



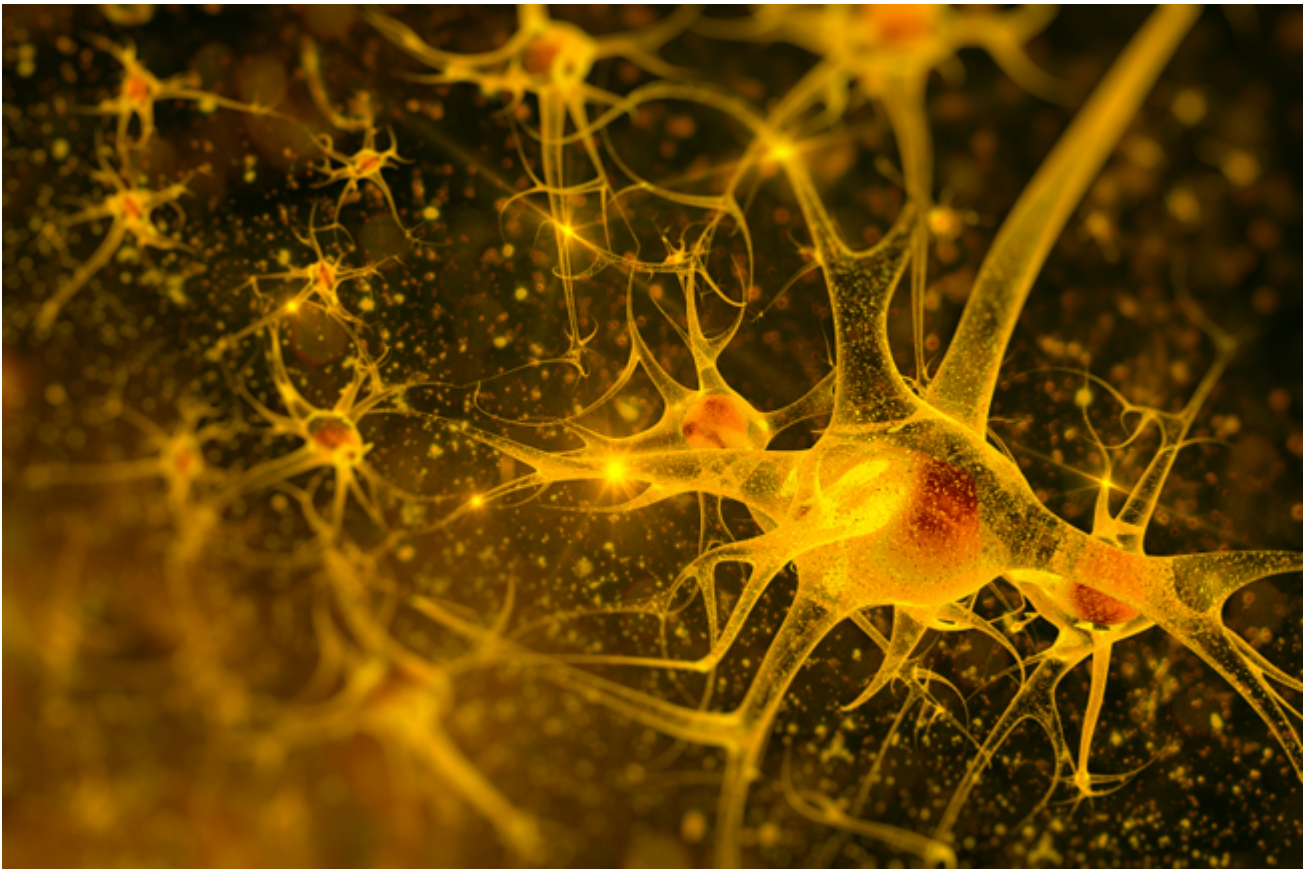
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NEUROIMAGERY AND THE JURY

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Don't miss the consultant responses below: *Ekaterina Pivovarova and Stanley L. Brodsky; Adam B. Shniderman; Ronald K. Bullis*



Technological advances in the field of neuroscience have raised concerns in both the academic and legal communities pertaining to how people evaluate this type of evidence. Neuroimages, such as those produced by MRI and fMRI scanners, provide sophisticated, tangible representations of otherwise complex and abstract physiological processes; as such, inexpert viewers may find this type of visual aid particularly alluring when offered as support for a particular scientific claim. It was thus feared that the public, including jurors, may find neuroimages to be particularly persuasive forms of evidence, thereby impeding their ability to make unbiased decisions (see, e.g., Shniderman, 2014 for additional discussion of the possible ramifications of such neuroscience effects).

EARLY RESEARCH IDENTIFIES A “NEUROIMAGE BIAS”

Several early, and now well-cited, articles seemed to support the notion of the ‘seductive’ power of neuroimaging. McCabe and Castel (2008) investigated the persuasive influence of brain images on the perceived credibility of cognitive neuroscience data. Participants read fictional articles summarizing brain imaging studies. The articles were paired with either a brain image or bar graph illustrating the brain activity described in the studies. The researchers found that articles that were presented with a brain image were judged to be more credible than the same articles presented with a bar graph conveying substantively identical information to that conveyed in the neuroimage. In a later study, McCabe and Castel (2011) bolstered these findings with results indicating that fMRI readings were judged to be a more convincing measure of lie detection than other non-neuroscientific technologies. The results of both studies suggested that the credibility afforded by laypersons to the conclusions drawn from neuroscience research was due to something inherently persuasive in the neuroimages themselves.

Other research has indicated that the mere presence of neuroscientific information can have an unduly influential effect on decision-makers. When laypersons and beginning neuroscience students were asked to judge the quality of both good and bad explanations of psychological phenomena, those explanations that were paired with neuroscience information were judged to be more satisfying than those that were not, even though the neuroscience information provided was irrelevant to the actual explanation itself (Weisberg, Keil, Goodstein, Rawson, & Gray, 2008). No difference in satisfaction ratings was found between good explanations that were paired with neuroscience information and those that were not. Bad explanations that were paired with neuroscience information, however, were judged to be more satisfying than bad explanations that contained no neuroscience information, suggesting that the addition of extraneous neuroscience information can fool laypersons into believing that they have received a scientific explanation for a particular phenomenon, even when they have not. Importantly, when neuroscience experts were asked to judge these explanations, no effect of neuroscience was found. Furthermore, the addition of irrelevant neuroscience information decreased the perceived quality of good explanations for the experts, indicating that extended exposure and education may be necessary for laypersons (i.e., jurors) to be able to correctly interpret neuroscience information.

To examine the influence of neuroevidence in a legal context, Gurley and Marcus (2008) assessed the effects of neuroimaging evidence on juror decision-making in insanity trials. Participants read a case study in which a murder defendant was diagnosed with either a psychotic disorder or psychopathy. The presence of neuroimaging evidence to substantiate this diagnosis was manipulated, as was the timing of the onset of the disorder (onset due to a traumatic brain injury (TBI) or onset not specified). The authors found that psychotic defendants were more likely to be found not guilty by reason of insanity (NGRI) than psychopathic defendants. Both the presence of TBI testimony and neuroimaging evidence made a NGRI verdict more likely, with the presence of both a neuroimage and TBI testimony increasing the odds of a NGRI verdict over and above either form of evidence alone. These findings lent credence to the notion that jurors may look for, and be especially persuaded by, evidence that provides concrete support for causal claims about a defendant’s behavior; in this case, testimony about a brain injury, after which a person’s behavior observably changed, and a neuroimage that provides tangible proof of a diagnosis that affects a person’s ability to control their behavior.

MORE RECENT RESEARCH: NOT SO FAST...

In the past few years, several pieces of research have sought to replicate and extend the early findings. These studies, however, failed to find support for the idea that neuroimages unduly influence jurors. Schweitzer, Saks, Murphy, Roskies, Sinnott-Armstrong, and Gaudet (2011) investigated the impact of neuroimages offered as evidence in a *mens rea* defense. Across four experiments, while neuroscience-based expert testimony was found to be more persuasive than clinical psychological or family/anecdotal evidence, the neuroimages themselves were found to have no special impact on verdicts, sentences, or perceptions of the defendant’s culpability over and above verbal expert neuroscience

testimony. In concert with these findings, Greene & Cahill (2011) found that the presence of neuroscientific testimony dramatically reduced the likelihood of participants imposing a death sentence on the defendant, but the form of the neuroevidence (brain image or neuropsychological testimony) made no difference.

These null effects hold in other contexts, as well. Gruber and Dickerson (2012) found that images representing brain activity are not evaluated as more credible or reasonable than other types of images placed above popular science news articles about neuroscience findings. Schweitzer & Saks (2011) found that while participants who viewed a neuroimage were more likely to render a NGRI verdict relative to participants who received clinical psychology testimony or no expert testimony at all, the neuroimage condition did not differ from conditions that included other forms of neuroscience testimony. Further, a replication of the original McCabe and Castel (2008) study found that brain images exert little to no influence on the extent to which people agree with the conclusions of a news article (Michael, Newman, Vuorre, Cumming, & Garry, 2013). Other recent findings suggest that fMRI images have no influence on judgments of research credibility and worthiness relative to bar graphs or photographs (Hook & Farah, 2013). Taken together, the results of these studies support the conclusion of Schweitzer and Saks (2011) that it is the entire package of neuroscience evidence, and not the neuroimage itself, that exerts a persuasive influence on jurors, suggesting that initial concerns over the persuasive impact of neuroimages were unfounded.

CURRENT DIRECTIONS IN NEUROIMAGE BIAS RESEARCH

With these two sets of experiments painting contradictory pictures, it is clear that the impact of neuroimage evidence on decision makers is anything but straightforward. Some current and ongoing research, however, is attempting to explore this complex picture. Saks, Schweitzer, Aharoni, & Kiehl (2013) conducted a study to examine the impact of neuroimages in the penalty phase of capital murder trials. The authors found that the addition of a neuroimage led psychopaths, but not schizophrenics, to be judged as less responsible for their actions and less likely to be given a death sentence, relative to conditions in which neuroscience testimony was presented without an image. These findings suggest that the net effect of neuroimage evidence may depend on the type of diagnosis to which the neuroimage is proffered.

Baker, Schweitzer, Risko, and Ware (2013) attempted to investigate one potential mechanism underlying this occasional neuroimage bias by examining how people physically look at neuroimages. Using an eye-tracking device, the authors found that while people do differentially attend to images (spending *less* time examining a neuroimage versus a graph depicting the same information), these differences did not predict subsequent legal decisions.

In another attempt to reconcile inconsistencies in the neuroimage literature, Schweitzer, Baker, and Risko (2013) performed a series of five experiments designed to identify the conditions most likely to elicit a neuroimage effect. The findings suggested that the persuasive effects of neuroimages may be present only when decision makers have something to which they can compare a neuroimage. Specifically, laypeople who read a scientific argument involving a neuroscientific claim were equally persuaded by that argument regardless of whether a neuroimage accompanied it. However, when those same laypeople went on to read a second scientific argument, the neuroimage effect emerged: people who had seen a neuroimage in the first argument were unimpressed by the second argument if it did not also contain a neuroimage, and people who had not seen a neuroimage with first argument were then quite impressed with the second argument if it did contain a neuroimage. This, of course, has direct implications for how neuroimage effects may play out in a trial: If a single expert testifies to a single fact using neuroimagery to support it, that neuroimage is unlikely to have any real impact; however, if an opposing expert is subsequently called to testify regarding that same fact, he or she would be well advised to include neuroimagery – to level the playing field if the first expert did use neuroimages, and to best the first expert if not.

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TOWARDS WARINESS BETWEEN ATTORNEYS AND NEUROSCIENCE CLINICIANS

Ware, Jones and Schweitzer reviewed the equivocal research findings about the impact of neuroimages on juror decision-making. It appears that early concerns about the potentially mesmerizing powers of brain pictures have not been fully realized in empirical studies. The authors reasonably conclude that juries do not appear to be swayed by the presentation of images *per se*, but may be influenced by the use of neuroscientific (and neurological) explanations as compared to other types of expert testimony (e.g., clinical). Psychiatrists and psychologists have proffered clinical explanations about medico-legal questions for over a century. Why then should neuroscientific testimony be more influential than clinical testimony to juries in some situations?

One possibility is that neuroscience offers a unique and qualitatively distinct explanation of behavior. This, of course, is true of *some* medico-legal issues. For instance, detection of tumors, brain lesions, and traumatic brain injury, and differentiation between types of dementia are inherently reliant on neurological and neuropsychological examinations. This type of testimony has been presented in court numerous times and is not considered controversial. In contrast, using neuroimaging to identify psychopathy is novel and controversial. Research is only now beginning to identify brain correlates that may aid standard clinical procedures in diagnosing psychopathic traits. At this time, however, there is an absence of cross-validated empirical work, standardized procedures and understanding of how neuroscientific methods improve our ability to detect psychopathy and other types of psychopathology. Furthermore, it remains unclear what neuroscientific explanations could offer, in contrast to other types of testimony, towards addressing questions of competency, insanity, and sentencing.

Alternatively, juries could be impacted by neuroscientific explanations exactly because of their “seductive” power. The original concerns about neuroimages may simply have been too specific. It may be that the field as a whole can be mesmerizing. There is no doubt that neuroscience research has transformed our understanding of the brain and human behavior and has produced remarkable findings. Still, it is a fairly new field. Legal and science scholars have repeatedly voiced concerns about applying neuroscience findings prematurely to medico-legal contexts.

Many questions remain about how juries perceive and interpret neuroscientific evidence as a whole. Rather than encouraging attorneys and forensic clinicians to blindly embrace neuroscience, we urge caution before proceeding pell-mell down this path. Attorneys and trial consultants alike need to have a cogent understanding of how neuroimaging evidence is used and if alternative, less controversial, methods could be utilized instead. Conversely, clinicians should not reach for the newest explanation in place of established mainstream answers. That is, both attorneys and clinicians should practice mutual wariness when it comes to the use of neuroscientific evidence.

We disagree with the authors’ conclusion that to “level the playing field” an expert “would be well advised to include neuroimagery.” As participants in the judicial system, the primary concern of the expert should be to engage in responsible, valid and empirically supported assessments based on probative legal-psychological issues rather than focusing

on the tactics of the opposing expert. There is still much to learn about neuroscience and at this point it is unclear what such a broad, amorphous field can offer in answering medico-legal questions. Attorneys should not feel obligated to hire neuroscientists to answer questions usually handled by forensic clinicians. As for experts, they have ethical standards that mandate use of well-established scientific practices.

Neuroscience has much potential in elucidating human behavior. We should await the measured and proper application of those research findings to legal issues. In the meantime, as attorneys, trial consultants, clinicians, and academics, we should all proceed cautiously.

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The authors' summary of the current state of knowledge highlights a point I made in a previous TJE article – *proceed with caution*. Neuroscience and genetics have enjoyed a rise to prominence in the legal community. Yet, relatively little is known about how these disciplines will impact the law and legal decision makers. Many proponents have suggested that these two disciplines hold the key to better understanding human behavior and more appropriately addressing criminal conduct. Skeptics have feared neuroscientific or genetic evidence would have an inappropriate impact on jurors. Two key studies served to further these fears (see, Weisberg et al., 2008 and McCabe & Castel, 2008). However, as the authors note, empirical evidence in this emerging intersection is murky and inconsistent. Efforts to replicate Weisberg and McCabe and Castel's findings have largely failed. Subsequent experiments, focused on jury decision making, have also produced inconsistent results.

Scientists are just scratching the surface of understanding the brain. As the authors' summary of findings implies, psychologists are not much farther along in understanding how jurors react to neuroscientific and genetic evidence. Results from early studies suggest the evidence could be favorable to criminal defendants. However, offering evidence of a brain injury/dysfunction/disorder may also backfire. We are yet to truly understand how and, even more importantly, when and why neuroscientific evidence impacts jurors. With these mixed experimental results, and failure to successfully penetrate the walls of the courtroom (see e.g., fMRI lie detection) many neuro-advocates are becoming more conservative in their predictions – recognizing that neuroscience has maturing to do before it is ready for use in courtrooms. The brain may have become a cultural icon – a sex symbol in its own right. But, I urge consultants and lawyers to share these scholars' caution. Until more systematic research is conducted, and results replicate, we don't know how jurors will react to the evidence or how to best use the evidence to serve clients needs. As Stephen Morse writes – avoid irrational NeuroLaw exuberance.

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RESPONSE TO "NEUROIMAGERY AND THE JURY"

I'll briefly describe why I think the article addresses trial needs of attorneys and then offer a couple of thoughts on further discussions occasioned (at least for me) occasioned by the article.

It is no secret that neuroscience does and will increasingly have significance for attorneys. Neither is it a secret that images related to forensic science can have powerful impacts on juries and on judges. The article alerts lawyers to an important nuance in the general discussion of neuroimaging and juror influence.

The article also gives clear history on how juries may have shifted their views somewhat over the time when neuroimaging has been used in trials—relatively brief as that time might be.

Nuances about how jurors perceive neuroimages is important because lawyers will want to base their tactics using neuroimages with this nuance in mind. Being aware of this shift might alert attorneys to take both the newer and older views into tactical considerations in deciding how more precisely to use neuroimages. Overall, the article places lawyers on notice to be mindful about their use of neuroimages.

Toward this end, the article offers specific suggestions on how attorneys might use neuroimages if the first expert does or does not use images on the stand. This is an example of how their preceding history can play out at trial. This concluding paragraph can prompt product thinking on other issues lawyers might face in using neuroimages.

For example, are there aspects of the trial process (even at sentencing) where brain images are more helpful than others—such as the sentencing phase?

Or what are some questions lawyers might ask a neuroimaging expert whom they are considering as a witness?

Or what are some of the general lines of questions that lawyers might ask an opposing expert to refute the impact or predictability or diagnostic potential of brain scans?

This article gives valuable insights into the nuances of using neuroimages. These insights will be increasingly important, as the article notes, as jurors become ever more accustomed to neuroimages and their experiences and expectations change over even relatively short periods of time. The article is well worth reading whether you have used neuroimages in the past or not.

I am guided in this response by the following law review articles which might be beneficial to others for further reading in this timely area:

Choe, S. (2014). Misdiagnosing the Impact of Neuroimages in the Courtroom. 61 *UCLA L. Rev.* 1502.

Blume, J. & Paavola, E. (2011). Life, Death, and Neuroimaging: The Advantages and Disadvantages of the Defense's Use of Neuroimages in Capital Cases -Lessons from the Front. 62 *Mercer L. Rev.* 909.

Compton, E. (2010). Not Guilty by Reason of Neuroimaging: The Need for Cautionary Jury Instructions for Neuroscience Evidence in Criminal Trials. 12 *Vand. J. Ent. & Tech. L.* 333.