Using Cognitive Neuroscience As a Basis Upon Which To Accurately Predict the Future Dangerousness of Violent Criminals and Thus Provide a Procedure for the Involuntary Commitment of Such Individuals As a Part of or Following the Duration of their Sentence

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By: Adam Lamparello

Part I

Introduction

“It is, of course, not easy to predict future behavior. The fact that such a determination is difficult, however, does not mean that it cannot be made. Indeed, prediction of future criminal conduct is an essential element in many of the decisions rendered throughout our criminal justice system … And any sentencing authority must predict a convicted person’s probable future conduct when it engages in the process of determining what punishment to impose. … The task that a [capital sentencing] jury must perform in answering the statutory question in issue is thus basically no different from the task performed countless times each day throughout the American system of criminal justice.”

A. “Future Dangerousness”

“[F]rom a legal point of view, there is nothing inherently unattainable about a prediction of future criminal conduct.” It is axiomatic that courts have “repeatedly treated predictive evidence relating to future dangerousness as highly relevant to the sentencing determination.” Indeed, in Simmons v. South Carolina, the U.S. Supreme Court held that “a defendant’s future dangerousness bears on all sentencing

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2 Jurek v. Texas, 428 U.S. 262, 274-276 (1976) (As the Jurek Court held, “[w]hat is essential is that the jury must have before it all possible relevant information about the individual whose fate it must determine.”)


determinations made in our criminal justice system.”\textsuperscript{6} Put another way, the Court has endorsed the view that “[c]onsideration of a defendant’s past conduct as indicative of his probable future behavior is an inevitable and not undesirable element of criminal sentencing.”\textsuperscript{7}

For example, in the death penalty context, courts have stated that “[i]t has long been held that a sentencing court may evaluate and consider a defendant’s propensity to commit acts of violence in the future as an aggravating factor weighing on favor of the death penalty.”\textsuperscript{8} As the Court in \textit{U.S. v. Umana}\textsuperscript{9} held, “a sentencing court may evaluate and consider a defendant’s acts of violence in the future as an aggravating factor weighing in favor of the death penalty.”\textsuperscript{10} Specifically, in \textit{Simmons v. South Carolina},\textsuperscript{11} the Court held that it was appropriate to consider “the defendant’s potential for reform and whether his probable future behavior counsels against the desirability of his release into society.”\textsuperscript{12} Indeed, “[e]vidence of future dangerousness has also been upheld as admissible at the federal level under the FDPA [Federal Death Penalty Act] …. [and] lower courts have uniformly upheld future dangerousness as a non-statutory aggravating

\textsuperscript{6} \textit{Id.} (emphasis added). (The Court further stated in \textit{dicta} that “prosecutors in South Carolina, like those in other States that impose the death penalty, frequently emphasize a defendant’s future dangerousness in their evidence and argument at the sentencing phase; they urge the jury to sentence the defendant to death so that he will not be a danger to the public if released from prison.”) \textit{Id.} at 163.

\textsuperscript{7} \textit{Skipper v. South Carolina}, 476 U.S. 1, 5 (1986).

\textsuperscript{8} \textit{U.S. v. Umana}, 2010 WL 1569 116 at *7 (W.D.N.C. April 19, 2007). (The \textit{Umana} Court further held that “[i]n addition to lay testimony, the government may also offer expert opinion testimony concerning the future dangerousness ….although future dangerousness is the jury’s overall inquiry, the defendant’s potential for rehabilitation is directly relevant to his future dangerousness.” \textit{Id.} at *8-9).

\textsuperscript{9} \textit{Id.} at *7

\textsuperscript{10} \textit{Id}.


factor in capital cases under the FDPA.”

To be sure, the Court has admitted into evidence “expert psychiatric predictions of future dangerousness even where the expert witness was testifying based on hypotheticals without ever having examined the defendant.” In the Court’s view, the consideration of future dangerous in the death penalty – and other contexts – is justified because “the jury must have before it all possible relevant information about the individual defendant whose fate it must determine.”

Additionally, predictions of future dangerousness have also been used in determining whether a mentally ill individual (or criminal defendant) should be involuntarily committed to a facility for rehabilitative treatment (in some cases post-sentence) based upon the fact that they are a danger to themselves or others. For example, in the civil commitment context, the inquiry focuses upon whether “the individual is mentally ill and dangerous to himself or others and is in need of confined therapy.” Furthermore, in Heller v. Doe, the Court held that, both with respect to the

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13 U.S. v. Diaz, 2007 WL 656831 at * 23 (N.D. Cal. Feb. 28, 2007) (the Court did hold, however, that “evidence of defendants’ future dangerousness should be limited to that which shows their potential for dangerousness while incarcerated … [i]f … the government’s incarceration protocols would nullify defendants’ dangerousness, presentation of this evidence to the jury would not be relevant to the sentencing Determination.”)

14 Patterson, supra note 4, at 1042.

15 Jurek, supra note 2, at 276.

16 See, e.g., Jones v. United States, 463 U.S. 354, 368-369 (1983) (“[t]here simply is necessary correlation between the severity of the offense and length of time necessary for recovery. The length of the acquitee’s hypothetical criminal sentence therefore is irrelevant to the purposes of commitment.”)

17 See e.g. Jones, supra note 14, at 370.

18 Addington v. Texas, 441 U.S. 418, 429 (1979) (emphasis added); see also J.B. O’Connor v. Donaldson, 422 U.S. 563 (1975)). (discussing the civil commitment procedure).

19 509 U.S. 312, 317-318.
mentally retarded and mentally ill, “diagnosis and [future] dangerousness” were the primary factors in determining whether civil commitment was warranted. As the *Heller* Court stated, “‘the state has a legitimate interest … in providing care to its citizens … ‘as well as authority under its police power to protect the community from’ … any dangerous … persons.’” In fact, in certain cases, a person who poses a “danger to others or the community” may be confined without a showing of mental illness. Ultimately, therefore, if the State can demonstrate that an individual “is mentally ill and dangerous,” then it may order the involuntary commitment of an individual to a mental institution despite the “significant deprivation of liberty,” coupled with the “adverse social consequences” and “stigma” that such commitment often engenders.

Finally, reliance upon future dangerousness is perhaps the most important factor when determining whether a repeat sexual offender or pedophile should be confined to a

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20 *Id.* at 324. (to involuntary commit the mentally retarded, the Stat was required to prove, by clear and convincing evidence, the following: “(1) [t]he person is a mentally retarded person; (2) [t]he person presents a danger or a threat of danger to self, family, or others; (3) [t]he least restrictive alternative mode of treatment presently available requires placement in [a residential treatment center]; and (4) [t]reatment that can reasonably benefit the person is available in [a residential treatment center].” (*quoting* Kentucky involuntary commitment procedures, section 202B.040.)

21 *Heller, supra* note 19, at 332 (*quoting* *Addington supra* note 18, at 426). (the Court also discussed committing the insane, holding that “the State must establish the grounds of insanity and dangerousness permitting confinement by clear and convincing evidence … [s]imilarly, the State must establish insanity and dangerousness by clear and convincing evidence in order to confine an insane convict beyond his criminal sentence, when the basis for his original confinement no longer exists.”) *Id.* at 86.

22 *Foucha v. Louisiana*, 504 U.S. 71, 80 (1992). (the Court also discussed commitment of the insane, holding that “the State must establish the grounds of insanity and dangerousness permitting confinement by clear and convincing evidence … [s]imilarly, the State must establish insanity and dangerousness by clear and convincing evidence in order to confine an insane convict beyond his criminal sentence, when the basis for his original confinement no longer exists.”) *Id.* at 86.

23 *Addington, supra* note 18, at 425. (the *Addington* Court also discussed the burden of proof that the State must satisfy in order to involuntary confine an individual, and held that “[t]o meet due process demands, the state has to inform the factfinder that the proof must be greater than a preponderance-of-the-evidence standard applicable to other categories of civil cases.”).

24 *Id.*

25 *Id.*
mental institution following his sentence. In this context, the courts rely upon “volition” or “control,” as a separate factor from future dangerousness, and thereby focus upon “the forcible civil detention of people who [can or cannot] control their [sexual] behavior and who thereby pose a danger to the public health and safety.” In the way, the Court requires that legislation ensures “to limit involuntary confinement [of sexual offenders] to those who suffer from a volitional impairment rendering them dangerous beyond their control.” Indeed, in Kansas v. Crane, the Court held that “our cases suggest that civil commitment of dangerous sexual offenders will normally involve individuals who find it particularly difficult to control their behavior … [such that] they are ‘unable to control their dangerousness.’” In the Court’s view therefore, the “volitional” or “control” aspect “underscored the constitutional importance distinguishing a dangerous sexual offender subject to commitment ‘from other dangerous persons’ … [a]nd a critical distinguishing

26 See e.g., R.W. v. Goodwin, 2009 WL 1405514 (May 19, 2009) (the Goodwin Court also made the surprising assertion that “a state may constitutionally deprive a person of freedom from detention so long as it establishes dangerousness and a mental abnormality that makes it difficult for the person to control his dangerous behavior, regardless of whether the State is providing treatment).

27 Kansas v. Hendricks, 521 U.S. 346, 357 (1997) (Hendricks is really the seminal case in this area, holding that individuals with, inter alia, mental abnormalities, may be involuntarily committed after their sentence has been served).

28 Id. at 358; but see Huftile v. Hunter, 2009 WL 111721 at *1 (E.D. Cal. 2009) (holding that the evidence was insufficient to support a finding that the defendant was a sexual predator.)


30 Id. (In so holding, the Crane Court held as follows:

[W]e did not give to the phrase “lack of control” a particularly narrow or technical meaning. And we recognize that in cases where lack of control is at issue, ‘in ability to control behavior’ will not be demonstrable with mathematical precision. It is enough to say that there must be proof of serious difficulty in controlling behavior. And this, when viewed in light of such features of the case as the nature of psychiatric diagnosis, and the severity of the mental abnormality itself, must be sufficient to distinguish the dangerous sexual offender whose serious mental illness, abnormality, or disorder subjects him to civil confinement from the dangerous but typical recidivist convicted in an ordinary criminal case.” Id. at 413.

31 Hendricks, supra note 27, at 360.
feature of that ‘serious … disorder’ … consisted of a special and serious lack of ability to control behavior.”

In this area, therefore, “[a] finding of dangerousness, standing alone, is ordinarily not a sufficient ground upon which to justify … involuntary commitment … [there must be an] added statutory requirement to limit those who suffer from a volitional impairment rendering them dangerous beyond their control.” Consequently, the involuntary commitment of sexual offenders or pedophiles rests upon issues of future dangerous and volitional capacity, which “requires proof of more than a mere disposition to violence; rather it requires evidence of past sexually violent behavior and a present mental condition that creates a likelihood of such conduct in the future.” Simply stated, commitment will be warranted where it is “difficult, if not impossible, for the defendant to control his dangerous [sexual] behavior.”

Importantly, many courts have relied upon the predictive value of future dangerous and volitional capacity when determining whether the involuntarily commit violent sexual criminals. For example, in United States v. Wilkinson, concerning a

32 Crane, supra note 29, 412-413.
33 Hendricks, supra note 27, at 358.
34 Id. at 357.
35 Id.
36 646 F.Supp.2d 194, 196 (D. Mass.2009) (In Wilkinson, the State attempted to prove lack of control based upon the fact that the defendant had “Anti-Social Personality Disorder.” In rejecting this argument, the Court held as follows:

The government has not established that Wilkinson has a serious mental impairment which causes him to have serious difficulty in controlling his behavior generally or, as required in this case, will cause him to have serious difficulty in refraining from sexually violent conduct or child molestation if released. Like many prisoners, Wilkinson has an Antisocial Personality Disorder. No one has diagnosed Wilkinson as having pedophilia or any mental abnormality that involves unnatural sexual urges. The government has not proven that Antisocial
potentially dangerous sexual predator, the court held that “an inmate cannot be committed merely because he is dangerous … commitment is constitutionally permissible only if the government proves by clear and convincing evidence that a person is dangerous because he has a serious mental condition which causes him to have difficulty in making reasoned choices and controlling his behavior.”

More specifically, the Court held that “the government must demonstrate that ‘as a result of’ the serious mental illness, abnormality or disorder,” … ‘there must be proof of serious difficulty in controlling behavior.” Indeed, it is the lack of behavioral control that distinguishes the “dangerous sexual offender … from the dangerous but typical recidivist.” Ultimately therefore, as with decisions concerning capital punishment and involuntary commitment for non-sexual offenders, confinement rests upon predictions about future behavior based upon past conduct.

Personality Disorder alone ever causes a person to have serious difficulty in controlling his conduct. In essence, the evidence indicates that individuals with severe forms of that disorder may often make unlawful choices, but they are able to control their conduct.

37 Id.

38 Id. at 201 (citing 18 U.S.C. 4247(a)(6); Crane, supra note 29, at 413; see also In re Commitment of W.Z., 173 N.J. 109, 129 (N.J. 2002) (In W.Z., the New Jersey Supreme Court analyzed the constitutionality of its own Sexually Violent Predator Act, and held as follows:

The SVPA authorizes the involuntary commitment of an individual believe to be a ‘sexually violent predator’ as defined by the Act … [t]he present mental condition and required threat of dangerousness are contained in other parts of the Act, including the expanded definitions of the terms in the phrase “suffers from a mental abnormality or personality disorder that makes the person likely to engage in acts of sexual violence if not confined in a secure facility to control, care or treatment” … [w]hat is important is that … the mental condition must affect an individual’s ability to control his or her sexually harmful conduct. Id. at 215 (quoting N.J.S.A. 30:4-27.26.

39 Wilkinson, supra note 36, at 200 (quoting Hendricks, supra note 27, at 357-359; see also Richard S. v. Carpinello, 589 F.3d 75 (2d Cir. 2009); Sokolsky v. Rostron, 2008 WL 4279384 (E.D. Cal. Sept. 9, 2008); Goodwin, supra note 26, at *5 (sexual criminals can remain in confinement even if they are not receiving treatment); E.D. v. Hunter, 2009 WL 111721 (E.D. Cal. Jan. 16, 2009).

40 See e.g., Goodwin, supra note 26, at *6.
Critically, however, and somewhat paradoxically, the courts – and commentators – have consistently recognized that predictive adjudications, whether it be for future dangerousness or lack of control, are often unreliable or, in some instances, simply inaccurate.\textsuperscript{41} For example, in \textit{Umana}, the Court explicitly recognized that “some studies indicated [sic] that predictions of future dangerousness are often wrong.”\textsuperscript{42} In fact, the courts have consistently acknowledged that expert testimony concerning “future dangerousness” is often unreliable, if not “more prejudicial than probative.”\textsuperscript{43} In \textit{U.S v.Taveras}\textsuperscript{44}, the Court also recognized that “[p]rojections of future dangerousness are precarious … [because] [they] require jurors to predict, beyond a reasonable doubt, future conduct based on an often uncertain pattern of past behavior.”\textsuperscript{45} Specifically, in \textit{Barefoot v. Estelle},\textsuperscript{46} the Court stated as follows:

\begin{quote}
We are aware that many mental health professionals have questioned the usefulness of psychiatric predictions of future dangerousness in light of studies indicating that such predictions are often inaccurate. For example, at the habeas hearing, Dr. Dickerson, one of petitioner’s expert witnesses, testified that psychiatric predictions of future dangerousness were wrong two out of three times … Dr. John Monahan, upon whom one of the States’s experts relied as the ‘leading thinker on this issue,’ … concluded that ‘the best’ clinical research currently in existence indicates that psychiatrists and psychologists are accurate in no more than one out of three predictions of violent behavior over a several year period among institutionalized
\end{quote}

\textsuperscript{41} \textit{Umana}, supra note 8, at *8.

\textsuperscript{42} Id. (citing \textit{Barefoot v. Estelle}, 463 U.S. 880, 899 (1983)).


\textsuperscript{44} 424 F.Supp.2d 446, 455 (E.D. Tex. 2006)

\textsuperscript{45} Id.

\textsuperscript{46} 463 U.S. 880, 901 (1983).
populations that had both committed violence in the past ... and who were diagnosed as mentally ill.\textsuperscript{47}

Importantly, the Addington Court echoed this view by stated that “‘[t]he subtleties and nuances of psychiatric diagnosis render certainties virtually beyond reach in most situations ... [p]sychiatric diagnosis ... is to a large extent based on medical ‘impressions’ drawn from subjective analysis ... [t]his process often makes it very difficult for the expert physician to offer definite conclusions about any particular patient.’”\textsuperscript{48} Thus, “[g]iven the lack of certainty and the fallibility of psychiatric diagnosis, there is a serious question as to whether a state could ever prove beyond a reasonable doubt that an individual is both mentally ill and likely to be dangerous.”\textsuperscript{49} Perhaps the most damaging criticism of future dangerousness/lack of control predications arose from the court’s decision in United States v. Sampson,\textsuperscript{50} where it held as follows:

For nearly twenty years we have known that psychiatrists cannot predict whether a person who has committed a violent act will be violent in the future ... Even the most scientific predictions based on thorough examination, diagnosis of mental symptoms, past patterns of behavior, and probalistic assessment are wrong nearly as often as they are right. The most common courtroom predictions-frequently based solely on hypotheticals—are wrong twice as often as they are right ... [S]tudies show that both clinicians [psychiatrists and psychologists] tend to think that they have more information than they really do and that they are poor at making extreme judgments ... [s]tereotypes and prejudices are just as likely to taint the decisions of

\textsuperscript{47} Id. at 901, n.7 (quoting Monahan, The Clinical Prediction of Violent Behavior 47-49 (1981) (emphasis in original)).

\textsuperscript{48} Addington, supra note 18, at 431. (As the Addington Court held, “‘[t]here may be factual issues to resolve in a in a commitment proceeding, but the factual aspects represent only the beginning of the inquiry ... [w]hether the individual ... is in need of confined therapy turns on the meaning of the facts which must be interpreted by expert psychiatrists and psychologists ... [however] [t]he subtleties and nuances of psychiatric diagnosis render certainties virtually beyond reach in most situation.’”).

\textsuperscript{49} Id. at 429 (emphasis added).

clinicians as they are of lay people. As a result, clinicians are no better than lay people in making these decisions.\textsuperscript{51}

In fact, a recent study analyzing predictions of future dangerousness “concluded that expert witnesses were wrong in 95% of the cases.”\textsuperscript{52} Stated simply, “[t]he scientific community virtually unanimously agrees that psychiatric testimony on future dangerousness is, to put it bluntly, unreliable and unscientific”\textsuperscript{53} Despite these concerns, in particular, the admissibility of such evidence under the \textit{Daubert} criteria\textsuperscript{54}, the Courts have consistently allowed future dangerousness to exist as a relevant factor in the

\textsuperscript{51} \textit{Id.} at 219 (the Court further discussed the fact that [j]urors … may give great deference to the testimony of a psychiatrist as a supposed expert for purposes of determining future dangerousness. As the American Psychiatric Association stated in \textit{Barefoot v. Estelle, discussed infra}, ‘a psychiatrist comes into the courtroom wearing a mantle of expertise that inevitable enhances the credibility, and therefore the impact, of the testimony.’ … Therefore, there is good reason to fear that that the testimony of a psychiatrist on the issue of future dangerousness will be given more weight than it deserves.” \textit{Id.} at 220 (quoting Eugenia T. La Fontaine, Note, “A Dangerous Preoccupation with Future Danger,” 44 B.C. L. REV. 228 (2002)).

\textsuperscript{52} \textit{Sampson, supra} note 50, at 221. Additionally, the \textit{Sampson} Court held that “[d]evelopments in the law and more recent scientific research suggest that expert testimony on future dangerousness would be inadmissible under the Federal Rules of Evidence and … [these] same considerations suggest that it may be timely for the Supreme Court to reconsider whether jurors can ascertain future dangerousness in a particular case.”

\textsuperscript{53} \textit{Flores v. Johnson}, 210 F.3d 456, 464 (2000) (as the \textit{Flores} Court held, “[n]either the Court nor the State of Texas has cited a single reputable scientific source contradicting the unanimous conclusion of professionals in this field that psychiatric predictions of long-term future violence are wrong more often than they are right.”); \textit{see also} Randy Otto, “On the Ability of Mental Health Professionals to Predict Dangerousness: A Commentary on Interpretations of the “Dangerousness” Literature, 18 LAW & PSYCHOL. REV. 43, 63, n. 63 (1994).

\textsuperscript{54} \textit{See Daubert v. Merrell Dow Pharmaceuticals, Inc.}, 509 U.S. 579, 589-90 (1993). In \textit{Daubert}, the Court delineated five factors to guide a court’s determination regarding the admissibility of scientific evidence. The are as follows:

1. Whether the theory has been tested;
2. Whether the theory has been subjected to peer review and publication;
3. The known rate of potential error;
4. The existence of standards controlling the operation of the technique; and
5. The degree to which the theory has been generally accepted by the scientific community.

Applying this criteria, the \textit{Flores} Court concluded that “the use of psychiatric evidence to predict a murderer’s “future dangerousness” fails all five \textit{Daubert} factors.
sentencing process.\textsuperscript{55} This is particularly troublesome given the fact that a defendant’s sentence “constitutes a significant deprivation of liberty that requires due process protection.”\textsuperscript{56} Ultimately, therefore, “[b]ecause most psychiatrists do not believe that they possess the expertise to make long-term predictions of dangerousness,”\textsuperscript{57} its use by courts and juries in sentencing a criminal defendant raises serious problems of fairness, substantive and procedural due process, and the legitimacy of the criminal sentencing process.\textsuperscript{58}

\textbf{B. COGNITIVE NEUROSCIENCE – IMPROVING FUTURE DANGEROUSNESS AND CULPABILITY DETERMINATIONS FOR ADOLESCENT AND ADULT VIOLENT CRIMINAL OFFENDERS.}

As will be set forth in greater detail \textit{infra} Part II, cognitive neuroscience “is an investigational field that seeks to understand how human sensory systems, motor systems, language, higher cognitive functions, emotions and even consciousness arise from the structure and function of the brain.”\textsuperscript{59} Indeed, “[t]he focus of cognitive neuroscience has expanded from an inquiry into basic sensorimotor and cognitive processes to the exploration of more highly complex human behaviors.”\textsuperscript{60} Put another

\textsuperscript{55} See \textit{e.g.}, \textit{Eaton v. Angelone}, 139 F.3d 990, 998 (4th Cir. 1998) (\textit{as cited in Umana supra note 8, at *8}).

\textsuperscript{56} \textit{Addington v. Texas}, \textit{supra} note 18, at 425.

\textsuperscript{57} \textit{Flores, supra} note 53, at 465; \textit{see also Heller v. Doe}, 509 U.S. 312, 324 (1993) (“many psychiatric predictions of future violent behavior are inaccurate.”)


\textsuperscript{59} O. Carter Snead, “Neuromaging and the “Complexity” of Capital Punishment,” \textit{82 N.Y.U. L. Rev.} 1265, 1273 (2007). (As Snead stated, “[c]ognitive neuroscience has been described as a ‘bridging discipline’ – between biology and neuroscience, on the one hand, and cognitive science and psychology, on the other.”)

\textsuperscript{60} Id.
way, neuroscientists believe that “‘as we understand more about the details of the regulatory systems in the brain and how decisions emerge in neural networks it is increasingly evident moral standards, practices and policies reside in our neurobiology.’”61 Stated simply, ‘[t]he foundational premise of cognitive neuroscience is that all aspects of the mind [and moral decisions] are reducible to the structure and function of the brain.’”62 In this way, neuroscientists posit that human thought and behavior are caused solely by physical processes taking place inside the brain …. “‘[an explanation] of human behavior in purely material terms.’”63 As a result, “neuroscience may have important implications for both how we understand the multiple influences on violent behavior and how the legal system may better engage with violent criminals.”64

As Part II examines in greater detail, neuroscientists have focused their research on two specific areas of the brain – a part of the brain’s “frontal lobe” including the prefrontal cortex65 as well as the amygdala.66 First, the pre-frontal cortex, which consists

61 Id. at 1274 (quoting Patricia Smith Churchland, MORAL DECISION-MAKING AND THE BRAIN, IN NEUROETHICS: DEFINING THE ISSUES IN THEORY, PRACTICE AND POLICY 3, 3 (Judy Illes ed., 2006)).

62 Snead, supra note 59, at 1277. Snead explains further as follows:

[C]ognitive Neuroscience follows the dominant approach of modern science, which seeks to understand and explain all observable phenomena as functions of their component parts. Under this methodology, questions of biology are thought to be reducible to matters of chemistry, which are, by extension, reducible to problems of physics. In principle, this approach will ultimately lead to the analysis of all phenomena in terms of the relationships of motion and rest among their most elemental particles.” Id. at 1278.

63 Id. at 1277-1278 (quoting in part Martha J. Farah, NEUROETHICS: THE PRACTICAL AND THE PHILOSOPHICAL, 9 Trends Cognitive Sci. 34, 34 (2005)).


65 In this Article, the use of “frontal lobe disorder” should be construed to include damage to the pre-frontal cortex.

66 Mobbs, et al. supra note 64, at e103.
primarily of the orbital, ventromedial, ventrolateral and dorsolateral cortexes – is responsible for “executive decision-making,” that is, reasoning, ethical choices, impulse and aggression control, as well as feelings of regret and empathy.\textsuperscript{67} As a result, “frontal lobe disorder [which includes the pre-frontal cortex], and which is the most common form of brain damage – affects, \emph{inter alia}, self-control, social behavior, the ability to plan behavior, conform to social norms/values, and exhibit sensitivity towards others.\textsuperscript{68} Perhaps the most alarming aspect of frontal lobe disorder is that it has “prevalence rates of ninety-four percent among homicide offenders, sixty-one percent among habitually aggressive adults, forty-nine to seventy-eight percent among sex offenders, and seventy-six percent among juvenile offenders.”\textsuperscript{69}

The same holds true for the amygdala, which deals with emotional responses, arousal, and responses to another’s expression of fear.\textsuperscript{70} In individuals with a history of violent behavior, there is “poorer recognition of facial expressions (of others),”\textsuperscript{71} which may lead to problems of impulse control. Furthermore, using specific neuro-imaging techniques, volunteers were presented with “a paradigm in which the appearance of a face on a screen was followed by painful shock in one condition but not in a second

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\textsuperscript{67} \textit{Id.}
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\textsuperscript{68} Richard E. Redding, “The Brain-Disordered Defendant” Neuroscience and Legal Insanity in the Twenty First Century,” 56 AM. U. L. REV. 51, 59-61 (2006). (As Redding Explains, “[f]rontal lobe dysfunction (when due to damage in the ventromedial prefrontal cortex) is thought to impair the emotional or somatic marking of stimuli linked to reward and punishment, which guides people in using past experience to anticipate future consequences of their behavior.”) \textit{Id.} at 73.
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\textsuperscript{69} \textit{Id.} at 57.
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\textsuperscript{70} Mobbs, \textit{supra} note 64, at e104.
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\textsuperscript{71} \textit{Id.} at e103.
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condition. The results demonstrated that “normal volunteers had “increased activity in the amygdala in responses to faces associated with shock, whereas psychopathic individuals showed no significant change in activity in this region.” Ultimately, these studies, along with examinations of the pre-frontal cortex, are showing that “we are closer to realizing the … the biological roots of criminality.”

This Article, therefore, proposes a solution that seeks to incorporate the findings of neuro-scientific studies into the criminal justice system in a way that more accurately reflects the culpability of a particular defendant. Importantly, however, at the outset, this Article neither attempts nor seeks to argue that brain damage in criminal defendants affects their mens rea, intent or sanity, as studies demonstrate that individuals with prefrontal cortex/frontal lobe disorder do retain the knowledge that their particular actions are in violation of a particular law, statute or societal norm. As a result, this

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72 Id.
73 Id.
74 Redding, supra note 68, at 56. (Redding explains as follows:

Though criminal behavior is seldom due to any single biological, psychological, or sociological cause, we are closer to realizing the early criminologist’s dream of identifying the biological roots of criminality. Many neuroscientists and mental health professionals now refer to ‘crime as a disease,’ the ‘psychopathology of crime,’ and ‘the neurobiology of violence.’ A ‘biological brain-proneness’ toward violence is widely accepted by neuroscientists.’ And, as one psychiatrist predicted, ‘we’re going to be able to diagnose many people who are biologically brain-prone to violence.’ New brain imaging technologies allow us to ‘literally look at, and into, the brains of [criminals] using functional and structural imaging techniques.’” Id. at 56-57 (quoting Jeffrey L. Kirchmeier, “A Tear in the Eye of the Law: Mitigating Factors and the Progression Toward a Disease Theory of Criminal Justice,” 83 OR. L. REV. 631, 631 (2004) (quoting Victor Hugo, THE LAST DAYS OF A CONDEMNED IN THE DEATH PENALTY: A LITERARY AND HISTORICAL APPROACH 103, 105 (Edward G. McGehee & William H. Hildebrand eds. 1964); Adrian Raine, THE PSYCHOPATHOLOGY OF CRIME: CRIMINAL BEHAVIOR AS A CLINICAL DISORDER 3 (1993); Jan Volavka, NEUROBIOLOGY OF VIOLENCE (1995); Nathanial J. Pallone & James J. Hennessy, “Brain Dysfunction and Criminal Violence, 35 Society 21, 21-22 (1998); Adrian Raine, Pschopathy, VIOLENCE AND BRAIN IMAGING, IN VIOLENCE AND PSYCHOPATHY 35 (Adrian Raine and Jose Sanmartin eds., 2001)
Article does not argue, explicitly or implicitly, that the insanity defense should be reformed, or that defendants with frontal lobe disorder are not competent to stand trial.

Rather, this Article proposes a novel solution that relies upon neuro-scientific evidence to suggest a new manner in which criminal defendants should be treated during and after they are convicted of a particular offense. To begin with, cognitive neuroscience has established with sufficient certainty the particular areas of the brain that, inter alia, affect action relevant to aggression and impulse control. As a result, neuro-scientific studies provide a far more accurate method by which to predict the future dangerousness of certain defendants, particularly violent criminals. Additionally, this proposal argues that, as a result, the sentences that violent criminals receive should not merely be retributive in nature, but rehabilitative as well.

Finally, in what is the most important part of this proposal, this Article argues that, based upon predictions of “future dangerousness,” defendants convicted of violent offenses can be committed to a mental institution after they serve their sentence, if there still exists evidence of, among other things, pre-frontal cortex/frontal lobe disorder, disorder of the amygdala, or other disorders that affect aggression, impulse control and judgment. This argument is predicated on the fact that a violent criminal defendant with a specific brain disorder can be successfully treated to a sufficient extent such that recidivism rates will substantially decrease. It is also based upon a utilitarian premise, that is, incapacitation of violent offenders -- premised upon more accurate assessments of future dangerousness -- will enhance public safety and protect the community from potentially violent and untreated individuals. Part II of this Article discusses cognitive neuroscience and its scientific findings, as related to both juveniles and adults. Part III
sets forth a specific solution to revise the criminal justice system in accordance with these findings, and thereafter addresses all relevant objections to such proposals.

PART II

COGNITIVE NEUROSCIENCE AND ITS IMPLICATIONS FOR THE CRIMINAL JUSTICE SYSTEM

A. BACKGROUND

1. CHARLES WHITMAN

Before he killed fourteen people and wounded thirty-eight at the University of Texas, Charles Whitman “was described as ‘handsome,’ and ‘fun,’ and ‘high spirited’ and was in many respects the ‘all American boy.’”75 When he was twelve years old, he became the youngest Eagle Scout in the world and in high school, pitched for the baseball team and managed the football team.76 After high school he joined the Marines, where he was described as “‘the kind of guy you would want around if you went into combat.’”77 He married while in the Marines, and would make notes to himself, one regarding his wife, stating, “[r]eceived a call from Kathy … it was fabulous … I will love her to the day I die …[s]he is the best thing I have in life.”78 Thereafter, he obtained a scholarship to the University of Texas, performed volunteer work while having a part-time job, and was described by his supervisor as “‘a truly outstanding person. Very likeable. Neat. Nice looking. A great guy.’”79


76 Id.

77 Id.

78 Id.

79 Id.
Suddenly, however, Whitman began to suffer severe headaches, and experience frequent acts of anger and aggression. He began to experience insomnia, and repeatedly wrote notes “reminding himself to be nice … and especially to control his tempter.” As he continued to experience increased feelings of anger, Whitman sought professional help at the University of Texas, where he “admitted that he had on two occasions assaulted his wife physically.” In addition, his doctor stated that “[h]is real concern is with himself at the present moment. He readily admits having overwhelming periods of hostility with a very minimum of provocation … he … also … made vivid reference to thinking about going up on the tower [at the University of Texas] with a deer rifle and start shooting people.”

Whitman never again met with a doctor about his condition. Rather, before climbing the tower, Whitman went to the police and asked to be arrested. Because he had committed no crime, he was released and it was recommended that he see a psychiatrist. Whitman then wrote another letter to himself, stating as follows:

I don’t quite understand what it is that compels me to type this letter … I don’t really understand myself these days … Lately I have been a victim of many unusual and irrational thoughts. These thoughts constantly recur, and it requires tremendous mental effort to concentrate … I talked to a doctor once for about two hours and tried to convey to him my fears that I felt overcome by overwhelming violent impulses. After one session I never saw the doctor again, and since then I have been fighting my mental turmoil alone, and

80 Id.
81 Id.
82 Id.
83 Id.
84 Id.
85 Id.
seemingly to no avail. After my death I wish that an autopsy would be performed to see if there is any visible physical disorder. I have had tremendous headaches in the past and have consumed two large bottles of Excedrin in the past three months.\textsuperscript{86}

Significantly, one day before Whitman climbed the tower at the University of Texas, he visited his mother, and “after they entered the penthouse … [h]e brutally beat, strangled, and stabbed her to death, crushing the back of her head, smashing her hands, and stabbing her in the chest with a huge hunting knife.”\textsuperscript{87} After murdering his mother, Whitman left a note saying, “I have just taken my mother’s life. I am very upset over having done it … I am truly sorry … Let there be no doubt in your mind that I loved this woman with all of my heart.”\textsuperscript{88}

After murdering his mother, Whitman then made the decision to kill his wife, stating, “[i]t was after much thought that I decided to kill my wife, Kathy, tonight … I love her dearly … I cannot rationally pinpoint any specific reason for doing this …”\textsuperscript{89} Whitman then “viciously stabbed her repeatedly [while she was sleeping] with his huge hunting knife, leaving five gaping holes in her chest. She died instantly.”\textsuperscript{90} He then wrote another note saying, “I brutally killed both of my loved ones … [i]f my life insurance policy is valid please pay off my debts … donate the rest anonymously to a mental health foundation. Maybe research can prevent further tragedies of this type.”\textsuperscript{91} The next day,

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\textsuperscript{86} Id. (emphasis added).
\textsuperscript{87} Id.
\textsuperscript{88} Id.
\textsuperscript{89} Id.
\textsuperscript{90} Id.
\textsuperscript{91} Id.
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Whitman climbed the tower at the University of Texas, killing fourteen people and injuring thirty-eight.\textsuperscript{92}

Perhaps most startling is the fact that in the post-mortem autopsy, part of Whitman’s brain “revealed a glioblastoma multiforme tumor the size of a walnut, erupting from beneath the thalamus, impacting the hypothalamus, extending into the temporal lobe and compressing the amygdaloid nucleus.”\textsuperscript{93} Indeed, it is precisely the amygdala, an “almond-shaped cluster of neurons,” that is involved in the processing of emotions.\textsuperscript{94}

\section{2. \textsc{The Schoolteacher}}

A forty-year old school teacher, by all accounts successful and happily married, suddenly began making sexual advances towards his stepdaughter.\textsuperscript{95} The Court

\textsuperscript{92} \textit{Id}.

\textsuperscript{93} \textit{Id}.


\textsuperscript{95} Redding, \textit{supra} note 68, at 51-52 (Redding also describes the famous story of Phineas Gage, “a railway foreman whose left frontal lobe was severely damaged when an explosion propelled a tamping iron through his head.” Redding further describes in pertinent part as follows:

The personality and behavior changes seen in Gage after the injury were dramatic. “So radical was the change in him that friends and acquaintances could hardly recognize the man.” He became irritable and immoral, his social functioning declined significantly, and he frequently became involved in fights and drunken brawls … Few cases, to be sure, are as stark. But brain-damaged defendants are seen everyday in American courtrooms, and in many cases, their criminal behavior appears to be the product of extremely poor judgment and self-control. Individuals with frontal lobe disorder … ‘become disinhibited … [t]heir capacity to say to themselves, ‘Stop! Don’t say or do that. It is not wise,’ is damaged. As one court explained, ‘due to the defendant’s brain impairment and problems with his frontal lobe functioning, the defendant had no judgment, in that \textit{he could appreciate the criminality of his conduct}, but could not conform his conduct to the requirements of the law.’ Indeed, frontally-damaged individuals typically do not lack understanding, they lack behavioral control.”\textsuperscript{\textit{quoting Antonio R. Damasio, Descartes’ Error: Emotion, Reason and the Human Brain 8 (1994); John Martyn Harlow, “Passage of an Iron Rod Through the Head, 39 BOSTON MED. AND SURGICAL J. 389-389-393 (1848); (Jonathan H. Pincus, “AGGRESSION, CRIMINALITY, AND THE HUMAN FRONTAL LOBES, FUNCTIONS AND DISORDERS 547, 549 (Bruce L. Miller & Jeffrey L.}}

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offered him two options – either attend a Sexaholics program or face incarceration. The schoolteacher chose the Sexaholics program, but failed because he could not stop making sexual advances to other program members.

The schoolteacher then underwent neuro-imaging examinations, which revealed a large brain tumor “displacing part of the frontal lobe (and hypothalamus) of his brain.” After the tumor was removed, the schoolteacher’s illegal sexual behavior immediately ceased.

3. **Harvey Weinstein**

Harvey Weinstein and his wife Barbara were married for many years and resided in Manhattan, New York. One morning, Weinstein suddenly strangled his wife and threw her body outside of their twelfth-story apartment, in an attempt to make her death look like a suicide.

Weinstein’s defense sought to mitigate his responsibility by introducing neuro-scientific evidence that directly impacted his culpability for this crime. The evidence revealed several brain disorders that characteristically implicate the “executive

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96 Redding, supra note 68, at 51-52.

97 Id. at 52.

98 Id.

99 Id.


101 Id. at 717.

102 Id. at 718.
functions,” of the brain, that is, reasoning, intent and judgment.\textsuperscript{103} To begin with, Weinstein underwent a skin conductance response test, which revealed that he had lesions on the frontal lobes of his brain.\textsuperscript{104}

The defense then adduced evidence that Weinstein’s brain was abnormal due “to the presence of an arachnoid cyst, the attendant displacement of the left frontal lobe, and firm indications of metabolic imbalance near the cyst and the regions of the brain opposite it.”\textsuperscript{105} When examining this evidence, the Court held as follows:

The frontal lobes of the brain—the general region where Weinstein’s abnormalities are most apparent, control the so-called executive functions. The ability to reason and to plan constitute the most important of these functions. The frontal lobes, in other words, are the seat of man’s cognitive powers. According to evidence at the hearing, damage to the frontal lobes can adversely affect a person’s reasoning capabilities. Putting it another way … ‘cognitive impairment is a sign of frontal lobe dysfunction.’”\textsuperscript{106} Thus … damage to the frontal lobes may be signaled by an erosion of a person’s powers of judgment, insight and foresight. These are matters generally accepted as valid in the fields of psychiatry, psychology and neurology.\textsuperscript{107}

As a result, Weinstein’s defense relied upon this information “to call at trial a psychiatrist to testify that at the moment Weinstein allegedly killed his wife, he lacked the cognitive

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\textsuperscript{104} Weinstein, supra note 100, at 718.
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\textsuperscript{105} Id. at 722. (More specifically, this conclusion was supported “scans of Weinstein’s brain obtained through “positron emission tomography (PET)” … [as well as skin conductance tests] … [and] Weinstein’s PET scans confirmed that a cyst exists within the arachnoid membrane, one of the brain’s protective coverings … PET scans and SCR test results … are factors that a psychiatrist will rely upon at trial to explain his diagnosis that, due to mental disease or defect, Weinstein was not criminally responsible for the death of his wife.” Id. at 717-718.
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\textsuperscript{106} Id. at 722-723 (citation omitted).
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\textsuperscript{107} Id.
\end{flushright}
ability to understand the nature and consequences of his conduct or that his conduct was wrong." 108 The Court held that this testimony was admissible. 109

B. COGNITIVE NEUROSCIENCE – THE METHODS BY WHICH IT DIAGNOSES BRAIN DISORDERS RELATING TO BEHAVIORAL ABNORMALITIES.

As set forth supra, cognitive neuroscience is “an investigative field that seeks to understand how human sensory systems, motor systems, attention, memory, language, higher cognitive functions, emotions, and even consciousness arise from the structure and function of the brain.” 110 As Professor Steven Erickson explains, “[i]mplicit in this model is the notion that, in time, all human experiences will be accessible by various physical apparatuses designed to explore the brain, that all mentation will be measurable by these devices, and that accurate predictions of human behavior by way of brain activity can be made solely by understanding the material properties of the brain.” 111 To be sure, “cognitive neuroscience confidently suggests [that] our perception of personhood grounded in the sense that we choose how to act is false and untenable … instead, we are a passive audience to the electrical cadence of neuronal firings buried deep within our

108 Id. at 723. Importantly, this Article will not argue what Weinstein’s defense attorney was essentially arguing – that he was temporarily insane at the time of the offense. The inclusion of this information is simply to demonstrate the impact that frontal lobe disorder can have on behavioral control and, how, in turn, this can influence criminal behavior.

109 Id. at 724. The discussion of the admissibility of neuro-scientific evidence, under both Frye and Daubert will be discussed in the “Objections” section, Part III infra.

110 Snead, supra note 59, at 1273.

heads.” In this way, “[w]hat we perceive as the mind is nothing more than a cognitive adaptation established by our brains to allow higher-ordered behavior.”

Consequently, “[t]he very notion of human agency – that people evaluate their environments, make choices, and impose those choices in the world – is entirely incompatible with the cognitive neuroscience theory of personhood.” Rather, cognitive neuroscience asserts that all individual thoughts, emotions and feelings can be traced to certain defined biological locations of the brain.” Critically, therefore, this view “has serious implications for theories of culpability and responsibility so fundamentally rooted in most legal systems.”

More specifically, cognitive neuroscientists use a variety of techniques to examine whether a particular individual has sustained damage to certain areas of the brain, i.e., the pre-frontal cortex, which invariably implicate issues concerning criminal

\[112\] Id. at 37-38.
\[113\] Id. at 38.
\[114\] Id. at 39. Erickson explains further as follows:

The foundational walls upon which it [cognitive neuroscience] rests hold unwaveringly to the tenets of classical physics, reductive materialism, and hard determinism … [w]e are automatons, fooled by a belief in goal-directed behavior that we perceive is under our control but is entirely the produce of forces set into motion long before our existence … [for example] that we may believe that we prefer and choose to indulge in chocolate ice cream over vanilla is an illusion … there is no ‘you’ as commonly understood: the brain and mind are synonymous … That our brains engage in behavior before we become consciously aware of it means behavior operates independently of our consciousness. At the least we are fools under the direction of our selfish genes; at the worst our identity is an utter illusion. Id. at 38-39.

\[115\] Id. at 42.
\[116\] Id.
responsibility. To begin with, neuroscientists use computed tomography scanning and magnetic resonance imaging to examine the structure and architecture of the brain.

More important, however, are the “functional techniques,” which measure the brain’s neural activity and thus form the basis for many conclusions regarding brain-damaged defendants. The first method to examine the brain’s electrical function was electroencephalography, which “uses electrodes placed on the scalp to directly measure ‘event related potential,’ [namely], the total response of a large number of neurons inside the brain.” An additional technique, magnetoencephalography “directly measures the magnetic fields produced by these same electrical charges from neural activity.” The problem with these methods, however, is that they cannot “localize the source of the electrical signal measured.”

Significantly, though, the more modern techniques of positron emission tomography (PET), single-photon emission computed tomography (SPECT), and functional magnetic resonance imaging (fMRI), have solved this problem. As Professor O. Carter Snead explains, “[i]t has long been thought that there is a relationship between neuronal activity and regional cerebral blood flow – that is, blood flow to the

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118 Snead, supra note 59, at 1281.

119 Id.

120 Id. at 1282.

121 Id.

122 Id.

123 Id.
region of the brain that is active during a given task." Each of the preceding techniques rely upon this principle, which assume that “once a threshold level of neuronal activity is reached, PET, SPECT and fMRI indirectly measure highly localized brain activity by recording certain proxies associated with cerebral blood flow.”

Ultimately, fMRI has become the most widely used and accepted technique in neuro-imaging. Like its counterparts, fMRI “relies on the principle that regional brain activation is indicated by increased cerebral blood flow.” However, “[w]hereas PET and SPECT utilize the proxies of blood flow and metabolic activity (e.g., glucose metabolism) of brain cells, fMRI measures the surplus of oxygenated blood recruited to the active brain region under consideration.” More specifically, “when the brain activity in a particular region increases, so too does the concentration of oxygenated blood (the “hemodynamic response”), while the concentration of deoxygenated blood simultaneously decreases.” As Professor Snead further states, “[d]eoxygenated blood contains deoxyhemoglobin … [and] its presence causes a decrease in the magnetic resonance signal.” In contrast, “[w]hen oxygenated blood flows to a brain region (and the concentration of deoxyhemoglobin decreases), the magnetic resonance signal

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124 Id. at 1282-1283. (Snead explains that “fMRI has numerous advantages over PET and SPECT. It is noninvasive and seemingly harmless. Its temporal resolution is superior to other indirect methods of functional neuroimaging (e.g., PET and SPECT) … [i]t is widely thought that fMRI, among all neuroimaging techniques, best balances temporal and spatial resolution.” Id. at 1285-1286.

125 Id. at 1283.

126 Id. at 1284.

127 Id. at 1284-1285.

128 Id. at 1285.

129 Id.

130 Id.
increases – a phenomenon referred to as the blood oxygenated level dependent (BOLD) response.” 131 In turn, researchers “interpret the increase in cerebral blood flow to a particular brain region (indicated by an increase in magnetic resonance signal strength) as an increase in cellular activity in that particular region.” 132 Ultimately, therefore, fMRI is the most widely used method by which neuroscientists examine and evaluate whether an individual suffers from certain brain abnormalities that have implications for criminal behavior. 133

More specifically, with respect to adolescents and adults, fMRI studies have revealed significant aspects of brain activity that bear directly upon the abilities to reason, control behavior, make sound judgments, and understand the consequences of particular actions.

1. ADOLESCENTS

Neuro-scientific studies have revealed substantial and meaningful differences between the brains of adolescents and adults. 134 To begin with, during brain development a process called myelination occurs, whereby “‘neuronal axons become wrapped in a fatty sheath to speed up transmission between neurons.” 135 Specifically, the teenage brain

131 Id.

132 Id.

133 Id. at 1284.


135 Id. at 11. (Indeed, Rightmer notes that “Dr. Elizabeth Sowell, a member of the UCLA research team, has lead several studies of brain development from adolescence to adulthood … [t]he results of her studies … [reveal that] … “[b]etween adolescence and adulthood, a dramatic increase in gray matter density loss is observed in the frontal lobes.” This suggests that even as adolescents’ brains mature in other areas, they still cannot reason like adults because they lack a fully formed frontal lobe. “Maturation, particularly in the frontal lobes, has been shown to correlate with measures of cognitive functioning.” Her studies also showed gray matter density reduction in the frontal lobes occurring during the post adolescent years, suggesting
“undergoes an intense overproduction of gray matter (the brain tissue that does the “thinking”). Subsequently, a period of “pruning” occurs, whereby the brain rapidly discards the gray matter. During the “pruning” period, “myelination” occurs, in which white matter develops, which “serves as insulation for the brain’s circuitry, making the brain more precise and efficient. As a result of this process, myelinated neurons transmit information up to one hundred times faster than non-myelinated neurons, and scientists believe that the “the greater speed of neuronal processing may facilitate cognitive complexity and the ability to adeptly combine information from multiple sources.” Researchers have found that “the pace and severity of these changes … continue into a person’s early 20s.”

Perhaps the most significant difference between the brains of adolescents and adults lies in the development of the frontal lobe/pre-frontal cortex which, as stated above, correlates with measures of cognitive functioning. Dr. Jay Geidd, a researcher in this area, explains that during adolescence “the part of the brain that is helping that the brain is still undergoing changes into a person’s twenties.) (quoting Elizabeth Sowell, Paul M. Thompson, Kevin D. Tessner & Arthur W. Toga, “Mapping Continued Brain Growth and Gray Matter Density Reduction in [the] Dorso Frontal Cortex: Inverse Relationships During Postadolescent Brain Maturation, 21 (22) J. NEUROSCIENCE 8819, 8821, 8828


138 Juvenile Justice Center, supra note 136 (citing Sowell, supra note 137).


140 Juvenile Justice Center, supra note 136, available at www.abanet.org/crmjust/juvjus

organization, planning and strategizing is not done being built yet … [i]t’s sort of unfair to expect [adolescents] to have adult levels of organizational skills or decision making before their brain is finished being built.”142 Researchers in this area have also opined that “the relatively late development of the pre-frontal cortex, which is linked to the ability to inhibit impulses and weigh consequences of decisions, may be related to ‘some of the behavioral manifestations of the teen years.’”143 Indeed, Dr. Ruben C. Gur, a neuropsychologist at the University of Pennsylvania, explains as follows:

The frontal lobe is ‘involved in behavioral facets germane to many aspects of criminal culpability … Perhaps most relevant is the involvement of these brain regions in the control of aggression and other impulses … If the neural substrates of these behaviors have not reached maturity before adulthood, it is unreasonable to expect behaviors themselves to reflect mature thought processes. The evidence is now strong that the brain does not cease to mature until the early 20s in those areas that govern impulsivity, judgment, planning for the future, foresight of consequences, , and other characteristics that make people morally culpable … Indeed, age 21 or 22 would be closer to the ‘biological age of maturity.’”144

As a result of these findings, Dr. Deborah Yurgelun-Todd of Harvard Medical School explains that “adolescents often rely on ‘emotional parts of the brain, rather than the frontal lobe … ‘ one of the things that teenagers seem to do is to respond more strongly

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143 Rightmer, supra note 134, at 13 (quoting Geidd, supra note 139, at 83) (Rightmer also explains that “while the juvenile brain may look like an adult brain and even have the ability to function as an adult brain, adolescents do not use their brains in the same way adults do.”) (citing Gargi Taukder, “Decision-Making is Still a Work in Progress for Teenagers,” BRAIN CONNECTION, July, 2000, available at http://www.brainconnection.com/topics/?main=news-in-rev/teen-frontal (Jul. 2000)

with gut response than they do with evaluating the consequences of what they’re doing.”

In addition, studies of the amygdala also underscore the differences between the brains of adolescents and adults. In particular, the amygdala is the region of the brain that processes emotions and emotional responses. Significantly, examinations of the amygdala in adolescents and adults revealed that “teenagers are more prone to erratic behavior than adults.” In a 1999 study at Harvard Medical School, teens were asked to identify the emotions they perceived in pictures of faces that were shown to them. Using functional fMRI, the amygdala of both teens and adults “burst with activity” when presented with a face showing fear. Critically, however, the pre-frontal cortex – which is responsible for higher cognitive functioning – did not “blaze” as it did in adults, suggesting that teens react emotionally, not rationally, when confronted with difficult situations.

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146 Beckman, supra note 145, available online at http://www.deathpenaltyinfo.org/node/1225.

147 Id.

148 Id.

149 Id.

150 Id.

151 Id.

152 Id.
In addition, “the teens kept mistaking fearful expressions for anger or other emotions.”153 Importantly, though, “subsequent experiments showed that in teenagers the “prefrontal cortex buzzes when they view expressions of people they know.”154 The critical difference between adolescents and adults, however, is that “while they pay attention to things that matter to them,” they “have difficulty interpreting images that are unfamiliar to them or seem remote in time.”155 Consequently, the combined process of slower frontal lobe development and maturation of the amygdala reveal that “an adolescent’s brain is unstable,”156 and if you “put stressors into a system that’s already fragile, it can easily revert to a less mature state.”157

Furthermore, it is important to recognize that the brain’s chemistry alone is not entirely predictive of an individual’s future behavior. As set forth infra Part III, early childhood abuse can adversely affect brain development.158 Indeed, it is not surprising, therefore, that “every [juvenile on death row] has been abused or neglected as a kid.”159

Ultimately, the brain development of teens has revealed a maturation process that implicates and involves core notions of criminal responsibility and culpability, which directly affects how they should be treated in the criminal justice system, particularly at the sentencing stage. In what is a positive response to such studies, some courts have

153 Id.
154 Id.
155 Id.
156 Id.
157 Id.
158 Id.
159 Id.
begun to rely upon this evidence when determining the proper punishment for a juvenile offender.

2. **Roper v. Simmons**

   In *Roper v. Simmons*\(^{160}\) the United States Supreme Court confronted the issue of whether it was permissible, under the Eighth and Fourteenth Amendments, to execute juveniles who were under eighteen at the time of the offense.\(^{161}\) The Supreme Court answered this question in the negative, holding that the death penalty could not be applied to juveniles under the age of eighteen.\(^{162}\) In so holding, the Court implicitly, if not explicitly, relied upon neuroscientific evidence reflecting that juveniles were less culpable than their adult counterparts.\(^{163}\) The Court held as follows:

   Three general differences between juveniles under 18 and adults demonstrate that juvenile offenders cannot with reliability be classified as the worst offenders. First, any parent knows and as the scientific and sociological studies respondent and his *amici* cite tend to confirm ‘[a] lack of maturity and an underdeveloped sense of responsibility are found in youth more often than in adults and are more understandable among the young. These qualities often result in impetuous and ill-considered actions and decisions.’ … The second area of difference is that juveniles are more vulnerable or susceptible to negative influences and outside pressures, including peer pressure … This is explained in part by the prevailing circumstance that juveniles have less control, or less experience with control, over their own environment … *The third broad difference is that the character of a juvenile is not as well formed as that of an adult.* The personality traits of juveniles are more transitory, less fixed … The susceptibility of juveniles to immature and irresponsible behavior means ‘their irresponsible behavior is not as morally reprehensible as that of an adult.’ … Indeed, ‘the relevance of youth as a mitigating factor derives from the fact that the signature qualities of youth are transient; as individuals mature, the impetuousness and recklessness that may dominate in younger years can subside … [Thus], [o]nce the diminished culpability of

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\(^{160}\) 543 U.S. 551 (2005).

\(^{161}\) *Id.* at 551.

\(^{162}\) *Id.*

\(^{163}\) *Id.* at 561-562.
juveniles is recognized, it is evident that the penological justifications for the death penalty apply with less force than to adults.\textsuperscript{164}

As the Court further held, “[r]etribution is not proportional if the law’s most severe penalty is imposed on one whose culpability or blameworthiness is diminished …”\textsuperscript{165} In reflecting on the lesser culpability of juveniles, the Court recognized that “‘[t]he likelihood that the teenage offender has made the kind of cost-benefit analysis that attaches any weight to the possibility of execution is so remote as to be virtually non-existent.’”\textsuperscript{166} As a result, the Court held that “[t]he differences between juvenile and adult offenders are too marked and well understood to risk allowing a youthful person to receive the death penalty …”\textsuperscript{167}

Of course, evidence regarding the adolescent brain has been recognized by the Courts as having strong implications for notions of criminal responsibility, particularly at the sentencing level. However, the courts have nonetheless been reticent to recognize that

\textsuperscript{164}Id at 569-571 (citations omitted) (emphasis added). The Court further held as follows:

In concluding that neither retribution nor deterrence provides adequate justification for imposing the death penalty on juvenile offenders, we cannot deny or overlook the brutal crimes to many juvenile offenders have committed … Certainly it can be argued, although we by no means concede the point, that a rare case might arise in which a juvenile offender has sufficient psychological maturity, and at the same time demonstrates sufficient depravity, to merit a sentence of death …. A central feature of death penalty sentencing is a particular assessment of the circumstances of the crime and characteristics of the offender … [w]e disagree … [a]n unacceptable likelihood exists that the brutality or cold=blooded nature of any particular crime would overpower mitigating arguments based on youth as a matter of course, even where the juvenile offender’s immaturity, vulnerability, and lack of true depravity should require a sentence less than death. \textit{Id.} at 572-573.

\textsuperscript{165}Id. at 571.

\textsuperscript{166}Id. at 572 (quoting \textit{Thompson v. Oklahoma}, 487 U.S. 815, 837 (1988)).

adult criminal defendants with diagnostic brain disorders, i.e., frontal lobe disorder, are also less culpable and deserving of different treatment at the sentencing process.

3. **Brain-Disorders in Adult Criminal Defendants**

To begin with, the introduction of neuro-imaging is no stranger to the civil or criminal justice system, as it has been used, *inter alia*, for purposes of competency to waive Miranda rights, subjective experience of pain in tort cases, custody determinations, mens rea defenses for fraud, kidnapping, burglary, and even murder.\(^{168}\) While this Article does not address these specific areas, it demonstrates that neuroscience is slowly making its way into the courtroom as a valid theory upon which to assess criminal responsibility and predict future dangerousness. This is due to the fact that, “neuroscience has resulted in a better understanding of the neural basis of psychiatric disorders, addiction, and cognitive and emotional processes across individuals.”\(^{169}\) Indeed, “[t]his improved understanding will likely inform the law first through the development of programs and policies … one practical application may be to craft better treatment options for drug courts and parole boards … neuroscience will have varying degrees of utility for legal scholars and practitioners.”\(^{170}\) The reason that neuroscience will play a substantial role in

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\(^{168}\) Teneille Brown, Emily Murphy, “Through a Scanner Darkly: NeuroImaging as Evidence of a Criminal Defendant’s Past Mental States,” 62 STAN. L. REV. 1119, 1132 (2010) (Brown and Murphy further state that “[w]hile prosecutors may one day introduce fMRI as evidence of future dangerousness, presently defense teams appear to be the dominant users of neuroimagining in the courtroom. One practical reason for this is that it would be physically difficult for the state to compel a brain scan of an unwilling person.”) Id. at 1133.

\(^{169}\) Brown and Murphy, *supra* note 168, 1135 (Brown and Murphy explain that “[n]euroimaging has seen the courtroom in the sentencing phase of capital cases, where evidentiary hurdles are much lower and a capital defendant may have a constitutional entitlement to a psychiatric evaluation. *Id.* at 1133 (emphasis added); see also Brent Garland, Mark S. Frankel, “Considering Convergence: A Policy Dialogue about Behavioral Genetics, Neuroscience and Law,” 69-SPG LAW & CONTEMP. PROBS. 101 (2006).

future legal discourse is that we now have a better understanding of the particular brain disorders and/or damage that affect human behavior.

A. **FRONTAL LOBE DISORDER**

Before getting into the specifics of frontal lobe disorder and, concomitantly, behavioral and volitional impairment, it must be recognized that, for these individuals, early childhood development is very significant. In other words, your childhood environment, parental upbringing, and exposure to certain influences can – and does – affect whether an individual will have frontal lobe/pre-frontal cortex damage that affects their ability to control aggressive impulses, and make reasoned and informed moral judgments. Specifically, “[m]ore often than not, defendants charged with homicide have been exposed to various risk factors in their environment that generate cognitive, neuropsychological, and organic brain impairment.” They are as follows:

- Young maternal age during pregnancy;
- Maternal alcohol, nicotine, drug use and poor diet and medical care during pregnancy;
- Fetal maldevelopment, minor physical abnormalities, fetal alcohol syndrome;
- Parental criminality and drug abuse;
- Domestic violence to mother during pregnancy;
- Poor offspring nutrition and medical care;

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171 John Matthew Fabian, “Forensic Neuropsychological Assessment and Death Penalty Litigation,” 33 APR CHAMPION 24 (2009) (Fabian notes that “[a]lthough assessing juveniles in capital proceedings is now moot, neuropsychological assessment of juveniles germane to mitigation at sentencing is still critical.”)

172 *Id.* at 25-26.

173 *Id.* at 25 (Fabian further notes that “any cognitive and neuropsychological impairment may be mitigating even if it cannot be determined to have direct causative etiology with the homicidal behavior.”); see also John Matthew Fabian, “State Supreme Court Responses to Atkins v. Virginia: Adaptive Functioning Assessment in Light of Purposeful Planning, Premeditation, and the Behavioral Context of the Homicide, 6 J. FORENSIC PSYCHOL. PRACTICE 1 (2006).
• Exposure to parental abuse and emotional neglect;
• Exposure to deplorable home conditions;
• Exposure to toxins, lead, parasites, infection;
• Poor socio-economic conditions; and
• Substance abuse and dependence history.\textsuperscript{174}

Amazingly, in a study addressing the prevalence of head injuries among various groups of offenders, it was discovered that: (1) 61\% of habitually violent offenders had a history of head injuries, compared with: (2) 67\% of convicts on death row; (3) 58\% of juvenile convicts on death row (before \textit{Roper} was decided); (4) 40\% of severely psychopathic criminals; and (5) 36\% of sexual offenders.\textsuperscript{175} Indeed, it is on this basis that we “must consider the preceding mitigating environmental risk factors that spawn organic and neuropsychological impairment as having a cumulative effect on one’s functional behavior and risk for violence.”\textsuperscript{176} Put differently, “the additive quality of both neurobiological and environmental factors places an individual at greatest risk for negative outcomes.”\textsuperscript{177}

Importantly, when studying the outcomes of these factors as they relate to violent behavior, there has been evidence of brain dysfunction in the areas associated with violence and aggression, namely, the \textit{frontal lobes and prefrontal cortex}, temporal lobes, amygdala, and limbic system.\textsuperscript{178} In fact, “about 100 percent of SPECT and PET studies

\textsuperscript{174} \textit{Id.} at 25-26.
\textsuperscript{175} \textit{Id.} at 26.
\textsuperscript{176} \textit{Id.}
\textsuperscript{177} \textit{Id.}
\textsuperscript{178} \textit{Id.} at 26. (Fabian explains that “[d]ecreases in prefrontal brain activity and increases in subcortical activity have been associated with antisocial behavior. Impairments in prefrontal lobe circuitry (ventromedial and orbitofrontal cortices have been linked with the understanding and processing of information; communication; understanding others’ reactions; abstracting and reasoning; controlling impulses; stopping behavior and emotional regulation; using knowledge to regulate behavior; persisting
reported deficits in prefrontal functioning (frontal lobe deficits), in violent, aggressive, and anti-social groups. “179

Now, with respect to frontal lobe disorder, it is critical to point out that “[t]wo divisions of the frontal lobes are responsible for different executive functions.”180 The “dorsolateral (prefrontal cortex) is associated with cognitive functions including language, working memory, and selective and sustained attention.”181 Additionally, “[t]he ventral and polar frontal cortex assists in regulating emotions, self-awareness, decision-making and social awareness.”182 Thus, damage to the frontal lobe/pre-frontal cortex can have the following consequences, which directly influence criminal behavior and bear upon notions of criminal responsibility:

• Controlling impulses/stopping behavior/emotional regulation;
• Inhibiting, unsuccessfully, inappropriate or impulsive behaviors;

179 Id. Fabian discusses the results of a study involving criminal defendants with brain impairments:

In one study of 41 defendants charged with murder or manslaughter assessing neurobiology related to mitigation, murderers as a group showed significant bilateral prefrontal metabolic decreases during a frontal lobe activation take. In another study with these same defendants, they were separated into affective versus predatory types and results indicated the affective types had sufficiently lower prefrontal metabolic activity as compared to the predatory types. Other data suggest that homicide frequently occurs because the individual responds to provocation with violent aggression that is out of proportion to the instigating stimulus, and the tendency for this process may be due to damage in the medial hypothalamic areas of the brain responsible for modulating defensive aggression. (citing A. Raine, M. Buchsbaum, and L. LaCasse, Brain Abnormalities in Murderers Indicated by Positron Emission Tomography, 42 BIOLOGICAL PSYCHIATRY (1997); A. Raine, J. Meloy, S. Bihrlle, et al., Reduced Prefrontal and Increased Subcortical Brain Functioning Assessment Using Positron Emission Tomography in Predatory and Affective Murderers, 16 BEHAV. SCI. AND L. 319 (1998); and D. Albert, M. Walsh, and R. Jonik, Aggression What is its Biological Foundation?, 17 NEUROSCI. AND BIOBEHAV. REV. 405 (1993).

180 Fabian, supra note 171, at 27-28.

181 Id.

182 Id.
Lacking appreciation of impact of behaviors onto others;
Using knowledge to regulate behavior;
Understanding others’ reactions;
Understanding, processing and communicating information;
Planning, organizing, and initiating thoughts and behavior;
Abstracting and reasoning;
Behavioral flexibility to changed contingencies;
Sustaining attention and concentration;
Modulating behavior in light of expected consequences;
Defects in goal formulation;
Spontaneous, florid confabulations with psychotic qualities;
Violence occurring within background of flat affect;
Low frustration tolerance;
Impaired self-control;
Low conformance to societal values;
Insensitivity towards others;
Manipulation of learned and stored information when making decisions; and
Distraction from persisting with appropriate behavior.  

In fact, studies of frontal lobe disorder reveal that “[many] defendants experience neuropathological organic impairment [namely] ‘underdeveloped brains’ that reveal deficits in neuropsychological and cognitive assessment.”

To be sure, the consequences of frontal lobe disorder have far-reaching effects on criminal behavior. First, “[i]t is the job of the frontal lobes to focus attention and to

\[Id\] at 27-28.

\[Id.\] at 28; Redding, supra note 68, at 59-60.; see also Tom Valeo, “Scientists Point to Brain Region of ‘Free Won’: Research adds to the evidence suggesting that brain dysfunction can compromise free will, available online at [www.dana.org](http://www.dana.org).

\[See\] Redding, supra note 68, at 61-71. Redding explains further as follows:

Frontal lobe brain dysfunction, in particular, has long been recognized as a possible causal factor in violent crime. As early as 1835, medical case reports linked frontal lobe injury with violence. But the exponential growth in neuroscience research over the last several decades provides compelling explanatory evidence that frontal lobe dysfunction may play a causal role in a wide variety of impulsive criminal behaviors. Damage to the frontal lobes – the largest part of the brain – is the most common form of brain damage. Each year, nearly one hundred thousand Americans sustain traumatic brain injuries … or brain tumors severe enough to damage the frontal lobes …. Substance abuse, relatively common among those who sustain traumatic brain injury, exacerbates the degree of brain damage. In childhood, physical abuse
modify and inhibit behavioral impulses that surge up from other arts of the brain
…[however] [f]rontally damaged people often cannot keep their behavior within the
general rules of society.”

As a result, there is a direct link between frontal lobe damage and criminal behavior, because “[a] person suffering from frontal lobe dysfunction could have an impairment in judgment, and could commit impulsive or violent acts even though such acts normally would be against that person’s nature.” In addition, a defendant’s frontal lobe damage could lead to “his inability to perceive social situations correctly and act accordingly, [and thus experience] an inability to control his behavior, and an inability to act rationally during stressful situations.” In essence, individuals with “frontal lobe damage often lose control over their own behavior and are prone to certain types of ‘rage’ attacks as the frontal lobe works [when not damaged] as a ‘breaking mechanism for human behavior.’”

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186 Redding supra note 68, at 60.

187 Id. at 60-61 (citing Commonwealth v. Monico, 488 N.E.2d 1168, 1173 (Mass. 1986)).

188 Redding, supra note 68, at 61.

189 Id. 61 (quoting Crook v. State, 813 So.2d 68, 71 (Fla. 2002)).
Put another way, a defendant with frontal lobe damage experiences impulse control [that is] so tenuous, so hair triggered, impaired by his [frontal lobe] dementia, that he would have … flown into a rage at the time and not handled a situation [the way] that someone with more reasoning ability might have handled with considerably less force.”

In fact, “[e]ven minimal frontal lobe dysfunction may cause impulsive aggression, as studies have found relationships between sub-clinical frontal lobe deficits and aggression in normal populations.”

It is not surprising, therefore, the brain imaging studies have consistently revealed structural and functional abnormalities in the frontal lobes of violent and psychopathic individuals. Redding explains as follows:

One of the most well-known studies is the Vietnam Veterans Head Injury study. It examined aggressive behavior in 279 veterans with frontal lobe lesions as compared to a matched control group of 57 non-injured veterans. The brain-injured veterans were reported by family and friends to be significantly more aggressive; twenty percent became aggressive after their injury and fourteen percent were violent. Similarly, a study of prison inmates found that violent crimes were committed by seventy-three percent of the brain-damaged inmates but by only twenty-eight percent of the non-injured inmates, and … clinical case studies of eighteen inmates on death row in Texas revealed that fifteen displayed symptoms of FLD (frontal lobe disorder) on neuropsychological tests.

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191 Redding, supra note 68, at 62.

192 Id.

193 Id.; see also Sasso, supra note 190, at 769 (stating that “emerging neurological research suggests that adolescents, as well as many, if not all, individuals the criminal justice system currently labels as mentally retarded, mentally ill, or even psychopathic, share a dispositive characteristic: their brains, typically their prefrontal cortices, are either damaged, defective and/or underdeveloped.”
Accordingly, “[t]he link between FLD and criminal behavior is not surprising when considering the functions of the frontal lobes, the so-called ‘theater of the mind,’ responsible for the executive brain functions of attention allocation, planning, decision making, judgment, behavioral monitoring, and impulse control.” 194 Furthermore, although “people with frontal lobe damage usually retain their overall intellectual capacities and can reason rationally about social and moral situations, they frequently behave ‘in a most unintelligent way,’ [because] [t]heir real world judgment is impaired. 195 In fact, the “‘inability to reason and decide advantageously in risky situations is likely to contribute to … impulsivity, rule breaking, reckless, [and] irresponsible behavior …” 196 As such, “[t]he impaired impulse control reflects ‘a curious dissociation between knowing and doing … [f]rontal lobe patients know their errors, but are unable to use that knowledge to modify [their] behavior.” 197

B. THE FRONTAL LOBES AND THE AMYGDALA

Importantly, in the aspect of frontal lobe disorder that causes impulsive behavior, “there is a disruption in the neural circuit running between the limbic system (especially the amygdala) and the frontal lobes, which is a brain circuit responsible for fear


196 Redding, supra note 68, at 73 (quoting Adrian Raine, “THE PSYCHOPATHOLOGY OF CRIME: CRIMINAL BEHAVIOR AS A CLINICAL DISORDER 3, 49 (1993)); Adrian Raine, PSYCHOPATHY, VIOLENCE AND BRAIN IMAGING 35, 301 (Adrian Raine and Jose Sanmartin eds., 2001)).

conditioning, stress responses, mood regulation, and impulse control, and ‘the meeting point between thought and emotion.’”  

Specifically, the amygdala, “which stores emotional memories of past experiences and compares incoming stimuli against those stored memories, is responsible for the rapid evaluation of incoming perceptual stimuli.” This occurs “automatically and outside of conscious awareness,” ... [it] is “something like a psychological sentinel, challenging every situation, every perception … Is this something I hate? That hurts me? Something I fear? If so … the amygdala reacts instantaneously, like a neural tripwire, telegraphing a message of crisis to all parts of the brain autonomic nervous system …”  

Professor Redding explains in pertinent part as follows:

[T]he amygdala proposes, the frontal lobe disposes … ‘the connections between the amygdala [and related limbic structures] and the [frontal lobes] are the hub of battles or cooperative treaties struck between head and heart,

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198 Redding, supra note 68, at 70 (quoting Daniel Goleman, EMOTIONAL INTELLIGENCE: WHY IT CAN MATTER MORE THAN IQ 28 (1994)).

199 Redding, supra note 68, at 70; see also Peggy Sasso, “Implementing the Death Penalty: The Moral Implications of Recent Advances in Neuropsychology,” 29 CARDOZO L. REV. 765 (2007) (Sasso explains as follows:

[Discussing Roper v. Simmons], [t]he Simmons Court … acknowledged its use of ‘scientific and sociological studies’ … in reaching its conclusion that … because adolescents do not have the same cognitive and emotional capacity as adults, they lack the same ability as an adult to be motivated by moral norms for moral reasons and thus are less culpable for failing to conduct their conduct accordingly … [t]he brief submitted by the AMA [American Medical Association] … explained that those regions of the brain that are associated with ‘impulse control, regulation of emotions, risk assessment, and moral reasoning’ do not achieve full maturity until after the age of eighteen … the prefrontal cortex, the area of the brain ‘most associated with impulse control, regulation of emotions, risk assessment, and moral reasoning’ is one of the last areas of the brain to mature and dies not become fully developed until early adulthood … in the absence of a developed prefrontal cortex, adolescents rely much more heavily on the amygdala … [which is] ‘a neural system that evolved to detect danger and produce rapid protective responses without conscious participation.’ It dictates instinctive gut reactions, including fight or flight responses.’ Id. at 798-799 (quoting and citing Simmons, supra note 160, at 569-570; Brief of American Medical Association et al. as Amicus Curiae in support of Respondent at 2-3, 12-13, 16.

200 Redding, supra note 68, at 70. (quoting Goleman, supra note 193, at 16, 20).
thought and feeling.’ Analogizing to classic Freudian terms, one could conceptualize the frontal lobes as serving the functions of the Ego, which keeps in check the primitive drives of the Id. Normally, the frontal lobes act as a circuit breaker for the reactive emotional responses generated by the amygdala. But the circuit breaker may fail when the frontal lobes are damaged. Frontally-damaged individuals may be unable to inhibit quick response reactions generated by the amygdala or to judge the consequences of an aggressive response, particularly in stressful or provocative circumstances. In many circumstances, the frontal lobes of the brain engage a stimulus at roughly the same time as the amygdala, producing a coordinated response that integrates emotional perceptions with rational decision making. But particularly in threatening or emotionally-charged situations, the amygdala’s evaluation and response occurs before the higher cognitive processes in the frontal lobe can become fully engaged to rationally analyze the situation.\footnote{Redding, supra note 68, at 70 (quoting Goleman, supra note 193, at 26-27).}

In essence, disruption between the neural circuit running between the amygdala and frontal lobe causes individuals to “become perpetually responsive and literally overstimulated.”\footnote{Redding, supra note 68, at 70.} As a result, these individuals “‘have lost the capacity to ignore their environment even when the response seems bizarre or inappropriate … [w]hen the frontal lobes are no longer in command …[w]e do not live reflectively but reflexively … [it]’s a sudden collapse of behavioral control.”\footnote{Redding, supra note 68, at 72 (citing Elissa Ely, “Physiology of Insight, 12 PSYCHIATRIC TIMES 9 (1995) (available at \url{http://psychiatriticimes.com/p950929.html}, (internal citations omitted).) In addition, “individuals with bilateral amygdala damage have demonstrated profound deficits in their ability to recognize certain emotions in others, such as fear, sadness, and disgust, and to identify trustworthy individuals from their facial appearances.”\footnote{Sasso, supra note 190 at 1241 (Based upon this and other evidence, Sasso concludes that “[a]dvances in our understanding of how the brain works have profound implications for the criminal law … [t]he neurosciences clearly have a role to play at the definitional stage in terms of formulating tests designed to exclude those individuals who are outside our moral discourse altogether as well tests identifying classes of individuals who can never qualify as our most morally culpable offenders …” Id. at 1243.} Ultimately, therefore, neuroscientific research}
has demonstrated that “when certain neural structures fail to operate properly the individual’s capacity to engage in positive social behavior, and thus qualify as a moral agent capable of rejecting the community’s moral and social norms, is severely impaired, if not eliminated altogether.”

What matters most, now, is not simply what the neuroscientific evidence demonstrates, but how it should, if at all, be used in the criminal justice system. To begin with, brain imaging has already been used in a variety of contexts, i.e., to show that a defendant was incompetent to stand trial, lacked the mens rea necessary to support a conviction for a particular crime, and to support an insanity defense. It has also been used to argue for more lenient sentences, and for the proposition that a defendant was not competent to be executed.

The proposal in this Article rejects using neuroscientific – and neuroimaging data -- for all of the above purposes, and instead offers a novel solution that takes into account both the individual’s medical condition and public safety. First, with respect to the issue of mens rea, the neuroscientific evidence has not demonstrated with any degree of persuasion that an individual can lacks the requisite mental state/intent at the time a particular crime is committed. Rather, what the neuroscience does show is that individuals may have problems with impulse control, reasoning and understanding the


206 Jones, et. al., supra note 117, at 3-4.

207 Id. Neuroscientific evidence has also been used in the civil context, i.e., in constitutional, personal injury, disability benefit, and contract cases. As Jones et al. detail, in one case the court considered whether a brain imaging study could be used to show that exposure to violent video games increases aggressive thinking and behavior in adolescents. Id. at 2. It has also been used to support evidence of head injuries resulting from a car accident, and mental incompetency to enter into a valid contract. Id.
consequences of their actions. These facts, however, do not negate an individual’s ability to form the requisite intent, i.e., purposefulness or premeditation, upon which to base a conviction for a specific crime.

Nor does the neuroscientific evidence even remotely support a successful assertion of the insanity defense. In fact, nowhere in the neuroimaging studies has there been any contention, explicitly or implicitly, that brain damaged defendants cannot distinguish between right and wrong. In fact, the studies demonstrate precisely the opposite, namely, that “people with frontal lobe damage usually retain their overall intellectual capacities and can reason rationally about social and moral situations ….”

The point here – and this goes to both mens rea and the insanity defense – is that frontal lobe damage does not remove from the individual the capacity to function at a cognitive level, an thus realize the wrongfulness of their actions. Instead, what the evidence does show is that behavioral functions are significantly impaired, and, when coupled with impulse control problems and tendencies toward aggression or ‘rage’ attacks,’ the brain-damaged defendant stands in a less culpable position than the ordinary criminal defendant.

The same, therefore, holds true with claims that an individual is not competent to stand trial or execution, because these arguments assume that a defendant does not have the ability to understand why they are being charged with or punished in accordance with a particular crime. Again, the neuroscientific literature does not support these cognitive-based arguments; it shows, as stated supra, problems with behavioral control, namely,

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208 Fabian, supra note 171, at 27-28.

209 Redding, supra note 68, at 68 (quoting Damasio & Anderson, supra note 195, at 429-34).
impulse control, judgment, conformity to societal norms, and reflective decision making.\footnote{210}\

The behavioral impairments, however, do have serious consequences with an individual’s ability to control their behavior and act in accordance with legal rules in specific environments. The studies do reveal – with a reasonable degree of accuracy – that frontal lobe disorder does affect the ability to exercise prudent judgment, engage in cost-benefit analysis, and control responses to external stimuli.\footnote{211} As stated, however, while these are behavioral problems, they are not cognitive impairments. Individuals with these brain abnormalities can still know right from wrong; they can still understand that their behavior transgresses societal norms; and they can still understand – to a certain degree – that their actions can and do have negative consequences. As such, no assertion of: (1) competency to stand trial; (2) lack of requisite mens rea; or (3) insanity should ever succeed under these facts. The evidence simply does not support these arguments.

Critically, however, they court can – and should, address the behavioral problems that individuals with frontal lobe disorder and neuronal disruption with the amygdala possess. These problems are substantial, and they negatively affect an individual’s ability to contribute meaningfully to the community and act in conformity with the law, societal norms, and basic values. Thus, addressing the behavioral problems, while acknowledging


\footnote{211} Sasso, \textit{supra} note 190 at 1227, 1241 (Sasso also discusses the hippocampus, “which is also part of the limbic system and likely supports our capacity to be able to act appropriately in a given social context. Specifically, the hippocampus appears essential to our ability to lay down new explicit memories. Given the critical role the hippocampus plays in the formation of new memories, it possible the hippocampus might also ‘facilitate conscious recollection of schemas and memories that allow past events to affect current decisions.’” \textit{Id} at 1242 (quoting William D. Casebeer, “Moral Cognition and its Neural Constituents, 4 \textsc{Nature Rev. Neuroscience} 841, 844 (2003)).
that these problems are not of a *cognitive* nature will not only serve to benefit a particular defendant through the implementation of rehabilitative measures, but it will also assist in reducing recidivism, thus contributing to greater public safety.

This Article proposes a new solution to this problem by arguing when – and for what reasons – neuroscientific evidence should be used in the courtroom. This proposal is based upon both the benefits and limits of relevant neuro-imaging studies, while also seeking to adopt a solution that has rehabilitative potential for the individual and utilitarian prospects for the community. In other words, neuroscientific evidence is beneficial both for the prosecution and defense.

**PART III**


This proposal is predicated upon the findings (both beneficial yet limited) of neuro-scientific evidence, relevant evidentiary rules, and, most importantly, the belief that criminal sentencing should be structured on a more individualized basis to reflect not only retributive both also rehabilitative and utilitarian concerns. Before proceeding, it is critical to point out that this Article is not biased; it neither seeks nor desires to benefit the State or defense counsel in its application and introduction in the courtroom. Instead, it endeavors to use this information responsibly in a manner that is consistent with those aspects of neuroscientific findings where a near-consensus has been reached. All other extrapolations of what neuro-imaging may – or could – demonstrate in the future, or even possibly in a particular case, are rejected by this Article. Instead, this proposal is based upon what we know now, not what we may know in the future.
Put another way, neuroscientific evidence must be used responsibly by defense counsel lest it become yet another strategic tool that is used in every possible way to vindicate their client. Such use would not only be irresponsible, but it would compromise the field, findings and future potential of neuroscientific evidence in the courtroom. This proposal, therefore, examines the stages of the criminal process and addresses where neuroscientific evidence can be used, and how it can be used in an entirely new proceeding for violent criminal defendants. Specifically, this Article proposes that individuals convicted of violent offenses that are diagnosed with, \textit{inter alia}, frontal lobe damage can be subject to a hearing, \textit{post-sentence} that could result in their involuntary confinement if: (1) rehabilitative efforts \textit{during} the defendant’s sentence have been unsuccessful or only partially successful; (2) it is determined that they do not have adequate control over their behavior (the “volitional” component); and (3) they are no longer likely to commit violent or other offenses (the “future dangerousness” component). Such a statute would require strict procedural and substantive controls, such as those that allow for the involuntary confinement of, for example, sexual offenders/pedophiles. But first, the use of neuroscience at various stages in the criminal process is examined.

\textbf{A. PRE-TRIAL PROCEEDINGS}

At this stage, defense counsel could potentially assert that an individual is incompetent to stand trial because he does not understand the nature or basis of the charges that have been filed.\textsuperscript{212} Based upon neuro-scientific findings, this argument should be rejected because individuals with frontal lobe disorder along with the neural

\begin{footnotesize}
\textsuperscript{212} \textit{See, e.g.}, \textit{McMurtrey v. Ryan}, 539 F.3d 1112 (9th Cir. 2008); \textit{United States v. Gigante}, 982 F. Supp. 140 (S.D.N.Y. 1997).\end{footnotesize}
circuit disruption between the amygdala and frontal lobes experience *behavioral*, not *cognitive* impairments.

Importantly, competency to stand trial is “essential to a fair trial,” and is governed by a three-pronged test. It is as follows:

[T]o be competent, a defendant must be able to (1) consult with the lawyer with a reasonable degree of rational understanding; (2) otherwise assist in the defense; (3) have a rational understanding of the criminal proceedings; and (4) have a factual understanding of the proceedings.

There can be no doubt that a defendant with frontal lobe disorder and amygdala neural disruption has the ability to understand, both rationally, factually and legally, the nature of the relevant proceedings. The distinction once again turns upon the *behavioral v. cognitive* component. When looking at the manifestations of frontal lobe disorder, none suggest that there is a problem of “understanding,” that is, of being able to rationally understand the nature of a particular action.

Instead, the neuroscientific evidence speaks more to problems with behaviors, particularly with controlling impulses, urges, and aggression. In other words, frontal lobe disorder affects your ability to act, but not your ability to know right from wrong. Put differently, analogizing to sexual offenders, the problem lies with volition, not cognition. The individual may have difficulty making the “right” or “legal” choice, but he knows the difference. Thus, because these individuals “usually retain their overall intellectual

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213 *U.S. v. Duhon*, 104 F.Supp.2d 663, 670 (W.D. La. 2000). In *Duhon*, the Court found that the defendant was incompetent to stand trial on the basis that he was mentally retarded. In support of this holding, the Court noted that the defendant “obtained a Verbal I.Q. score of 70, a Performance I.Q. of 65, and a Full Scale I.Q. of 67, which indicated the classification of Mild Mental Retardation.” *Id.* at 667.

214 *Id.*

215 *Id.* (quoting *Drope v. Missouri*, 420 U.S. 162, 171-172 (1975)).
capacities and can reason rationally about social and moral situations …” \(^{216}\) any challenge to competency, based purely on neuroscientific evidence, should be rejected.

To be sure, in *McMurtrey v. Ryan* \(^{217}\) the Court detailed precisely the type of conduct that is appropriate for a finding of incompetency, which is informative in the neuroscientific context. In *McMurtrey*, doctors that examined the defendant testified that he had neither neurological damage nor disease. \(^{218}\) Instead, expert testimony revealed that McMurtrey “had a history of head injuries and mental health problems, along with a longstanding history of psychological problems that stemmed from unresolved issues surrounding McMurtrey’s father’s fatal shooting of McMurtrey’s mother and her lover when McMurtrey was seventeen.” \(^{219}\) He was also diagnosed with “schizoid personality” \(^{220}\) disorder, prescribed “[t]horazine and [a]tarax…for seizures and anxiety,” \(^{221}\) … and had “‘experienced auditory and visual hallucinations since age fifteen.’” \(^{222}\) Additionally, McMurry had “been moved to the psychiatric unit of a local hospital because of ‘‘suicidal ideation and a psychotic breakdown.’” \(^{223}\) Finally, there was testimony that McMurtrey suffered from ‘high anxiety level[s],’ \(^{224}\) … mixed neuroses,\(^ {225}\)


\(^{217}\) 539 F.Supp. 1112 (9th. Cir. 2008).

\(^{218}\) *Id.* at 1121.

\(^{219}\) *Id.* at 1119.

\(^{220}\) *Id.* at 1119.

\(^{221}\) *Id.* at 1120.

\(^{222}\) *Id.* (citation omitted).

\(^{223}\) *Id.* at 1121. (citation omitted).

\(^{224}\) *Id.* at 1121. (citation omitted).
‘depression,’ and ‘atypical dissociative disorder.’” Based on these findings, the 9th Circuit reversed the state court and ordered that a hearing be held to determine whether McMurtrey was competent to stand trial.

As stated above, individuals with frontal lobe disorder and neural circuit disruption with the amygdala do not suffer from these impairments because McMurtrey’s illnesses affected his cognitive abilities, i.e. hallucinations, and mood/personality disorders. Now, if defense counsel can introduce this type neuroscientific evidence at a competency hearing, and persuasively assert that it results from frontal lobe disorder, then it may bear upon the issue of competency. To date, however, there is no consensus in the scientific community for this proposition. As such, neuroscientific evidence should not – and does not – support the position that an individual may not be competent to stand trial.

B. THE GUILT/INNOCENCE PHASE

The guilt innocence phase implicates two specific elements relevant to neuroscientific data – the issue of mens rea, along with the admissibility of such evidence into the adjudicatory phase of the criminal process. The argument that a defendant, based upon the foregoing neuroscientific data, lacked the requisite mental state to commit a particular crime is without merit. First, because defendants with frontal lobe disorder

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225 Id. at 1121. (citation omitted).

226 Id. at 1121. (citation omitted).

227 Id. at 1121. (citation omitted).

228 Id. at 1132.
retain their “overall intellectual capacities”\textsuperscript{229} and ability to “reason rationally,”\textsuperscript{230} it follows that they likely have the capability to act with purpose, knowledge, recklessness or negligence. Again, when examining the consequences of frontal lobe disorder, the vast majority of symptoms involves behavioral and volitional aspects, and do not suggest impairment of cognitive functioning. As set forth \textit{supra}, the most common manifestations of frontal lobe disorder are, \textit{inter alia}: 

- Low frustration tolerance;
- Impaired self-control;
- Low conformance to societal values;
- Insensitivity towards others;
- Controlling impulses/Stopping behavior/emotional regulation;
- Inhibiting, unsuccessfully, inappropriate or impulsive behaviors;
- Behavioral flexibility to changed contingencies;
- Sustaining attention and concentration;
- Modulating behavior in light of expected consequences; and
- Defects in goal formulation\textsuperscript{231}

Nowhere in this picture, however, can one legitimately argue that a defendant afflicted with frontal lobe disorder cannot establish the requisite mental state to commit a particular criminal act. Rather, it \textit{can} be argued that an individual had extreme volitional difficulty, that is, resisting the urge to engage, purposely or otherwise, in a specific action. This is especially true if there is a neural dysfunction between the amygdala and

\textsuperscript{229} Redding, \textit{supra} note 68, at 68, \textit{(quoting Damasio \& Anderson, at 429-34)} (Redding does explain, however, that “[t]heir [people with frontal lobe damage] real-world judgment is impaired. The impaired impulse control reflects ‘a curious dissociation between knowing and doing … [f]rontal lobe patients know their errors, but they are unable to use that knowledge to modify [their] behavior.’” \textit{Id. (quoting Donald T. Stuss and D. Frank Benson, “Neuropsychological Studies of the Frontal Lobes, 95 PSYCHOL. BULL. 3, 18 (1984)}

\textsuperscript{230} Redding, \textit{supra} note 68, at 68, \textit{(quoting Damasio \& Anderson, \textit{supra} note 195, at 429-34)}.

\textsuperscript{231} Fabian, \textit{supra} note 171, at 27-12; Redding, \textit{supra} note 68, at 59-60 (In examining these factors, Fabian states that “[p]sychiatric disorders such as schizophrenia and bipolar disorder impair one’s thoughts and behaviors and interfere with reality contact and volitional behavior. These disorders are the foundation of a legal insanity defense that negates a defendant’s criminal responsibility. In contrast, one may query whether neurocognitive impairment that affects one’s thoughts and behaviors can be used as mitigating one’s lack of free will, behavioral control, and moral culpability.”)
frontal lobes, because, then, a person can become prone to aggression or ‘rage’ attacks, because the amygdala’s initial response to outside stimuli is not mitigated by the higher functions of the frontal lobe/pre-frontal cortex. But to argue that someone has extreme difficulty controlling their actions does not mean that they do not have the ability to act with a specific level of intent when failing to resist the impulses from which they are affected.\textsuperscript{232} That is precisely the difference between volitional impairment and cognitive awareness. Individuals with frontal lobe disorder still act with intent, purpose and knowledge, but they do so within a context where it is much more difficult to control the urge commit specific illegal conduct. That may make them less culpable, but it does not affect their guilt, nor does it render them insane.

In addition, there would exist legitimate issues, both at the state and federal level, concerning the admissibility of neuro-scientific evidence at the guilt/innocence phase of the trial. First, at the state level, the admission of expert testimony is generally governed by the principle set forth in Frye v. United States,\textsuperscript{233} where the Court held as follows:

Just when a scientific principle or discovery crosses the line between experimental and demonstrable is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the field in which it belongs.\textsuperscript{234}

\textsuperscript{232} Redding, supra note 68, at 70 (quoting Goleman, supra note 198, at 26-27).

\textsuperscript{233} 293 F. 1013 (D.C. Cir. 1923).

\textsuperscript{234} Marsh v. Valyou, 977 So.2d 543, 546 (Fla. 2008) (quoting Frye, supra note 233, at 1014).
Thus, under *Frye*, “‘[t]he proponent of the evidence bears the burden of establishing by a preponderance of the evidence the general acceptance of the underlying scientific principles and methodology.’”235

At the federal level, as set forth above, the test for admitting expert testimony is governed by *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579, 587 (1993), which analyzes the following five factors:

- Whether the theory has been tested;
- Whether the theory has been subjected to peer review and publication;
- The known rate of potential error;
- The existence of standards controlling the operation of the technique; and
- The degree to which the theory has been generally accepted by the scientific community.236

Here, as an evidentiary matter, the introduction of frontal lobe disorder and/or other brain damage data, i.e., disruption of neural circuits will be problematic because of the specific purpose for which the evidence is being presented. In other words, the admissibility of neuroscientific evidence does not exist in a vacuum; its admissibility depends heavily upon the proposition for which it is being used to support. In the guilt/innocence phase, the most likely reasons for introducing neuroscientific studies concerning a particular defendant would be to either negate *mens rea* or support an insanity defense.

Importantly, however, using neuroscience for these purposes is not likely to pass the admissibility threshold under *Frye* or *Daubert* because, *inter alia*, there is no consensus among the scientific community that neuroscientific studies negate *mens rea* or prohibit an individual from discerning right from wrong. Now, as set forth below,

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235 *Marsh, supra* note 234, at 547 (*quoting Castillo v. E.I. Du Pont De Nemours & Co., Inc.*, 854 So.2d 1264, 1268 (Fla. 1983)).

236 *Daubert*, 509 U.S. 593-594.
there may be a consensus among the scientific community that frontal lobe disorder causes the symptoms and manifestations listed above, but because they are generally behavioral in nature, the use of such information as a cognitive matter to negate mens rea or establish an insanity defense has not been generally accepted by the scientific community. Put differently, the problem is not that the neuroscientific evidence is deficient; rather, admissibility problems arise when such information is connected to and used for a particular purpose. As a result, because there currently exists no consensus establishing that frontal lobe disorder and/or amygdala neural circuit malfunction results in cognitive deficiencies, this evidence should not be admitted at the guilt/innocence phase.

C. THE SENTENCING PHASE

The next issues then become whether, after the adjudicatory phase, the defendant may introduce precisely the type of neuro-scientific evidence that was excluded at the underlying trial. Indeed, the defendant should be allowed to proffer all relevant neuro-scientific evidence, i.e., frontal lobe syndrome, because the purpose here is not to negate mens rea, but instead to demonstrate that the defendant was less culpable or less responsible than an ordinary defendant that did not suffer from this type of brain damage. Put differently, the connection between the evidence itself, and the purpose that it seeks to establish, renders it both relevant and probative of the defendant’s responsibility for the commission of a particular crime. Therefore, this evidence performs a mitigating function because it provides an explanation, rather than a justification, regarding the circumstances surrounding the criminal act.
Viewed in this context, it is highly likely that, under both *Daubert* and *Frye*, a defendant can demonstrate a scientific consensus connecting the criminal behavior to the relevant brain injury. As set forth *supra* part II, frontal lobe disorder, and disruption of the neural circuit between, among other things, the amygdale and frontal lobes, can result in impulse control problems, rage attacks, aggressive behavior, and lack of conformity to societal values.\(^{237}\) This type of behavior can certainly cause an individual to engage in behaviors that transgress criminal laws, even though, as a cognitive matter, the individual still knows that such behavior is prohibited. In other words, the science concerning the manifestations of frontal lobe disorder is consistent and well-accepted within the scientific community. Additionally, the behavioral consequences of this and other brain disorders will likely bear upon the defendant’s criminal culpability or responsibility, but not serve as a justification for a particular crime or support an insanity defense. The latter does not have consensus within the scientific community, but the former does, and thus should be admissible at the sentencing phase.

The admission of this evidence is permissible, *a fortiori*, because the relevant rules of evidence, as a general matter, are less stringent at the sentencing phase of a trial. By way of analogy, in federal capital cases, “[t]he Federal Death Penalty Act erects very low barriers to the admission of evidence at capital sentencing hearings.”\(^{238}\) Indeed, “[s]ince the need to regulate the scope of testimony is less at the penalty phase than at the guilt phase of trial, parties may present evidence ‘as to any matter relevant to the


\(^{238}\) *U.S. v. Lee*, 274 F.3d 485, 494 (8th Cir. 2001).
sentence.” In fact, at the federal level, the Daubert factors do not even apply at the capital sentencing phase, as expert testimony is admissible if it ‘is the product of reliable principles and methods’ that are applied ‘reliably to the facts of the case.’ In fact, U.S. v. Fields, Court held that “[n]o Circuit we are aware of has applied Daubert to sentencing.” The justification underlying the lower standards for admissibility are premised upon the notion that “‘it is desirable for the jury to have as much information before it as possible when it makes the sentencing decision.’”

The same rationale should apply to sentencing hearings where the defendant suffers from brain damage/injuries that affect behaviors that bear directly upon and are relevant to a particular criminal act. The sentencing decision is based upon and reflective of the defendant’s culpability for a particular crime. The ramifications of frontal lobe disorder or neural circuit disruption with the amygdala bear directly upon responsibility because they affect, inter alia, an individual’s ability to control his behavior and exercise impulse control. On this basis, expert testimony concerning neuroscientific date should be admitted.

The remaining issue concerns the type of sentence that an individual with these brain disorders should receive. The sentence, of course, implicates and reflects the defendant’s criminal responsibility, and the type of sentence, whether retributive, rehabilitative, or for incapacitory purposes, ultimately reflects a judgment about the defendant’s action[s]. Based upon the totality of the circumstances, the defendant should

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239 Id. at 494 (quoting Williams v. New York, 337 U.S. 241, 247 (1949)).

240 U.S. v. Fields, 483 F.3d 313, 342-343 (5th Cir. 2007) (quoting FED. R. EVID. 702).

241 Fields, supra note 240, at 342.

receive a mixed sentence that reflects both retributive and rehabilitative ends. First, because the defendant retains the ability to think rationally, despite impulse control issues, he retains the ability to distinguish legal from illegal conduct. Furthermore, particularly with violent offenders, there must be an acknowledgment both that the defendant is still responsible and that the victim is entitled to redress for injuries suffered. Moreover, the community at large, as a matter of public policy and the court’s institutional legitimacy, has a responsibility to punish individuals who transgress the law with knowledge of both its illegality and potential consequences. Therefore, the defendant should receive a sentence within the statutory range promulgated for a particular criminal offense.

The sentence, however, should differ in two respects. Recognizing the defendant’s reduced culpability as a mitigating factor, the defendant should receive a sentence at the lower end of the statutory range. If there is no statute, and the sentence is entirely entrusted to the court, then such sentence should be influence by and reflected in the specific term of imprisonment. In other words, where there is reduced culpability, there should be reduced punishment, but not to the degree that the defendant receives a sentence so disproportional to others than have committed similar crimes. Because brain-disordered defendants have a cognitive understanding of their behaviors, punishment – albeit reduced – is warranted.

The sentence should also be rehabilitative in nature, because a defendant with frontal lobe disorder has a legitimate ailment that makes him not only less culpable, but less able to function normally within the community. Thus, as a significant part of any sentence, the court should order the defendant to undergo ongoing treatment for the
specific brain disorder that is the focal point of a behavioral malfunction. The treatment may involve psychological counseling and cognitive behavioral therapy, to assist the defendant in becoming aware of their actions and how to manage them in particular situations. Additionally, psychiatric intervention may be required, as specific medications used to treat various manifestations of, for example, of frontal lobe disorder, may be beneficial. As part of the treatment plan, the defendant may spend portions of his sentence in an in-patient institution designed to treat similarly-situated individuals, subject to, of course, a court order approving such request. The purpose of the rehabilitative aspect of the sentence is two-fold – it serves to promote public safety by reducing recidivism rates, and it strives to effectuate the defendant’s successful transition into the community upon completion of his sentence. These goals, therefore, connect public safety with individual reform, and in that way, the sentence can truly be tailored to realize these objectives.

D. INVOLUNTARY COMMITMENT POST-SENTENCE

1. INTRODUCTION

Finally, there will invariably arise situations where a defendant completes his sentence yet treatment has not been successful or has had partial success but requires more time for full rehabilitative purposes. In this instance, upon the defendant’s release, there will exist the likelihood that, due to untreated or unaddressed behavioral issues, he may commit further crimes of violence. This poses dilemma for the State and an ongoing threat to public safety.

Therefore, this Article proposes that, for the first, time, the State may petition the Court for a hearing to determine whether the defendant – who continues to suffer from a
particular brain disorder – remains a danger to the community. At such a hearing, if it is
determined, based upon all relevant evidence, that the defendant’s treatment has been
unsuccessful, or that further treatment is needed because the defendant suffers from a
particular brain disorder, and that he remains a danger to the public, then involuntary
commitment post-sentence may be warranted. This type of involuntary commitment
procedure should be statutory in nature and contain stringent procedural protections to
ensure that the defendant is treated fairly and not held for any further time than necessary
to successfully treat, for example, frontal lobe disorder.

By way of analogy, this type of procedure is already utilized to order the post-
sentence involuntary commitment of sexual predators. For example, in 2002, New
Jersey enacted the Sexually Violent Predators Act (SVPA). When enacting the SVPA,
the legislature stated that ‘‘[c]ertain individuals who commit sex offenses suffer from
mental abnormalities or personality disorders which make them likely to engage in repeat
acts of sexual violence if not treated.’’ The legislature further declared that ‘‘[t]he
nature of the mental condition from which a sexually violent predator may suffer may not
always lend itself to characterization under existing standards for mental commitment,
‘although civil commitment may nonetheless be warranted due to the danger the person
may pose to others as a result of the mental condition.’’ The Court described the
procedure in relevant as follows:

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243 See Hendricks supra note 27 at 350-358.
244 See N.J.S.A. 30:4-27.24 to 27.28.
246 W.Z., 173 N.J at 119-120 (quoting N.J.S.A. 30:4-27.25b)).
The SVPA authorizes the Attorney General to initiate a court proceeding for the involuntary commitment of an individual believed to be a ‘sexually violent predator’ as defined by the Act … Clear and convincing proof is required for commitment … The definition of ‘sexually violent predator’ requires proof that the individual has been convicted, adjudicated delinquent, or found not guilty by reason of insanity of a ‘sexually violent offense’ … and ‘suffers from a mental abnormality or personality disorder that makes the person likely to engage in acts of sexual violence if not confined to a secure facility for control, care and treatment.’ ‘Mental abnormality’ is a ‘mental condition that affects a person’s emotional, cognitive or volitional capacity in a manner that predisposes that person to commit acts of sexual violence.’ The phrase ‘likely to engage in acts of sexual violence’ is defined further to mean that ‘the propensity of a person to commit acts of sexual violence is of such a degree as to pose a threat to the health and safety of others’.247

The SVPA, however, has strict procedural protections to ensure that an individual is guaranteed treatment and held for no longer than necessary. For example, the Department of Corrections “is required to provide a safe and secure facility to house involuntarily committed sexually violent predators from other offenders in the Department’s custody.”248 Additionally, “[w]hile an individual is committed, the Division of Mental Health Services in the Department of Human Services must provide treatment tailored to address the specific needs of sexually violent predators.”249 There are also “annual reviews of a committed individual to assess his or her need for continued treatment or conditional discharge.”250 Finally, the SVPA provides that “if at any time during the involuntary commitment the committee’s treatment team determines that the committee is no longer ‘likely to engage in acts of sexual violence if released,’ the Act allows the

247 *In the Matter of Commitment of W.Z.*, 173 N.J at 120 (quoting N.J.S.A 30:4-27.28; 30:4-27.32a; 30:4-27.26 (emphasis added)).

248 *W.Z.*, 173 N.J at 120.

249 *Id.*

250 *Id.* (citing N.J.S.A. 30:4-27.35).
treatment team to recommend to the Department of Human Services that the committee be authorized to petition the court for discharge.”

Similarly, Kansas has also enacted a Sexually Violent Predator Act, which allows for the involuntary confinement of a person who “suffers from a mental abnormality or personality disorder which makes the person likely to engage in predatory acts of sexual violence.” In addition, it defines the term “mental abnormality” as a “congenital or acquired condition affecting the emotional or volitional capacity which predisposes the person to commit sexually violent offenses in a degree constituting such person a menace to the health and safety of others.” The Kansas SVPA also provides similar procedural protections for a committee.

Perhaps the most important factor common to both the New Jersey and Kansas statutes is that an individual may be committed if he is unable to control his behavior. As the Crane court held, “[i]t is enough to say that there must be proof of serious difficulty in controlling behavior.” This determination, of course, assists in determining whether an individual is likely to commit further criminal acts if not committed and treated for a specific amount of time.

2. **A Hypothetical Statute**

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252 W.Z., 173 N.J at 121 (quoting Kan. Stat. Ann. 59-29a02(a)).

253 Id.


255 *See Hendricks, supra* note 27, at 352-353.

256 *See Crane, supra* note 29 at 412-413.

257 Id. at 413.
Based upon the above discussion of statutes involving sexual predators, there can – and should – be statutes promulgated to allow for the involuntary commitment of violent offenders (post-sentence) who: (1) have not been successfully treated while incarcerated; (2) are likely to or at risk for committing another violent offense; and (3) exhibit signs that they have impulse control problems, that is, that they lack the ability to inhibit the type of aggressive responses that led to their initial conviction. Such a statute, however, would have to contain stringent procedural protections for the individual and be non-punitive in nature, namely, it must allow for release when it is determined that the individual is longer a threat to himself or others, and can control and comport his behavior to societal norms.

Thus, hypothetically, a state may enact a statute entitled “The Violent Offender Post-Sentence Commitment Act.” The legislative purpose underlying this statute would be to “successfully treat an individual with violent tendencies as a result of frontal lobe syndrome or other brain, personality or mental disorders that affects such individual’s ability to control behavior and thus conform to community norms.” Another purpose underlying the Act would be to “promote public safety by rehabilitating a particular offender and thus reduce the risk for repeat violent offenses, while also providing the necessary treatment to facilitate the defendant’s successful re-entry into society.” The legislature should then emphasize that this statute is “non-punitive in nature, and all procedures set forth herein are designed to ensure efficacious treatment of the individual for a time no longer than necessary as determined by the relevant treatment team.”

The next part of the statute should set forth the specific procedures for post-sentence involuntary commitment. To begin with, as a defendant nears the completion of
his sentence, the State must file a petition with the Court declaring that the individual: (1) has not been successfully treated while incarcerated; (2) is likely to commit another violent offense upon release (the “future dangerousness” element); and (3) lacks volitional control and thus continues to have difficulties with impulse control. The burden will be on the State to prove each of these factors by clear and convincing evidence, so that the statute does not sweep too broadly and encompass individuals who truly are not in need of additional treatment.

The next issue will concern the test for admissibility of evidence at the commitment hearing. Importantly, because the defendant’s liberty is at stake for non-punitive purposes after completion of his sentence, the evidentiary standard should be very low, as all relevant, probative and non-prejudicial evidence should be admitted. In this instance, in proffering evidence to prove the “future dangerous” element, the State will and should be allowed to introduce expert testimony from those individuals who have treated the defendant in prison, as well as neuroscientific data showing that untreated or partially treated individuals with a particular brain disorder are likely to engage in aggressive behavior due to impulse control or other impairments. Significantly, this underscores that cognitive neuroscientific studies can not only help a defendant, but can also be quite valuable to the State in commitment proceedings. Additionally, at this proceeding, the defendant should be allowed to introduce all relevant evidence, including expert testimony, demonstrating that the State has failed to prove one or more of the three elements required for involuntary commitment.

At the conclusion of this hearing, if the court finds that the State has satisfied its burden, then the defendant shall be committed to an institution for treatment purposes no
longer than necessary to effectuate successful rehabilitation. Importantly, to ensure that the defendant’s constitutional and substantive due process rights are not being violated, the State will be required to report to the Court every thirty days, providing an affidavit setting forth: (1) the specific treatment that the defendant is receiving; and (2) the particular reasons why continued confinement is necessary. The Court shall also allow the defendant to be present at this hearing, to rebut the State’s findings and demonstrate that he is no longer likely to commit acts of violence, has volitional control, and has thus been successfully treated and is entitled to immediate release. The thirty-day hearings shall occur up to and until the defendant is released from the institution to which he is committed.

In addition, after each thirty-day treatment period, the defendant will be permitted to petition to the Court that: (1) he is not receiving proper or sufficient treatment; or (2) that treatment has been successful and that he is therefore entitled to immediate and unconditional release. The defendant may introduce any relevant evidence, including testimony from his treatment team, and the State will again be required to establish, by clear and convincing evidence, that further commitment is necessary. This type of hypothetical statute has two objectives: to promote rehabilitation of the individual and thus allow him to transition successfully into the community, and to promote public safety by reducing recidivism rates and acts of violence.

E. OBJECTIONS

It is inevitable that this type of statute will engender a variety of objections ranging from its constitutionality to its effectiveness. This part will address some of the common objections that are likely to arise.
1. **The Statute is Unconstitutional**

An important objection is likely to be that the statute violates the substantive due process clause of the Fourteenth Amendment as well as the *ex post facto* clause. This argument, however, is without merit because the commitment statute is for non-punitive purposes and therefore does not constitute punishment. These arguments were considered and rejected by the Court in *Hendricks*, where it analyzed a Kansas involuntary commitment statute for violent sexual predators.  

In *Hendricks*, the Court stated that “commitment under the Act does not implicate either of the two primary objectives of criminal punishment: retribution or deterrence.” The Court further explained that “the fact that the Act may be ‘tied to criminal activity’ is ‘insufficient to render to statute punitive.’” It expanded upon this reasoning by holding as follows:

> [U]nlike a criminal statute, no finding of sciente[r] [mens rea] is required to commit an individual who is found to be a sexually violent predator; instead, the commitment determination is made based on a ‘mental abnormality’ or ‘personality disorder’ rather than on one’s criminal intent … [t]he absence of such a requirement here is evidence that confinement under the statute is not intended to be retributive … [n]or can it be said that the legislature intended the Act to function as a deterrent. Those persons committed under the Act are, by definition, suffering from a ‘mental abnormality’ or ‘personality disorder,’ that prevents them from exercising adequate control over their behavior. … [a]nd the conditions surrounding that confinement do not suggest a punitive purpose on the State’s part. The State has represented that an individual confined under the Act is not subject to the more restrictive conditions placed on state prisoners, but instead experiences essentially the same conditions as any involuntarily committed patient in the state mental institution. Because none of the parties argues that people institutionalized under the Kansas general civil commitment statute are subject to punitive conditions, even

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258 *Hendricks*, supra note 27, at 360-363.

259 Id. at 361-362.

260 Id. at 362 (quoting *United States v. Ursery*, 518 U.S. 267 (1996)).
though they may be involuntarily confined, it is difficult to conclude that persons under this Act are being 'punished.'

Thus, “[a]lthough the [Kansas] civil commitment scheme at issue here does involve an affirmative restraint, ‘the mere fact that a person is detained does not inexorably lead to the conclusion that the government has imposed punishment.’”

Rather, “[t]he State may take measures to restrict the freedom of the dangerously mentally ill … [such] is a legitimate governmental objective and has been historically so regarded.”

In fact, the Court has relied upon the confinement of ‘mentally unstable individuals who present a danger to the public’ as one classic example of nonpunitive detention.

Moreover, “commitment under the statute is only potentially indefinite … [as] [f]ar from any punitive objectives, the confinement’s duration is instead linked to the stated purpose of commitment, namely, to hold the person until his mental abnormality no longer causes him to be a threat to others.”

The hypothetical statute at issue here is similarly non-punitive and has as its sole objective the rehabilitation of individuals with frontal lobe disorder, neural disruption between the frontal lobes and amygdala, and/or other brain and personality disorders. There is nothing punitive about this statute. The State must initiate treatment immediately upon confinement and report to the Court every thirty days to specify in detail the treatment that the defendant is receiving, and explaining why further confinement is necessary. The defendant also has the right, every thirty days, to petition the Court for

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261 Hendricks, supra note 27, at 362-363.

262 Id. at 363 (quoting United States v. Salerno, 481 U.S. 739, 746 (1987)).

263 Hendricks, supra note 27, at 362-363 (citing Salerno, supra note 262, at 747).

264 Hendricks, supra note 27 at 363 (emphasis added) (citing Salerno, supra note 258, at 748-749).

265 Hendricks, supra note 27 at 363-364.
release should he believe that he is no longer suffering from the particular disorder resulting in his confinement, thus rendering him no threat to himself or others. These protections are designed to ensure that the confinement is rehabilitative, no longer than necessary, and void of any retributive or deterrence-based objectives. Based upon *Hendricks*, the argument that such confinement violates the due process clause of the Fourteenth Amendment and/or the *ex post facto* clause is likely to fail.

2. **Many Individuals With Frontal Lobe Disorder or Other Brain Abnormalities Do Not Engage in Criminal Behavior**

   A second objection is that many individuals suffer from frontal lobe disorder or other brain, mental or personality disorders yet function adequately in society and do not engage in criminal behavior. Thus, the argument that there is a causal connection between these conditions and criminal behavior is meritless.

   Certainly, this assertion is true – there are individuals who suffer from various brain disorders, mental illnesses, and/or personality disorders that do not engage in any type of criminal behavior, and in fact contribute meaningfully to the community in which they reside. The problem with this argument, however, is that, it does not follow that because some individuals with these disorders do not engage in criminal activity, it must be concluded that *all* individuals can control their behavior and comport with societal and legal norms. By way of analogy, it has been well-established that smoking causes lung cancer. However, not all individuals who smoke – even for prolonged periods of time – develop lung cancer. The fact remains, however, that smoking does cause lung cancer, and any assertion otherwise is contrary to the scientific evidence.
In other words, this argument is far too general and misconstrues the complexity of cognitive neuroscience. Instead of extrapolating from the argument that, because some people with brain disorders do not engage in criminal behavior, then therefore it does not cause anyone to engage in criminal conduct, it is imperative to base these determinations on a case-by-case basis. In addition, it is critical to examine the specific proposition for which the neuroscientific evidence seeks to establish. For example, if defense counsel seeks to introduce evidence that severe parental abuse resulted in damage to an individual’s pre-frontal cortex, and thus has compromised his reasoning capacities, such evidence may have significant probative value because there is a general consensus of a linkage between prefrontal cortex damage and impaired reasoning.

Additionally, if a defendant suffers from frontal lobe disorder, caused by a severe automobile accident when he was a child, then evidence of impulse control problems will also be relevant to that individual’s culpability, because there is a well-known connection between frontal-lobe disorder and volitional control. Thus, simply because some individuals with similar injuries may not engage in criminal conduct, it does not follow that the science is faulty or that an individual can engage in illicit conduct as a result, at least in part, based on such injuries.

3. **IT IS TOO COSTLY AND UNREALISTIC TO CONDUCT NEURO-IMAGING STUDIES OF EVERY DEFENDANT THAT IS ACCUSED OR CONVICTED OF A VIOLENT CRIMINAL OFFENSE.**

This argument is not without merit – it would be both impractical and unnecessary to subject every criminal defendant to neuro-imaging examinations to determine if there are underling brain disorders that may have influenced a particular
criminal act. However, this argument does not mean that some defendants cannot be subject to neuro-imaging studies in an attempt to demonstrate reduced culpability for a particular crime. The method by which to separate those defendants that should or should not have such examinations is to look for the risk factors set forth supra Part II, namely: (1) young maternal age during pregnancy; (2) maternal alcohol, nicotine, drug use and poor diet and medical care during pregnancy; (3) fetal mal-development, minor physical abnormalities, fetal alcohol syndrome; (4) parental criminality and drug abuse; (5) poor offspring nutrition and medical care; (6) domestic violence to mother during pregnancy; (7) exposure to parental abuse and emotional neglect; (8) exposure to deplorable home conditions; (9) exposure to toxins, lead, parasites, infection; (10) poor socio-economic conditions; and (11) substance abuse and dependence history.

Importantly, if defense counsel is aware that the defendant’s background includes one of several of these factors, then he should petition to the Court that neuro-imaging studies be performed because there exists a higher likelihood that these defendants may suffer from the type of brain damage, i.e., frontal lobe disorder, that bears directly upon their culpability. Furthermore, the Court should then order, and the State should provide the resources, to allow for such examinations, the results of which can be used at the sentencing phase of the trial. This procedure is particularly important because, as set forth above: (1) 61% of habitually violent offenders have a history of head injuries, as do: (2) 67% of convicts on death row; (3) 58% of juvenile convicts on death row (before Roper was decided); (4) 40% of severely psychopathic criminals; and (5) 36% of sexual
offenders. As a result, neuroscientific evidence can prove very valuable to those individuals with brain injuries because it is relevant to culpability.

4. **There is no evidence that the frontal lobes, the amygdala, or any other aspect of the brain is the sole cause of impulse control and other behavioral problems.**

This assertion is also meritorious, and requires careful use of neuroscientific evidence in the courtroom. The fact is that there are a myriad of factors that influence and result in criminal behavior, and cognitive neuroscience cannot – and has not – definitively answered the question as to all of the causal factors that drive criminal decision-making. Indeed, there are both internal and external influences that result in criminal conduct, and neuroscience cannot simply assert that it has all of the answers to explain why individuals act as they do; if that were true, then it would be very easy to treat those convicted of crimes and reduce the recidivism rate. It is obvious, however, that this is not the case.

Significantly, however, what this argument ignores is that neuroscientific findings have established that frontal lobe syndrome and neural disruption involving the amygdala and frontal lobes/pre-frontal cortex do have substantial consequences that affect judgment, volition, decision-making, and response to external stimuli. As such, neuroscience has established that these injuries/disorders are, at the very least, a causal factor in the commission of criminal behavior. Thus, while it may only be one cause among the multi-factorial aspects that influence criminal behavior, it is nonetheless a valuable discovery that connects brain disorders with human action. Consequently, because it is at least one of many causes, the admission of neuroscientific data in the courtroom is both relevant and probative. However, it is subject to the following caveat;

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the introduction of neuroscientific evidence should be limited only to those findings that thus far have engendered a consensus within the scientific community. Put differently, there are a vast amount of studies being conducted concerning brain chemistry and human behavior. In the field of cognitive neuroscience, there is a separation between what scientists know and what they do not know, i.e., there is a consensus for certain issues and not others. Accordingly, since evidence that, for example, frontal lobe disorder is a causal factor in behavioral control problems, and there is a consensus among scientists for this proposition, then such evidence should be admitted for the purpose of demonstrating a causal connection between the frontal lobes and specific crime for which the defendant is being charged. Ultimately, the problem with the above argument is that it requires too much from the neuroscientific data and fails to recognize that there are certain limited yet material circumstances in which the use of this evidence can be valuable and persuasive.

5. **Neuroscientific Studies in General Are Not Reflective of the Individual’s Brain Images**

A strong argument can be made that the general findings of neuroscientific studies from fMRI brain images do not necessarily mean that the individual’s brain is consistent with such findings. For example, expert testimony that frontal lobe disorder causes impulse control problems may be evidenced by repeated brain-imaging studies, but that does not mean that a particular individual’s brain suffers from the same disorders with the same consequences.

The solution to this problem, as stated above, is to provide for individual neuro-imaging for those defendants whose background suggests that they may have suffered, or are suffering from, a brain injury that is relevant to culpability. This procedure is
particularly important considering the startling amount of, *inter alia*, habitually violent offenders that are afflicted with head injuries (61 percent), convicted criminals on death row (67 percent), and severely psychopathic criminals (40 percent). Thus, it is neither necessary nor expected that defense counsel should have to rely upon general neuroscientific findings. Instead, should there exist factors indicating a likelihood of frontal lobe or other brain disorders, then as a matter of due process a neurological examination should be conducted.

**CONCLUSION**

Cognitive neuroscience is assisting the criminal law in understanding why individuals make certain choices and decisions that transgress societal norms and community standards. There could be no greater goal for criminal law, and law generally, than to understand how the brain contributes to human action, because our system of criminal justice relies on the premise that individuals’ choices are the subject of free will and autonomy. If this were not the case, even to a limited extent, the criminal law must re-think the justifications for punishing those convicted of crimes, how we treat such individuals, and what specific reforms are necessary to reflect the true nature of human behavior.

In this way, cognitive neuroscience has tremendous potential to challenge our most basic assumptions about what it means to be moral agents, namely, that we are capable of making reasoned choices not due to certain predispositions or internal maladies, but because we can think cognitively apart from the brain’s influences or affects. Ultimately, the very essence of mind/brain dualism will be debated, and the

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philosophical and ontological underpinnings of this argument, when viewed in light of the available data, will hopefully allow us to make choices that are consistent with who we are as humans and what we represent as rational decision-makers. While cognitive neuroscience has yet to answer these questions, it has proven thus far to have sufficiently evolved to where its entry into the criminal justice system is now secure, and its potential for influence in the law infinite.