant's capacity for rationality or for self-control. The questions are what will satisfy the requirement of "extreme mental or emotional disturbance" and what is meant by "reasonable explanation or excuse." There is interpretive controversy about both questions. The situations that would meet the criteria for the traditional provocation/passion mitigation doctrine will satisfy this test, too, but how much further does this test go? For example, serious mental disorder seems to be a mental or emotional disturbance, but can there be a "reasonable explanation or excuse" for mental disorder? Perhaps the best interpretation of the requirement is, again, that the defendant is not at fault for being in the emotionally or mentally disordered state that compromises his rationality.

a. The potential contributions of neuroscience

The potential contribution of neuroscience to traditional provocation/passion is limited because what counts as legally adequate provocation is a normative question, and present neuroscience is not likely to help decide the retrospective question of whether the defendant was in fact enraged when he killed. It is conceivable in the future that neuroscience might be able to contribute probative evidence concerning whether particular types of provocations were likely to enrage an individual defendant, but such a contribution is not possible today, and it is an open question whether neuroscientific techniques will be more accurate than behavioral measures.

If the reasonable person in provocation/passion doctrine is subjectivized, then, in principle, neuroscience might help us discover whether and how a particular type of defendant is predisposed to a rage reaction under various circumstances. Once again, however, this is beyond our current capabilities, but as noted in the section on duress, neuroscience might in the future assist in more individualized evaluation.

There is more promising neuroscience potential concerning the "extreme mental or emotional disturbance" test, which is more subjective. Common sense is less of a guide in such cases because there is no requirement of a provocation that would enrage ordinary people. Consequently, straightforward

inferences may be unavailable. Neuroscience might provide evidence about a particular defendant's abnormality or vulnerability that predisposed him to be in a state of disturbance even if there were no traditional provocation. Moreover (subject to the usual problems concerning retrospective judgments based on present-state evidence), neuroscience might help identify whether the defendant was in fact in a state of emotional disturbance. Again, such contributions are beyond current technology, but the potential probative power of neuroscience evidence seems clearer in this case than in cases of ordinary provocation/passion unless it is subjectivized to some degree.

C. Sentencing

I. MITIGATION AND AGGRAVATION

Diminished responsibility and future dangerousness or recidivism risk are two primary sentencing factors to which neuroscientific data may be relevant. The former involves a retrospective evaluation of the defendant's capacity for rationality and self-control at the time of the crime. Although such conditions may have been insufficient at trial to support a full excuse or doctrinal mitigation, a sentencing judge with discretion, or a jury in capital cases, may take them into account. These factors can be especially important at capital sentencing proceedings if they are linked to demonstrable neural or psychological abnormalities.

The question of "future dangerousness" involves a straightforward prediction. It can be an especially important factor in capital proceedings and is a statutory aggravating factor in a small number of jurisdictions. Because the defense has wide latitude in capital punishment proceedings, the defense could surely introduce evidence of diminished recidivism risk to try to avoid the death penalty.

Note that the same data that suggest that a defendant suffered from diminished rational or control capacity at the time of the crime may also suggest that the defendant will behave dangerously in the future. And, of course, a prediction can provide evidence of heightened and diminished risk. Thus, neurodata is a knife that may cut both ways in this context.

a. The potential contributions of neuroscience

The relation of neuroscience to claims concerning diminished responsibility is the same as those related to legal insanity, and many of the same considerations apply. Neuroscience might well provide converging evidence of allegedly abnormal behavioral capacities in cases in which the behavioral evidence is unclear. At present, the ability to do this is tenuous, but future discoveries might alter that conclusion.

As in the case of legal insanity, however, it is important not to make the error of believing that an apparent structural or functional brain abnormality necessarily means that the defendant's rational or control capacities were diminished. At present, brain abnormalities or their lack can only provide convergent evidence and cannot stand on their own as indicators that rational and control capacities were abnormal. Advocates often use an alleged brain abnormality as per se indications of reduced responsibility, especially in capital cases, but as subsection 4 above demonstrates, this is an error that should be resisted. The criteria for diminished responsibility are behavioral, not neurological, so the neuroevidence at most furnishes additional reason to believe that a defendant was or was not sufficiently impaired to deserve mitigation.

At present, there are numerous forms of behavior-based mechanical (actuarial, statistical) and semi-structured clinical techniques for predicting future dangerousness. Even the best-validated among them applied to high-risk categories of offenders are only mildly accurate, and, in general, it is difficult accurately to predict low base-rate (low frequency) behaviors such as homicide or rape. It would therefore be useful if more precisely accurate techniques for prediction were available, but at present there is only one "proof of concept" prospective study of a neuromarker for future violence, but it is not sufficiently validated to permit proper legal use¹⁶. Neurodata are not generally probative at present, and using them risks introducing prejudice and confusion. In the future, good studies might reveal neuromarkers that sufficiently increase accuracy to justify their use on a cost-benefit basis, but such data are not yet available.

II. DIVERSION

It is increasingly common in the United States for courts of general criminal jurisdiction or for specialized drug or mental health courts to divert criminals charged with nonviolent crimes to treatment programs in lieu of criminal justice resolution or as a component of the criminal sentence. In essence, these courts use the threat of criminal conviction and punishment to give nonviolent offenders an incentive to undergo drug or mental health treatment that they would not otherwise accept. Such programs or specialized courts exist only for nonviolent addicts and people with mental disorders, but, in principle, such diversionary programs could be applied to violent offenders generally or to any group of offenders with some type of abnormality who might be rehabilitated without sentencing the offender to jail or prison.

Although the Supreme Court has never ruled on the constitutionality of using such criminal justice "leverage" to impose unwanted treatment, and there are reasons to question its fairness, it seems clear that the practice is constitutionally acceptable. The present data are unclear, but it is reasonable to

assume that effective imposed treatment can reduce recidivism and save costs generally.

The question for the law is how to use such leverage most effectively. Not all "divertible" defendants will be equally responsive to treatment or equally likely to recidivate with or without treatment. It would be extremely useful to be able to predict accurately who are the best candidates for diversion because they are the most treatable and least likely to recidivate.

a. The potential contributions of neuroscience

At present there is a paucity of neuroscience data that might indicate which individuals are most treatable by which methods and who is likely to recidivate. There are some suggestive data about treatment, but nothing sufficiently well validated to justify its use in making criminal justice decisions that affect liberty.

If neurotechniques for assessing treatment-responsiveness and future risk are developed, however, they will help the criminal justice system decide when it is cost-beneficial to divert a particular offender to a program that bypasses imprisonment.

III. INVOLUNTARY QUASI-CRIMINAL COMMITMENT

In our legal system, a responsible person may not be incarcerated for dangerousness alone, but a person who is not responsible and dangerous may be involuntarily committed to a hospital if the person suffers from some form of mental abnormality.

In two decisions, *Kansas v. Hendricks*¹⁷ and *Kansas v. Crane*,¹⁸ the United States Supreme Court has approved as constitutionally acceptable a specific type of criminal justice-related form of civil commitment for so-called mentally abnormal, sexually violent predators. Such people may be committed if the state can prove the following: (1) a sexual criminal charge or conviction; (2) mental abnormality; (3) a prediction of future dangerousness; and (4) "serious difficulty" controlling behavior. The definition of *mental abnormality* adopted by many jurisdictions and approved by the Supreme Court is *not* an accepted criterion for psychiatric or psychological disorders. The Court did not provide criteria for "serious difficulty" controlling oneself, and lower courts addressing this issue have not done so, either.

This type of commitment may be imposed *after* the "predator" has completed a prison term for a sexual offense for which the predator was found responsible and subjected to imprisonment. These commitments are constitutionally justifiable even if a particular inmate is untreatable or if treatment is not the primary reason for the commitment. These commitments have been vigorously criticized by professional organizations, civil-libertarian lawyers,

and others, but they are constitutional, and a substantial minority of states has adopted them.

a. The potential contributions of neuroscience

Neuroscience might potentially be relevant concerning whether the subject is mentally abnormal, has “serious difficulty controlling himself” and whether he will be at high risk for engaging in future predation. As we have seen in the section on legal insanity, at present there are no valid neuromarkers for psychiatric disorders. Moreover, because the definition of “mental abnormality” is frequently different from psychiatric criteria, even potentially valid neuro markers of accepted disorders may not be probative. Neuroscience currently lacks valid techniques for determining whether an individual has inadequate control capacities, but brain findings associated with executive capacity dysfunction or similar types of incapacities might provide helpful convergent evidence, especially if increasingly sophisticated neuroscientific understanding of control capacity develops, as it surely will.

The potential use of neuroscience for predicting dangerous future behavior among this population is the same as its potential use for sentencing generally. At present, there is no general, valid neuromarker to increase the accuracy of dangerousness predictions, and using neurodata risks introducing prejudice and confusion. Future research might change that assessment, but for now decision makers are limited to current, behaviorally-based, scientific and clinical techniques.

There is also a specific, potential use of neuroscience. If it were to be determined that having particular sexual desires of sufficient intensity were predictive of future recidivism, and neuroscientific techniques could help confirm that a person had the requisite desires of sufficient intensity, then neuroscientific data would help accurately predict future specifically sexual recidivism. At present there are controversial psychophysical measures for addressing these questions, and perhaps neuroscience will produce an advance. Whether it will is an open empirical question.

7. CRIMINAL COMPETENCE

All criminal competencies—competence to stand trial, competence to plead guilty, competence to represent oneself, competence to be sentenced, competence of a prisoner to refuse mental health or medical treatment, and competence to be executed—are functional, current-mental-state questions. The question is always whether *at present* the person is capable of understanding or acting in ways the law requires to treat the person as competent. We will not discuss each competence standard because the issue is the same in

all cases: Are the behavioral, functional criteria met. In most cases, the core will be the person’s capacity to rationally understand his situation or to act rationally.

In most cases, mental disorder or developmental disability (retardation) will be the primary reason that people are judged not competent, but the presence of mental disorder or developmental disability alone is insufficient to render the person incompetent. The lack of relevant functional abilities, such as the ability to understand the nature of the proceedings and the charges, must also be found. The criteria are written as relatively vague standards rather than as bright-line rules. How much understanding is sufficient will allow for subjectivity in judgment. Most often, however, competence proceedings are not fully adversarial, or not adversarial at all. The judge or administrative panel with the jurisdiction to decide routinely accepts the conclusion of the evaluator, who is almost always a state employee or paid by the state. In virtually all cases, the standards for the criminal competence in question are in practice quite low, however the criteria are written.

A clinical evaluation, usually by a psychologist or a psychiatrist, is the traditional method of assessing whether a person is incompetent. The clinician typically evaluates both whether the person suffers from an abnormality and whether the requisite functional abilities are present. In some cases, specific behavioral tests based on legal criteria have been developed to help the clinician evaluate whether the person meets the functional standards for competence. In many cases, there will be strategic reasons for a defendant to fake incompetence or for the prosecution improperly to allege that a defendant is incompetent. Thus, it would be helpful to have robustly valid measures for evaluating whether a person is genuinely incompetent.

A. The Potential Contributions of Neuroscience

At present there is no neurodiagnostic technique sufficiently accurate to be used to diagnose mental disorder or developmental disability, and no study has validly used neuroscientific data to assess any form of criminal competence. Neuroscientific advances may soon enable neuroimaging methods to diagnose mental abnormality reliably, but at present they cannot do so, including assessing whether a subject is malingering. At most, neuroscientific data can furnish suggestive evidence that may aid the determination of whether the person is genuinely suffering from a mental abnormality.

Furthermore, until studies demonstrate that neuroscientific techniques can reliably assess the functional disabilities that compromise competence, neuroscience is not relevant and probative concerning the functional standards of the various criminal competences. Its use in this context will therefore not

be probative and will waste scant resources. Again, future neuroscientific advances might justify more optimism than the current situation warrants.

NOTES

1. Miller, G.A. (2010). Mistreating psychology in the decades of the brain. *Perspectives on Psychological Science*, 5, 716–743.
2. For a more complete analysis of the framework in this subsection and of the materials in the next subsection, see, Morse, S. (2011). Lost in translation?: An essay on law and neuroscience. In M. Freeman (Ed.), *Law and Neuroscience* (pp. 529–562). Oxford: Oxford University Press.
3. Caspi, A., McClay, J., Moffitt, T., Mill, J., Martin, J., Craig, I., Taylor, A., & Poulton, R. (2002). Role of genotype in the cycle of violence in maltreated children. *Science*, 297, 851–854.
4. McHugh, P., & Slavney, P. (1998). *The Perspectives of Psychiatry* (2nd ed.). Baltimore: Johns Hopkins University Press.
5. Greene, J., & Cohen, J. (2006). For the law, neuroscience changes nothing and everything. In S. Zeki & O. Goodenough (Eds.), *Law and the Brain* (pp. 207–226). Oxford: Oxford University Press.
6. We use the vague phrase “establish an affirmative defense” to signal that the Constitution grants jurisdictions considerable leeway concerning which party bears the burden of persuasion for affirmative defenses and at what level of burden.
7. *Lockett v. Ohio*, 438 U.S. 506 (1978).
8. Frances, A. (2009). Whither DSM-V? *The British Journal of Psychiatry*, 195, 391–392.
9. Delgado-Escueta, A.V., Mattson, R.H., King, L., Goldensohn, E.S., Spiegel, H., Madsen, J., Crandall, P., Dreifuss, F., & Porter, R.J. (2002). The nature of aggression during epileptic seizures. *Epilepsy and Behavior*, 3, 550–556.
10. Delgado-Escueta, A.V., Mattson, R.H., King, L., Goldensohn, E.S., Spiegel, H., Madsen, J., Crandall, P., Dreifuss, F., & Porter, R.J. (2002). The nature of aggression during epileptic seizures. *Epilepsy and Behavior*, 3, 550–556.
11. American Law Institute, MODEL PENAL CODE AND COMMENTARIES §2.02 (1985).
12. *Clark v. Arizona*, 548 U.S. 735 (2006).
13. *Montana v. Egelhoff*, 518 U.S. 37 (1996).
14. See, e.g., Illes, J., Kirschen, M.P., Edwards, E., Stanford, L.R., Bandettini, P., Cho, M.K., Ford, P.J., Glover, G.H., Kulynych, J., Macklin, R., Michael, D.B., & Wolf, S.M. (2006). Incidental findings in brain imaging research: What should happen when a researcher sees a potential health problem in a brain scan from a research subject? *Science*, 311, 783–784.; Wolf S.M., Lawrenz F.P., Nelson C.A., Kahn J.P., Cho M.K., Clayton E.W., Wilfond B.S. (2008). Managing incidental findings in human subjects research: Analysis and recommendations. *The Journal of Law, Medicine & Ethics*, 36, 219–248.
15. Barkley R.A., & Murphy K.R. (2010). Impairment in occupational functioning and adult ADHD: The predictive utility of executive function (EF) ratings versus EF tests. *Archives of Clinical Neuropsychology*, 25, 157–173.
16. See, Aharoni, E., Vincent, G.M., Harenski, C.L., Calhoun, V.D., Sinnott-Armstrong, W., Gazzaniga, M.S., & Kiehl, Kent, A. (2013). Neuropredictions of future rearrest, available at www.pnas.org/cgi/doi/10.1073/pnas.1219302110.
17. *Kansas v. Hendricks*, 521 U.S. 346 (1997).
18. *Kansas v. Crane*, 534 U.S. 407(2002).