

Brain Overclaim Redux

Stephen J. Morse†

Introduction

In his dissenting opinion in *Miller v. Alabama*, Chief Justice Roberts wrote, “teenagers are less mature, less responsible and less fixed in their ways than adults—not that a Supreme Court case was needed to establish that.”¹ Precisely. It has been recognized for centuries, as the common law defense of immaturity and the establishment of a juvenile court system confirm, that the law has long responded to the differences between juveniles and adults. In its recent trilogy of juvenile punishment cases, the Supreme Court gave explicit constitutional status to this difference under some circumstances. In *Roper*,² it categorically held that capital punishment could not be imposed on adolescents who committed murder when they were sixteen or seventeen years old; in *Graham*,³ it categorically held that life without possibility of parole could not be imposed on juveniles who had committed non-homicide crimes; and in *Miller*,⁴ it held that imposing mandatory life imprisonment without possibility of parole on juveniles who had committed homicide crimes was unconstitutional, but that this sentence could be imposed in an appropriate case after individualized review.

In *Roper* there was no specific mention of neuroscience as a basis for the Court’s reasoning and conclusions, although some have interpreted without support some vague language about “other science” as referring to neuroscience. In *Graham* there was a non-specific reference to neuroscience, but it was arguably dictum because it was used to support a proposition that no one denied: namely, that the science of adolescent development since *Roper* continued to confirm the Court’s earlier reasoning about adolescent development. No one claimed that the science had

†. Ferdinand Wakeman Hubbell Professor of Law, Professor of Psychology and Law in Psychiatry, Associate Director, Center for Neuroscience and Society, University of Pennsylvania. I thank Ed Greenlee for his invaluable help.

1. 132 S. Ct. 2455, 2480 (2012) (Roberts, C.J., dissenting).

2. *Roper v. Simmons*, 543 U.S. 551, 578 (2005).

3. *Graham v. Florida*, 130 S. Ct. 2011, 2034 (2010).

4. 132 S. Ct. at 2460.

markedly changed to suggest that adolescents possessed psychological characteristics that rendered them apparently more responsible than the *Roper* majority thought. In *Miller*, the majority cited *Graham*'s citation of the neuroscience to support the view that the brain science continued to show fundamental differences between adolescents and adults that are relevant to responsibility. In a footnote, the opinion noted that, "The evidence presented to us in these cases indicates that the science and social science supporting *Roper*'s and *Graham*'s conclusions [about adolescent psychological characteristics] have become even stronger."⁵ The material cited, however, was conclusory and relatively non-specific. Again, however, no one was arguing that the social science and neuroscience suggested little difference between adolescents and adults. Moreover, if the science in *Roper* and *Graham* was sufficient to support their categorical holdings, it was certainly sufficient to support *Miller*'s requirement of an individualized determination. Thus, the *Miller* citation was arguably dictum and it was certainly additive and superfluous at best. The real question remains why some advocates are so excited by the citation of neuroscience for an already indisputable set of behavioral propositions about the indisputably behavioral criteria for criminal responsibility. What does the neuroscience really add?

In an earlier paper written in the light of *Roper*, I tentatively identified a hitherto unrecognized psychological disorder, Brain Overclaim Syndrome (BOS),⁶ and noted its symptoms, which are of course provisional until the syndrome is fully empirically validated. The symptoms are: 1) confusion about the brain-mind-action connection; 2) confusion about the distinction between an internal and external critique of legal doctrine and practices; 3) misunderstanding the criteria for responsibility, especially failure to recognize that the criteria are fully folk psychological; and 4) 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.⁷ The paper recommended Cognitive Jurotherapy (CJ) as the treatment

5. *Id.* at 2464 n.5. The quoted material incorrectly draws a distinction between social science and "science." Social science, like neuroscience, is science. The important distinctions are between good and bad science and between legally relevant and legally irrelevant science.

6. Stephen J. Morse, *Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic Note*, 3 OHIO ST. J. CRIM. L. 397 (2006).

7. *Id.* at 403-06.

of choice.⁸ My combing the relevant literatures since first identifying BOS convinces me that the syndrome is still endemic among writers in the relevant fields and that, apparently, too few have received CJ. Perhaps the Affordable Care Act will remedy that to some degree.

This brief contribution to the symposium has the modest goals of identifying one further symptom of BOS and of suggesting that neuroscience, for all its spectacular advances in the wake of non-invasive functional Magnetic Resonance Imaging [fMRI], still has limited value-added when assessing juvenile law policy, such as questions of adolescent responsibility and competence, and individual cases. The next section of this Article addresses the new, provisional symptom: overconfidence about the current status of neuroscience, especially as it relates to human action. Then, I turn to the problem of “translation” between neuroscientific findings and law’s folk psychological responsibility criteria, even in those cases when the neuroscience is clearly valid science. This Article next considers what the neuroscience really adds to what we already knew behaviorally and what its implications are. The following section speculates about why BOS is so rampant. A brief section speculates about the potential contributions of neuroscience to more rational, fair adjudication, and the paper concludes by recommending CJ yet again. Although I share the goals of the advocates for gentler treatment of adolescent offenders for the same reasons they provide, the most general thesis of this Article is that the neuroscience evidence was not necessary to reach these goals and emphasis on the neuroscience tends to foment BOS and to avoid focusing on the sociocultural and psychological variables that account for vastly more of the variance in explaining juvenile offending and juvenile responsibility.

I. Overconfidence in Neuroscience: A New Symptom of BOS

All too often, advocates for the legal relevance of neuroscience have exaggerated notions of how much we already know and how firm the science is. The purpose of this section is to encourage “neuromodesty,” the recognition that we know less than we hope.

The most general problem is that the relation of brain, mind, and action is one of the hardest problems in all science. We have no

8. *Id.* at 410–12.

idea how the brain enables the mind or how action is possible.⁹ Some people, termed “mysterians,” believe that consciousness is the hardest problem in science and may be beyond the capacity of the human mind to solve.¹⁰ The brain-mind-action relation is a mystery. 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. 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, are not acting, and indeed are not doing much of anything at all. Still, we do not know how mental states and action are caused. Until we solve the “mind-body” problem—and we may never do so, although I am agnostic about whether it is possible—there will be limits to what neuroscience can disclose about human behavior.

Despite the astonishing advances in neuroimaging and other neuroscientific methods, we still do not have sophisticated causal knowledge of how the brain works generally, and we have little information that is legally relevant. This is unsurprising. The scientific problems are fearsomely difficult. Only in the last decade or so have researchers begun to accumulate much data from fMRI, which is the technology that has generated most of the legal interest and enthusiasm. Moreover, virtually no studies have been performed to address specifically legal questions.¹¹

Let us consider the specific grounds for neuromodesty in cognitive, affective and social neuroscience, the subdisciplines most relevant to law. At present, most neuroscience studies on human beings involve very small numbers of subjects, although this phenomenon is starting to change. Most of the studies have been done on college and university students, who are hardly a random sample of the population generally, and of offenders, specifically.

9. PAUL MCHUGH & PHILIP SLAVNEY, *THE PERSPECTIVES OF PSYCHIATRY* 11–12 (2d ed. 1998).

10. For a discussion of the difficulties investigating such differences, see, for example, COLIN MCGINN, *THE MYSTERIOUS FLAME* (1999).

11. There are notable exceptions. *E.g.*, Eyal Aharoni et al., *Neuroprediction of future rearrest*, available at www.pnas.org/cgi/doi/10.1073/pnas.1219302110 (2013) (demonstrating with a prospective design and the use of official records that a neural marker can contribute to the accuracy of prediction of re-arrest). Also, the MacArthur Research Network on Law and Neuroscience is engaged in neuroscientific studies of adolescent development and responsibility, mental states, and memory that are addressed specifically to legal issues. For a description of the network, see, <http://www.lawneuro.org/>.

There is also a serious question about whether findings based on subjects' behavior and brain activity in a scanner would apply to real world situations. In other words, are the tasks "ecologically valid," i.e., are they related to "real world" behavior and would subjects behave in the "real world" as they do in the magnet? As noted, few studies have been done for the purpose of illuminating a legal issue or problem. Further, most studies average the neurodata over the subjects, and the average finding may not accurately describe the brain structure or function of any actual subject in the study. Replications are few, which is especially important for law. Policy and adjudication should not be influenced by findings that are insufficiently established, and replications of findings are crucial to our confidence in a result.

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.¹² What is being investigated is an association between a task in the scanner and brain activity. These studies virtually never demonstrate that the brain activity in a particular region is a necessary, sufficient, or predisposing causal condition for the behavioral task that is being done in the scanner.¹³ Any language that suggests otherwise—such as claiming that some brain region is the neural substrate for the behavior or language that suggests that a region in the brain is a homunculus that is "doing" something—is simply not justifiable based on the methodology of most studies. Moreover, activity in the same region may be associated with diametrically opposite behavioral phenomena—for example, love and hate.

There are also technical and research design difficulties. It takes many mathematical transformations to get from the raw fMRI data to the images of the brain that are increasingly familiar. Explaining these transformations is beyond me, but I do understand that the likelihood that an investigator will find a statistically significant result depends on how the researcher sets the threshold for significance. There is dispute about this, and the threshold

12. See, e.g., Gregory A. Miller, *Mistreating Psychology in the Decades of the Brain*, 5 PERSP. ON PSYCHOL. SCI. 716 (2010) (providing a cautious, thorough overview of the scientific and practical problems facing cognitive and social neuroscience).

13. Moreover, the brain is a particularly complicated piece of biological real estate. We are learning increasingly about the connections between various areas of the brain, but claims that a specific region that activated is the only or primary region associated with the behavior in the scanner are simply not justified in most cases. We do not have sufficient understanding yet.

levels are conventional. If the threshold changes, so does the outcome. I have been convinced by neuroscience colleagues that many such technical difficulties have largely been solved, but research design and potentially unjustified inferences from the studies are still an acute problem. It is extraordinarily difficult to control for all conceivable artifacts. Consequently, there are often problems of over-inference. Finally, it is also an open question whether accurate inferences or predictions about individuals are possible using group data when that group includes the individual. This is a very controversial topic, but even if it is difficult or impossible now, it may become easier in the future. Over time, however, all these problems may ease as imaging and other techniques become less expensive and more accurate, research designs become more sophisticated, and the sophistication of the science increases generally.

Virtually all neuroscience studies of potential interest to the law involve some behavior (or condition) 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.¹⁴ There is usually some behavior or behavioral condition—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 identified and validated the behavior under neuroscientific investigation. Thus, neurodata can be no more valid than the behavior with which it is correlated.

On occasion, the neuroscience might suggest that the behavior (broadly construed as always to include actions and mental and emotional states) is not well-characterized or is neurally indistinguishable from other, seemingly different behavior. In general, however, the existence of legally relevant behavior will already be apparent before the neuroscientific investigation begins. 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

14. For an amusing exception, see Craig M. Bennett et al., *Neural Correlates of Interspecies Perspective Taking in the Post-Mortem Atlantic Salmon: An Argument for Multiple Comparisons Correction*, 1 J. SERENDIPITOUS & UNEXPECTED RESULTS 1, 1 (2009), available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.161.8384&rep=rep1&type=pdf>. The study scanned a dead Atlantic salmon to demonstrate that significant results can be obtained from the most unpromising investigations unless the research design properly controls for chance findings (false positives). *Id.*

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 normative significance.

The clear behavior with which neuroscientific investigation begins in turn leads to what I term the “clear cut” problem. Studies use subjects who clearly exhibit the behavioral condition under investigation or who clearly are or are not being exposed to the experimental condition. Even if the study finds statistically significant differences between the two groups, those differences are not typically large and the curves overlap. This explains, for example, why brain images demonstrating the structural differences between the brains of people with and without major mental disorders cannot be used for diagnostic purposes, even in cases of severe disorder.¹⁵ Again, however, the behavioral data necessary to make the diagnosis—the criteria for all mental disorders are behavioral—were already clear and the brain images were not necessary. The law might need help in the less clear behavioral cases, however, but those are precisely the cases in which neuroscience will be of least help. The unclear cases will be even more alike neurally than the cases in which the behavior is already evident.

Finally, if the legal system were to start using brain imaging routinely to help answer legal questions, such as whether the subject is lying or remembers something, many subjects will have an incentive to use countermeasures to invalidate the scan. Studies have shown that subjects can quickly learn simple countermeasures that are very effective.¹⁶ Of course, neuroscientists might develop markers of the use of countermeasures, but that would create incentives to learn the countermeasures to the anti-countermeasure techniques. And so on. Future science may solve this problem, but it is at present a major technological problem even if various

15. Allen Frances, *Whither DSM-V?*, 195 BRIT. J. PSYCHIATRY 391–92 (2009). Many studies do find differences between patients with mental disorders and controls, but the differences are too small to be used diagnostically. *But see* John P.A. Ioannidis, *Excess Significance Bias in the Literature on Brain Volume Abnormalities*, 68 ARCHIVES GEN. PSYCHIATRY 773, 777 (2011) (claiming, based on a meta-analysis of studies of brain volume abnormalities in patients with mental disorders, that many more studies than should be expected found statistically significant results and attributing such results to strong biases in the reporting of the data).

16. *See, e.g.*, Giorgio Ganis et al., *Lying in the Scanner: Covert Countermeasures Disrupt Deception Detection by Functional Magnetic Resonance Imaging*, 55 NEUROIMAGE 312, 317 (2011).

constitutional and other objections to involuntary scanning were overcome.

In the future, we may learn more about the causal link between the brain and behavior, and studies may be devised that are more directly legally relevant. I suspect that we are unlikely to make substantial progress with neural assessment of legally relevant mental content, but we are likely to learn more about capacities that may bear on excuse or mitigation. Even about the latter we must nonetheless be cautious, however. For example, some think that “executive capacity”—roughly, the congeries of cognitive and emotional capacities that help to plan and regulate human behavior—is going to be the Holy Grail to help the law determine an offender’s true culpability. After all, there is an attractive moral case that offenders with a substantial lack of these capacities are less culpable, even if their conduct satisfied the *prima facie* case for the crime charged. Perhaps neuroscience can provide specific data previously unavailable to identify executive capacity differences more precisely. There are two problems, however. First, significant problems with executive capacity are readily apparent without testing, and criminal law simply will not adopt fine-grained culpability criteria. Second, the correlation between neuropsychological tests of executive capacity and actual real world behavior is not terribly strong.¹⁷ Only a small fraction of the variance is accounted for, and the scanning studies will use the types of tasks the neuropsychological tests use. Consequently, we are far from able to use neuroscience accurately to assess non-obvious executive capacity differences that are valid in real world contexts.

In short, there is reason for some optimism about legally-relevant advances in neuroscience, but we should not expect too much.

II. Lost in Translation: Actions Speak Louder Than Images

The criteria for responsibility and competence are completely folk psychological—actions and mental states. Neuroscience is a completely mechanistic science. Neurons, neural networks, and the connectome do not have mental states such as intentions, they do

17. See, e.g., Russell A. Barkley & Kevin R. Murphy, *Impairment in Occupational Functioning and Adult ADHD: The Predictive Utility of Executive Function (EF) Ratings Versus EF Tests*, 25 ARCHIVES OF CLINICAL NEUROPSYCHOLOGY 157, 169 (2010).

not have a sense of past, present, and future, and they do not have aspirations. These are properties of persons. Is the apparent chasm between those two types of discourse bridgeable? This is a familiar question in the field of mental health law,¹⁸ but there is even greater dissonance in neurolaw. Psychiatry and psychology sometimes treat behavior mechanistically, sometimes treat it folk-psychologically, and sometimes blend the two. In many cases, the psychological sciences are quite close to folk psychology in approach. Neuroscience eschews folk-psychological concepts and discourse.¹⁹ Thus, the gap will be harder to bridge.

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 a category error.²⁰ This is a plausible view, and perhaps it is correct. If it is, then the whole subject of neurolaw is empty, and there was no point writing this comment in the first place. 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 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. Any legal criterion must be established independently, and biological evidence must be translated into the criminal law's

18. ALAN A. STONE, LAW, PSYCHIATRY, AND MORALITY 96 (1984) ("Psychiatry has not yet found a unified discourse about organisms and persons.").

19. 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. See, e.g., Liad Mudrik & Uri Maoz, *Me & My Brain: Exposing Neuroscience's Closet Dualism in Studies of Consciousness and Free Will* 1–2 (unpublished manuscript) (on file with the author).

20. See, e.g., M. R. Bennett & P.M.S. Hacker, PHILOSOPHICAL FOUNDATIONS OF NEUROSCIENCE 112, 270, 360 (2003); Michael S. Pardo & Dennis Patterson, *Philosophical Foundations of Law and Neuroscience*, 2010 U. ILL. L. REV. 1211, 1214 (highlighting the problematic nature of the claims made in support of neurolaw and suggesting alternative directions for the field).

folk-psychological criteria.²¹ That is, the advocate for using the data must be able to explain precisely how 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 competence evaluations, the advocate 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, as the last section indicated, few such data exist, but neuroscience is advancing so rapidly that such data may exist in the near or medium term. Moreover, the argument about relevance is conceptual and does not depend on any particular neuroscience findings.

The problem of translation is even more acute for legal policy because the database necessary to reach firm conclusions simply does not exist. As the previous section noted, there are few replications of potentially relevant neuroscientific studies and there are problems with generalizing from the laboratory to the real world. Even among populations of undoubted legal interest that have been studied intensively by neuroscientists, such as adolescents and addicts, the people who have been studied are not a random sample of the population as a whole. We do not possess baseline data in specific populations or the general population to reach confident conclusions about what is normative. If we cannot reach such conclusions, policy recommendations should not follow.

A final point about the translations 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 the brain appears structurally or functionally abnormal. We confidently knew

21. 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 because the latter have an inevitable normative component for the decision maker to assess. Further, such standards can evolve, and trying to use an external marker to adjudicate them would conservatively inhibit normatively driven evolution. Moreover, such markers are beyond present neuroscientific expertise.

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 complains about back pain, a subjective symptom, and the question is whether the subject actually does have back 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. If there is reason to suspect malingering, however, and 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.

III. The Legal Value-Added of Neuroscience

The juvenile trilogy—*Roper*, *Graham*, and *Miller/Jackson*—with which this Article began is a good place to begin examination of this topic. Common sense and a rich body of behavioral science literature already demonstrated beyond peradventure that, on average, adolescents differed from adults on psychological characteristics such as judgment, impulsivity, risk-seeking, and susceptibility to peer pressure.²² The Supreme Court argued that such characteristics are relevant to assessing whether adolescents are as legally responsible as adults.²³ I believe the Court was correct because these characteristics are all related to rationality, broadly speaking, and the capacity for rational conduct is the crucial generic responsibility criterion.²⁴ I will return later to the question of whether these differences entailed the legal conclusions about the just punishments for juveniles that the Court reached. But first, I will consider the question of what the neuroscience contributed.

Let us begin with some obvious considerations and some

22. See, e.g., *Miller v. Alabama*, 132 S. Ct. 2455, 2458 (2012) (summarizing the evidence to this effect from *Roper* and *Graham*).

23. *Id.*

24. See Stephen J. Morse, *Rationality and Responsibility*, 74 S. CAL. L. REV. 251, 264–66 (2000).

implications for the law. If behavior is different, the brain will be different. The brain enables the mind and action, although, once again, we have no idea how.²⁵ On average, adolescents behave differently from adults in some potentially legally-relevant ways, and thus it is unsurprising, to say the least, that on average adolescent and adult brains are different. Although expected, this difference has no legal implications *per se* as I shall discuss below.

Second, it is extremely unlikely that the relation between the brain and behavior will be invariant in groups or individuals. The brain is always changing, and the brain-environment interaction is powerful. The causal relation between the brain and behavior is going to be exceptionally complex, variable, and mediated by non-neural variables. Although the brains of well-nourished, healthy adolescents in all countries are surely alike, there are striking differences in crime rates and other potentially injurious behaviors. Adolescents are not responsible for their level of brain maturation, but brain maturation differences do not entail adolescent criminal offending or differential legal treatment. Adolescents in other lands are somehow able to transcend their immature neural biology and to refrain from crime. Moreover, and more importantly, focusing on the brain (and behavioral) differences between adolescents and adults may cause us to avoid paying attention to the social and cultural factors, especially those that are the product of injustice, that better account for serious adolescent offending than biological immaturity. In the right environment, adolescents can behave like adults concerning serious criminal behavior.

Third, there will be substantial overlap in the biological maturity of adolescent and young adult brains, especially at the margin of legal adulthood. Many adolescents will have the greater myelination of neural connections and pruning of gray matter associated with adults and many young adults will have the lesser myelination and pruning associated with adolescence. The same overlap will be true of behavioral differences. It is often said that the law must draw bright lines, such as the age of eighteen for adulthood, for administrative convenience, and that adolescents are still in the process of maturation and development. But if the brains (and behavioral characteristics) of some younger and perhaps not so young adults are indistinguishable from those of adolescents, why can't an individualized determination be made about culpability in an appropriate case? Brain maturation continues into

25. See MCHUGH & SLAVNEY, *supra* note 7.

the mid-twenties and the brain is plastic and always changing.²⁶ In *Miller/Jackson*, the Court conceded that an individualized analysis of culpability was possible.²⁷ Although more is at stake in life without parole (LWOP) cases than in the usual array of criminal punishment, in principle, individualized determination of blameworthiness could always be accomplished. In their zeal to soften the law's response to juvenile offenders, advocates for adolescents who want to draw bright lines may be deflecting attention from injustice towards older criminals who equally deserve softer legal response.

Finally, recall that what we learn neurally is always dependent on prior, clear identification of legally relevant behavior or an already established condition, such as age, that is legally relevant because its behavioral characteristics are probative of legal criteria. In short, behavior is the gold standard; neurodata is simply a handmaiden. For example, any excusing condition must be established independently. The goal is always to translate the biological evidence into the criminal law's folk-psychological criteria. What we learn about behavior neurally and psychologically may affect the law's normative behavioral criteria, but such knowledge will virtually never logically entail any general legal conclusion at the policy level or in an individual case.

Now let us expand on some of the foregoing considerations to understand what neuroscience has contributed to our understanding of adolescent criminal offending. The overarching theme is that the causal contribution of the brain and nervous system is neither all-powerful nor well-understood.

The enormous temporal and geographical differences in adolescent rates of offending suggests that in general the brain (and other intra-individual variables) contributes only a small amount causally in explaining criminal behavior in this group. The spectacular decrease in homicide in the United States, and especially in New York, since the 1990s is clearly not accounted for by recent changes in the brain maturation rates of adolescents and young adults in the United States. Although there is dispute about the causes of the "great crime drop," it is clearly attributable to sociocultural variables, as are the temporal and geographical

26. See Brief for the American Psychological Association et al. as Amici Curiae Supporting Petitioners at 24–27, *Graham v. Florida*, 130 S. Ct. 357 (2009); C. Antoinette Clarke, *Bridging the Gap: An Interdisciplinary Approach to Juvenile Justice Policy*, 56 DEPAUL L. REV. 927, 934 (2007).

27. See *Miller*, 132 S. Ct. at 2467–68.

differences generally.²⁸

The causal contribution of neural variables is also not well understood. For example, there is no fixed, linear correlation between brain maturity and criminal behavior. The correlation between age and risk preference is u-shaped rather than linear, although myelination seems to be linear. Moreover, one of the few empirical studies that directly investigated the correlation between risk-creating, dangerous behavior and myelination surprisingly found that juveniles who engage in more dangerous activities have more mature frontal white matter than their peers who behave more conservatively.²⁹ This is a surprising result, but more replications are needed and social and cognitive neuroscience are still too young to provide clear understanding of the causal role of the brain, whether that role is small, as I suspect, or large.

Although our understanding of the brain does not seem to add much to our knowledge about adolescent offending beyond what we knew behaviorally and sociologically, it seems to confirm what we already thought we knew about the average behavioral maturity differences between adolescents and adults. Thus, we can be more confident about our conclusions concerning these differences. Suppose, however, that there were no obvious brain differences, such as those concerning myelination and pruning. I am confident that we would still assume that there were brain differences that our methods were simply too unsophisticated to detect and our confidence in the validity of the behavioral differences would be unaffected. After all, we had a common law infancy excuse for hundreds of years and almost a hundred years of having a juvenile court before diffusion tensor imaging was developed. Note, too, once again, it is the behavioral differences that are directly relevant to the legal criteria for responsibility because those criteria are themselves behavioral. In short, even if the neuroscience is consistent with our behavioral understanding and thus tends to confirm that understanding, there is very little value added when the behavioral data are already so clear.

I believe that many of the claims for the relevance and added value of neuroscience concerning adolescent offenders are best

28. See, e.g., FRANKLIN ZIMRING, *THE CITY THAT BECAME SAFE: NEW YORK'S LESSONS FOR URBAN CRIME AND ITS CONTROL* (2012).

29. Gregory S. Berns, Sara Moore & C. Monica Capra, *Adolescent Engagement in Dangerous Behaviors Is Associated with Increased White Matter Maturity of Frontal Cortex*, 4 PLoS ONE e6773. (2009), <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0006773>.

characterized as more “rhetorically relevant” than genuinely relevant. That is, advocates for juveniles (or other groups) hope that the fetching images produced by “real” neuroscience will be more persuasive to decision makers than evidence to date provided by apparently more suspect social and behavioral science, even if the advocate cannot say precisely how the neuroscience answers the legal question.

Please permit me to offer an instructive anecdote that illustrates the point. At a conference, I was presenting to a group of judges the case study of Spyder Cystkopf/Herbert Weinstein, a sixty-two-year-old retired businessman who had strangled his wife to death during an argument and then threw her out the twelfth story window of their apartment building.³⁰ It was later discovered that on the underside of the middle lining surrounding his brain, he had a large, benign cyst that pressed on and displaced a large amount of his frontal cortex.³¹ 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.³² The behavioral history and evidence were entirely inconsistent with the validity of this claim 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 did not 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 he 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 were taken in by a stunning image and thought that such an abnormality simply “must” have mitigating implications. Now, the best study to date of the effect of

30. *People v. Weinstein*, 591 N.Y.S.2d 715, 717 (N.Y. Sup. Ct. 1992); see also Stephen J. Morse, *Brain and Blame*, 84 Geo. L.J. 527, 537–40 (1996) [hereinafter Morse, *Brain and Blame*]. “Spyder Cystkopf” was a pseudonym used before the case record was published. *Id.* at 527 n.1.

31. *Weinstein*, 591 N.Y.S.2d at 718.

32. *Id.* at 718, 723.

images on decision making concerning culpability surprisingly found little effect,³³ but the anecdote does illustrate rhetorical relevance if not genuine relevance. In the next part of this Article, I will address further the irrational exuberance fueling attempts to use neuroscience to answer questions of criminal responsibility.

Finally, suppose that we understood the neural mechanisms underlying problematic behavior or that we could effectively intervene to prevent it using neuroscientific knowledge. What should we do? Should we now “medicalize” antisocial behavior simply because it has partial biological roots? If partial neural causation were an adequate justification to medicalize behavior as the sign of a disorder, then all behavior should be medicalized because all behavior is neurally caused at least in part. Further, eliding the crucial distinction between mad and bad is a conceptual, moral, and political error. They are different types of behavior that deserve different moral and political responses according to moral and political theories we have reason to and do endorse. The civil liberties implications of treating badness as madness in order to more easily control behavior we fear is deeply disquieting, as our lamentable experience with quasi-criminal sexual predator commitments has demonstrated.³⁴

Neuroknowledge might be useful if it demonstrated that our behavioral assumptions about adolescents were incorrect, but it is not clear how it would do this. If there are clear, valid behavioral differences, they are still valid, even if they are not obviously related in a systematic manner to neural differences. Likewise, if behavior is the same, brain differences among those who behave similarly would not convince us that the behavior is really different. Once again, behavior is the gold standard for law.

In principle, I suppose, neuroscience might help us understand why adolescents have more difficulty than we thought exercising a legally relevant capacity, such as the capacity to self-regulate their behavior. But without some behavioral test of such diminished capacity, how would we know that the neuroscientific findings are indicative of it? Problems like this may be solved by technological or scientific advances in the future, but for now, neuroscience provides little added value to legal responsibility

33. Nick J. Schweitzer et al., *Neuroimages as Evidence in a Mens Rea Defense: No Impact*, 17 PSYCHOL. PUB. POL'Y & L. 357, 382 (2011).

34. See, e.g., Stephen J. Morse, *Uncontrollable Urges and Irrational People*, 88 VA. L. REV. 1025, 1035 (2002) (criticizing the criteria for sexual predator commitments on conceptual, empirical, and legal grounds).

assessments and policy beyond what behavioral science already provides.

Finally, valid neuroscientific studies that somehow did add value beyond mere confirmation of what behavioral science already disclosed would not entail legal changes unless the neuroscience demonstrated that the behavioral assumptions underlying legal doctrine were flatly wrong. Then doctrine should change, but such neuroscientific discoveries are unlikely to occur with any frequency because the neuroscience always begins with the behavior of interest, which is the gold standard.

Assuming that new neuroscience findings do not demonstrate that the law's behavioral assumptions are erroneous, they may nonetheless demonstrate hitherto unknown differences between adolescents and adults. If so, whether these differences should have legal consequences depends on the normative assumptions governing the context. For example, the adolescent punishment trilogy correctly notes that on average the rational capacities of adolescents do differ from those of adults, but whether those differences are large enough to necessitate a legal difference, such as categorically banning the death penalty for juveniles, is purely a normative question about which science must fall silent.³⁵ The Court could have held, for instance, that the average adolescent was still rational enough to be executed even though the average adult was more rational. After all, there are surely substantial rationality differences among the adults sentenced to death and equally surely the most rational sixteen or seventeen-year-old capital murderers are as rational as the least rational adults sentenced to death. Thus, the Court could have held that capital case decisions for adolescents should be as individualized as they are for adults, but with the presumption communicated to capital sentencing juries that adolescents were on average less rational than adults. These alternative holdings are fully consistent with the finding of difference. As the next section explains further, those who believe that the added value of neuroscience is that it will entail preferred legal consequences are still suffering from BOS because they do not fully comprehend the distinction between the positive and the normative.

35. Let me be clear. I fully support the outcomes in the trilogy, but do not believe that they were logically or constitutionally entailed by the psychological or neural findings.

IV. Endemic BOS and Irrational Neuroexuberance

Neuroscience is fascinating and is making rapid advances. It captures the attention because it promises at last to reveal the inner, mechanical workings of our brains and the images it produces are, well, way cool and often very beautiful. Nonetheless, we know much less, especially about legally relevant behaviors, than most lay people think and as honest scientists concede. Our failure to understand how the brain enables the mind explains why the oft-quoted metaphor about finally “getting under the hood” is grossly misleading and question-begging. We understand the mechanics of a car engine perfectly. We can specify how an engine makes automotive locomotion possible. But we could not begin to specify the relation between brain and mind, even in principle. The brain is part of nature and subject to the physical laws of the universe,³⁶ but it is a part of nature that produces the capacity for consciousness, intentionality, aspirations, a sense of past, present, and future, and all the other mental phenomena that make life worth living for homo sapiens. Even if both car engines and brains are subject to the laws of nature, mental states (and unaided, intentional human locomotion) are distinguishable from purely mechanical locomotion and the explanation of the former will be infinitely more complicated if it is soluble at all. It is possible that our mental states are epiphenomenal products that can be reduced to brain states, but this is unlikely to be true, even if one accepts physicalism or materialism. To date, the inter-theoretic reduction project has eluded us in the easiest case, chemistry to physics, and has completely eluded us in the hardest case, mind to brain. Assuming that brains are just like engines begs the question in favor of reductionism with no warrant. How much neuroscience will actually help us understand human behavior is an open question.

If my cautious account of what neuroscience offers law at present is accurate, how does one account for the irrational

36. See H. Allen Orr, *Awaiting a New Darwin*, 60 N.Y. REV. BOOKS 26 (2013) (reviewing THOMAS NAGEL, *MIND AND COSMOS: WHY THE MATERIALIST NEO-DARWINIAN CONCEPTION OF NATURE IS ALMOST CERTAINLY FALSE* (2012)). Professor Orr does concede, however, that although the materialist project of reducing mind to matter appears to be the proper approach, “we haven’t the slightest idea how it would work.” *Id.* at 27. But see THOMAS NAGEL, *MIND AND COSMOS: WHY THE MATERIALIST NEO-DARWINIAN CONCEPTION OF NATURE IS ALMOST CERTAINLY FALSE* (2012) (providing an extended argument for why natural selection is unlikely to account for mental life and especially consciousness). The book has been heavily criticized. I disagree with Nagel for the reasons Orr and others give, but Nagel is one of the foremost philosophers in the world and the argument deserves to be taken seriously.

exuberance of those who think it will imminently lead to major beneficial (so they hope) reforms and perhaps even to a revolution in our responsibility practices? What follows is pure speculation, but I believe that two factors, legal insecurity and advocacy bias, are the jurotoxic agents that account for most of the cases of BOS that I encounter and treat daily. Let us consider these in order.

Virtually every legal issue is contested—the criminal responsibility of older juveniles is a classic example—and there is always room for debate about policy, doctrine, and adjudication. In a recent book, Professor Robin Feldman has argued that law lacks the courage forthrightly to address the difficult normative issues that it faces.³⁷ The law therefore adopts what Feldman terms an “internalizing” and an “externalizing” strategy for using science to try to avoid the difficulties.³⁸ In the internalizing strategy, the law adopts scientific criteria as legal criteria.³⁹ A futuristic example might be using neural criteria for criminal responsibility. In the externalizing strategy, the law turns to scientific or clinical experts to make the decision.⁴⁰ An example would be using forensic clinicians to decide whether a criminal defendant is competent to stand trial and then simply rubberstamping the clinician’s opinion.⁴¹ Neither strategy is successful because each avoids facing the hard questions and impedes legal evolution and progress.⁴² Professor Feldman concludes, and I agree, that the law does not err by using science too little, as is commonly claimed.⁴³ Rather, it errs by using it too much because the law is too insecure about its resources and

37. ROBIN FELDMAN, *THE ROLE OF SCIENCE IN LAW* 7 (2009) (asserting that science does not provide answers for the law but rather allows those in the legal field to ignore their failure to resolve legal questions).

38. *Id.* at 8–14 (introducing the concepts of internalization and externalization relationships between science and law).

39. *Id.* at 8 (defining internalization as “importing scientific lines to resolve a legal dilemma”).

40. *Id.* at 14 (defining externalization as “tr[ying] to outsource [law’s] dilemmas to experts”).

41. See HENRY J. STEADMAN, *BEATING A RAP?: DEFENDANTS FOUND INCOMPETENT TO STAND TRIAL* 47–54 (1979) (reporting that the majority of competency hearings observed in the study were extremely brief and that the judge routinely approved the evaluator’s conclusion).

42. See FELDMAN, *supra* note 37, at 13–14 (criticizing internalizing and externalizing strategies for distorting the image of science and law).

43. See *id.* at 159 (“[S]cience does have an important role to play in the legal process. As long as that role is properly recognized as supportive of rather than replacing the functioning of law, science can help guide and illuminate policy, while allowing the law to operate within its own parameters.”).

capacities to do justice.⁴⁴ I think the optimistic predictions about neuroscience fit this analysis precisely. At last, people believe, we will have sufficiently good and powerful science to help the law resolve the normative questions that inevitably bedevil us. But the outcome is not enhanced legal resolution; it is the increasing incidence of the *juropathology* of BOS.

More specifically, why has neuroscience especially captured the imagination of criminal law scholars and practitioners?⁴⁵ Why do so many enthusiasts seem to have extravagant expectations about the contribution of neuroscience to criminal law? Here are my speculations about the source for the two major types of advocacy bias I have identified: reformation and revolution. The reformers do not want to abandon criminal justice concepts, doctrines, practices, and institutions as we know them; they simply want to alter them in ways that the advocates find normatively desirable. Proponents for the differential, softer treatment of juveniles, opponents of the death penalty, and those who think that neuroscience will demonstrate that many more offenders should be excused and do not deserve the harsh punishments imposed by the United States criminal justice system fit into this camp of reformers suffering from advocacy bias. The reformers are so eager to achieve their desired result that they will either uncritically over-claim both the validity and legal relevance of the neuroscience, or they will simply grasp at rhetorical relevance if they believe that it helps their cause. The use of neuroscience is not new in this respect. Decades ago, advocates in the criminal justice system tried to use psychodynamic psychology for the same purposes. More recently, genetics has been employed in a similar manner. In all cases, however, the claims are signs of BOS or allied syndromes. They persist in the face of overwhelming contrary evidence because they produce what we clinicians term, "secondary gain." The benefits of having the disorder sufficiently outweigh the costs. Consequently, sufferers are consciously or unconsciously willing to recognize the reality and to become well again.

The use of legally irrelevant or weak science for reform by advocates has many potential drawbacks. First, it may deflect

44. See *id.* at 195 ("The powerful allure of science flows in part from our distress over the weakness and imperfection of law.").

45. Criminal law is by no means the only field in which practitioners have hopes for neuroscience. Other examples are lie detection and the objective measurement of pain. But neuroscience has been especially embraced by criminal lawyers.

attention from more important questions and data. Focusing on the adolescent brain rather than on sociocultural variables is a good example. Second, it can have unintended consequences. The same “hole in the head” that suggests that a capital defendant was less culpable may also convince the sentencing jury that the subject is more dangerous and should be put to death for that reason. Third, it clogs the courts with irrelevant or weak evidence that does not really answer the legal question or that is misleading.

The infamous Supreme Court case, *Barefoot v. Estelle*,⁴⁶ is a classic example of the second and third problems mentioned above. Barefoot was sentenced to death on the basis of a clinical psychiatric prediction that he would be dangerous if he was not executed.⁴⁷ This prediction was based on answers to hypothetical questions rather than on a clinical examination or other forms of investigation, such as psychological testing. All the relevant professional groups argued that such predictions were invalid and Barefoot challenged the admission of the prediction on due process grounds.⁴⁸ The Court held that the accuracy of the prediction was a matter of weight of the evidence and not of admissibility.⁴⁹ At the time, advocates of abolition of the death penalty were surprisingly ambivalent about this holding. Many critics, such as myself, had argued that much forensic psychiatric testimony should not be admissible in criminal cases because it was either scientifically or clinically weak or was legally irrelevant.⁵⁰ But such testimony could potentially be helpful for mitigation and

46. 463 U.S. 880 (1983).

47. *Id.* at 884 (“The State also called two psychiatrists . . . who, in response to hypothetical questions, testified that petitioner would probably commit further acts of violence and represent a continuing threat to society. The jury answered both of the questions put to them in the affirmative, a result which required the imposition of the death penalty.”).

48. *Id.* at 920–22 (highlighting concerns of the American Psychiatric Association and other scholars about utilizing psychiatric predictions of long-term future dangerousness).

49. *Id.* at 902.

50. Stephen J. Morse, *Crazy Behavior, Morals, and Science: An Analysis of Mental Health Law*, 51 S. CAL. L. REV. 527, 600–25 (1978). Although forensic testimony is considerably better than it was when that article was published, too much testimony is still weak or irrelevant and purely clinical predictions of future dangerousness are still comparatively inaccurate. See Stephen J. Morse, *The Ethics of Forensic Practice: Reclaiming the Wasteland*, 36 J. AM. ACAD. PSYCHIATRY & L. 206 (2008) (analyzing the contemporary state of forensic practice); Jennifer L. Skeem & John Monahan, *Current Directions in Violence Risk Assessment*, 20 CURRENT DIRECTIONS IN PSYCHOL. SCI. 38 (2011) (assessing the state of violence risk assessments).

advocates of abolition feared careful, rigorous scrutiny of the quality of psychiatric testimony generally. Thomas Barefoot was executed.

In response to the third concern, some advocates correctly note that the courts already admit a great deal of scientific, clinical, and technical evidence that is either of poor quality or of questionable legal relevance. They then ask, "What reason exists not to permit introduction of neuroscience, which is no worse than many other kinds of evidence that are routinely admitted?"⁵¹ My answer as a scholar and as a citizen is that we should not perpetuate bad practice simply to achieve a preferred end. Instead, we should attempt to limit the introduction of weak and irrelevant evidence even if doing so undermines our attempts to succeed with our normative agenda. If advocates have the better argument, they should use good arguments to achieve their ends.⁵²

Revolutionaries subject to advocacy bias may be classified as either weak or strong depending on how completely committed they are to radical reform of criminal justice. They all have in common an intense dislike of the concept and practice of retributive justice, thinking that retribution is prescientific and necessarily harshly punitive. Their hope is that the new neuroscience will convince the law at last that determinism is true and that no offender is genuinely, ultimately responsible. The weak revolutionaries are willing to continue holding people (faux) responsible on consequential grounds, but then argue for a fully consequential punishment system. Thus, the criminal justice system will look much like the present system, except that retributivism will play no role in blame and punishment. In contrast, the strong revolutionaries believe that the only logical conclusion is that the law should adopt a consequentially-based prediction/prevention system of social control guided by the knowledge of the neuroscientist-kings who will finally have supplanted the Platonic philosopher-kings.⁵³

51. You Know Who You Are, unpublished public comments (on file in the author's mind and never to be forgotten). I am especially agog when law professors blithely state this position.

52. Let me be clear. I am a proponent of softening the legal response to juvenile offenders and I am an opponent of capital punishment. At the same time, however, I am a firm believer in honest and rational legal process. I do not subscribe to using weak evidence or bad arguments to achieve my normative goals. I believe that doing so ultimately undermines justice and the rule of law.

53. Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, in *LAW & THE BRAIN* 207, 217–18, 224 (Semir Zeki & Oliver Goodenough eds., 2006). Interestingly, Greene and Cohen admit that the

Once again, the data from neuroscience or from other sciences do not remotely conclude that we are not agents and that retributive justice is incoherent.⁵⁴ Neuroscience cannot prove that determinism is true and determinism is not inconsistent with genuine legal or moral responsibility.⁵⁵ The strong revolutionary claim is simply a speculative argument that assumes that the mind-matter reduction project and hard-deterministic incompatibilism are true. Moreover, our moral and legal practices accept deontology in every context and most of the harshest criminal justice policies in recent years—e.g., mandatory minimum sentences, recidivist sentencing enhancements, lengthier sentences generally, and quasi-criminal commitments of so-called sexual predators—have been justified consequentially, not retributively. The same has been true of the harsh treatment of juveniles. In my opinion, factors such as the fear of juvenile “superpredators,” and not the belief that young people deserve greater punishment, fueled the increased use of transfer and harsh sentences for juveniles adjudicated as adults. Incapacitation and deterrence, not retributive justice, were the goals.

Why would anyone seriously recommend the strong revolutionary’s dehumanizing and almost certainly inhumane legal regime given the current state of the science and accompanying concepts? I am not sure of the answer, but I believe that such overclaiming is a result of a combination of fulminant BOS and misguided utopianism that can exist only in the rarefied and other-worldly precincts of the academy. The secondary gain of such unfortunate sufferers of BOS must be immense to permit such extravagant overclaiming. In my estimation, these overclaimers are well-meaning, but suffer from severe anosognosia, a condition in which the sufferer resolutely denies that he or she is ill.⁵⁶ There is a successful treatment, of course,

law may still have to punish some people for consequential reasons, but this is an incoherent claim in light of their premises. Society may need to involuntarily restrain some dangerous human organisms (we used to call them persons), but punishment—the intentional infliction of deserved pain associated with blame and moral stigma on moral agents—would never be justified according to their own premises. They are trying to have it both ways.

54. Stephen J. Morse, *Lost in Translation? An Essay on Law and Neuroscience*, 13 *LAW & NEUROSCIENCE* 529, 533–34 (2010).

55. Stephen J. Morse, *The Non-Problem of Free Will in Forensic Psychiatry and Psychology*, 25 *BEHAV. SCI. & L.* 203, 219 (2007).

56. Anosognosia is a term technically applied to sufferers from confirmed neurological disorders who deny that a problem exists. In recent years, it has been

Cognitive Jurotherapy (CJ), but it is damnably difficult to persuade subjects who suffer from agnosognosia to accept the unfortunate truth that CJ is indicated for their juropathological condition. Unlike the advocates of involuntary intervention in the lives of those who deny their allegedly dysfunctional behavior, I believe that we should treat BOS sufferers with dignity, respect, and kindness and try to persuade them voluntarily to seek a cure.

V. The Future of Law & Neuroscience: The Case for Cautious Optimism

Despite my scientific and conceptual cautions at present and my fear of virulent BOS, I am nonetheless optimistic about the near- and intermediate-term contributions that neuroscience may make to more rational, fair resolution of individual cases. I doubt that we will have a sufficient neuroscientific data base for major policy innovations, but assisting adjudication seems potentially possible.

Perhaps the easiest contribution of neuroscience would be in cases involving prediction, such as predicting future violence, amenability to treatment, and other legally-relevant behavioral predictions.⁵⁷ Finding valid neural markers would not necessarily require theoretical, conceptual, or causal understanding of why a marker increases the accuracy of the prediction. It would be sufficient if it were empirically confirmed that it does. Of course, whether employing neuroscientific techniques for prediction would be cost-benefit justified would depend on cost and the predictive value-added of obtaining the neural marker compared to the cost and accuracy of obtaining behavioral predictors.

Assessing criminal responsibility involves a retrospective evaluation of the defendant's mental states at the time of the crime.

applied to people who deny that they suffer from mental disorders although professionals believe that they do. Neurological illnesses have defined pathological anatomies or physiologies, whereas mental disorders do not. Some people are crazy whether or not there is a demonstrable, causal pathological anatomy or physiology associated with their abnormal behavior. But who is genuinely crazy is often disputable, especially in cases involving allegedly religious beliefs. Terming those who deny that they have mental abnormalities as suffering from "agnosognosia" simply begs the question against and demeans those who question whether they are suffering from disorder. Some people are obviously psychotic and deny that they are out of touch with reality, but we need not give that denial a reifying label that does no additional work beyond the observations upon which it is based. As the critique in this Article should make clear, I am of course being tongue-in-cheek when I apply this further diagnosis to those who suffer from BOS.

57. See Aharoni et al., *supra* note 11.

No criminal wears a portable scanner or other neurodetection device that provides a measurement at the time of the crime, at least not yet.⁵⁸ Further, as we have seen, 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. Nonetheless, certain aspects of neural structure and function that bear on legally relevant capacities, such as the capacity for rationality and control, may be temporally stable in general or in individual cases. If they are, neuroevidence may permit a reasonably valid retrospective inference about the defendant's rational and control capacities and their impact on criminal behavior. This will of course depend on the existence of adequate science to do this.

We currently lack such science, such as genuinely normative data about adolescent brain structure and function, but future research may provide the necessary information. In tandem with the behavioral sciences, neuroscience might help us learn more about the behavioral capacities that affect responsibility. This hope is not inconsistent with my earlier claim that, for legal purposes, neuroscience is the handmaiden of behavioral science. It is often the case that our behavioral concepts are not as clear as we would like. For example, the capacity for self-regulation is enormously difficult to understand and is highly contested. Many paradigms abound, usually using different methodologies, but we still do not have anything approaching a firm understanding of whether people cannot control themselves or whether they simply will not control themselves. In such instances, my hope is that behavioral and neuroscience together can help reach a conceptual-empirical reflective equilibrium in which each type of science helps refine the other's concepts, categories, and measures. Ultimately, the behavioral understanding will be more important for the law because the law's criteria are behavioral, but neuroscience might help us better understand behavior. With such understanding, we might be able to more accurately assess control difficulties and

58. Questions concerning competence or predictions of future behavior are based on a subject's present condition (or confirmed historical facts in the case of predictions). Thus, the problems besetting the retrospective responsibility analysis do not apply to such issues. The criteria for competence are functional. They ask whether the subject can perform some task—such as understanding the nature of a criminal proceeding or understanding a treatment option that is offered—at a level the law considers normatively acceptable to warrant respecting the subject's choice and autonomy.

other legal criteria that are so difficult to apply.

The ability to guide therapeutic interventions is a more speculative promise of neuroscience. If we do understand the causal mechanisms underlying antisocial or other problematic behaviors, perhaps we will be able to intervene effectively to prevent these problems behaviorally and biologically. The failure to develop genuinely new, effective, and safe psychopharmacological agents in recent decades probably stems from the inability to understand the relation of brain to mental states. It is not clear if imaging studies will help end this epistemological impasse, but if neuroscience is broadly understood to encompass all physiochemical aspects of brain function, perhaps it will. Except in a few cases of clear, medically well-characterized illnesses such as epilepsy, however, this prospect is probably far off, but it is not unthinkable.

In short, I have modest hopes for a neuroscientific contribution to rational adjudication. I will be thrilled if this contribution exceeds my expectations, but not surprised if it does not or even if it fails simply to meet them.

Conclusion: The Cure

Living together is damnably hard. It would be a blessing if science could provide a guide to how to live together more successfully, but it cannot. Science inevitably has this limitation because human behavior is so hard to understand and predict, the scientific data are often less secure than we thought as paradigm shifts demonstrate, and, most important, we disagree so profoundly about the normative implications of the scientific data for our communal lives. Neuroscience, like all the other sciences advocates have used to promote their agendas, is unlikely to radically transform the law. I predict that it will disappoint those with extravagant or somewhat more modest expectations, much as its predecessors did. BOS stands in the way of genuine normative, social, and legal progress. It prevents realistic understanding of what can be achieved through neuroscience, it creates doctrinal confusion and inefficient adjudication, and it deflects attention from more promising approaches to social melioration. CJ, which is not an expensive therapy, is the solution. I fervently hope that BOS sufferers will avail themselves of this excellent remedy.