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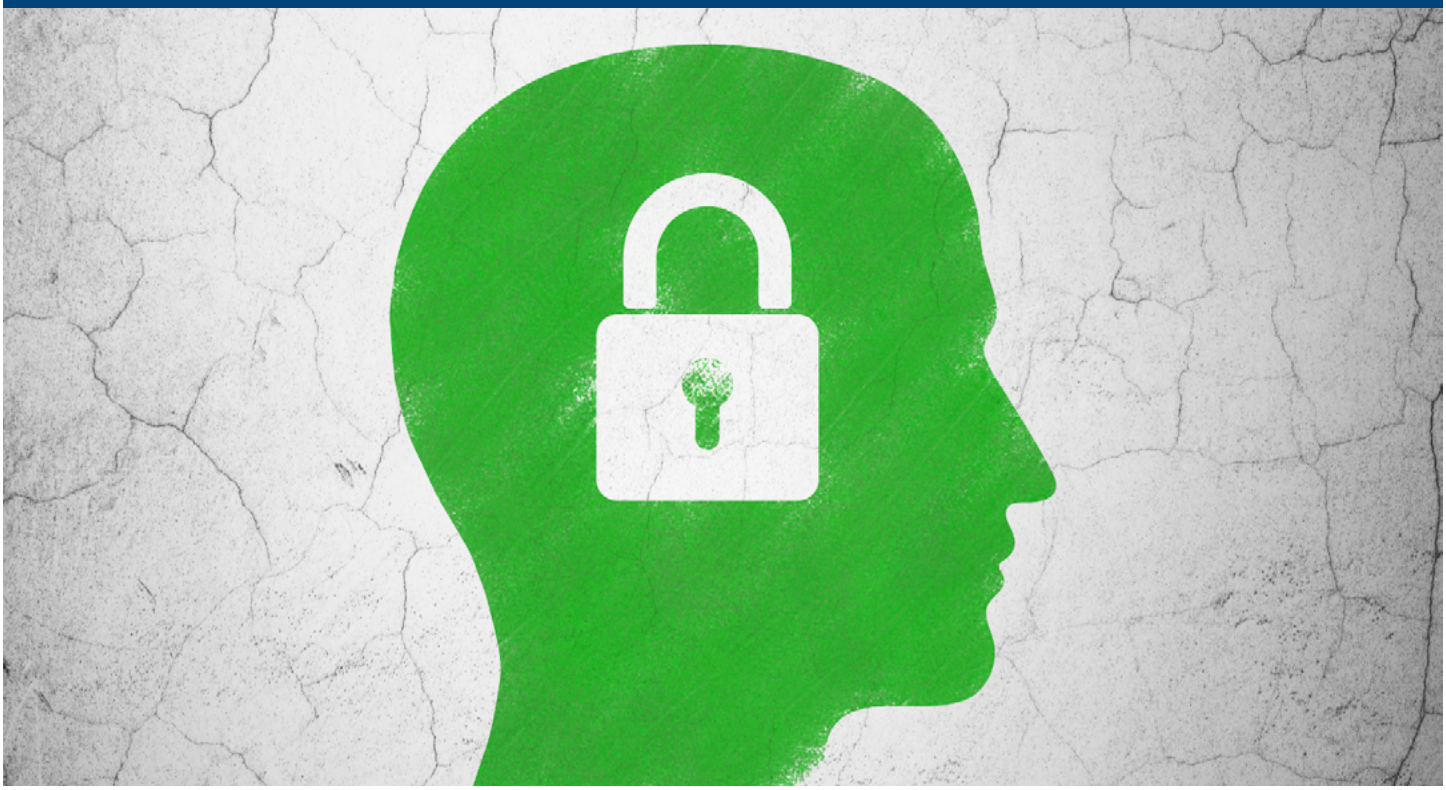

MUCH HAS BEEN MADE of recent neuroscientific discoveries and their relevance for the criminal justice system. Some have touted neuroscience as the system's savior – a means for finally handling criminals effectively and appropriately. Neuroscientific expert evidence *may* provide a more effective means of representing clients by framing mental illness in terms of organic illness and providing jurors with objective indicia of a defendant's claims. Neuroscience may also provide a means for mitigating the perceived culpability of an otherwise "evil" defendant. However, there is no "silver bullet." Attempts to use neuroscientific evidence in court should be carefully considered before a neuroscientist is consulted and testimony is offered. Lawyers should be careful to avoid irrational exuberance and mining the brain for a defense. While anecdotal evidence abounds, there is limited research on the impact of neuroscientific evidence on jurors and results are mixed. The evidence may even backfire. A number of factors can impact the success of using neuroscientific expert evidence in court. This article provides an overview highlighting the complicated state of the relevant fields, and provides insight and guidance for trial lawyers and consultants defending clients with possible neurological impairment.

Representing a client with mental illness or a psychological/personality disorder can present a significant challenge. The insanity defense is fraught with emotion and preconceived notions. The public is highly skeptical of insanity pleaders, in part due to skepticism about the legitimacy of defendants' claims of mental illness and misunderstanding the implications of an *NGRI* verdict. Research shows that the public believes that many insanity pleaders are simply faking mental illness to avoid the consequences of their actions. This myth impacts even the most educated of jurists. In Atkins v. Virginia, Justice Scalia embraced the myth that the "[determination a person's incapacity] is a matter of great difficulty, partly from the uneasiness of counterfeiting this disability…" (p. 351, 2002). The fear of faking may be strongly associated with the longstanding perception that psychology is unscientific, and that psychologists simply ask people why they do what they do, instead of conducting scientific investigation into human behavior. Additionally, research finds that jurors misunderstand the consequences of an NGRI verdict, often believing that a

person spends only a short time in custody or is released as they would be if found not guilty. It is logical that these perceptions would interact to influence jury verdicts. Jurors who fear they are being duped by a cunning defendant who "beat" psychological testing, and who believe that the defendant will be released quickly if found *NGRI* are going to be less inclined to find a defendant legally insane.

Biocriminology: Do Bad Brains Cause Bad Behavior?

In the past two decades, advances in neuroimaging have allowed physicians and researchers to analyze the structure and function of the brain in greater detail. These technological advances, as well as the sequencing of the human genome, have led to a resurgent interest in understanding biological correlates and predispositions of criminal conduct. Neurocriminologists, those who study the neurological correlates of criminal behavior, are investigating and finding the purported neurological roots of a variety of behaviors and traits associated with criminality. Importantly, the deterministic attitude of early biocriminology has been replaced with the understanding that genes and brains interact with environment to shape behavior. Research finds that neurological dysfunction reaches far beyond the prototypical mental illness (*e.g.* psychosis) in criminals. For example, a particular recessive genotype of the tryptophan hydroxylase-1 ("TPH1") gene, involved in the synthesis of serotonin, has been found to be a genetic risk factor for criminal behavior, particularly homicidal behavior in patients with schizophrenia. The MAO-A gene, the so-called "warrior gene," which codes an enzyme responsible for degrading the neurotransmitters noradrenaline, adrenaline, serotonin, and dopamine, has also been the subject of significant research. Studies have revealed that a particular low activity form of the gene, in conjunction with environmental factors, could lead to aggressive impulsiveness.

Imaging studies have paid attention to a variety of regions of the brain. Scholars have explored the role of the prefrontal cortex—the region of the brain just behind the forehead that is implicated in decision-making and regulating behavior—in antisocial and violent behavior. Empirical studies have shown that patients with antisocial personality disorder ("APD") have a significant reduction in prefrontal cortex gray matter, with similar findings in studies of aggressive individuals and pathological liars. Functional imaging studies have also revealed decreased activation in this region of the brain in impulsive violent individuals, suggesting impulsive violence stems from diminished use of the prefrontal cortex's inhibition systems. In addition to the prefrontal cortex, a variety of areas of the limbic system, particularly the amygdala – involved in reward processing and fear – show structural and functional differences in individuals with antisocial behavior. With these discoveries has come significant interest from the academic and legal community in understanding its potential impact on the criminal justice system. Some lawyers and academics hoped neuroscience would provide the impetus for radical change in the legal system, while others believe this new information is of little use. As Hank Greely writes, "[t]oday we are regularly making new discoveries about the functioning of the human brain, discoveries that have led many lawyers, philosophers, and neuroscientists to speculate about the consequences of our new understanding for the criminal justice system."

The Unclear Impact of Neuroscientific Evidence

In 2008, McCabe and Castel found that neuroimages had a significant impact on individuals' perceptions of articles summarizing cognitive neuroscience data. These images impacted perceptions of both accurate summaries and those that included incorrect science. These early findings spurred a widespread fear among academics and lawyers that jurors would be bamboozled by colorful 3-D images of the defendant's brain. In the aftermath of these early studies, scholars have conducted mock jury experiments to understand the impact of neuroimages on jurors. The field is rapidly growing, however, neurolaw is still in its early stages. To date, only five published, and several forthcoming empirical studies, including several of my own, have explored the impact of neuroscientific expert testimony on jurors. A recent blog post notes that the tides have turned since 2008. However, the impact of neuroscientific evidence and neuroimages in particular is complex and remains unclear. Dr. Handrich is correct. Scholars *have* generally found that providing jurors with neuorimages has no additional impact above and beyond verbal expert testimony (see *e.g.* Schweitzer & Saks and Schweitzer et al.). In a forthcoming article in the Journal of Empirical Legal Studies (JELS), Saks *et al*. found that neuroimages are important to obtaining a desirable outcome.

When the defense offered expert evidence in support of mitigation for a defendant diagnosed as psychopathic, the evidence only had the desired effect when accompanied with neuroimages. Without neuroimages, neuroscientific and genetic expert testimony backfired and led to harsher sentences. The opposite was true for defendants diagnosed as schizophrenic. Non-image based testimony produced the desired effect of mitigating assessments of responsibility and sentencing. Neuroimages increased judgments of responsibility and sentences of death in the capital phase of a criminal trial for these defendants. The authors suggest the difference in findings from other recent studies, finding no impact of neuroimaging, may be attributable to the fact that most studies examine the guilt phase, whereas this study focused on the sentencing phase. As such, jurors in the JELS study were assured that the defendant would receive some form of punishment. However, Greene and Cahill also examined the sentencing phase of a capital case and found that neuroimages provided no additional benefit beyond neuropsychological testing without imaging. Variation in the results may be attributable to the fact Saks *et al*. employed a more representative sample of the United States population, while Greene and Cahill used a sample of college students. As for the backfire effect, the authors acknowledge that the reason for these puzzling findings is unclear.

Studies have *generally* found significant impact of *verbal* expert testimony, particularly in the guilt phase. Neuroscientific evidence is significantly more persuasive than psychological testimony. Studies by Schweitzer and Saks in 2011 and Schweitzer *et al.* in 2012 and Greene and Cahill in 2012 show that neuroscientific expert evidence was significantly more likely to produce desirable outcomes (*NGRI* or *GBMI* verdicts) and decreased sentences for defendants. Much has been made of the fact that neuroscience is more persuasive than clinical psychology, but little attention has been paid to the mechanism for its persuasiveness. The results of published and forthcoming studies do provide some insight into possible explanations, which may provide potential guidance for lawyers. As discussed at the outset, the public is highly skeptical of clinical psychology and of the insanity defense. The inexactness of the tools used to diagnose mental illness leaves jurors no choice but to take a large leap of faith. Neuroscience, even without imaging presented in court, provides the jury with more specifics about the cause for the defendant's behavior than clinical psychology can provide. Neuroscientific expert testimony, in these mock jury studies and in actual criminal cases, localizes the dysfunction in the defendant's brain and provides greater detail about the cause of the dysfunction and aberrant behavior.

Finally, a recent study of 181 state trial judges by researchers at the University of Utah provides some insight into how judges view neuroscientific evidence and how this evidence can impact sentencing. While the decisions in Graham v. Florida and Miller v. Alabama provided some insight into the possible influence of neuroscientific evidence on how the Court viewed a class of offenders (the extent of the role of neuroscience in influencing these decisions is highly contested among academics), the University of Utah study looks at the impact of neuroscience on trial judges handling the trials and everyday sentencing of the criminal justice system. The study asked judges to sentence an individual in a mock case who had been convicted by a jury of aggravated assault. The researchers found that while a diagnosis of psychopathy resulted in an enhanced sentence (almost 14 years compared to an average of 9 years for this crime), neuroscientific and genetic evidence reduced the impact of the diagnosis by approximately a year. The study has, however, recently been criticized by legal scholar Deborah Denno for methodological problems and its failure to reflect the reality of the legal system.

Use neuroscientific evidence in sentencing hearings to assist in the defense of clients who do not fit the traditional image of mentally ill.Remember that neuroscientific evidence may offer greater likelihood of success for an insanity defense. When cost is a concern, remember that framing the defense in terms of the brain may be effective regardless of whether it was an internal (e.g., neuroscientific) or external (e.g., neuropsychological) examination.

When considering neuroscience knowledge, proceed with caution – and caution beyond that of the ordinary caution any good trial lawyer uses in defending a client.

Effectively Advocating Using Neuroscience

There are several ways current neuroscience knowledge can be useful to trial lawyers representing clients with mental illness. First, it's time to think beyond traditional mental illness, particularly at sentencing, where the rules of evidence are relaxed. A new or less common technique/form of evidence is more likely to be admitted. Neuroscientific evidence has been used in sentencing hearings across the United States to assist in the defense of clients who do not fit the traditional image of mentally ill (see *e.g.*, Grady Nelson, Brian Dugan, Virginia Schoolteacher, among others). Research has discovered that neurological dysfunction can contribute to delinquent/criminal behavior far beyond the bounds of traditional mental illness. A defendant with a long criminal history may have genetic or neurological factors that predispose or contribute to his/her delinquent behavior. Presenting evidence of such a condition at sentencing may help reframe that potentially detrimental history and mitigate its potentially aggravating effect. The evidence may also be offered as mitigation even where no aggravating evidence is offered.

Second, neuroscientific evidence may offer greater likelihood of success for an insanity defense. The majority of neuroscientific research that exists in neurocriminology considers conditions that involve volitional impairment. In total, 28 states adopt an insanity standard that gives no consideration to volitional incapacity. As such, the opportunity to enter an insanity plea based on volitional impairment and, at the same time, offer neuroscientific evidence is limited – likely to states that have adopted an irresistible impulse test(IIT "25") (*e.g.*, Colorado where the Aurora theater shooter James Holmes has entered an insanity plea). In "IIT" states, neuroscience may assist trial lawyers in overcoming some of the skepticism and prejudices that are associated with the insanity defense. Neuroscientific testimony would provide the jury with "hard" science evidence and provide a more precise description and location of the dysfunction, which may alleviate a number of concerns that the juries have in these cases. Psychology experiments thus far suggest you stand a better chance of success if neuroscientific evidence is used in support of an insanity claim.

One might read this article and assume the use of neuroscientific evidence constitutes a "rich person's defense" – available only to those that can afford neuroimaging, or to defense lawyers who can get the court to pay for the expense. However, several studies, including Schweitzer and Greene's studies, as well as forthcoming studies, find that neuroscientific evidence (based on imaging) is no more persuasive than *neuro*psychological evidence (that employs only an external examination to find and characterize the neurological root of the illness). While fMRI and QEEG and structural MRI might be seen as the pinnacle of evidence (even if the images cannot be presented in the courtroom), framing the defense in terms of the brain may be effective regardless

of whether it was an internal (e.g., neuroscientific) or external (e.g., neuropsychological) examination.

As noted at the outset, however, proceed with caution – and caution beyond that any good trial lawyer uses in defending a client. Don't mine the brain for an excuse – it could backfire. Research on the impact of neuroscientific evidence remains ongoing. Relatively little research exists in this area and as this article highlights, the research that does exist provides unclear and mixed information about the potential impact of presenting neuroscience in court. A dysfunctional brain may be a double-edged sword. Attempting to mitigate responsibility by showing a biological contributor may have the opposite effect. Judges and juries may see a client as permanently damaged and unfixable, leading to a guilty verdict or a harsher sentence in the hopes that this permanently aggressive or dangerous defendant will not return to the streets any time soon. The success of using this type of evidence and defense may depend on the type of crime, the type of dysfunction and conclusions of the expert, as well as the beliefs of the jury in science, determinism/free will, mental illness and other yet unknown factors. Given the nature of this area and the complexities of presenting a defense using neuroscientific evidence, consulting an academic (someone who studies and understands juror decision making) may be useful. This area likely requires a team effort between lawyers and various experts to craft a successful defense

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