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The Selective Allure of Neuroscience and Its Implications for The Courtroom

by Adam B. Shniderman, Ph.D.

Don't miss the consultant responses at the end of this article: Robert M. Galatzer-Levy and Ekaterina Pivovarova.

Background

Advances in neuroimaging and growing knowledge about the operation of the human brain have led to the rapid discovery of the purported neurological roots of a variety of behaviors and traits. With these advances has come forecasting about the role and influence of neuroscience on the criminal justice system. In 2004, Joshua Cohen and Jonathan Greene argued that the hard science of neuroscience would provide scientific "proof" of "facts" that various scholars have long been inclined to believe – that free will is an illusion and that some people cannot control their behavior as a result of their neurobiology. In light of this proof, Greene and Cohen claimed that society, beyond the realm of already doubting academics, would radically change its views about criminal culpability, leading people to find the current legal system unjust.

A growing number of studies have assessed the impact of neuroscience and neuroimages on the lay public (see e.g., Weisberg, Keil, Goodstein, Rawson, & Gray, 2008; McCabe & Castel, 2008; Gruber & Dickerson, 2012), including within the mock jury paradigm (see e.g., Gurley & Marcus, 2008; Schweitzer & Saks, 2011; Schweitzer et al., 2011; Greene and Cahill, 2012; Saks, Schweitzer, Aharoni, & Kiehl, 2014). Weisberg et al.'s 2008 article inspired fear that neuroscience would bamboozle and overwhelm laypersons. Their study found that naïve adults were duped by unsound and irrelevant neuroscience explanations. The article gained significant traction in the academic community and has been cited more than four hundred times. Yet, subsequent experiments examining the influence of neuroscience (and extending to neuroimaging) have yielded less fear-inducing and less clear results. Studies have set out to explore these contradictory results and understand what conditions the impact of neuroscience and neuroimages (see e.g., Baker, Schweitzer, Risko, & Ware, 2013; Schweitzer, Baker, & Risko, 2013). However, Nick Scurich and I observe that much of the research in this area has been atheoretical, overlooking a large body of literature on how prior beliefs affect perceptions, particularly in the evaluation of scientific and social scientific research (see e.g., Lord, Ross, & Lepper, 1979; Kunda, 1990; Ditto & Lopez, 1992; Koehler, 1993; Nickerson, 1998; etc.).

The Current Research

In The Selective Allure of Neuroscientific Explanations (Scurich & Shniderman, 2014), we sought to understand the role of motivated reasoning, the tendency to selectively credit or discredit information in a manner that reinforces preexisting beliefs, in lay evaluations of neuroscience. We conducted two studies on highly politically and emotionally charged issues – the death penalty and abortion.

In the death penalty study, subjects began the experiment with a single-item measure of attitudes toward death penalty, abortion, and the HPV vaccine. Subsequently, participants read a fictional news article that described the results of fictional studies that used neuroscience. Participants in the fictional study viewed footage of an execution or a documentary about life without parole and living in prison. The result of the reported study was experimentally varied. In one condition, the results indicated that those who viewed the execution footage were significantly less impulsive than those who viewed the footage of life behind bars. Accordingly, the lead researcher concluded that the death penalty was a deterrent. In the other condition, the results indicated no significant difference in the neurological activity. The lead researcher stated that this meant the death penalty was not a deterrent.

Our subjects responded to 10 items evaluating the "neuroscience quality" of the reported study. The 10 items (Cronbach's alpha = .891) were combined to create a composite score. A two-way ANOVA, excluding participants who stated they had no opinion about the death penalty (n= 25), evaluated the impact of prior attitudes (split into those opposed and those in favor of the death penalty) and study outcome (is deterrent, is not a deterrent). We found a significant interaction effect between prior attitudes and condition (INSERT HERE). We found no significant main effects. Thus, prior attitudes interacted with outcome of the study to determine how scientific the study was perceived. Consistent with our hypothesis neuroscience, like other scientific information, was subject to motivated reasoning.

To confirm our hypothesis and assess whether the results replicated, we conducted a subsequent study on abortion. To ensure a new sample, individuals who participated in the first study were prevented from participating in the second study by a software feature. The procedure was identical to the death penalty scenario. Subjects provided their opinion about abortion, death penalty, and the HPV vaccine. The participants then read a fictional news article that described a study in which fetuses were exposed to a noxious sound, known to cause discomfort and pain in babies less than one year old, while being scanned by an fMRI. The fictional researcher detailed how activation in the parietal lobes of the fetus would indicate whether the fetus was experiencing pain. As in Study 1, the result of the fictional study was experimentally manipulated. In one condition, the results of the fMRI indicated that second and third trimester fetuses were able to feel pain. Based on these results, a fictional pro-life individual stated that the study results indicate that second trimester abortions should be illegal because the fetus can feel pain. In the other condition, fMRI results indicated the fetus could not feel pain. A fictional pro-choice individual concluded that the study indicates that second trimester abortions should be legal because the fetus doesn't feel any pain. Participants were asked to respond to the same 10 questions as in Study 1. The responses to these questions were collapsed into a neuroscience quality scale (Cronbach's alpha = .874). Consistent with our hypothesis and with Study 1, a two-way ANOVA yielded a significant interaction effect between prior attitude and outcome of the fictional study (INSERT HERE). No main effects were found.

Contrary to the fear inspired by Weisberg et al. and McCabe and Castel's findings, the results of these two studies indicate that neuroscientific explanations/evidence are subject to motivated reasoning, like other scientific and social scientific information. The biggest determinant of the impact of neuroscientific information on an individual appears to be the individual's prior attitude about the topic. Thus, neuroscience appears to have a selective, rather than a universally seductive, allure.

As with all experimental research, this study has its limitations. First, it is unclear whether this research is relevant for issues that are less polarizing. The effect is likely to exist for issues that are non-moral or less ideologically driven, however it may be smaller than observed. Second, relatively little is known about the representativeness of MTurk samples, which may limit the generalizability of findings using the service.

Implications for The Courtroom

As I have recommended in several prior issues of TJE, this research reinforces the need for caution when attempting to use neuroscientific evidence in court. That motivated reasoning plays a significant role in the evaluation of neuroscience suggests the effect of neuroscience in the courtroom will be highly dependent on jurors' case relevant attitudes, and potentially their feelings about the disease/disorder for which neuroscience is being offered. This raises the importance of thorough voir dire to [de]select appropriately and to understand those who compose your jury.

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References

Baker, D.A., Schweitzer, N.J., Risko, E.F., & Ware, J.M. (2013). Visual attention and the neuroimage bias. PLoS One 8.

Ditto, P.H., & Lopez, D.F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. J Pers Soc Psychol 63: 568 – 584. doi: 10.1037/0022-3514.63.4.568

Greene, E., & Cahill, B.S. (2012). Effects of neuroimaging evidence on mock juror decision making. Behav Sci Law 30: 280 – 296. doi: 10.1002/bsl.1993

Greene, J., & Cohen, J. (2004). For the law, neuroscience changes nothing and everything. Phil Trans R Soc Lond B Biol Sci 359: 1775 – 85.

Gruber, D., & Dickerson, J.A. (2012). Persuasive images in popular science: Testing judgments of scientific reasoning and credibility. Public Underst Sci 21: 938 – 948. doi: 10.1177/0963662512454072

Gurley, J.R., & Marcus, D.K. (2008). The effects of neuroimaging and brain injury on insanity defenses. Behav Sci Law 26: 85 – 97. doi: 10.1002/bsl.797

Koehler, J.J. (1993). The influence of prior beliefs on scientific judgments of evidence quality. Organ Behav Hum Decis Process 56: 28 – 55. doi: 10.1006/obhd.1993.1044

Kunda, Z. (1990). The case for motivated reasoning. Psychol Bull 108: 480 – 498. doi: 10.1037//0033-2909.108.3.480

Lord, C.G., & Lepper, M.R., & Preston, E. (1984). Considering the opposite: a corrective strategy for social judgment. J Pers Soc Psychol 47: 1231. doi: 10.1037//0022-3514.47.6.1231

McCabe, D.P., & Castel, A.D. (2008). Seeing is believing: The effect of brain images on judgments of scientific reasoning. Cognition 107: 343 – 352. doi: 10.1016/j.cognition.2007.07.017

Nickerson, R.S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. Rev Gen Psychol 2: 175 – 220. doi: 10.1037//1089-2680.2.2.175

Saks, M.J., Schweitzer, N.J., Aharon, E., & Kiehl, K.A. (2014). The impact of neuroimages in the sentencing phase of capital trials. J Empir Leg Stud 11: 105 – 131. doi: 10.1111/jels.12036

Schweitzer, N. J., Baker, D. A., & Risko, E. F. (2013). Fooled by the brain: re-examining the influence of neuroimages. Cognition, 129(3), 501-511.

Schweitzer, N.J., & Saks, M.J. (2011). Neuroimage evidence and the insanity defense. Behav Sci Law 29: 592 – 607. doi: 10.1002/bsl.995

Schweitzer, N.J., Saks, M.J., Murphy, E.R., Roskies, A.L., & Sinnott-Armstrong, W., & Gaudet, L. (2011). Neuroimages as evidence in a mens rea defense: No impact. Psychol Public Policy Law 17: 357 – 393. doi: 10.1037/a0023581

Scurich, N., & Shniderman, A. (2014). The Selective Allure of Neuroscientific Explanations. PLoS One 9.

Weisberg, D.S., Keil, F.C., Goodstein, J., Rawson, E., Gray, J.R. (2008). The seductive allure of neuroscience explanations. J Cogn Neurosci 20: 470 – 477. doi: 10.1162/jocn.2008.20.3.470

Robert M. Galatzer-Levy responds:

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This laboratory study suggests that jurors are likely to use neuroscience evidence in support of preexisting belief rather than being convinced by neuroscience evidence itself. As always with such studies it is interesting to explore their ecological validity, i.e., whether they apply in the real world. The following example provides such a confirmation.

An "experiment of nature" occurred in the form of the arguments and decisions of SCOTUS in a series of cases on the issues of juvenile death penalty – life without parole. In chronological order these are Roper v. Simmons (543 U. S. 551, 560) which barred the death penalty for children, Graham v. Florida (560 US 48, 176 L. Ed. 2d 825), which barred juvenile life without parole for crimes other than murder, and Miller v. Alabama (548, 181 L. Ed. 2d 395) which extended the ban on life without parole to include murder. The decisions in all three cases rested solidly on arguments that adolescents are immature such that they have a relative incapacity to control their behavior, i.e., they are impulsive. Furthermore, their personalities are likely to change with time since their development is incomplete so that sentences that gave them no opportunity to benefit for these changes are inappropriate. The role of neuroscience in these cases is consistent with Shniderman's research.

Across the three cases the court relied increasingly, but always to a very limited extent on neuroscience. Justice Kennedy commented in Graham that the neuroscience was consistent with "what every parent knows" about the psychological immaturity of adolescents. As Charles Ogletree, a Harvard Law School

professor, put it, "Roper established what every parent knows and what science confirms: adolescents are fundamentally different from adults in maturity and judgment." In other words, like Shniderman's subjects, the court used neuroscience at most to bolster its own preexisting opinions.

The court's modest use of neuroscience contrasts with the very extensive briefs filed in these cases, both by the parties and the amici. These briefs progressively rested more heavily on neuroscience studies that suggests that the connection between the parts of the brain that regulate behavior and those parts of the brain in which impulses arise are not fully formed until the mid-twenties and are certainly different in adults and adolescents. This trend toward reliance on neuroscience data was doubtless partly due to the massively increased amount of neuroimaging research available in the last 20 years. However, the primary neuroscience findings had been well established by the time Roper came before the court. The more recent studies simply confirmed the earlier high quality studies. There was no new information pertinent to the court's decisions that emerged from neuroscience research during this period.

What appears to have happened is that the briefs' authors, especially the authors of the amicus briefs, had themselves become convinced on the persuasive value of neuroscience and assumed the court would be convinced by the neuroscience evidence. Their belief in the persuasive value of neuroscience was far greater than the court's. This conviction persisted despite the clear indication that the majority of the court was perfectly willing to rely on common sense psychology rather than neuroscience as the foundation of its opinion.

Social scientists and mental health professionals seem to be impressed by neuroscience. They are remarkably ready to believe neuroscience evidence on psychological issues. And this attitude is present even when the neuroscience data is of questionable quality or relevance. They commonly believe neuroscience findings should be given more weight than more direct observations of psychological phenomena. For example, the demonstration of neuroimaging changes accompanying PTSD is given enormous weight by many psychiatric researchers even though those data are merely consistent with well- known and long standing clinical findings and tell nothing of practical importance beyond the psychological findings.

It is not surprising that these same mental health professionals, who are so persuaded by neuroscience findings, anticipate that judges and juries would be similarly impressed. However, for better or worse it seems not to be the case that courts find neuroscience findings much more persuasive than comparable psychological findings.

The idea that psychological theories are most persuasive if presented as neuroscience research parallels the so called "CSI effect," the claim that the popular television show had set new (and unrealistic) expectations among jurors concerning forensic evidence. Shelton (2007) demonstrated that recent decades have indeed seen a shift in juries toward greater expectation of forensic work but this shift did not result from jurors mistaking the essentially magical activities portrayed on the CSI shows for real forensic science. Instead, jurors appear to be increasingly well educated about the actual science involved. For examples, most jurors now know what DNA is. They are neither greatly impressed by exaggerated or greatly diminished claims about what forensic science can do. Attorneys and expert witnesses who assume there is a strong CSI effect are probably confusing their own opinions with those of a jury.

Similarly, just as the CSI effect concept mistakenly asserts that the exaggerated portrayal of forensic science on television has great influence on triers of fact, so too, lawyers and neuroscientists enthused about neuroscience studies are likely to believe that neuroscience evidence will particularly influence courts. However, studies like the one under review and the observation of courts dealing with similar issues strongly suggests that judges and juries are not as impressed with neuroscience as these lawyers and psychological professionals hope or fear.

References

Shelton, D,; Kim, Y.; Barak, G. (2007). A Study of Juror Expectations and Demands Concerning Scientific Evidence: Does the CSI Effect Exist? Vanderbilt Journal of Entertainment and Technology Law 9 (2): 367.

Ekaterina Pivovarova responds:

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In Selective Allure of Neuroscience and Its Implications for the Courtroom, Shniderman adds to an already long list of reasons for why attorneys and trial consultants should be cautious in using neuroscientific evidence in legal proceedings. Scurich and Shniderman (2014) found that individuals evaluated the scientific validity of neuroscientific evidence based on preexisting beliefs. At first glance, this study might seem like another example of scientists proving a well-known concept that juries and judges bring their individual experiences into the courtroom. In fact, voir dire is premised on identifying individuals with particular types of beliefs that may produce a particular type of verdict. However, on closer examination, the findings from this study highlight a different point – introduction of neuroscientific research may backfire, or in the very least not produce the intended results. And, not knowing how the jury or a judge will interpret a particular type of evidence should be disconcerting to attorneys, legal consultants and experts.

Scurich and Shniderman (2014) acknowledge a significant limitation of the study. The authors asked respondents questions about highly polarizing issues – death penalty and abor-

tion. It is unclear whether similar effects, of interpreting the validity of evidence through a prism of motivated reasoning, will hold for less emotionally charged issues. A related point that was not addressed by the study is whether the same pattern would emerge if the fact finders were offered with opposing expert opinions. In real life settings, juries and judges are unlikely to hear scientific evidence that is unopposed or offered without cross-examination. It is possible that motivated reasoning would be diminished somewhat through legal techniques specifically designed to offset potential bias by the fact finder. Researchers will need to address this issue before conclusions about the impact of neuroscientific evidence in the courtroom can be made.

Shniderman notes that concerns about the deleterious effects of neuroscience on juror decision-making have not borne out. Further, he notes that the insights promised by neuroscientists in changing how judges and juries think about free will, and thereby decide about criminal culpability, have not occurred. I disagree that either of these conclusions can be made at this time. First, as noted above, the research we have on juror decision-making is limited and as described in a previous post (see Pivovarova and Brodsky comment here) focuses on specific neuroscientific features. Second, the impact of neuroscience is difficult to assess, in part because there are legal barriers to introducing such evidence and because the field is relatively new compared to other scientific and social fields. Whether such changes will ever occur is unclear, but there is little doubt that neuroscience has allowed us to understand behavior in unique ways. Dismissing the impact of neuroscience on the fact finder too early is just as problematic as giving it too much credence. As this study highlights we have much to learn about how juries and judges interpret neuroscientific evidence.