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Neuroscience in Forensic Contexts: Ethical Concerns

Stephen J. Morse
University of Pennsylvania Law School

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Stephen J. Morse, J.D. Ph.D.

Stephen J. Morse, J.D., Ph.D. is Ferdinand Wakeman Hubbell Professor of Law, Professor of Psychology and Law in Psychiatry, and Associate Director of the Center for Neuroscience and Society at the University of Pennsylvania.

Introduction

This chapter uses the term "neuroscience" to refer to brain imaging in individual cases, especially using non-invasive techniques such as structural and functional magnetic resonance imaging (MRI and fMRI, respectively) and to reliance on studies about the relation between the brain and behavior that use non-invasive imaging. The issue is whether the use of these newer techniques and the data from studies employing them raise new ethical issues for forensic psychiatrists and psychologists. The implicit thesis throughout is that if the legal questions, the limits of the new techniques and the relevance of neuroscience to law are properly understood, no new ethical issues are raised. A major ethical lapse would occur if practitioners use neuroscience without the proper understanding.

Brain imaging and neuropsychological methods have always been admissible in personal injury or malpractice suits to answer questions about brain injuries and lesions that are typically medically well-characterized. In such cases, the image or test data is directly relevant to the question of whether the plaintiff had an injury or lesion. This is the forensic use of the old neurology, neuropsychology and neuroradiology and this chapter does not address the ethical issues in such cases.[1] Instead, it addresses the question of the relevance of the newer techniques of brain imaging to forensic legal criteria that are behavioral, that is, that require evaluation of a subject's mental states and actions. For examples, did a defendant charged with homicide kill the victim intentionally, or is the defendant competent to stand trial. In these cases, the imaging will be inferentially relevant.

I begin with brief discussion of the legal standard for the admissibility of scientific and technical evidence. Then I turn to the proper understanding of legal questions to guide forensic work. I will use examples from the criminal law, but the analysis generalizes to behavioral criteria in the civil law, such as whether a person is competent to contract or whether a decedent was competent to make a valid will. The next section considers the current

[1] Neuroradiologists have published an analysis of the ethical issues for that specialty with recommendations based on a consensus conference held at Emory University in 2013 (Meltzer et al. 2014). Full disclosure: the author of this chapter was one of the participants at the conference.

state of cognitive, affective and social neuroscience, which will be most relevant to law. I will assume in this section that the research design (where relevant) was appropriate, the image was acquired properly, and the analysis was sound. It is of course true that some expert testimony does not meet this standard, even if it is improperly admitted. Nonetheless, I shall ignore that problem and focus instead on what I consider the greater problem: the general limits of current neuroscience.

The following section uses the analysis of the preceding two sections to address the question of legal relevance. In short, the question is, "How, precisely, does the proffered scan or data based on scanning answer the specific legal question it supposedly helps answer?" I term this the problem of "translation." I conclude that, at present, brain imaging has little relevance to behavioral legal criteria. The primary exception is cases in which the subject has a well-characterized brain abnormality, such as epilepsy, that may be probative of a legal question, such as whether a criminal defendant's harmful bodily movements were "acts" as the criminal law defines action. This section also reports the findings of five recent studies that investigated the reception of neuroscience in criminal cases in four countries. The conclusion that follows addresses the ethical issues

directly, and takes note of the rampant disorder, Brain Overclaim Syndrome, and offers a remedy.

Brief Legal Preliminaries

Forensic practitioners understand that expert opinion and testimony are needed when the subject matter is beyond the ken of the ordinary lay person's understanding. Whether the testimony will be admissible will be decided according to the applicable rules for scientific and technical evidence in force in a jurisdiction. In general, testimony will be admissible if the scientific or technical methods and data being proffered are scientifically and technically valid and have been reliably applied to the facts of the case and if the testimony is legally relevant. Legal relevance is judged by whether the evidence makes a legally determinative fact more or less probative than it would be without the evidence. Even if evidence meets this standard, a judge typically has the power to exclude it if the testimony's probative value would be outweighed by the dangers of it causing unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence (e.g., Federal Rules of Evidence, Sec. 403, which has been adopted by a majority of states). All these considerations will apply to evidence based on neuroscience.

Experts are also expected to adhere to the ethical standards of their discipline, but typically this is raised only if there is a substantial breach that casts doubt on the integrity of the process and its outcome. Otherwise, such matters are left to the disciplinary standards and procedures of the profession involved. Perhaps the most extreme example of the difference between legal and professional response to misconduct occurred in *Barefoot v. Estelle* (1983), in which the Supreme Court was asked to decide if in a capital punishment proceeding a psychiatrist's opinion about future dangerousness based on hypothetical questions and no personal evaluation violated due process. The psychiatrist, an infamous Dallas doctor named John Grigson had testified in a large number of capital cases that the convict was certain to kill again if not executed, which was his testimony in this case. The jury sentenced Barefoot to death. The American Psychiatric Association and others all supported petitioner, Barefoot, and considered this "expert" opinion utterly unjustified as a matter of psychiatric expertise. The Supreme Court nonetheless held that admitting the testimony did not violate due process and that any deficiencies in it were matters of weight that could be tested with cross-examination. Grigson was reprimanded twice and finally expelled from the American Psychiatric Association, but he never lost his

medical license and continued doing forensic work until he retired. Thomas Barefoot was executed.

The Law's Psychology and Legal Criteria

The law's psychology is folk psychology. When I write about the law's psychology, I am not claiming that there is a reified anthropomorphic entity, "The Law," that has somehow officially adopted a psychology. I am offering a goodness of fit interpretation of legal doctrine and practice. Folk psychology is an explanatory causal theory that explains human behavior in part using mental state variables, such as desires, beliefs, plans, and intentions. For example, part of the explanation for why you are reading this chapter is, roughly, that you desire to learn more about the subject to improve your forensic work; you believe that reading it will achieve that goal, and, therefore, you formed the intent to read it and are doing so. This is a practical syllogism, not a deductive one. Of course, this is only a partial explanation. A full explanation would be multifield/multilevel, using variables from biology at various levels, other psychological variables, and sociological variables. Folk psychological theorists may differ about mental state categories and how they should be individuated, but all agree that mental states are part of the explanation of human behavior. Folk psychology does not insist that the causal mental variables must be conscious and that every

action is preceded by a practical syllogism of the type used earlier. It simply claims that mental states are consciously causal or rationalize actions, including mental state actions, that may not have been preceded by conscious causal thought.

Many scientists think that folk psychology is primitive or false. I and many others, including those who are expert in the science and philosophy of mind and action (e.g. Fodor 1987), think the critics are wrong. For now, however, we do not have to resolve this question because we are simply providing a descriptive account of the law as it is, not a prescriptive account of the law as some scientists or others might prefer it to be. People may be critical of the law's underlying assumptions and policies based on them, but no legally sophisticated commentator would deny that the account provided is accurate.

Existing legal criteria for responsibility and competence are completely folk psychological—actions and mental states. Again, no legally sophisticated commentator would disagree, and, at some level, every practicing forensic practitioner knows this. Nonetheless, it is so familiar that it is easy to forget, but doing so is perilous because then one runs the risk of doing irrelevant or misleading forensic work. There are no brain or other biological criteria in any of the criminal and civil law contexts in which

forensic practitioners work. For example, competence to stand trial requires that the defendant has a rational understanding of the charges and proceedings and is able rationally to assist counsel. These are criteria about the defendant's level of understanding—a mental state issue—and about his ability rationally to communicate with and otherwise work effectively with counsel—action and mental state criteria. The standard is entirely behaviorally functional. An insanity defense obtains if a mental disorder results in a defendant's inability to know right from wrong. The mental disorder criterion is itself proved behaviorally by considering the defendant's cognition, mood and other mental state variables. As is well known, there is no imaging test sensitive enough yet to diagnose mental disorder, including major mental disorder. I might also add in passing that the mental disorder criterion in any legal doctrine is a legal test and not a biological, psychiatric or psychological test. Knowing right from wrong is a mental state issue.

Now let us briefly address some issues that are often misunderstood by non-lawyers (and sometimes even by lawyers, who should know better!). Metaphysical, libertarian free will, the ability to act uncaused by anything other than one's own agency, is not a criterion for any legal doctrine and it is not even foundational for any part of the law (Morse 2007). Causation, whether by biological, psychological, sociological, or some combination of

variables, is not per se an excusing or mitigating condition in law. All behavior is caused in a causal universe. If causation per se were an excuse, everyone would always be excused. Many people think that this is correct, but it is not the law we have, which excuses some people but finds most people responsible and competent. All action is caused, but not all action is excused. Causation only excuses if it produces a genuine excusing condition, such as lack of rational capacity, but in that case, it is the lack of rational capacity, a behavioral criterion, that is doing the excusing work. Causation is not the equivalent of compulsion, which can be an excusing condition. If all caused behavior were compelled, then all behavior would be compelled and everyone would always be excused. But it is clear that not everyone is compelled all the time. Presumably no one is compelling you in any ordinary sense of the term to read this chapter, say, by threatening you with death if you do not read it. Finally, predictability is also not an excusing condition. Much of our behavior is completely predictable by ourselves and others, but unless some simultaneous, genuine excusing condition exists when we act predictably, we are responsible for our predictable behavior.

When considering the relation between the data from any other field to legal questions, it is crucial to understand the question under consideration. Unless, it is understood, it will be difficult to properly apply the other data to

it. And that is what forensic psychiatrists and psychologists do for a living. They use their specialty methods and data to help answer a legal question. Whether they use the result of a diagnostic interview, a rating scale, a psychological test, or a brain scan, they are trying to relate their expert knowledge to the legal issue at stake. After examining the state of legally-relevant current neuroscience, in a later section we will turn specifically to the relevance of the new neuroscience to the practice of forensic psychiatry and psychology.

The Status of Current New Neuroscience

Most generally, 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, how consciousness is produced, and how action is possible (Adolphs 2015, 175; McHugh and Slavney 1998, 11–12). The brain-mind-action relation is a mystery not because it is inherently not subject to scientific explanation, but because the problem is so difficult. 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. 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, sec. 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. Wittgenstein's question cannot be answered yet.

Despite the astonishing advances in neuroimaging and other neuroscientific methods—especially in understanding systems such as vision and memory, for example—we still do not have sophisticated causal knowledge of how the brain works generally, and we have little information that is directly or even indirectly morally or legally relevant. The scientific problems are fearsomely difficult. Only in the present century have researchers begun to accumulate much data from fMRI imaging. New methodological problems are constantly being discovered (e.g., Bennett, Wolford, and Miller 2009; Button et al. 2013; Eklund, Nichols, and Knutsson 2016; Vul, Harris, Winkielman, and Pashler 2009; but see Lieberman, Berkman, and Wager 2009, for a contrary view). This is not surprising, given how new the science is. Moreover, although there are good studies of the neural correlates of legal decision-making, virtually no studies have been performed to address specifically legally-relevant questions that

would be relevant to practitioners and policy-makers. Law and forensic psychiatry and psychology should not expect too much of a young science that uses new technologies to investigate some of the most intrinsically difficult problems in science and that does not directly address questions of normative interest. Caution is warranted, although many would think the argument of this chapter is too cautious.

Furthermore, 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 (Frances 2009; Morse and Newsome 2013, 150, 159–160, 167). Many studies do find differences between patients with mental disorders and controls, but the differences are too small to be used diagnostically, and publication bias may have inflated the number of such positive studies (Ioannidis 2011). There are limited exceptions for some genetic disorders that are diagnosed using genomic information or some well-characterized neurological disorders such as epilepsy that is definitively diagnosed using electroencephalography (EEG), but these are not the types of techniques that are central to the new neuroscience based primarily on imaging. Indeed, when the American Psychiatric Association published its most recent version of the authoritative *Diagnostic and Statistical Manual of Mental Disorders*, *Fifth Edition* (DSM-

5) in 2013, it conceded that no validated neurological diagnostic markers for major mental disorders such as schizophrenia and major affective disorder had been identified. Nothing has changed since then (Rego 2016, who also claims that dementias may be an exception.)

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, for example, a criminal defendant's rational and control capacities and their impact on criminal behavior. Some legal questions, such as whether a defendant is competent and what the agent will do in the future, depend on current rather than retrospective evaluation of the agent. Such evaluations will be easier than retrospective evaluation. Nonetheless, both types of evaluation will depend on the existence of adequate neuroscience to aid such evaluations. With the exception of a few well-characterized medical disorders, such as epilepsy, we currently lack such science (Morse and Newsome 2013), but future research may provide the necessary data.

Let us consider the specific grounds for modesty about the current achievements of cognitive, affective, and social neuroscience, the sub-disciplines most relevant to forensic psychiatry and psychology. fMRI is still

a rather blunt instrument to measure brain functioning. It measures the amount of oxygenated blood that is flowing to a specific region of the brain (the blood oxygen dependent level [BOLD] signal), which is a proxy for the amount of neural activation that is occurring in that region above or below baseline activation (the brain is always and everywhere physiologically active). There is good reason to believe that the BOLD signal is a good proxy, but it is only a proxy. The time lag between alleged activation and measurement and its spatial resolution are less than optimal (Roskies 2013). These difficulties will surely be ameliorated by technological advances, but studies to date, especially if they used lower power scanners, do suffer from these limitations.

There are research design difficulties. It is extraordinarily difficult to control for all conceivable artifacts; that is, other variables that may also produce a similar result. The same region of interest (ROI) may produce opposite behaviors, which also confounds inferences.

At present, most neuroscience studies on human beings involve small numbers of subjects, which makes it difficult to achieve statistically significant results and which undermines the validity of significant findings (Button et al. 2013; Szucs and Ioannidis 2016). This phenomenon will change as the cost of scanning decreases and future studies will have more

statistical power, but this is still a major problem. Most of the studies in cognitive, affective, and social neuroscience have been done on college and university students who are hardly a random sample of the population generally.

Many of the studies use other animals, such as rats or primates, as subjects. Although the complexity and operation of the neural structure and function of other animals may be on a continuum with those of human beings and there may be complete similarity at some level, there is reason to question the applicability of the neuroscience of behavior of other animals to humans. The human brain is capable of language and rationality, which mark an immense difference between humans and other animals. To the best of our knowledge, other animals do not act for and are not responsive to reasons in the full-blown sense that intact human beings are. Is so-called altruistic behavior in orangutans, for example, the same as altruistic behavior in humans? Although the point should not be overstated, we should be cautious about extrapolating to human action from the neuroscience of the behavior of other animals.

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. This leads to a more general problem about the

applicability of group data to an individual subject, a problem called *G2i* for "group to individual" (Faigman, Monahan, and Slobogin 2014). Scientists are interested in how the world works and produce general information. Law is often concerned with individual cases, and it is difficult to know how properly to apply relevant group data. For example, a neuroscience study that reports increased activation in some ROI bases its conclusion on averaging the activation across all the subjects, but no subject's brain may have activated precisely in the area identified. If such group data are permitted, as they now are for functions such as predictions, the question is how to use probabilistic data to answer what is often a binary question, such as whether to release a prisoner to parole because he is deemed no longer a danger to society. This is a topic under intensive investigation at present, and I assume progress will be made. The forensic practitioner presenting group data must understand that this is a fraught, complicated topic.

A serious question is whether findings based on subjects' behavior and brain activity in a scanner would apply to real-world situations. This is known as the problem of "ecological validity." Does a subject's performance in a laboratory while being scanned on an executive function task that *inter alia* allegedly measures the ability to control impulses really predict that person's ability to resist criminal offending, for example?

Replications are few, which is especially important for any discipline, such as law, that has public policy implications and often immense consequences in individual cases (Chin 2014). 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 (Ioannidis 2011) and reproducibility skepticism (Chin 2014; Open Science Collaboration 2015; but see, Gilbert, King, Pettigrew, and Wilson 2016 for a critique of the Open Science Collaboration paper that concludes that the point is not proven). Indeed, replications are so few in this young science and the power is so low that one should be wary of the ultimate validity of many results. Indeed, a recent analysis by Szucs and Ioannidis (2016) suggests that more than 50 percent of cognitive neuroscience studies may be invalid and not reproducible. Drawing extended inferences from findings is especially unwarranted at present. If there are numerous studies of various types that seem valid, all converge on a similar finding, and there is theoretical reason to believe they should be consistent, then lack of replication of any one of them may not present such a large problem. The congruence of behavioral science and anatomical imaging studies showing an average difference between

adolescence and young adults is a good example. But such examples are at present few, especially in legally-relevant neuroscience.[2]

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 (Miller 2010). What is being investigated is an association between a condition or a task in the scanner and brain activity. These studies do not demonstrate that the brain activity is a sensitive diagnostic marker for the condition being investigated or either a necessary, sufficient, or predisposing causal condition for the behavioral task that is being performed 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) or if the investigator is able experimentally to temporarily disable some ROI, as has been done in some studies.

[2] These data were cited by the United States Supreme Court in the "juvenile trilogy" of Roper v. Simmons (2005; although this case cited only to behavioral science), Graham v. Florida (2010) and Miller v. Alabama (2012) to argue that adolescents are generally less responsible than adults.

Law and forensic psychiatry and psychology are concerned with human mental states and actions. What is the relevance of neuroscientific evidence to decision-making concerning human behavior? If the behavioral data are not clear, then the potential contribution of neuroscience is large. Unfortunately, it is in just such cases that neuroscience at present is not likely to be of much help. I term the reason for this the "clear-cut" problem (Morse 2011), and it is a major difficulty. Virtually all neuroscience studies of potential interest to the law involve some behavior that has already been identified as of interest, and the point of the study is to identify that behavior's neural correlates. Neuroscientists do not go on general "fishing" expeditions (but see Bennett, Baird, Miller, and Wolford 2009, for an amusing exception). There is usually some bit of behavior—such as addiction, schizophrenia, or impulsivity—that investigators would like to understand better by investigating its neural correlates. To do this properly presupposes that the researchers have already well-characterized and validated the behavior under neuroscientific investigation. Cognitive, social, and affective neuroscience are inevitably embedded in a matrix involving allied sciences, such as cognitive science and psychology. Thus, neurodata can very seldom be more valid than the behavior with which it is correlated. In such cases, the neural markers might be quite sensitive to the already

clearly identified behaviors precisely because the behavior is so clear. Less clear behavior is simply not studied, or the overlap in data about less clear behavior is greater between experimental and comparison subjects. Thus, the neural markers of clear cases will provide little guidance to resolve behaviorally ambiguous cases of relevant behavior, and they are unnecessary if the behavior is sufficiently clear. It is in unclear, "gray area" cases that forensic practitioners and the law need help the most, but it is in precisely these cases, alas, that the neuroscience is least helpful.

On occasion, the neuroscience might suggest that the behavior is not well-characterized or is neurally indistinguishable from other, seemingly different behavior. In general, however, the existence of relevant behavior will already be apparent before the neuroscientific investigation is begun. For example, some people are grossly out of touch with reality. If, as a result, they do not understand right from wrong, we excuse them because they lack such knowledge. We might learn a great deal about the neural correlates of such psychological abnormalities. But we already knew without neuroscientific data that these abnormalities existed, and we had a firm view of their legal significance. In the future, however, we may learn more about the causal link between the brain and behavior, and studies may be devised that are more directly legally relevant. Indeed, my best hope is that

neuroscience and law will each richly inform the other and perhaps help reach what I term a conceptual-empirical equilibrium in some areas. I suspect that we are unlikely to make substantial progress with neural assessment of mental content, but we are likely to learn more about capacities that will bear on excuse or mitigation.

Here is an example of the current limitations of neuroscience for legal conclusions. A neuroscientist and I reviewed all the behavioral neuroscience that might possibly be relevant to criminal law adjudication and policy. With the exception of a few already well-characterized medical conditions, such as epilepsy, our review found virtually no solid neuroscience findings that were yet relevant (Morse and Newsome 2013). Similar conclusions were reached after reviews of "brain reading" studies, such as "neural lie detection" (Greely 2013) and the addictions (Husak and Murphy 2013). These conclusions are unsurprising. Behavioral neuroscience is a new discipline that is working on problems of immense conceptual and scientific complexity. Future conceptual and technological advances will certainly improve our knowledge base, but, for now, modesty is in order about what neuroscience can teach us that is relevant to adjudication, legal policy-making, and the practice of forensic psychiatry and psychology. This is sobering news, but the good news is that it means that for the foreseeable

future, forensic psychiatry and psychology will be essential to help law understand the acting human being who is the subject of legal interest (Morse 2015). Neuroscience will not supplant these specialties.

The Problem of Legal Relevance: Lost in Translation?

Let us begin this section with an observation that will always be germane even if neuroscience makes huge leaps forward. Neuroscience is a purely mechanistic science. Neurons, neural networks, and the connectome do not have reasons. They have no aspirations, no sense of past, present, and future. These are properties of agents, of acting human beings. Ethics and law are addressed to agents. Thus, there will always be a problem of translation between the pure mechanism of neuroscience and the folk psychology of law. Neuroscience eschews folk-psychological concepts and discourse. Thus, the gap will be harder to bridge. Paradoxically, however, neuroscientists frequently write dualistically by suggesting that regions of the brain are little homunculi that do things and that there seems to be a struggle between the self and the brain as an independent agent (Mudrik and Maoz 2014). The translation problem is thus a much greater problem for neuroscience than for psychiatry and psychology. The latter sometimes treat people as mechanisms but also treat them as agents. Consequently, they are

in part folk psychological, and the translation will be easier. It is the task of forensic practitioners always to explain precisely how neuroscientific findings, assuming that they are valid, are relevant to an ethical or legal issue. No hand waving is allowed.

The brain does enable the mind (even if we do not know how this occurs). Therefore, the facts we learn about brains in general or about a specific brain could in principle provide useful information about mental states and about human capacities in general and in specific cases. Some believe that this conclusion is entirely or largely a category error (Bennett and Hacker 2003; Pardo and Patterson 2013). This is a plausible view, and perhaps it is correct. If it is, then the whole subject of this chapter is empty, and there was no point writing it. Let us therefore bracket this pessimistic view and determine what follows from the more optimistic position that what we learn about the brain and nervous system can be potentially helpful to resolving questions of criminal responsibility and other legal issues if the findings are properly translated into the law's folk psychological framework.

The question is whether some concededly valid neuroscience is legally relevant because it makes a proposition about responsibility or competence more or less likely to be true. Biological variables, including abnormal biological variables, do not per se answer any legal question because the law's

criteria are not biological. For instance, even a biological abnormality that seems causally related to criminal behavior does not per se establish that the defendant was not rational or could not control himself. The famous case of Mr. Oft, whose right orbital frontal tumor caused pedophilic desires that were then acted on, is a perfect example (Burns and Swerdlow 2003; see Morse 2011, for an analysis of this case). For another example, even if criminal behavior is a sign of an established disorder, it does not follow that the defendant must be mitigated or excused. Any legal criterion, such as lack of rational or control capacity, must be established independently, and biological evidence must be translated into the criminal law's folk-psychological criteria. That is, the advocate for using the data must be able to explain precisely how, for example, the neurodata bear on whether the agent acted, formed the required *mens rea*, or met the criteria for an excusing or mitigating condition. In the context of civil and criminal competence evaluations, the forensic practitioner must explain precisely how the neuroevidence bears on whether the subject was capable of meeting the law's functional criteria.

If the evidence is not directly relevant, the advocate should be able to explain the chain of inference from the indirect evidence to the law's criteria. At present, few such data exist that could be the basis of such an inferential chain of reasoning (Morse and Newsome 2013), but neuroscience is

advancing so rapidly that such data may exist in the near or medium term.

Even if neuroscience does seem relevant to a legal issue, the concerns with prejudice, cumulation and the other issues the rules of evidence, such as Federal Rule 403, raise must be considered. The common wisdom about imaging data was that it was prejudicial compared to other, equally valid sources of evidence, such as purely verbal expert testimony or psychological testing, That is, juries were likely to give brain images undue weight. More recent, better designed studies have disclosed that this worry appears unjustified. With limited exceptions, decision makers do not give undue weight to imaging data. (Roskies 2013; Schweitzer et al. 2011). The issue is not resolved empirically yet, but the default must be that the evidence is not prejudicial.

The more pressing concern is the value-added of imaging. A scan is relatively expensive and somewhat time consuming. It thus has the potential for waste and delay unless there is genuine value-added. More important, legally relevant neuroimages must be based on good prior behavioral science that identifies clearly the behavior to which the brain structure or function will be correlated. This raises the problem of cumulation. For example, studies of the anatomical abnormalities associated with schizophrenia must have clearly identified whether the subjects in fact met the diagnostic criteria for the

disorder using behavioral criteria to make the diagnosis. Thus, we already knew behaviorally that the person suffered from schizophrenia. What does the scan add? For another example, the law has treated adolescents differently from adults for centuries based on undoubted average behavioral differences between adolescents and adults. Recall that the criteria for responsibility are behavioral. What does the diffusion tensor imaging (DTI) scanning data about incomplete myelination and pruning in adolescence add to what we already knew? It is potentially causal information and it is comforting that the brain data are consistent with the behavioral data. But the latter were already clear. After all, we have had a juvenile court system for over a hundred years and the common law had an immaturity defense for centuries. It is unsurprising in light of the behavioral differences that there are brain differences, but would we believe adolescents are not behaviorally different if the current brain imaging data did not show a difference? Thus, in individual cases where the behavior is clear, the imaging data will be cumulative and unnecessary.

But, might not neuroscience be especially helpful in cases in which the behavioral evidence is unclear? The answer in principle is that of course it would be helpful, but as a practical matter it will not be because the neurodata is based on correlations with clear behavioral data. The “clear cut” issue

identified in the previous section is the major stumbling block. Where the behavior is unclear, the neurodata will not be sufficiently sensitive to help resolve the behavioral issue even if the neurodata can distinguish the already behaviorally clear cases. These types of problems might be remedied by future advances in neuroscience, but such breakthroughs do not appear on the horizon yet.

A final point about the translation problem is that actions speak louder than images with very few exceptions. The law's criteria are behavioral—actions and mental states. If the finding of any test or measurement of behavior is contradicted by actual behavioral evidence, then we must believe the behavioral evidence because it is more direct and probative of the law's behavioral criteria. For example, if an agent behaves rationally in a wide variety of circumstances, the agent is rational even if his or her brain appears structurally or functionally abnormal. We confidently knew that some people were behaviorally abnormal—such as being psychotic—long before there were any psychological or neurological tests for such abnormalities. In contrast, if the agent is clearly psychotic, then a potentially legally-relevant rationality problem exists even if the agent's brain looks entirely normal.

An analogy from physical medicine may be instructive. Suppose someone who has been in a workplace accident and is seeking disability

compensation complains about disabling back pain, a subjective symptom, and the question is whether the subject actually does have such severe pain. We know that many people with abnormal spines do not experience back pain, and many people who complain of back pain have normal spines. If the person is claiming a disability and the spine looks dreadful, evidence that the person regularly exercises on a trampoline without difficulty indicates that there is no disability caused by back pain. There is no good test to identify malingering, neural or psychological. If there is reason to suspect malingering, then neurodata may be useful in a common sense fashion. In the example given, if there is not clear behavioral evidence of lack of pain, then a completely normal spine might be of use in deciding whether the claimant is malingering.

Unless the correlation between the image and the legally relevant behavior is very powerful, however, such evidence will be of limited help. If a biomarker were virtually perfectly correlated with a legal criterion and it was less expensive to collect the biological data than behavioral data, then the biological variable might be a good proxy for a legal criterion. But this would be possible only with clear, bright line legal rules and not with standards, such as whether a reasonable person would be aware of a particular circumstance, because the latter have an inevitable normative

component for the decision maker to assess. Further, standards can evolve, and trying to use an external marker to adjudicate them would conservatively inhibit legal evolution. Moreover, such markers are beyond present neuroscientific expertise.

I believe that many of the claims for the relevance of neuroscience are best characterized as more "rhetorically relevant" than genuinely relevant. For example, defense advocates in capital punishment proceedings, in which the threshold for admissibility of mitigating evidence is considerably lower than at trial, hope that the fetching images produced by "real" neuroscience will be more persuasive to decision makers than evidence provided by apparently more suspect social and behavioral science, even if the advocate cannot say precisely how the neuroscience bears on a genuinely mitigating condition. Having a brain lesion or injury is not a mitigating condition per se. The actual relevance of such brain abnormality evidence therefore requires an account of why the brain evidence makes it more likely than not that a genuine mitigating condition, such as lack of rational capacity, obtains.

The foregoing consideration of relevance/translation has been general. Quite recently, however, we finally have preliminary data about how neuroscientific information is being used in criminal cases. Five very interesting empirical studies from the United States (Farahany 2015; Gaudet

and Marchant 2016), England and Wales (Catley and Claydon 2015), Canada (Chandler 2015), and the Netherlands (deKogel and Westgeest 2015) have attempted to discover the extent to which and in what way neuroscientific evidence is used in criminal cases. The question is what they disclose about actual practice that may be a guide for future ethical practice.

All the studies focus on appellate cases reported in various data bases for somewhat different periods in the range of years from 2000 to 2012, and all are admirably cautious about the methodological limitations of the study sample. None purports to be an accurate representation of the use of neuroscientific evidence throughout the criminal justice system and other methodological quibbles may be raised, such as the failure to use independent interrater reliability for characterizing the cases. All use a very expansive definition of neuroscience that includes techniques and data that long antedate the new neuroscience. At most, the data are suggestive. Nonetheless, the studies are interesting and innovative.

The late, great baseball scientist Yogi Berra was apocryphally quoted as saying “It’s déjà vu all over again.” The data indicate that the courts make the classic mistakes about the relevance of neuroscience and behavioral genetics to criminal cases that have bedeviled the reception of behavioral science in general and of psychiatry and psychology in particular. The

overarching classic mistake is misunderstanding or uncritically accepting the validity of apparently relevant science and misunderstanding the relevance of the science to the specific criminal law criteria at issue, which are, once again, primarily acts and mental states. In particular, courts too often do not understand the following issues (discussed previously). Metaphysical free will is not a criterion for any criminal law doctrine, and it is not even foundational for criminal responsibility in general. Causation in general and brain causation in particular, even causation by abnormal variables, are not per se a mitigating or excusing condition, and causation per se is not the equivalent of compulsion, which is an excusing condition. And, finally, people with the same diagnosis or condition are behaviorally heterogeneous, and, ultimately, it is the behavior that is legally relevant, not the diagnosis. In one form or another, most of these cases exhibit these mistakes and confusions. It is no surprise that one of the authors, Professor Nita Farahany, characterizes the cases as follows: “That use [of neurobiological research in criminal law] continues to be haphazard, ad hoc, and often ill conceived” (Farahany 2015, 488–489).

Not surprisingly, sentencing decisions were the most common context for the introduction of neuroscience evidence because the bar for admissibility is lower than at trial. It was also used to resolve questions

about many criminal responsibility doctrines and, surprisingly, about competence, which as we have seen, is a functional behavioral determination. Perhaps the most striking finding is how infrequently the new neuroscience of functional imaging and related techniques is used. This varies across jurisdictions, but the large majority of cases involve the "old" neurology or the old neuropsychology that uses classical structural imaging or behavioral methods to assess brain functioning associated with well-characterized neurological conditions, such as epilepsy and frontal lobe injuries or lesions. Such diagnostic methods are far more common than fMRI, and, in the Dutch and Canadian samples, there is virtually no functional imaging evidence.

In sum, these studies suggest that the influence of the new neuro-investigative techniques applied to individual cases for forensic assessment is quite modest but confused nonetheless. Even when inferences are drawn in individual cases using group data about the consequences of various neurological conditions, the studies used are often classic behavioral studies rather than neuroimaging investigations. Indeed, careful examination of the expanded case studies that the papers present indicates that, in most instances, the neuroscientific evidence was far less important than the behavioral evidence, and the former was used largely to buttress the latter.

The neuroevidence was rarely dispositive, and, in the other cases, it is impossible to know from these papers' summaries of the case reports how influential the additive neuroevidence was.

The first question when considering the admissibility of scientific evidence, as always, is the degree to which the basis of the testimony has been established. We have already seen that legally relevant neuroscience is not well-established at present, which is no critique of contemporary neuroscience for the reasons previously given. For a specific example, the apparently wide but not universal Dutch acceptance of a brain disease model of addiction that guides legal decision-making fails to confront the hard questions about the status of the science. Judges are not yet in a good position to evaluate neuroscience and may be either too critical or too uncritical (see Rakoff 2016, for an analysis by a neuroscientifically informed federal judge).

For another example, fetal alcohol syndrome (FAS) plays a large role in the Canadian cases (although not in the other samples), but the potentially legally relevant aspects of the disorder are the cognitive and rationality defects, which are behavioral signs, that sufferers demonstrate from an early age. Are the brains of FAS sufferers different from the brains of those without the disorder? Of course. This is just a necessary truth of biological

materialism. If the behavior is markedly different, so will be the brain. Brain difference is not per se a mitigating or excusing condition, however. If a particular FAS sufferer is somehow sufficiently able rationally to regulate his behavior, then FAS is irrelevant to mitigation or excuse. Moreover, if a FAS sufferer exhibited lifelong cognitive defects, as many do, that sufferer is potentially excusable even if sophisticated neurotechniques cannot identify the brain pathology or brain difference.

Many of the cases in these studies fail to understand the relevance of the neuroevidence. Even if there is clear evidence of brain damage or a neurological disorder, it does not mean that the defendant did not act, lacked *mens rea*, was less culpable, is incompetent, or will be dangerous in the future. All the criteria depend on direct assessment of the offender's behavior. The alleged relevance of neuroevidence to competence determinations, which occurs in many of the samples, is instructive but bewildering. Criminal competencies are behaviorally functional and again defined entirely in terms of mental states and in infrequent cases also in terms of actions. Does the defendant understand the nature of the charges, can he rationally assist counsel, does he understand the consequence of a guilty plea, does he understand the nature of the penalty about to be imposed on him and why it is being imposed? These normative, mental criteria must

all be evaluated behaviorally. Either the defendant can perform these tasks to the requisite degree or he cannot.

These are continuum capacities, however, and it may be asked whether neuroscience can help with the gray area, indeterminate cases. The answer is, no, for reasons that have already been addressed. Any brain condition will have heterogeneous consequences. Some people with very broken brains have essentially normal mental functioning. But, cannot group data about people with this condition help us draw inferences at the margin? Once again, the answer is, no, in the present state of neuroscience because of the "clear-cut" problem.

A critical reader of the empirical studies will be repeatedly struck by how many of the expanded cases either used irrelevant or weak (or nonexistent) neuroscience—for example, to assess competence or whether a defendant suffered from a mental illness—or could have been fully resolved with more careful behavioral evaluation. Of course there can be conflict about the behavioral evidence, but because act and mental state questions must be resolved, it is the behavioral evidence that is doing the real work. And for the reasons given, neuroevidence will seldom be helpful in resolving the gray area cases in which most help is needed.

Much is at stake in criminal cases, and, of course, forensic practitioners and judges would like scientific help to advocate for their clients and to resolve the vexing issues they must resolve. At present, however, turning to the neuroscience will do nothing more in most cases than to provide a rationalization for a result the practitioner or judge wishes to reach on other grounds. It is once again a matter of rhetorical rather than real relevance. Convergent behavioral and neurodata might help solve some of these problems that cannot be resolved with either type of evidence alone, but such convergent lines of legally relevant evidence are very rare.

If a proper framework for the relevance of neuroscience to law is established and if a cautious approach to the science is adopted, I think neuroscience can potentially help. It may refine legal mental state categories, such as *mens rea* and mental disorder, it might also help the fairness and efficiency of criminal law decision-making by increasing predictive accuracy. The criminal law already uses predictions for purposes of diversion, sentencing, parole, and the quasi-criminal commitment of some sexual offenders. We have already decided as a normative matter that predictions are acceptable. If neural variables make this practice more accurate at reasonably acceptable cost, that is an advance. Finally, in tandem with behavioral science, neuroscience might help us more accurately

understand legally relevant human capacities, such as the capacity for rationality and for self-control, which would again improve legal policy, doctrine, and adjudication. But all such optimistic outcomes will depend on precise understanding of legal relevance and valid science.

I shall end this section with an instructive anecdote that illustrates the point. At a conference, I was presenting to a group of federal judges the case study of Spyder Cystkopf/Herbert Weinstein, a sixty-two-year-old retired business executive who had strangled his wife to death during a physically-heated argument and then threw her out the twelfth story window of their apartment building (*People v. Weinstein* 1992; Morse 1996; "Spyder Cystkopf" was the pseudonym first used in the literature). He was arrested and charged with murder. It was later discovered that on the underside of the middle lining surrounding his brain, the arachnoid layer, he had a large, benign cyst that pressed on and displaced a large amount of his frontal cortex. The brain image showing the displacement is spectacularly arresting. Based on this finding, the defendant was going to raise the insanity defense, claiming that he could not conform his conduct to the requirements of the law. The behavioral history and evidence were entirely inconsistent with the validity of this claim, however, and after presentation of both the prosecution and defense arguments, one hundred percent of the judges voted to convict. I

then asked the judges if they would consider the cyst a mitigating factor at sentencing. About a third of them indicated that they would consider it, so I asked them why. The modal response was that the defendant had a proverbial "hole in his head." I asked why, if it didn't affect his behavior, it should be considered a mitigating factor. None of the judges who indicated a willingness to consider it had any adequate explanation except to repeat the (true) observation that the defendant had a gross anatomical abnormality. With respect, having such an abnormality is not *per se* an excusing or mitigating condition unless it produces a genuine mitigating condition such as diminished rationality or diminished control capacity. But there was not a shred of evidence that the defendant had such problems. The judges simply believed that such an abnormality simply "must" have mitigating implications, but the relevance was rhetorical rather than real.

Conclusion: The Ethics of Caution

There is little consensus about what ethical conduct demands in most contexts (see Morse 2008, for a full discussion of this point in the context of forensic psychiatric ethics). Probably most forensic practitioners would endorse the requirements of the "standard model" most ably advanced by Paul Appelbaum (1997): the forensic practitioner owes only the duty to act

respectfully and honestly towards the subject and to perform his forensic functions with the highest level of professional skill. The standard model starts with impeccable moral pre-commitments to respect for persons and professional integrity. It suggests that forensic practitioners can serve a socially important and useful function if they adhere to those pre-commitments. The model appeals to public reason. Who could rationally object to this? The question, of course, is what counts as the highest level of professional skill when using the very young methods and data of cognitive, affective and social neuroscience.

The message of this chapter has been that the forensic practitioner must understand the legal question at issue, must understand the limits of neuroscience methods and data, and most importantly, must be able adequately to translate the mechanistic neuroscience information into the law's folk psychological criteria. There is nothing new in these prescriptions that wouldn't apply to the use of any clinical or scientific information. Moreover, neuroscience techniques are not unusually invasive and cannot read minds, which would potentially raise hitherto unimaginable privacy issues. If they increase the accuracy of prediction practices we already think are justified, justice is better done. They can produce incidental findings, but

this, too, is a traditional issue. When these findings must be disclosed to the subject is familiar ground.

If this chapter is correct about the current limits and legal relevance of neuroscience, the most important ethical admonition for the practitioner is to be modest and cautious and not to make claims for the relevance of neuroscience that cannot be adequately defended conceptually and empirically. Forensic psychiatrists and psychologists are not like some other experts, such as art authenticators, that have few objective criteria to help them form opinions. We are expected to be more objective. Even if mock juries in experimental work are not terribly swayed by the seemingly hyper-scientific findings of neuroscience, practitioners have a duty not to go beyond their data. That is the gravest ethical lapse possible in this area. I believe if we are suitably cautious, neuroscience may in the near future provide modest help in resolving forensic issues and using it would be proper. At present, however, as the empirical studies disclose, that contribution is considerably less than many believe and that the law too often permits. We must police ourselves.

In two recent contributions (Morse 2006, 2013), I provisionally identified a maladaptive pattern of behavior that I termed, "Brain Overclaim Syndrome (BOS)." Suffering from this syndrome is the forensic

practitioner's greatest ethical danger. Fueled by overconfidence in the state of the neuroscience, insufficient understanding of the law and the relation of the two, this disorder is marked by inflated claims for the usefulness of neuroscientific information to guide individual case adjudication, doctrinal change, legal policy, and specific legal practices. The criterial signs and symptoms, all of which are provisional until they are fully validated empirically, are 1) confusion about the brain-mind-action connection; 2) overconfidence about the current state of neuroscience, especially as it relates to human action; 3) confusion about the distinction between an internal and external critique of legal doctrine and practices; 4) misunderstanding the criteria for responsibility, especially failure to recognize that the criteria are fully folk psychological; and 5) confusion of positive and normative claims, especially failure to recognize that a behavioral or neural difference between groups or individuals does not *per se* entail different legal treatment. Inflated claims for the legal relevance of neuroscience in the courtroom are simply one manifestation of BOS.

In the previous papers, I recommended Cognitive Jurotherapy (CJ) as the treatment of choice. It is exceedingly safe, effective and inexpensive. Nevertheless, combing the relevant literatures and attending numerous neurolaw conferences since first identifying BOS convince me that the

syndrome is still endemic among writers, speakers and practitioners in the relevant fields and that, apparently, too few have received CJ. Perhaps the Affordable Care Act or its potential replacement, if any, will remedy that to some degree.

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