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## Neurohype and the Law: A Cautionary Tale

Stephen J. Morse

Many people think that neuroscience based on non-invasive brain imaging will transform how we view ourselves and our institutions, such as the law. Take for example the following editorial statement published in *The Economist* back in 2002.

‘Genetics may yet threaten privacy, kill autonomy, make society homogeneous and gut the concept of human nature. But neuroscience could do all of these things first.’<sup>1</sup>

But neither genetics nor any other science that was predicted to revolutionize society and the law has had this effect. Neuroscience, which is simply the newest science on the block, is unlikely to produce the results *The Economist* fears, at least for the foreseeable future. At most, in the near to intermediate term, neuroscience may make modest contributions to legal policy and case adjudication. Nonetheless, there has been irrational exuberance about the potential contribution of neuroscience, a phenomenon I refer to as ‘Brain Overclaim Syndrome’.<sup>2 3</sup> Although I have prescribed a safe, effective, inexpensive treatment for this dire condition—‘Cognitive Jurotherapy’—which simply requires learning the limitations of neuroscience and the conceptual relation between neuroscience and law, the disorder persists.

The reasons for neurohype are conceptual and empirical. Let’s begin with the former. Law and neuroscience do not use the same language. Thus, there will be problems of translation.<sup>4</sup> The law speaks the language of “folk psychology,” the psychology we all use to explain our own behavior and the behavior of others in terms of mental states like desires, beliefs, intentions, and reasons. For example, the explanation for why you are reading this chapter is, roughly, that you desire to learn something about the relevance of neuroscience to law, you believe that reading this chapter might help achieve that goal, and thus you formed the intention to read it and you are now doing so. Legal rules are primarily about acts and mental states and are addressed to rational creatures who can be guided by rules.

In contrast, neuroscience is a mechanistic science that speaks the language of mechanism and in principle avoids folk-psychological concepts and discourse (although neuroscientific articles are rife with dualistic discourse<sup>5</sup>). Neurons, neural networks, and the brain’s connectome (see chapter ##) do not have reasons. They have no aspirations, no sense of past, present, and future. They do not “do” things to each other. These are all properties of people. Brain images cannot tell us the reasons for a person’s actions.

Can we bridge the chasm between the law’s folk psychology and the mechanistic nature of neuroscience? This is a familiar question in the field of mental health law, but there is even greater dissonance when considering the relation of neuroscience to law. Psychiatry and psychology sometimes treat people as mechanisms but also treat them as agents. Consequently, these disciplines are in part folk psychological, and the translation to law is

easier than it is for neuroscience, which is purely mechanistic. Those claiming the relevance of neuroscience should always be able to explain precisely how neuroscientific findings, assuming that they are valid, are relevant to a legal issue.

Before turning to the current relation of neuroscience to law, let us quickly dispose of two “radical” challenges to law that neuroscience poses but that have had no legal purchase. The first is the belief that if determinism is true, which neuroscience allegedly proves, then responsibility is impossible. And yet, free will is not a criterion of any legal doctrine and is not even necessary to justify present doctrines of criminal responsibility.<sup>6</sup> Nonetheless, believing that no one is ever responsible for anything would upend criminal law and much of human interaction as we know it. No science can prove the truth of determinism, however, and there are good philosophical answers to the claim that determinism is incompatible with responsibility. “Neurodeterminism” is no more persuasive than all the other deterministic claims based on other sciences.

The more radical challenge is that neuroscience proves that we are just a pack of neurons or that we are simply victims of neuronal circumstances.<sup>7</sup> If this is true, we are less than simply not responsible; we are not agents who act for reasons. Mental states are just the foam on the neuronal wave. They exist but do nothing. This is a transformative claim, but on both conceptual and empirical grounds, there is simply no reason at present to believe that our mental states play no causal role in explaining behavior. Agency is secure.

The brain does enable the mind and action, although we do not know how this occurs.<sup>8,9</sup> 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 about the potential relevance of neuroscience is unwarranted. For the moment, let us bracket this pessimistic view and consider the relevance of neuroscience to resolving questions of criminal responsibility and other legal issues once the findings are properly translated into the law’s folk psychological framework.

Our question is whether some concededly valid neuroscience is legally relevant. Biological variables, including abnormal biological variables, do not per se answer any legal question because the law’s criteria are behavioral—acts and mental states—and not biological. For example, even if a brain abnormality such as a tumor played a causal role in explaining a criminal defendant’s behavior, it does not follow that a behavioral excusing condition, such as lack of rational or self-control capacity, was present. Any legal criterion must be established independently, and biological evidence must be translated into the law’s folk-psychological criteria.

The advocate for using the data must be able to explain precisely how the neurodata bear on the legal question in issue, such as whether a criminal defendant killed intentionally or whether the defendant was severely mentally disordered at the time of the crime. Does the tumor, for example, help confirm that the defendant’s claim of mental disorder is true and how does it confirm it? If the evidence is not directly relevant, the advocate should be able to explain convincingly the chain of inference from the indirect evidence to the law’s criteria.

Now let’s turn to the empirical problems. The potential usefulness of neuroscience to

law faces two major obstacles in addition to the problem of translation previously discussed. Despite the astonishing advances, behavioral neuroscience is not as advanced as we might hope. More directly relevant, there is a dearth of legally relevant studies. We shall discuss these two problems in order.

Space precludes detailed analysis of the general scientific difficulties, but the following considerations, discussed at length elsewhere,<sup>10</sup> are important. Once again, we do not understand how the brain enables the mind and action. This does not present an insurmountable hurdle to good research, but it does hinder it. Most studies involve too few subjects to have sufficient statistical power and this casts doubt on the reproducibility of the results (see chapter #sample-size#). Research design in behavioral neuroscience is particularly difficult and often makes clear inferences from results problematic. There are many response biases and artifacts (uncontrolled for variables) and more are constantly being identified. Most of what we know is correlational and coarse, rather than causal and fine-grained. The ability to generalize from laboratory findings to real world behavior--ecological validity--remains unclear. Performance on artificial tests in a scanner may not predict how people would behave in the rough and tumble world. The standard subjects of behavioral neuroscience studies are college students, who are hardly representative of the population generally or of, say, criminal offenders.

Finally, and perhaps most importantly for the law, there are few replications of studies. We cannot be sure that results are certain even if an individual study seems valid. There is a “replication crisis” in medicine and the social sciences and behavioral neuroscience is no exception (see chapter #rep-crisis#). Lack of replications is particularly important for law (and medicine), which have such profound effects on people’s lives. We don’t want legal policy made or individual case outcomes affected by science that is quite uncertain. We certainly don’t want a criminal defendant to be convicted and punished, or acquitted for that matter, based on the finding of one study.

None of these scientific concerns is surprising. Neuroimaging for general research is an infant science working on one of the hardest problems known to science, the relation of the brain to mental states such as intentions and to action. The proper methodologies are a work in progress. Many of these problems may be solved or substantially ameliorated in the future. For example, as the cost of imaging decreases, studies will be able to enroll more subjects. But many of these problems, such as the difficulties with inferences and the correlational nature of the research, will remain and present challenges.

The second major problem is that few studies have been addressed to normative legal questions, such as the nature of mental states that should ground culpability. In a recent review, an eminent neuroscientist and I reviewed all the behavioral neuroscience that might possibly be relevant to criminal law adjudication and policy. With the exception of studies of a few well-characterized medical conditions, such as epilepsy, that did *not* employ functional magnetic resonance imaging or other new techniques of non-invasive brain imaging, our review found virtually no solid neuroscience findings that were yet relevant.<sup>11</sup> Similar conclusions were reached after reviewing “brain reading” studies (e.g., “neural lie detection”)<sup>12</sup> and neuroimaging research on addiction and criminal law.<sup>13</sup>

There are some exceptions to this gloomy picture. Researchers have already carried out a few legally-relevant, “proof of concept” studies about using neural variables to predict criminal re-offending<sup>14</sup> and to identify legally-relevant mental states.<sup>15</sup> There are ongoing studies of potentially objective neural measures of how much subjective pain a subject is experiencing. This is of profound importance because the law’s system of compensation in personal injury cases awards damages for pain and suffering based on mostly subjective assessment.<sup>16</sup> None of these studies or research projects is ready for practical use, but they do give a hint about the modest contributions that neuroscience may make to law in the near or medium-term future.

Let us conclude with an observation that will always be germane even if neuroscience makes huge leaps forward. For the law, 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 a criminal defendant behaves rationally in a wide variety of circumstances, the defendant is rational even if his or her brain appears structurally or functionally abnormal. In contrast, if the defendant is clearly psychotic, then a potentially legally-relevant rationality problem exists even if his brain looks normal. We might think that neuroscience would be especially helpful in distinguishing the truth in “gray area” cases in which the behavioral evidence is unclear. For example, is the defendant simply very grandiose or actually delusional? But unfortunately, the neuroscience helps us least when we need it the most, and if the behavior is clear, we don’t need it at all.

In sum, despite major advances in behavioral neuroscience, the field has little to contribute to law at present. In the future, as the science develops, it will surely make contributions to legal policy and adjudication, but the law’s underlying assumptions about human behavior and its concept of the person will remain largely unchanged.

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Rosen, J. The brain on the stand. New York Times Magazine. March 11, 2007 (an excellent exposition of popular science writing).

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