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The Brain-Disordered Defendant: Neuroscience and Legal Insanity in the Twenty-First Century

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THE BRAIN-DISORDERED DEFENDANT: NEUROSCIENCE AND LEGAL INSANITY IN THE TWENTY-FIRST CENTURY

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A forty year-old schoolteacher suddenly begins soliciting prostitutes and making sexual advances toward his stepdaughter. The court

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> orders him to complete a Sexaholics Anonymous program or face incarceration. Because he cannot stop asking other program members for sex, he fails the program. Neuroimaging reveals a large brain tumor displacing part of the frontal lobe (and hypothalamus) of his brain. After removal of the tumor, the deviant sexual behavior immediately ceases.[1]

INTRODUCTION

Consider the above case. The sudden and uncontrollable onset, and equally sudden cessation of criminal behavior, coincided with the presence or absence of an abnormality in the frontal lobes of the defendant's brain. This 1990 case is reminiscent of the celebrated 1848 case of Phineas Gage, a railway foreman whose left frontal lobe was severely damaged when an explosion propelled a tamping iron through his head.[2] 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."[3] He became irritable and amoral, his social functioning declined significantly, and he frequently became involved in fights and drunken brawls.[4] He thus exhibited some of the symptoms of Antisocial Personality Disorder.[5]

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. Some have a disorder in the frontal lobes, the area of the brain responsible for judgment and impulse control. Individuals with frontal lobe disorder (hereinafter "FLD") "become

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1. *See* Jeffrey M. Burns & Russell H. Swerdlow, *Right Orbitofrontal Tumor with Pedophilia Symptoms and Constructional Apraxia Signs*, 60 ARCHIVES NEUROLOGY 437, 437-38 (2003) (describing a man whose uncontrollable sexual misbehavior returned to normal following resection of an orbitofrontal tumor). The hypothalamus, in the orbitofrontal cortex of the brain, regulates sexual drives. *Id.* at 438.

2. *See generally* MALCOLM MACMILLAN, AN ODD KIND OF FAME: STORIES OF PHINEAS GAGE (2000).

3. ANTONIO R. DAMASIO, DESCARTES' ERROR: EMOTION, REASON, AND THE HUMAN BRAIN 8 (1994). For a modern-day biographical account of the effects of frontal lobe brain damage, see CATHY CRIMMINS, WHERE IS THE MANGO PRINCESS? (2000).

4. *See* John Martyn Harlow, *Passage of an Iron Rod Through the Head*, 39 BOSTON MED. & SURGICAL J. 389, 389-93 (1848) [hereinafter Harlow, *Passage of an Iron Rod Through the Head*]; John M. Harlow, *Recovery from the Passage of an Iron Bar Through the Head*, 43 BOSTON MED. & SURG. J. 329, 339 (1868). *See generally* MACMILLAN, *supra* note 2.

5. *See* AMERICAN PSYCHIATRIC ASSOCIATION, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS, § 301.7, at 701-06 (4th ed. text rev. 2000) [hereinafter DSM-IV] (defining Antisocial Personality Disorder as "a pervasive pattern of, disregard for, and violation of, the rights of others," often including criminal behavior, impulsivity, irritability or aggressiveness, and irresponsibility).

disinhibited. . . . Their capacity to say to themselves, 'Stop! Don't say or do that. It is not wise,' is damaged."[6] 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 he could appreciate the criminality of his conduct, but could not conform his conduct to the requirements of the law."[7]

Indeed, frontally-damaged individuals typically do not lack *understanding*, they lack *behavioral control*. Not surprisingly, therefore, insanity defenses based on FLD are few in number and have not fared well. Because defendants suffering from FLD usually understand the difference between right and wrong, they are unable to avail themselves of the only insanity defense available in most states, a defense based on the *McNaghten* test.[8] *McNaghten* is a narrow test that exculpates only defendants who did not understand the nature and consequences of their actions or that their criminal act was wrong.[9] "Irresistible impulse" (or "control") tests, on the other hand, provide an insanity defense to those who committed a crime due to their inability to exercise behavioral control. Control tests for insanity have fallen into disfavor, however, with less than one-third of the states currently employing a control test.[10]

In this Article, I argue for a return to control tests for insanity, but with important doctrinal modifications. The law must develop a "neurojurisprudence" that comports with modern neuroscience research on the role of brain dysfunction in impulsive criminal behavior.[11] Control tests are needed to ensure that brain-disordered defendants have the opportunity to prove that they lacked criminal responsibility for the charged offense—a right that is essential, particularly in our system of retributive justice. Defendants who substantially lack the physiological ability to control their criminal behavior should be allowed to present an insanity defense based on evidence of impaired impulse control.

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6. Jonathan H. Pincus, *Aggression, Criminality, and the Frontal Lobes in* THE HUMAN FRONTAL LOBES: FUNCTIONS AND DISORDERS 547, 549 (Bruce L. Miller & Jeffrey L. Cummings eds., 1999) [hereinafter Pincus, *Aggression and Frontal Lobes*] (noting frontal lobe involvement as the most prevalent type of brain involvement among "repeatedly violent individuals").

7. Cooper v. State, 739 So. 2d 82, 88 (Fla. 1999).

8. *See* McNaghten's Case, 8 Eng. Rep. 718 (1843).

9. *See id.* at 719.

10. *See infra* Appendix B.

11. The term "neurojurisprudence" was coined by Professor Janet Weinstein and Dr. Ricardo Weinstein. *See* Janet Weinstein & Ricardo Weinstein, *Neuro-Jurisprudence: The Brain and the Law,* AMERICAN PSYCHOLOGY-LAW SOCIETY (March 2005) (symposium presented at annual meeting).

Part I of this Article provides a synthesis and review of neuroscience research on frontal lobe dysfunction as a causal factor in criminal behavior. Then, following a brief discussion in Part II of the admissibility of FLD evidence, Part III presents the proposal for a return to control tests for insanity. Opponents of control tests have offered, and continue to offer, three rationales for their abandonment: (1) that cognitive tests for insanity are sufficient, since those with impaired impulse control will also be cognitively impaired;[12] (2) that mental health professionals are incapable of reliably assessing the capacity for impulse control, particularly in relation to criminal behavior, or of differentiating between a truly irresistible impulse and an impulse that is merely difficult to resist;[13] and, therefore, that control tests lead to erroneous insanity acquittals;[14] and, (3) that because "[they] directly pose the question of whether a person could control his or her behavior,"[15] control tests run counter to the law's assumption that people have free will and bear responsibility for their actions.[16] As I demonstrate in Part III, current neuroscience research presents a challenge to these claims.

I begin with an analysis of neuroscience research on the causal role of FLD in criminal behavior. A compelling body of research demonstrates the reality of rationality in the absence of behavioral control in some defendants who suffer from frontal lobe dysfunction, providing the scientific foundation of my proposal for a return to control tests for insanity.

I. FRONTAL LOBE BRAIN DYSFUNCTION ("FLD") AND CRIMINALITY

> "While nothing is easier than to denounce the evil doer, nothing is more difficult than to understand him."[17]

Philosophers and criminologists have, for centuries, speculated about the possible biological causes of crime.[18] Biological

12. *See infra* notes 248-56 and accompanying text.
13. *See infra* notes 283-298 and accompanying text.
14. *See infra* note 239.
15. RALPH REISNER, CHRISTOPHER SLOBOGIN & ARTI RAI, LAW AND THE MENTAL HEALTH SYSTEM: CIVIL AND CRIMINAL ASPECTS 558 (4th ed. 2004).
16. *See infra* notes 336-43 and accompanying text.
17. Robert I. Simon, *Should Forensic Psychiatrists Testify About Evil?*, 31 J. AM. ACAD. PSYCHIATRY L. 413, 413 (2003) (quoting FYODOR MIKHAILOVICH DOSTOEVSKY, CRIME AND PUNISHMENT (George Gibian ed., Jessie Coulson trans., 1964) (1866)).
18. *See, e.g.*, GUSTAV ASCHAFFENBURG, CRIME AND ITS REPRESSION (Adalbert Albrecht trans., Little, Brown, and Co. 1913) (1903); THOMAS HOBBES, LEVIATHAN: WITH SELECTED VARIANTS FROM THE LATIN EDITION OF 1668 (Edwin Curley ed., 1994) (1651); CLAUDE ADRIAN HELVÉTIUS, ESSAYS ON THE MIND AND ITS SEVERAL FACULTIES (Burt Franklin, 1970) (1810); Cesare Beccaria, *On Crimes and Punishments in* ON CRIMES AND PUNISHMENTS AND OTHER WRITINGS (Richard Ellamy ed., Richard Davies

explanations for crime date back to ancient times. In 360 B.C., Plato wrote: "For no man is voluntarily bad; but the bad becomes bad by reason of an ill disposition of the body . . . [which] happen[s] to him against his will."[19] Thus, "Plato may have been the first advocate of a disease theory of crime."[20] Centuries later, Victor Hugo predicted that crime eventually would be seen as a disease, because it is due to factors—including biology—outside the offender's control.[21] One of the best known proponents of biological explanations for criminality was the Italian physician Cesare Lombroso, whose writings during the Victorian period were influential in advancing the view that criminals had an innate disposition towards crime.[22] Lombroso's work led to the popularity of biological and psychological research on criminality in the United States,[23] where a "naturalist" school of thought, which emphasized hereditary and biological explanations for crime, dates back to the late eighteenth century.[24]

& Virginia Cox trans., (Cambridge Univ. Press 1995)) (1764); EMILE DURKHEIM, RULES OF SOCIOLOGICAL METHOD (Sarah Solovay, John H. Mueller & George E. G. Catlin eds. & trans., 8th ed., (Univ. Chicago Press 1938)) (1895); FRANZ JOSEF GALL, ON THE ORIGIN OF THE MORAL QUALITIES AND INTELLECTUAL FACULTIES OF MAN AND THE CONDITIONS OF THEIR MANIFESTATION (Marsh, Capen & Lyon eds. & trans., 1835); FRANCIS GALTON, ESSAYS IN EUGENICS (1909); SHELDON GLUECK & ELEANOR GLUECK, 500 CRIMINAL CAREERS (1930). *See generally* David L. Bazelon, *The Morality of the Criminal Law: A Rejoinder to Professor Morse*, 49 S. CAL. L. REV. 1269 (1976); 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 (2004); Clarence Darrow, *Is Capital Punishment a Wise Policy?: Debate With Judge Talley*, *in* ATTORNEY FOR THE DAMNED 89 (Arthur Weinberg ed., 1957).

19. Kirchmeier, *supra* note 18, at 633 (quoting Plato's TIMAEUS, *as translated in* VICTOR GOLLANCZ, FROM DARKNESS TO LIGHT (1956) (internal citation omitted)).

20. *Id.* at 649 (citing MARVIN HENBERG, RETRIBUTION: EVIL FOR EVIL IN ETHICS, LAW, AND LITERATURE 95 (1990)).

21. *Id.* at 631 (citing Victor Hugo, *The Last Days of a Condemned*, *in* THE DEATH PENALTY: A LITERARY AND HISTORICAL APPROACH 103, 105 (Edward McGehee & William H. Hildebrand eds., 1964)) ("We shall look on crime as a disease, and its physicians shall displace the judges, its hospitals displace the galleys. Liberty and health shall be alike. We shall pour balm and oil where we formerly applied iron and fire; evil will be treated in charity, instead of in anger.").

22. *See* CESARE LOMBROSO, CRIME: ITS CAUSES AND REMEDIES (Henry P. Horton ed. & trans.) (Little Brown & Co. 1911) (1899); *see also* Marvin Wolfgang, *Cesare Lombroso, 1835-1909*, *in* PIONEERS IN CRIMINOLOGY 232, 246-57 (Hermann Mannheim ed., 2d ed., Patterson Smith Publishing 1972) (1955) (describing Lombroso's research into physical anomalies of criminals).

23. *See* Wolfgang, *supra* note 22, at 246-57; *see also* Thomas A. Green, *Freedom and Criminal Responsibility in the Age of Pound: An Essay on Criminal Justice*, 93 MICH. L. REV. 1915, 1920-23 (1995) (stating that when early twentieth-century American criminologists began to apply behavioral science to the treatment of criminal offenders, they drew on the writings of late nineteenth-century European criminologists and penologists).

24. *See* DAVID J. ROTHMAN, THE DISCOVERY OF THE ASYLUM: SOCIAL ORDER AND DISORDER IN THE REPUBLIC 59-78 (1971).

Though criminal behavior seldom is 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.[25] Many neuroscientists and mental health professionals now refer to "crime as a disease,"[26] the "psychopathology of crime,"[27] and "the neurobiology of violence."[28] A "'biological brain-proneness' toward violence is widely accepted by neuroscientists."[29] And, as one psychiatrist predicted, "we're going to be able to diagnose many people who are biologically brain-prone to violence."[30] New brain imaging technologies allow us to "literally look at, and into, the

25. *See generally* DEBRA NIEHOFF, THE BIOLOGY OF VIOLENCE: HOW UNDERSTANDING THE BRAIN, BEHAVIOR, AND ENVIRONMENT CAN BREAK THE VICIOUS CIRCLE OF AGGRESSION (1999); THE SCIENCE, TREATMENT, AND PREVENTION OF ANTISOCIAL BEHAVIORS VOLUME 1: APPLICATION TO THE CRIMINAL JUSTICE SYSTEM (Diana H. Fishbein ed., 2000) [hereinafter ANTISOCIAL BEHAVIORS VOL. 1]; HANDBOOK OF ANTISOCIAL BEHAVIOR (David M. Stoff, James Breiling & Jack D. Maser eds., 1997) [hereinafter HANDBOOK OF ANTISOCIAL BEHAVIOR].

A number of studies have found a genetic basis for antisocial and criminal behavior. *See generally* H. Hill Goldsmith & Irving I. Gottesman, *Heritable Variability and Variable Heritability in Developmental Psychopathology*, *in* FRONTIERS OF DEVELOPMENTAL PSYCHOPATHOLOGY 5 (Mark F. Lenzenweger & Jeffrey J. Haugaard eds., 1996); Peter McGuffin & Anita Thapar, *Genetics and Antisocial Personality Disorder*, *in* PSYCHOPATHY: ANTISOCIAL, CRIMINAL AND VIOLENT BEHAVIOR 215 (Theodore Millon et al. eds., 1998). For example, a study of monozygotic twins reared apart found heritabilities for antisocial behavior ranging from .41 in childhood to .28 in adulthood. William M. Grove et al., *Heritability of Substance Abuse & Antisocial Behavior: A Study of Monozygotic Twins Reared Apart*, 27 BIOLOGY PSYCHIATRY 1293 (1990). A large Danish study found that sixty-seven percent of the variability in crimes against persons and fifty percent of the variability in property crimes was attributable to genetic factors. C.R. Cloninger & I. I. Gottesman, *Genetic and Environmental Factors in Antisocial Behavior Disorders*, *in* THE CAUSES OF CRIME: NEW BIOLOGICAL APPROACHES 92 (Sarnoff A. Mednick, Terrie E. Moffitt & Susan A. Stack eds., 1987). A study of juvenile offenders found that about thirty percent of the variability in aggression-based delinquency was explained by genetic factors. *See generally* Lisabeth DiLalla & Irving I. Gottesman, *Heterogeneity of Causes for Delinquency and Criminality*, 1 DEVELOPMENT & PSYCHOPATHOLOGY 339, 339 (1989).

26. *See* Kirchmeier, *supra* note 18, at 631 (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)).

27. ADRIAN RAINE, THE PSYCHOPATHOLOGY OF CRIME: CRIMINAL BEHAVIOR AS A CLINICAL DISORDER 3 (1993).

28. *See, e.g.*, JAN VOLAVKA, NEUROBIOLOGY OF VIOLENCE (1995).

29. *See* Nathaniel J. Pallone & James J. Hennessy, *Brain Dysfunction and Criminal Violence*, 35 SOCIETY 21, 21 (1998).

30. *Id.* at 22 (quoting neuropsychiatrist Stuart Yudofsky); *see also* Christopher M. Filley et al., *Toward an Understanding of Violence: Neurobehavioral Aspects of Unwarranted Physical Aggression: Aspen Neurobehavioral Conference Consensus Statement*, 14 NEUROPSYCHIATRY, NEUROPSYCHOLOGY, AND BEHAV. NEUROLOGY 1 (2001) (reporting conclusion of consensus group of experts, convened by the Brain Injury Association at the Aspen Neurobehavioral Conference, that the primary neurobehavioral causes of violence appear to be FLD, abnormal serotonin metabolism, and genetic factors).

brains of [criminals] using functional and structural imaging techniques."[31]

Indeed, neuropsychological studies show that the prevalence rate of brain dysfunction among criminal populations is extremely high, with 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[32] (by comparison, the prevalence rate in the general population is only three percent).[33] Clinical evaluations of death row inmates, for example, reveal that many have a history of head injury and serious neuropsychological deficits.[34]

A. Causes and Symptoms of FLD

Frontal lobe brain dysfunction, in particular, has long been recognized as a possible causal factor in violent crime.[35] As early as 1835, medical case reports linked frontal lobe injury with violence.[36] But the exponential growth in neuroscience research over the last several decades provides compelling explanatory evidence that

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31. Adrian Raine, *Psychopathy, Violence, and Brain Imaging*, *in* VIOLENCE AND PSYCHOPATHY 35 (Adrian Raine & Jose Sanmartin eds., 2001).

32. Pallone & Hennessy, *supra* note 29, at 21. However, the definition of "brain dysfunction" in these studies may include anything from mild deficits to major dysfunction.

33. The prevalence of mental disorders among persons with criminal justice system involvement is staggering. *See* Richard E. Redding, *Why It Is Essential to Teach About Mental Health Issues in Criminal Law (And a Primer on How to Do It)*, 14 WASH. U. J. L. & POL'Y 407, 408-10 (2004) (reviewing data on the prevalence of mental disorders among adults who come into contact with the criminal justice system).

34. *See, e.g.*, Pamela Y. Blake, Jonathan H. Pincus & Cary D. Buckner, *Neurologic Abnormalities in Murderers*, 45 NEUROLOGY 1641 (1995); Dorothy Otnow Lewis et al., *Psychiatric, Neurological, and Psychoeducational Characteristics of 15 Death Row Inmates in the United States*, 143 AM. J. PSYCHIATRY 838, 838 (1986) [hereinafter Lewis et al., *15 Death Row Inmates*]; Dorothy Otnow Lewis et al., *Neuropsychiatric, Psychoeducational, and Family Characteristics of 14 Juveniles Condemned to Death in the United States*, 145 AM. J. PSYCHIATRY 584, 584 (1988) [hereinafter Lewis et al., *14 Juveniles Condemned to Death*]. It should be noted, however, that these are not controlled studies but reports of clinical cases.

35. *See generally* Kurt Goldstein, *The Mental Changes Due to Frontal Lobe Damage*, 17 J. PSYCHOL. 187 (1944); Montgomery C. Brower & Bruce H. Price, *Neuropsychiatry of Frontal Lobe Dysfunction in Violent and Criminal Behaviour: A Critical Review*, 71 J. NEUROLOGY NEUROSURGERY & PSYCHIATRY 720 (2001); Peter R. Giancola, *Neuropsychological Functioning and Antisocial Behavior—Implications for Etiology and Prevention*, *in* ANTISOCIAL BEHAVIORS VOL. 1, *supra* note 25; Bill Henry & Terrie E. Moffitt, *Neuropsychological and Neuroimaging Studies of Juvenile Delinquency and Adult Criminal Behavior*, *in* HANDBOOK OF ANTISOCIAL BEHAVIOR, *supra* note 25, at 280; Keith A. Hawkins & Krista K. Trobst, *Frontal Lobe Dysfunction and Aggression: Conceptual Issues and Research Findings*, 5 AGGRESSION & VIOLENT BEHAV. 147 (2000); Alex B. Morgan & Scott O. Lilienfeld, *A Meta-Analytic Review of the Relation Between Antisocial Behavior and Neuropsychological Measures of Executive Function*, 20 CLINICAL PSYCHOL. REV. 113 (2000); Pincus, *Aggression and Frontal Lobes*, *supra* note 6.

36. *See* Brower & Price, *supra* note 35, at 720.

frontal lobe dysfunction may play a causal role in a wide variety of impulsive criminal behaviors.[37]

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 (usually due to motor vehicle accidents, falls, sports injuries, and assaults) or brain tumors severe enough to damage the frontal lobes.[38] Fifty to seventy-six percent of motor vehicle accident victims show personality and mood changes due to frontal lobe injury,[39] and even mild head injuries can cause frontal lobe damage.[40] Substance abuse, relatively common among those who sustain traumatic brain injury, exacerbates the degree of brain damage.[41] In childhood, physical abuse may result in injury to the frontal lobes,[42] the part of the developing brain most sensitive to head injury.[43]

37. *See infra* Part I.B.

38. NAT'L INST. OF HEALTH, CONSENSUS DEVELOPMENT CONFERENCE STATEMENT ONLINE, *Rehabilitation of Persons with Traumatic Brain Injury* (1998), http://consensus.nih.gov/1998/1998TraumaticBrainInjury109html.htm; *see also* Robert T. Knight & Donald T. Stuss, *Prefrontal Cortex: The Present and the Future*, *in* PRINCIPLES OF FRONTAL LOBE FUNCTION 573, 587 (Robert T. Knight & Donald T. Stuss eds., 2002).

39. *See, e.g.*, Erin D. Bigler, *The Lesion(s) in Traumatic Brain Injury: Implications for Clinical Neuropsychology*, 16 ARCHIVES OF CLINICAL NEUROPSYCHIATRY 95 (2001) (assessing the pathophysiological impact of traumatic brain injury); Armin Schnider & Klemens Gutbrod, *Traumatic Brain Injury*, *in* THE HUMAN FRONTAL LOBES: FUNCTIONS AND DISORDERS, *supra* note 6, at 498.

40. *See* R. Bart Sangal & JoAnne M. Sangal, *Closed Head Injury Patients with Mild Cognitive Complaints without Neurological or Psychiatric Findings Have Abnormal Visual P300 Latencies*, 39 BIOLOGICAL PSYCHIATRY 305, 306 (1996) (finding abnormalities in seventy-five percent of patients with mild head injuries).

41. Harold V. Hall, *Criminal-Forensic Neuropsychology of Disorders of Executive Functions*, *in* DISORDERS OF EXECUTIVE FUNCTIONS: CIVIL AND CRIMINAL LAW APPLICATIONS 65 (Harold V. Hall & Robert J. Sbordone eds., 1998) [hereinafter Hall, *Criminal-Forensic Neuropsychology*] (noting that violence can be the result of interaction between substance intoxication and frontal lobe deficits).

42. Yasuhiko Ito et al., *Increased Prevalence of Electrophysiological Abnormalities in Children with Psychological, Physical, and Sexual Abuse*, 5 J. NEUROPSYCHIATRY & CLINICAL NEUROSCIENCES 401, 401 (1993); James S. Grisolia, *Neurobiology of the Psychopath*, *in* VIOLENCE AND PSYCHOPATHY, 79, 83-85 (Adrian Raine & Jose Sanmartin eds., 2001); *see also* Harvey S. Levin et al., *Magnetic Resonance Imaging in Relation to Functional Outcome of Pediatric Closed Head Injury: A Test of the Ommaya-Gennarelli Mode*, 40 NEUROSURGERY 432, 438 (1997) (noting that brain lesions occur in about fifty-five percent of children and adolescents who sustain moderate head injuries and eighty-one percent of those sustaining severe head injuries).

43. JONATHAN H. PINCUS, BASE INSTINCTS: WHAT MAKES KILLERS KILL? 85 (2001) [hereinafter PINCUS, BASE INSTINCTS] ("The frontal lobes and executive functioning seem to be the most sensitive to the deleterious effects of all these causes of brain damage in young children."); *see also* Grisolia, *supra* note 42, at 83-85 (observing that malnutrition can also retard frontal lobe development).

Frontal lobe brain damage often produces changes in personality, mood, and behavior,[44] resulting in "frontal lobe dysfunction" or "frontal lobe syndrome," a brain disorder recognized in the World Health Organization's *International Classification of Diseases*.[45] In courtrooms, the terminology experts use to describe FLD symptomatology varies, including, *inter alia*, "frontal lobe syndrome,"[46] "organic brain syndrome,"[47] "frontal lobe brain damage,"[48] a "deficiency in executive frontal lobe impairment,"[49] and "impulse control disorder."[50] Common symptoms of FLD (*see* Table 1) include: emotional lability (irritability, euphoria), deficits in self-awareness, the inability to adjust behavior to changing circumstances, and decreased responsiveness to punishment.[51] But deficits in planning and foresight, impaired social judgment, impulsivity, and behavioral disinhibition are the hallmarks of the disorder.[52]

Table 1. Symptoms Associated With Frontal Lobe Disorder

Cognition

- Impaired temporal discrimination for recency and time span
- Defects in goal formulation
- Impaired ability to sustain attention
- Impaired ability to shift conceptual sets
- Difficulty in reversal of perspective
- Defects in planning behavior
- Spontaneous, florid confabulations with psychotic qualities
- Marked dissociation between verbalized intentions and actions
- Low creativity but may be maladaptively or primitively original
- (Overall intelligence as measured by IQ tests may not be impaired)

Emotion

- Flat, blunt, or labile affect
- Violence occurring within background of flat affect

44. D. Michael Bitz & Jean Seipp Bitz, *Incompetence in the Brain Injured Individual*, 12 ST. THOMAS L. REV. 205, 231-33 (1999).

45. INTERNATIONAL CLASSIFICATION OF DISEASES § 310.0 ("frontal lobe syndrome") (10th ed. 2003).

46. *See, e.g.*, State v. Hall, 752 N.E.2d 318, 320 (Ohio Ct. App. 2001).

47. *Id.*

48. *See, e.g.*, Crook v. State, 813 So. 2d 68, 70 (Fla. 2002).

49. *See, e.g.*, Lambert v. State, 743 N.E.2d 719, 742 n.25 (Ind. 2001).

50. *See, e.g.*, Bryant v. State, 881 A.2d 669, 678 (Md. App 2005). *See generally* Crook v. State, 908 So. 2d 350 (Fla. 2005).

51. *See* Hawkins & Trobst, *supra* note 35, at 150-51; Antonio R. Damasio & Steven W. Anderson, *The Frontal Lobes*, *in* CLINICAL NEUROPSYCHOLOGY 404, 429-34 (Kenneth M. Heilman & Edward Velenstein eds., 4th ed. 2003).

52. Hawkins & Trobst, *supra* note 35, at 150-51.

Short-lived pleasure or pain
Low frustration tolerance
Shallow or inappropriate jocularity
Inability to see the point in humorous pictures, anecdotes, cartoons, etc.

Individual Behaviors

Marked perseveration
Impaired self-control
Incompetent or ineffectual behavioral productions
Impaired ability to modulate or fine-tune complex behavior

Social Behaviors

Marital or familial conflict centering around impairments
Inability to obtain/maintain employment
Low conformance to societal values/norms with no maliciousness intended
Little spontaneous speech
No maintenance of word flow, or difficulty turning off verbiage
Inability to make appropriate shifts of "principle of action" (e.g., switching from attack to escape behaviors)
Boastful, loud verbal productions
Insensitivity towards others
Sexual disinhibition
Impaired ability to modulate emotional response during sustained social interaction

Adapted from Harold V. Hall, *Criminal-Forensic Neuropsychology of Disorders of Executive Functions*, *in* DISORDERS OF EXECUTIVE FUNCTIONS: CIVIL AND CRIMINAL LAW APPLICATIONS 65 (Harold V. Hall & Robert J. Sbordone eds., 1998).

"It is the job of the frontal lobes to focus attention and to modify and inhibit behavioral impulses that surge up from the other parts of the brain. . . . Frontally damaged people often cannot keep their behavior within the general rules of society."[53] Thus, some persons with FLD show the patterns of behavioral responses associated with criminality. In recent court cases involving evidence of frontal lobe dysfunction, expert testimony frequently explained the link between a defendant's FLD and his or her criminal behavior. Experts opined, and courts have concluded, for example, that:

> A person suffering from frontal lobe dysfunction could have an impairment in judgment, and could commit impulsive or violent

53. PINCUS, BASE INSTINCTS, *supra* note 43, at 217.

> acts even though such acts normally would be against that person's nature.[54]
>
> Defendant's frontal lobe damage led to his inability to perceive social situations correctly and act accordingly, an inability to control his behavior, and an inability to act rationally during stressful situations.[55]
>
> [T]he circumstances of the crime were consistent with the experts' diagnosis of frontal lobe brain damage. . . . [P]eople with frontal lobe brain damage often lose control over their own behavior and are prone to certain types of "rage" attacks as the frontal lobe works as a "braking mechanism for human behavior."[56]
>
> [The defendant's] impulse control 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.[57]
>
> If it were not for the [brain] injury that [the defendant] sustained in 1980 he would not have committed this crime. Prior to [his] accident in 1980 he had no behavioral problems.[58]
>
> [D]ue to the defendant's brain impairment and problems with his frontal lobe functioning, the defendant had no judgment, in that he could appreciate the criminality of his conduct, but could not conform his conduct to the requirements of the law.[59]

Indeed, a recent meta-analysis[60] of thirty-nine studies (totaling 4,589 participants) concluded that persons who exhibit antisocial, criminal, or delinquent behavior perform significantly poorer than normal individuals on neuropsychological tests of the planning, decision making, self-monitoring, and judgment skills that reflect frontal-lobe functioning.[61] Even minimal frontal lobe dysfunction

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54. *See* Commonwealth v. Monico, 488 N.E.2d 1168, 1173 (Mass. 1986).

55. *See* People v. Morgan, 719 N.E.2d 681, 693 (Ill. 1999) (describing how the defendant presented affidavits as to his history of seizures and bizarre behavior, including violent episodes).

56. Crook v. State, 813 So. 2d 68, 71 (Fla. 2002).

57. State v. Stuard, 863 P.2d 881, 899 (Ariz. 1993).

58. Roberts v. State, 102 S.W.3d 482, 499 (Ark. 2003) (Thornton, J., dissenting).

59. Cooper v. State, 739 So. 2d 82, 88 (Fla. 1999).

60. Meta-analysis is a statistical technique for aggregating and integrating results across studies. *See generally* R. ROSENTHAL, META-ANALYTIC PROCEDURES FOR SOCIAL RESEARCH (Rev. ed. 1991).

61. Though the relationship between antisocial behavior and executive deficits was substantial, with large average statistical effect sizes for criminality (1.09) and delinquency (.86), the meta-analysis likely underestimated the relationship between FLD and executive deficits because it did not focus on frontal lobe functioning. *See* Morgan & Lilienfeld, *supra* note 35, at 113.

may cause impulsive aggression, as studies have found relationships between sub-clinical frontal lobe deficits and aggression in normal populations.[62] And, in laboratory studies with animals, induced frontal lobe damage uniformly produces aggression toward other animals.[63]

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.[64] 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,[65] and Professor Lewis' clinical case studies of eighteen inmates on death row in Texas revealed that fifteen displayed symptoms of FLD on neuropsychological tests.[66]

Brain imaging studies have consistently revealed structural and functional abnormalities in the frontal lobes of violent and psychopathic individuals.[67] Professor Adrian Raine and colleagues found that murderers showed less frontal lobe activity, as measured by Positron Emission Tomography ("PET") scans, than did matched control subjects[68] and that men with antisocial personality disorder had, on average, eleven percent less gray matter in the frontal lobes of their brains.[69] Magnetic Resonance Imaging ("MRI") scans of a

62. Hawkins and Trobst, *supra* note 35, at 156.

63. *See generally* Pallone & Hennessy, *supra* note 29.

64. Jordan Grafman et al., *Frontal Lobe Injuries, Violence, and Aggression: A Report of the Vietnam Head Injury Study*, 46 NEUROLOGY 1231 (1996).

65. Ernest T. Bryant, Monte L. Scott & Charles J. Golden, *Neuropsychological Deficits, Learning Disability, and Violent Behavior*, 52 J. CONSULTING & CLINICAL PSYCHOL. 323, 323 (1984).

66. Dorothy Otnow Lewis et al., *Ethics Questions Raised by the Neuropsychiatric, Neuropsychological, Educational, Developmental, and Family Characteristics of 18 Juveniles Awaiting Execution in Texas*, 32 J. AM. ACAD. PSYCHIATRY & L. 408, 414-18 (2004) [hereinafter Lewis et al., *Ethics Questions*]. It should be noted, however, that this was not a controlled study.

67. Henry & Moffitt, *supra* note 35, at 280; Adrian Raine & Monte S. Buchsbaum, *Violence and Brain Imaging*, *in* NEUROBIOLOGICAL APPROACHES TO CLINICAL AGGRESSION RESEARCH 195 (David M. Stoff & Robert B. Cairns eds., 1996).

68. *See* Adrian Raine et al., *Selective Reductions in Pre-Frontal Glucose Metabolism in Murderers*, 36 BIOLOGICAL PSYCHIATRY 365-66 (1994) (finding that low glucose metabolism in both the lateral and medial prefrontal cortex may be related to a person's propensity for violence).

69. Adrian Raine et al., *Reduced Prefrontal Gray Matter Volume and Reduced Autonomic Activity in Antisocial Personality Disorder*, 57 ARCHIVES GEN. PSYCHIATRY 119, 123 (2000).

community sample of men diagnosed with antisocial personality disorder as compared to substance dependent and normal male control groups, showed that the antisocial men had significantly lower volumes of prefrontal gray matter, with the most psychopathic men having the lowest volumes of prefrontal gray matter.[70] Another study comparing predatory murderers with "affective" murderers found that although both groups had excessive activity in the subcortex (including the amygdala and hippocampus), which may explain their aggressive temperament, only the affective murderers had abnormal functioning in the frontal lobes, which may account for their impulsive killings.[71]

Although such neuroimaging studies are often referenced as persuasive evidence for the role of FLD in violent behavior, a note of caution must be sounded. These studies, still relatively few in number, often include only a small number of subjects, lack control groups, or find "considerable overlap between the values of patient and control groups in studies of the size, shape, or metabolic activity of different brain regions."[72] Moreover, to date, there are no standard criteria available for differentiating between normal and abnormal scan results or for quantifying the extent of brain damage.[73]

In adolescence, frontal lobe dysfunction may lead to delinquent behavior[74] by producing behavioral disinhibition, a key predictor distinguishing between "adolescence-limited" and "life-course

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70. *See* Adrian Raine et al., *Prefrontal Glucose Deficits in Murderers Lacking Psychosocial Deprivation*, 11 NEUROPSYCHIATRY, NEUROPSYCHOLOGY & BEHAV. NEUROLOGY 1, 5 (1998) (noting that prefrontal dysfunction is hard to attribute to factors such as physical abuse or socioeconomic deprivation).

71. Adrian Raine et al., *Reduced Prefrontal and Increased Subcortical Brain Functioning Assessed Using Positron Emission Tomography in Predatory and Affective Murderers*, 16 BEHAV. SCI. & L. 319, 327-28 (1998) (hypothesizing that murderers who commit impulsive murders are more likely to have deficient prefrontal regulation); *see also* Raine et al., *supra* note 68 (examining the effect of low prefrontal glucose levels in murderers).

72. Jennifer Kulynych, Comment, *Brain, Mind, and Criminal Behavior: Neuroimages as Scientific Evidence*, 36 JURIMETRICS J. 235, 239 (1996) [hereinafter Kulynych, *Neuroimages as Scientific Evidence*]; *see also* Stephen J. Morse, *Brain Overclaim Syndrome and Criminal Responsibility: A Diagnostic Note*, 3 OHIO ST. J. CRIM. L. 397, 399-400 (2006) [hereinafter Morse, *Brain Overclaim*] (criticizing the tendency of people to use advances in neuroscience to arrive at moral and legal conclusions).

73. *See* Kulynych, *Neuroimages as Scientific Evidence*, *supra* note 72, at 238-40. *See generally* Jennifer Kulynych, Note, *Psychiatric Neuroimaging Evidence: A High-Tech Crystal Ball*, 49 STAN. L. REV. 1249 (1996-97) [hereinafter Kulynych, *High-Tech Crystal Ball*] (discussing the evidentiary issues relating to the admission of neuroimages into evidence).

74. *See* Terrie E. Moffitt & Simonne A. Silva, *Neuropsychological Deficit and Self-Reported Delinquency in an Unselected Birth Cohort*, 27 J. AMER. ACAD. CHILD & ADOLESCENT PSYCHIATRY 233, 233 (1988) (hypothesizing that some indicators of cognitive deficit may be linked to delinquent behavior).

persistent" offenders.[75] Roughly twenty percent of juvenile offenders have Attention-Deficit Hyperactivity Disorder ("ADHD"), a primary risk factor for delinquency.[76] Studies suggest that ADHD, a disorder characterized by deficits in attention allocation, self-monitoring, and impulse control, may be due to diffuse frontal lobe dysfunction.[77] In his clinical evaluations of death row inmates, Professor Jonathan Pincus found[78] that many had been victims of child abuse, had sustained traumatic brain injuries in childhood, and had been dually diagnosed with ADHD and conduct disorder.[79]

Even without any damage, however, the frontal lobes of adolescents are underdeveloped as compared to adults. Recent longitudinal neuroimaging studies show that the frontal lobes are the last part of the brain to reach maturity. One recent neuroimaging study, for example, found less brain activity in the frontal lobes of seventeen-year-olds as compared to adults when completing a laboratory task requiring them to identify the emotions of others in facial photographs, although their amygdala was fully activated to alert the adolescents that the images were important. The adolescents also were less accurate in their assessments.[80] Frontal lobe development during adolescence includes gray matter thinning, increases in white matter, and neuronal myelination and pruning. The greatest maturation occurs between the ages of sixteen and twenty, though

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75. *See* Helene Raskin White, Marsha E. Bates & Steven Buyske, *Adolescence-Limited Versus Persistent Delinquency: Extending Moffitt's Hypothesis Into Adulthood*, 110 J. ABNORMAL PSYCHOL. 600, 601 (2001) (explaining that adolescent-limited delinquents will not continue to offend into adulthood).

76. *See* Naomi E. Sevin Goldstein, Oluseyi Olubadewo, Richard E. Redding & Frances J. Lexcen, *Mental Health Disorders: The Neglected Risk Factor in Delinquency*, *in* JUVENILE DELINQUENCY: PREVENTION, ASSESSMENT, AND INTERVENTION 92-93 (Kirk Heilbrun, Naomi Goldstein & Richard Redding eds., 2005) (noting that ADHD can impair cognitive abilities which may intensify behavioral problems).

77. *See* Pincus, *Aggression and Frontal Lobes*, *supra* note 6, at 554-55; Carole Samango-Sprouse, *Frontal Lobe Development in Childhood*, *in* THE HUMAN FRONTAL LOBES: FUNCTIONS AND DISORDERS 584, 597-98 (Bruce L. Miller & Jeffrey L. Cummings eds., 1999).

78. AMERICAN PSYCHIATRIC ASSOC., DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS 93 (4th ed. 2000) [hereinafter DIAGNOSTIC AND STATISTICAL MANUAL] (defining Conduct Disorder as a disorder of childhood and adolescence where "a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated"). Conduct disorder is often the precursor to adult Antisocial Personality Disorder. *Id.* at 94.

79. *See* Pincus, *Aggression and Frontal Lobes*, *supra* note 6, at 554-55 (finding that most of the individuals with frontal lobe damage who were on death row sustained brain damage in their infancy).

80. *See* Abigail A. Baird et al., *Functional Magnetic Resonance Imaging of Facial Affect Recognition in Children and Adolescents*, 38 J. AM. ACAD. CHILD & ADOLESCENT PSYCHIATRY 195, 195 (1999) (noting that all of the adolescents exhibited a marked increase in amygdala activity during facial expression recognition exercises).

maturation is not complete until the early twenties.[81] Adolescents' frontal lobe immaturity contributes to their psychosocial immaturity, including their impulsivity, risk taking behavior, and vulnerability to peer pressure, all of which are risk factors for delinquent behavior.[82] Some juvenile offenders *additionally* suffer from frontal lobe dysfunction (often due to child abuse),[83] thus exacerbating the psychosocial immaturity typical of adolescent brain immaturity. A study comparing physically aggressive and nonaggressive boys found signs of FLD only in the aggressive boys.[84] "[S]uch impaired youths may possess a theoretical understanding of right and wrong and still lack the capacity to reflect on and manage their aggressive feelings."[85]

Yet, while the prevalence rate of violence among those with frontal lobe dysfunction is ten percent higher than that found among the general population,[86] most adolescents and adults who suffer from FLD are never criminally violent.[87] Professor Pincus notes that those who become violent frequently have a co-existing psychiatric disorder with paranoid features and a history of abuse in childhood (a typical pattern found among inmates on death row). "With frontal [lobe] injury, individuals become disinhibited. . . . Their capacity to say to themselves, "Stop! Don't say or do that. It is not wise," is damaged. In people whose instincts are benign, this may not be socially

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81. *See* John Giedd et al., *Brain Development During Childhood and Adolescence: A Longitudinal MRI study*, 2 NATURE NEUROSCIENCE 861, 862 (1999) (demonstrating nonlinear changes in cortigal gray matter, as opposed to the linear changes the scientific community previously hypothesized); *see also* Niten Gogtay et al., *Dynamic Mapping of Human Cortical Development During Childhood Through Early Adulthood*, 101 PROC. NAT'L ACAD. SCI. U.S. 8174, 8175-76 (2004) (reporting that cortical gray matter development continues until at least age twenty-one).

82. *See* Elizabeth S. Scott et al., *Evaluating Adolescent Decision Making in Legal Contexts*, 19 L. & HUM. BEHAV. 221, 230 (1995) (noting that adolescents take more risks in areas of health and safety than adults, but are not less likely to risk consequences such as social ostracism); *see also* Robert E. Shepherd, Jr., *The Relevance of Brain Research to Juvenile Defense*, CRIM. JUST. 51, 51 (2005) ("These characteristics are built in—literally hard-wired into the adolescent brain—and are not aberrant symptoms of moral weakness.").

83. *See* Lewis et al., *Ethics Questions*, *supra* note 66, at 426-27 (noting that in addition to damaging to the frontal lobes, the chronic stress of child abuse also has long-term negative effects on brain chemistry (by increasing the levels of glucocorticoid and noradrenaline response to stressors), resulting in hyper-vigilance and increased sensitivity to threat). *See generally* JAMES BLAIR, DEREK MITCHELL & KARINA BLAIR, THE PSYCHOPATH: EMOTION AND BRAIN 102-03 (2005).

84. J. R. Sequin et al., *Cognitive and Neuropsychological Characteristics of Physically Aggressive Boys*, 104 J. ABNORMAL PSYCHOL. 614, 615 (1995) (studying the differences in cognitive function between six to twelve-year-old boys with a history of physical aggression and without a history of physical aggression).

85. Lewis et al., *Ethics Questions*, *supra* note 66, at 427.

86. Brower & Price, *supra* note 35, at 725.

87. *See id.* ("The actual frequency of violent behavior, however, seems relatively low.").

dangerous. It is our contention that in the abused and paranoid, frontal damage is like letting a lion out of his cage."[88] Substance abuse, common among those with FLD, further increases the risk for violence, just as it does for those with other mental disorders.[89] Individuals with extensive frontal lobe damage may develop episodic dyscontrol characterized by rage attacks in response to minimal provocation, which may be triggered by even small amounts of alcohol. The dyscontrol may lead to unplanned homicide, assaults, spousal and child abuse, reckless driving, and property destruction.[90]

Although FLD is more closely associated with reactive-violent and impulsive crimes, FLD may be a contributing factor in almost any type of crime, given the pervasive effects of FLD on cognition, affect, and behavior. (Professors Travis Hirschi and Michael Gottfredson's influential "unified theory of crime" suggests poor impulsive control to be the genesis of much criminal behavior.)[91] A study of even *non-violent* offenders living in the community found that fifty percent had sustained a head injury.[92] Frontal lobe dysfunction can contribute to crime in unexpected ways, as demonstrated by the first recently-published report of stalking behavior and erotomania due to an arteriovenous malformation in the person's frontal lobe.[93]

88. Pincus, *Aggression and Frontal Lobes*, *supra* note 6, at 549.

89. *See id.* at 550 ("Often, alcohol or drugs contribute to wild, rageful overkilling."); *see also* Edward P. Mulvey, *Assessing the Likelihood of Future Violence in Individuals with Mental Illness: Current Knowledge and Future Issues*, 13 J. L. & POL'Y 629, 630, 636-37 (2005) (concluding, based on a review of the empirical literature, that while mental illness is a modest risk factor for violence, the combination of mental illness and substance abuse substantially increases the risk of violence); Jeffrey Swanson et al., *Violence and Psychiatric Disorder in the Community: Evidence from Epidemiologic Catchment Area Surveys*, 41 HOSP. & COMMUNITY PSYCHIATRY 761, 768-69 (1990) (reporting that twenty-one percent of individuals with a substance abuse problem had a history of violence); NATIONAL ACADEMY OF SCIENCES, UNDERSTANDING AND PREVENTING VIOLENCE 185 (A. Reiss & J. Roth eds., 1993) (reporting on studies showing that about one-third of violent offenders are alcoholics).

90. Frank A. Elliott, *Neurology of Aggression and Episodic Dysfunction*, 10 SEMINARS IN NEUROLOGY 303, 307 (1990).

91. *See* MICHAEL R. GOTTFREDSON & TRAVIS HIRSCHI, A GENERAL THEORY OF CRIME 85-120 (1990) (asserting that criminal acts provide immediate gratification, and often the gratification is not pleasure but relief from irritation).

92. Michael Sarapata et al., *The Role of Head Injury in Cognitive Functioning, Emotional Adjustment and Criminal Behavior*, 12 BRAIN INJURY 821, 833 (1998) (noting that head injuries are potentially a contributing factor to a person's engagement in criminal activity).

93. *See* Frank R. Farnham et al., *Pathology of Love*, 350 THE LANCET J. 710, 710 (1997) (emphasizing that clinicians should consider the possibility that an offender's behavior is the result of an underlying pathology).

B. The Role of FLD in Criminal Behavior

> [If the criminal] law stood on the moral grounds which are proposed for it [we would have to consider] those limitations in the capacity for choosing rightly which arise from abnormal instincts, want of education, lack of intelligence, and all the other defects which are most marked in the criminal classes.

(Justice Oliver Wendell Holmes, 1881)[94]

Modern research on FLD probably began in 1949,[95] when neurology Professors Ackerly and Benton reported on the case of "JP," in a classic set of papers.[96] JP had a normal IQ and his school performance was average. A pneumoencephalogram, however, revealed that a substantial portion of his frontal lobes were missing or had been destroyed.[97] Ackerly and Benton, who followed JP from the time he was nineteen years of age until he reached fifty, observed that his life was "a semblance of normality."[98] He was very polite and, in some ways, interpersonally "impressive."[99] Remarkable, however, was JP's lack of self-reflection and insight, his erratic and impulsive behavior, and his almost complete inability to learn from punishment or negative experiences.[100] He was so present-oriented that it "isolate[d] him from the mainstream of human events."[101] Since his youth, JP had frequently been involved in petty crime, particularly impulsive thefts.[102]

The link between FLD and criminal behavior is not surprising when considering the functions of the frontal lobes, the so-called "theater of the mind,"[103] responsible for the executive brain functions of attention allocation, planning, decision making, judgment,

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94. OLIVER WENDELL HOLMES, JR., THE COMMON LAW 45 (39th printing 1946) (1881).

95. Elissa Ely, *The Physiology of Insight*, 12 PSYCHIATRIC TIMES 9 (1995), *available at* http://psychiatrictimes.com/p950929.html (noting that modern frontal lobe research began with the work of S.S. Ackerly and Arthur Benton).

96. *See* S. Spafford Ackerly, *A Case of Perinatal Bilateral Frontal Lobe Defect Observed for Thirty Years*, *in* THE FRONTAL GRANULAR CORTEX AND BEHAVIOR 192 (J.M. Warren & K. Akert eds., 1964) (presenting the findings of a study of a subject with "bilateral frontal lobe disease").

97. *Id.* at 196-98.

98. *Id.* at 192.

99. *Id.* at 195.

100. *See id.* at 198-206, 213-14 (noting that the subject's social development was comparatively the most arrested aspect of his development).

101. *Id.* at 213-14.

102. *See id.* at 198 (noting that the subject's impulsive thievery became a pattern).

103. *See* Terence W. Picton, Claude Alain & Anthony R. McIntosh, *The Theatre of the Mind: Physiological Studies of the Human Frontal Lobes*, *in* PRINCIPLES OF FRONTAL LOBE FUNCTION 109 (Donald T. Stuss & Robert T. Knight eds., 2002) (noting that the frontal lobes allow humans to learn from experiences and understand the principle of cause and effect).

behavioral monitoring, and impulse control.[104] 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."[105] Their real-world judgment is impaired.[106] The impaired impulse control reflects "a curious dissociation between knowing and doing . . . . Frontal lobe patients know their errors, but are unable to use that knowledge to modify [their] behavior."[107]

Frontal lobe dysfunction comes in at least two distinct forms, depending upon the location of the frontal lobe damage. One form (involving damage to the ventromedial prefrontal cortex) produces impulsivity[108] and impulsive aggression, while the other form (involving damage to the dorsolateral prefrontal cortex) impairs judgment and moral reasoning.[109] However, since most brain injuries and illnesses causing substantial injury to the frontal lobes have

104. *See id.* (noting that the frontal lobes perform these functions through "representational processing"); *see also* Donald T. Stuss & D. Frank Benson, *Neuropsychological Studies of the Frontal Lobes*, 95 PSYCHOL. BULL. 3, 3 (1984) ("In 1928, the American neurologist Tilney suggested that the entire period of human evolutionary existence could be considered the 'age of the frontal lobe.'").

105. Damasio & Anderson, *supra* note 51, at 415.

106. *See* Raymond J. Dolan, *On the Neurology of Morals*, 2 NATURE NEUROSCIENCE 927 (1999) (noting that social abilities are generally severely impaired in persons with frontal lobe damage). *See generally* Antoine Bechara et al., *Poor Judgment in Spite of High Intellect: Neurological Evidence for Emotional Intelligence*, *in* THE HANDBOOK OF EMOTIONAL INTELLIGENCE 192 (Reuven Bar-On & James D.A. Parker eds., 2000); Daniel T. Tranel, *"Acquired Sociopathy": The Development of Sociopathic Behavior Following Focal Brain Damage*, 17 PROGRESS IN EXPERIMENTAL PERSONALITY AND PSYCHOPATHOLOGY RESEARCH 285, 290 (1994) [hereinafter *Tranel, Acquired Sociopathy*] (noting that patients with frontal lobe damage tend to show "callous unconcern, boastfulness, and unrestrained and tactless behavior"). Individuals with FLD often score in the normal range on IQ tests. But they frequently have difficulty with real-life problem solving, which requires an evaluation of multiple competing options in social contexts and decision making under stressful conditions. Brower & Price, *supra* note 35, at 721.

107. Stuss & Benson, *supra* note 104, at 18.

108. *See* F. Gerald Moeller et al., *Psychiatric Aspects of Impulsivity*, 158 AM. J. PSYCHIATRY 1783, 1783 (2001) (defining impulsivity as an individual's "predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individual or to others").

109. *See* M. Allison Cato, Dean C. Delis, Tracy J. Abildskov & Erin Bigler, *Assessing the Elusive Cognitive Deficits Associated with Ventromedial Prefrontal Damage: A Case of a Modern-Day Phineas Gage*, 10 J. INT'L.= NEUROLOGICAL SOC. 453, 454 (2004) (concluding that the cognitive deficits resulting from prefrontal lobe damage may be greater than previously believed); *see also* Daniel Tranel, *Emotion, Decision Making, and the Ventromedial Prefrontal Cortex*, *in* PRINCIPLES OF FRONTAL LOBE FUNCTION 338 (D. T. Stuss & R.T. Knight eds., 2002) [hereinafter Tranel, *Ventromedial Prefrontal Cortex*] (examining the effect frontal lobe injury has on a person's ability to use emotions to guide their decision-making); Jorge Moll et al., *The Neural Basis of Human Moral Cognition*, 6 NATURE REVS. NEUROSCIENCE 799, 799-800 (2005) (examining the link between brain dysfunction and social behavioral impairments).

widespread effects,[110] it is not uncommon to find both forms present, though one form may predominate.[111] Thus, this Article discusses both forms of FLD, but focuses on the type that affects impulse control, since it is central to my proposal to revive control tests for insanity.

In the form of FLD 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 conditioning, stress responses, mood regulation, and impulse control,[112] and "the meeting point between thought and emotion."[113] 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.[114] This evaluation occurs automatically and outside of conscious awareness.[115] The amygdala 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"[116] and

110. *See* Stuss & Benson, *supra* note 104, at 6, 23 ("[B]rain injury is never totally focal . . . the frontal lobes are only infrequently disturbed individually.").

111. *See id.* at 3 ("[T]he term *frontal lobe syndrome* is used to refer to an amorphous, varied group of deficits, resulting from diverse etiologies, different locations, and variable extents of abnormalities."). Professor Pincus equates the varied symptoms of FLD with drunkenness: some individuals are irritable, moody, and violent, while others are relatively calm, sad, and apathetic. *See* PINCUS, BASE INSTINCTS, *supra* note 43, at 217 (adding that people with frontal lobe damage who also have psychiatric disorders that cause mood swings often find their mood swings exacerbated).

112. *See* Ralph Adolphs, *Neural Systems for Recognizing Emotion*, 12 CURRENT OPINION IN NEUROBIOLOGY 299 (2002) (listing the numerous brain structures that aid a person's facial recognition ability). *See generally* Skye McDonald & Sharon Flanagan, *Social Perception Deficits After Traumatic Brain Injury: Interaction Between Emotion Recognition, Mentalizing Ability, and Social Communication*, 18 NEUROPSYCHOLOGY J. 572 (2004); Raine, *supra* note 31, at 49-50; Hall, *Criminal-Forensic Neuropsychology*, *supra* note 41, at 41.

113. DANIEL GOLEMAN, EMOTIONAL INTELLIGENCE: WHY IT CAN MATTER MORE THAN IQ 28 (1994).

114. *See* F.C. Murphy, I. Nimmo-Smith & A.D. Lawrence, *Functional Neuroanatomy of Emotions: A Meta-Analysis*, 3 COGNITIVE, AFFECTIVE, AND BEHAVIORAL NEUROSCIENCE 207, 207 (2003) (finding that the emotions of anger, fear and disgust were consistently associated with activity in the amygdala, among other brain areas).

115. Ralph Adolphs, *Cognitive Neuroscience of Human Social Behavior*, 4 NATURE REVS. NEUROSCIENCE 165, 169 (2003) [hereinafter *Cognitive Neuroscience*] ("The bulk of research on the human amygdala has used emotional facial expressions as stimuli and has pointed most consistently to this region being involved in the processing of fear and related emotions.").

116. GOLEMAN, *supra* note 113, at 16.

autonomic nervous system, triggering the secretion of epinephrine and norepinephrine.[117]

"[T]he amydgala proposes, the prefrontal lobe disposes . . . . The connections between the amygdala (and related limbic structures) and the [frontal lobes] are the hub of the battles or cooperative treaties struck between head and heart, thought and feeling."[118] 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 and emotions of the *Id*.[119] 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,[120] particularly in stressful or provocative circumstances.[121] 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 lobes can become fully engaged to rationally analyze the situation.[122]

Recall the 1848 Phineas Gage case, described at the beginning of this Article.[123] Gage's physician described his post-injury functioning thusly:

> The equilibrium or balance, so to speak, between his intellectual faculties and animal propensities seems to have been destroyed.

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117. *Id.* at 16, 20.
118. *Id.* at 26-27.
119. I am indebted to Professor Michael Williams for this analogy.
120. *See generally* BLAIR, MITCHELL, & BLAIR, *supra* note 83, at 96-101 (describing the neurocognitive physiology of reactive aggression).
121. *See* Richard J. Davidson, Katherine M. Putnam & Christine L. Larson, *Dysfunction in the Neural Circuitry of Emotion Regulation—A Possible Prelude to Violence*, 289 SCIENCE 591, 591-92 (2000).
122. *See* Adam K. Anderson, Kalina Christoff, David Panitz, Eve De Rosa & John D. Gabrieli, *Neural Correlates of the Automatic Processing of Threat Facial Signals*, 23 J. NEUROSCIENCE 5,627 (2003). *See generally* J.E. LEDOUX, THE EMOTIONAL BRAIN: THE MYSTERIOUS UNDERPINNINGS OF EMOTIONAL LIFE (1996); J.S. Morris, A. Ohman & R.J. Dolan, *Conscious and Unconscious Emotional Learning in the Human Amygdala*, 393 NATURE 467, 468-70 (1998); J.S. Morris, A. Ohman & R.J. Dolan, *A Subcortical Pathway to the Right Amygdala Mediating "Unseen" Fear*, 96 PROCEED. NAT. ACAD. SCI. U.S. 1680, 1682-84(1999); Paul J. Whalen et al., *Masked Presentations of Emotional Facial Expressions Modulate Amygdala Activity without Explicit Knowledge*, 18 J. NEUROSCIENCE 411, 411 (1998).
123. *See supra* notes 2-5 and accompanying text; *see also* Cato et al., *supra* note 109.

> He is fitful, irreverent, indulging at times in the grossest profanity, manifesting but little defense for his fellows, impatient of restraint or advice when it conflicts with his desires, at times pertinaciously obstinate, yet capricious and vacillating, devising many plans of operation, which are no sooner arranged than they are abandoned in turn for others appearing more feasible . . . [P]revious to his injury . . . he possessed a well-balanced mind . . . [I]n this regard his mind was radically changed, so decidedly that his friends and acquaintances said he was "no longer Gage."[124]

Consider the behavior of two young adults who sustained severe frontal lobe damage in infancy or early childhood.[125] G.K., who sustained brain damage at birth:

> did not respond to parental discipline [and] always sought gratification of his immediate needs . . . . [He has been] imprisoned 8 times on charges of assault, forgery (using his father's cheque book), grand larceny, drug involvement and lewd behaviour. Inappropriate behaviours were numerous. While walking by a gas station he saw an unattended taxi with keys in the ignition. He jumped in and drove off, ripping the hose from the gas pump, only to be captured several blocks away.[126]

After sustaining frontal lobe damage at age four, M.H.:

> became verbally and physically assaultive in an abrupt, unpredictable, and short-lived manner. She hit her brother, threw her father over a table, and cut her sister with glass. Family members lived in constant terror and once called the police when she threatened them at knife point . . . since her early teens, she was known for her sexual promiscuity and bravado. She intermittently engaged in heavy alcohol and marijuana use. She had no sustained friendships.[127]

"Both patients displayed impulsive behavior triggered by the immediate stimulus, performed with childish abandon and shallow foresight. Neither was able to learn from negative experience or punishment."[128] They lacked "the physiology of insight."[129]

In some frontally-damaged individuals, the impulsivity and emotional reactivity reflects "environmental dependency syndrome"—a "powerless[ness] in the face of influences from the

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124. Harlow, *Passage of an Iron Rod Through the Head*, *supra* note 4, at 339-40.

125. *See* Bruce H. Price et al., *The Comportmental Learning Disabilities of Early Frontal Lobe Damage*, 113 BRAIN 1383, 1383 (1990) (finding arrested development in two subjects who both suffered prefrontal lobe damage).

126. *Id.* at 1384.

127. *Id.* at 1385.

128. *Id.* at 1389.

129. *Id.*

outside world"[130]—due to a loss in the frontal lobes' ability to inhibit activity in the parietal lobes of the brain.[131] As Dr. Ely explains:

> [Frontal lobe patients] become perpetually responsive and literally overstimulated. They have lost the capacity to ignore their environment even when the response seems bizarre or inappropriate . . . . When the frontal lobes are no longer in command . . . [w]e do not live reflectively, but reflexively . . . . It's a sudden collapse of behavioral control. You can have a conversation with a man, a good and pleasant conversation. The next day, he steals his father's credit card, buys a luxury piece of equipment, and gives it away to the first person he meets.[132]

Professor Damasio's somatic marker theory[133] provides a cogent explanation for the extremely poor judgment and inability to learn from experience often seen in those with FLD. Frontal 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 the future consequences of their behavior.[134] The "emotional value laden encoding of information is necessary for rationality,"[135] allowing us to appreciate the positive and negative attributes of situations and decisions, to learn from and be responsive to reward and punishment, and to make quick but sound judgments about the most appropriate behavioral responses.[136] The extant behavioral and physiological evidence, though limited, provides support for the somatic marker theory.[137] For example,

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130. *See* Francois L'Hermitte, *Human Anatomy and the Frontal Lobes. Part II: Patient Behavior in Complex and Social Situations: The "Environmental Dependency Syndrome*," 19 ANN. NEUROLOGY 335, 342 (1986).

131. *See* Francois L'Hermitte, *Part I: Imitation and Utilization Behavior: A Neuropsychological Study of 75 Patients*, 19 ANN. NEUROLOGY 326, 333 (1986).

132. Ely, *supra* note 95, at 9 (internal citations omitted).

133. Damasio, *supra* note 3, at 8.

134. *Id.* at 171-79.

135. Bitz & Bitz, *supra* note 44, at 257. *See generally* Jonathan Haidt & Frederik Bjorklund, *Social Intuitionists Answer Six Questions About Moral Psychology*, *in* MORAL PSYCHOLOGY, VOL. 2: THE COGNITIVE SCIENCE OF MORALITY (W. Sinnott-Armstrong ed. forthcoming) (stating that "[w]hen emotion is removed from decision making people do not become hyperlogical or hyperethical; they become unable to feel the rightness and wrongness of simple decisions and judgments").

136. *See* Bitz & Bitz, *supra* note 44, at 257-60; *see also* Dolan, *supra* note 100, at 928.

137. Raine's "prefrontal dysfunction hypothesis" provides an integrative explanation for the psychophysiology (EEG, skin conductance, and heart rate studies showing under arousal and heightened attention to stimulating events) underlying antisocial behavior as well as the deficits in cognitive and interpersonal functioning often seen in antisocial individuals. "[P]refrontal dysfunction results in arousal, orienting, and anticipatory fear deficits (in addition to personality and cognitive deficits) that in turn predispose to antisocial behavior." RAINE, *supra* note 27, at 301;

unlike normal individuals, those with frontal lobe damage do not generate anticipatory skin conductance responses (indicating visceral sensory arousal) when contemplating risky choices.[138]

People with FLD tend to make risky decisions in order to achieve short-term rewards, and are relatively insensitive to long-term negative consequences.[139] This has been demonstrated using a neuropsychological assessment tool designed to simulate real-world decision making—the Iowa Gambling Task, which requires participants to develop a strategy for minimizing losses and maximizing gains in a card gambling game.[140] People with frontal lobe damage continue to make disadvantageous choices despite being aware of the better long-term strategy because the risky choices produce short-term rewards.[141] This "inability to reason and decide advantageously in risky situations is likely to contribute to the impulsivity, rule-breaking, and reckless, irresponsible behavior that make up four of the seven personality traits of antisocial personality disorder."[142]

Many of the symptoms of Antisocial Personality Disorder are consistent with the symptoms of frontal lobe dysfunction.[143] Damage to the orbitofrontal cortex ("OFC") region of the frontal lobes,[144] the area (located just above the eye sockets) most susceptible to head trauma[145] that has substantial neuronal connections to the limbic

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Antoine Bechara et al., *Deciding Advantageously Before Knowing the Advantageous Strategy*, 275 SCIENCE 1293 (1997).

138. Bechara et al., *supra* note 137. *But see* Tiago V. Maia & James L. McClelland, *A Reexamination of the Evidence for the Somatic Marker Hypothesis: What Participants Really Know in the Iowa Gambling Task*, 101 PROC. NAT'L ACAD. SCI. U.S. 16,075 (2004) (questioning evidence for the somatic marker hypothesis).

139. DAMASIO, *supra* note 3, at 217.

140. *See generally* Eldad Yechiam, Jerome R. Busemeyer, Julie C. Stout & Antoine Bechara, *Using Cognitive Models to Map Relations Between Neuropsychological Disorders and Human Decision-Making Deficits*, 16 PSYCHOLOGICAL SCI. 973 (2005) (reviewing research findings using the Iowa Gambling Task).

141. DAMASIO, *supra* note 3, at 214-17, 311; Antoine Bechara, Antonio R. Damasio, H. Damasio, & S.W. Anderson, *Insensitivity to Future Consequences Following Damage to Human Prefrontal Cortex*, 50 COGNITION 7, 11 (1994). Pathological gamblers exhibit similar response patterns on the Iowa Gambling Task, suggesting that FLD may be implicated in gambling addiction. P. Cavendini et al., *Frontal Lobe Dysfunction in Pathological Gambling Patients*, 51 BIOLOGICAL PSYCHIATRY 334, 339 (2002).

142. RAINE, *supra* note 27, at 49; Raine, *supra* note 31, at 301.

143. PINCUS, *supra* note 43, at 78.

144. "[T]he orbitofrontal cortex is a nexus for sensory integration, the modulation of autonomic reactions, and participation in learning, prediction and decision making for emotional and reward-related behaviours." Morten L. Kringelbach, *The Human Orbitofrontal Cortex: Linking Reward to Hedonic Experience*, 6 NATURE: NEUROSCIENCE 691, 691 (2005).

145. J. Duffy & J Campbell, *Regional Prefrontal Syndromes: A Theoretical and Clinical Overview*, *in* THE FRONTAL LOBES AND NEUROPSYCHIATRIC ILLNESS 117 (Stephen Salloway, Paul F. Malloy & James D. Duffy eds., 2001).

system, is particularly likely to produce repetitive, impulsive criminal behavior. "Whereas damage to the orbitofrontal cortex in adults impairs somatic markers for decision making, it spares abstract knowledge regarding decision making; such patients can usually describe what to do in an abstract choice, but become impaired when faced with actually having to choose themselves."[146] People with significant damage often exhibit "pseudopsychopathy"—showing the behavioral characteristics of psychopaths—but more frequently displaying impulsive aggression rather than instrumental aggression, and without the psychopaths' charm and social skills.[147] Unlike true psychopaths, they often feel remorse for their actions.[148] Those with pseudopsychopathic syndrome show a diminished fear of punishment and have particular difficulty delaying gratification.[149]

The development of psychopathy[150] may in some cases be traced to frontal lobe damage early in life,[151] which may prevent the child from forming "internal emotional models" that help him or her understand and appreciate the feelings and emotional needs of others.[152] Professor Steven Anderson and colleagues report the cases of several adults who sustained OFC lesions before sixteen months of age.[153] In addition to exhibiting the behavioral symptoms of FLD, they had impaired moral reasoning and even lacked an understanding of basic social norms. "[D]amage to the orbitofrontal cortex incurred early in childhood impairs not only actual decision making, but abstract knowledge regarding advantageous choices and specifically about right and wrong—that is, moral knowledge."[154] Proper frontal lobe functioning may be necessary to learn from experiences of reward and punishment and for social perspective taking, both of

146. Adolphs, *supra* note 112, at 173.

147. *See* Robert D. Hare, *Performance of Psychopaths on Cognitive Tasks Related to Frontal Lobe Function*, 93 J. ABNORMAL PSYCHOL. 133, 136-39 (1984); Morgan & Lilienfeld, *supra* note 35, at 122-23; R. Blair, *Neurocognitive Models of Aggression, the Antisocial Personality Disorders, and Psychopathy*, 71 J. NEUROLOGY NEUROSURGERY AND PSYCHIATRY 727, 728 (2001).

148. Knight & Stuss, *supra* note 38, at 586.

149. ELKHONON GOLDBERG, THE EXECUTIVE BRAIN: FRONTAL LOBES AND THE CIVILIZED MIND 146, 146 (2001).

150. Psychopathy is "[a] severe form of antisocial personality disorder, characterized by callousness and lack of empathy." Moll et al., *supra* note 109, at 807.

151. *See* Paul J. Eslinger et al., *Developmental Consequences of Childhood Frontal Lobe Damage*, 49 ARCHIVES NEUROLOGY 764, 764 (1992).

152. Grisolia, *supra* note 42, at 83-85; *see also* Tranel, *Ventromedial Prefrontal Cortex*, *supra* note 109, at 349.

153. Steven W. Anderson et al., *Impairment of Social and Moral Behavior Related to Early Damage in Human Prefrontal Cortex*, 2 NATURE: NEUROSCIENCE 1032, 1032 (1999).

154. Adolphs, *supra* note 115, at 173.

which are crucial for the development of empathy and moral reasoning skills.[155]

Finally, the frontal lobes also contain the brain's major serotonergic projections, and abnormalities in serotonin metabolism may contribute to impulsive aggression. Research has shown a strong link between aggression and low levels of the neurotransmitter serotonin.[156] PET scans of people who exhibit impulsive aggression show less activity, relative to normal individuals, in the inhibitory regions of the prefrontal lobes in response to a serotonergic stimulus that activates the inhibitory regions of the brain.[157]

Having discussed the neuroscience research on the link between FLD and criminal behavior, we turn now to an analysis of its implications for criminal jurisprudence. The next Part discusses the admissibility of FLD evidence. Following a brief review of this foundational issue, Part III presents the proposal for a return to control tests for insanity.

II. ADMISSIBILITY OF FLD EVIDENCE

Courts generally admit evidence of FLD, including neuroimaging and neuropsychological test results.[158] Federal courts use the admissibility standard set forth in *Daubert v. Merrill Dow*

155. *Id.*; Paul J. Eslinger, *Neurological and Neuropsychological Bases of Empathy*, 39 EUR. NEUROLOGY 193-99 (1998); Anderson et al., *supra* note 153; J.L. Muller et al., *Abnormalities in Emotion Processing with Cortical and Subcortical Regions in Criminal Psychopaths: Evidence from a Functional Magnetic Resonance Imaging Study Using Pictures with Emotional Content*, 54 BIOLOGICAL PSYCHIATRY 152, 152 (2003).

156. *See* Davidson, Putnam & Larson, *supra* note 121; Filley et al., *supra* note 30, at 2 (concluding that abnormal serotonin metabolism is a primary neurobiological cause of violence).

157. Antonia S. New et al., *Blunted Prefrontal Cortical 18Fluorodeoxyglucose Positron Emission Tomography Response to Metachlorophenylpiperazine in Impulsive Aggression*, 59 ARCHIVES GEN. PSYCHIATRY 621, 621 (2002).

158. Evidence of FLD is typically introduced through the testimony of psychiatrists, psychologists (often neuropsychologists), and neurologists. Although courts are receptive to challenges based on a physician's lack of psychiatric or neurological training, *see* Commissioner v. Monico, 488 N.E.2d 1168, 1175-76 (Mass. 1986), it is well established that psychologists may testify about neuropsychological and neuroimaging findings. *See* Daniel A. Martell, *Forensic Neuropsychology and the Criminal Law*, 16 L. & HUM. BEHAV. 313, 327 (1992) (citing Jenkins v. United States, 307 F.2d 637 (D.C. Cir. 1962)); Hoskins v. State, 702 So. 2d 202, 208 (Fla. 1997), particularly when they have training in neuropsychology or physiological psychology. Courts rely on the evidentiary principle that the admission of an expert is based on his or her specialized "knowledge, skill, experience, training or education." *See* State v. Rogers, 4 P.3d 1261, 1277 (Or. 2000) (allowing testimony of neuropsychologist on defendant's FLD). As one court explained, "[t]he critical factor is the [witness's] actual experience and the probable probative value of his testimony." *Monico*, 488 N.E.2d at 1176 (citing United States v. Green, 307 F.2d 637, 646 (D.C. Cir. 1962) (noting that the psychologist expert was trained in neuropsychology)).

Pharmaceuticals.[159] *Daubert* requires trial judges to act as evidentiary "gatekeepers," by considering four factors when evaluating the reliability of proffered scientific evidence: (1) its falsifiability (i.e., whether the hypotheses can be tested empirically), (2) the error rates of the methods used, (3) the extent of peer review and publication of relevant scientific findings, and (4) its general acceptance in the scientific community. Though the *Daubert* standard has been adopted in many states, the majority of states still use a variant of the traditional *Frye* standard,[160] which only requires judges to determine if the proffered evidence has gained "general acceptance in the particular field in which it belongs."[161] The U.S. Supreme Court's decision in *Kumho Tire Co. v. Carmichael*[162] extends the *Daubert* standard to the clinical testimony of mental health experts: trial judges "must determine whether [their] testimony has 'a reliable basis in the knowledge and experience of [the relevant] discipline.'"[163]

There are, however, no reported criminal cases involving *Frye* or *Daubert* hearings on proffered FLD evidence.[164] Challenges to the admissibility of clinical or scientific evidence are uncommon in criminal cases due to the longstanding practice of deferring to forensic experts[165] and the limited resources available to most criminal defendants. A study of all federal criminal cases decided between 1993 and 2001 found only seventy-five cases involving *Daubert* challenges to the admissibility of behavioral science evidence.[166]

Though the reality of FLD and its effect on judgment and impulse control is well accepted in the scientific community, the reliability of

159. 509 U.S. 579, 593 (1993).

160. David E. Bernstein & Jeffrey D. Jackson, *The Daubert Trilogy in the States*, 351 JURIMETRICS 351, 351 (2004).

161. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).

162. 526 U.S. 137 (1999). Generally speaking, valid and reliable clinical evidence will be grounded in science, since diagnostic categories and techniques are derived from scientific research. *See* Alan M. Goldstein, Marchelle R. Thomson, Richard E. Redding & David Osman, *The Role of Research in Forensic Psychological Testimony: Do Judges Listen?*, 3 J. FORENSIC PSYCHOL. PRAC. 89, 97 (2003); Richard E. Redding & Daniel C. Murrie, *Judicial Decision Making About Forensic Mental Health Evidence*, *in* FORENSIC PSYCHOLOGY: EMERGING TOPICS AND EXPANDING ROLES 683, 687-90 (Alan M. Goldstein ed., 2006).

163. *Kumho Tire Co.*, 526 U.S. at 149 (quoting *Daubert*, 509 U.S. at 592).

164. There are only a few reported cases of litigated *Frye* or *Daubert* challenges to FLD evidence in civil cases. *See, e.g.*, Fini v. General Motors Corp., No. 227592, 2003 WL 1861025 (Mich. App. Apr. 8, 2003).

165. *See* Redding & Murrie, *supra* note 162; Daniel W. Shuman, *Expertise in Law, Medicine, and Health Care*, 26 J. HEALTH POL. POL'Y & L. 267, 267 (2001).

166. Henry F. Fradella, Adam Fogarty & Linda O'Neill, *The Impact of* Daubert *on the Admissibility of Behavioral Science Testimony*, 30 PEPP. L. REV. 403, 403 (2003).

a diagnosis of frontal lobe dysfunction and evidence about how it may have contributed to the instant offense would be open to *Daubert* or *Frye* challenges, particularly with respect to neuroimaging results. Neuroimages are not direct visualizations of the brain. Rather, they "simplify complicated data about the brain, but . . . are mutable, constructed representations, far more similar to charts and line graphs than to photographs."[167] There are no precise criteria for differentiating normal from abnormal imaging results, nor for quantifying the extent of FLD. Thus, "[i]t would be a step in the right direction if the imaging expert in the courtroom were held accountable for his or her expert testimony by the same standards of peer review"[168] that are applied when evaluating scientific research findings under *Daubert*.[169]

But because judges virtually never conduct, *sua sponte*, *Daubert* or *Frye* reviews in criminal cases, litigants must raise evidentiary challenges.[170] Prosecutors may be well-advised to do so. As one defense attorney explained:

> It is one thing for a psychiatrist to get on a witness stand and give his opinion, but to be able to show a jury a PET scan, with these big dark areas in the frontal lobes, which someone has called a "rat bite," is a very effective form of evidence.[171]

According to a recent study, mock jurors were more likely to find a defendant not guilty by reason of insanity when provided with neuroimaging showing brain damage in the defendant's frontal lobes than when presented with clinical testimony alone.[172] "Most juries

167. Kulynych, *Neuroimages as Scientific Evidence*, *supra* note 72, at 244.

168. Donald Reeves et al., *Limitations of Brain Imaging in Forensic Psychiatry*, 31 J. AM. ACAD. PSYCHIATRY & L. 89, 96 (2003); *see also* Kulynych, *Neuroimages as Scientific Evidence*, *supra* note 72, at 241-42 (arguing that because the production of a neuroimage involves the manipulation and analysis of technical parameters of the imaging process, about which mental health professionals have little expertise, "the presentation of neuroimaging evidence ought to encompass witnesses involved in the production and data analysis phases of the neuroimaging study as well as the psychiatrist or neurologist who uses the image").

169. In one case the trial court refused to admit the defendant's proffered PET scan evidence suggesting that he had FLD, finding it to be too uncertain. People v. Protsman, 88 Cal. App. 4th 509, 509 (Ct. App. 2001).

170. *See* Goldstein et al., *supra* note 162, at 98.

171. Lori D'Agincourt, *PET Findings Support Insanity Defense Case*, DIAGNOSTIC IMAGING, Jan. 1993, at 45.

172. Jessica R. Gurley & David K. Marcus, *Phineas Gage on Trial: The Effects of Neuroimaging & Brain Injury on Decisions of Insanity*, Paper presented at the American Psychology-Law Society Conference (Mar. 8, 2005).

feel that most mental patients are really faking . . . [i]f you show them the [brain scan], they're convinced."[173]

In capital cases, jurors have reported giving considerable weight to neuroimaging evidence in deciding not to impose the death penalty.[174] Neuroimaging evidence can also be sufficiently compelling to convince prosecutors to reduce the charges or offer a plea bargain.[175] The singular persuasiveness of neuroimaging is illustrated in the dissenting opinion of a Florida Supreme Court Justice, who complained that the experts' conclusions, based largely on the defendant's history and neurological examinations, were not based on "objective" testing "*such as brain scans* . . . as differentiated from the experts' subjective conclusions."[176]

III. MODERN NEUROSCIENCE AND LEGAL INSANITY

We turn now to the proposal to revive control tests for insanity. First, however, it is helpful to briefly review the history of insanity standards in American jurisprudence.

A. The History of Insanity Standards in American Jurisprudence

> [As science and the knowledge of the disease [of insanity] progressed . . . the rule has been extended in modern times until it begins to comprehend within its saving influences most of those who by the visitation of disease are deprived of the power of self-government. Yet the law, in its slow and cautious progress, still lags far behind the advance of true knowledge.[177]

Insanity defenses,[178] when successful, are completely exculpatory, relieving the defendant of criminal liability with a verdict of "Not Guilty by Reason of Insanity" ("NGRI").[179]

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173. Don J. DeBenedictis, *Criminal Minds: PET Scans Used to Prove Accused Killers' Brain Abnormalities*, 76 A.B.A. J. 30, 30 (1990) (quoting Dr. Bernard Diamond, Professor Emeritus of Law and Medicine, University of California at Berkeley).

174. *See* Kulynych, *High-Tech Crystal Ball*, *supra* note 72, at 252-53.

175. *See* D'Agincourt, *supra* note 171, at 45 (reporting case of sixty-four-year-old Herbert Weinstein, who had no history of violent behavior but strangled his wife after a minor provocation). After a PET scan revealed a large arachnoid cyst in the defendant's frontal lobe, the prosecutor agreed to a plea bargain for manslaughter. *Id.*

176. Crook v. State, 813 So. 2d 68, 80 (Fla. 2002) (Wells, J., concurring in part and dissenting in part) (emphasis added).

177. People v. Klien, 1 Edm. Sel. Cas. 13, 25 (N.Y. Sup. Ct. 1845) (quoted in Robert E. Mensel, *Right Feeling and Knowing Right: Insanity in Testators & Criminals in Nineteenth Century America*, 58 OKLA. L. REV. 397, 417 (2005).

178. The insanity defense is to be distinguished from the issue of adjudicative competence (or "competence to stand trial"). Competence to stand trial is not a defense, but rather, an inquiry into the defendant's capacity to understand and participate in adjudicatory proceedings. *See generally* Richard E. Redding, *supra* note

33, at 416 (providing chart contrasting competence to stand trial the insanity defense doctrines). The due process clause of the Fourteenth Amendment to the U.S. Constitution bars the adjudication of incompetent defendants. A defendant must have the "sufficient present ability to consult with his lawyer with a reasonable degree of rational understanding[;]" a "rational as well as factual understanding of the proceedings against him," Dusky v. United States, 362 U.S. 402, 402 (1960), and the capacity "to assist in preparing his defense." Drope v. Missouri, 420 U.S. 162, 171 (1975). But the bar for competence is set rather low, requiring only a minimal level of rational understanding and ability to work with the attorney. *See, e.g.*, State v. Hampton, 959 S.W. 2d 444, 449-50 (Mo. 1997) (upholding trial court's finding that defendant was competent to stand trial, despite neurologist's testimony that defendant's frontal lobe injury impaired his ability to assist in his defense); United States v. Branham, 97 F.3d 835, 855 (6th Cir. 1996) (accord); State v. VanNatta, 506 N.W.2d 63, 66-68 (N.D. 1993).

When a defendant's FLD is severe or present alongside other mental impairments, it may form the basis for a finding of adjudicative incompetence. *See* State v. Hall, 752 N.E.2d 318, 320-26 (Ohio Ct. App. 2001). Such individuals may not, for example, fully appreciate their legal situation, maintain motivation and attention when interacting with counsel, or be able to testify effectively or make sound judgments about their defense options. *See* Richard E. Redding & Lynda E. Frost, *Adjudicative Competence in the Modern Juvenile Court*, 9 VA. J. SOC. POL'Y & L. 353, 358 (2001) (discussing adult legal and clinical standards for competency). Even when not leading to a finding of incompetence, accommodations may be made when a defendant's impaired ability to participate effectively is brought to the court's attention. In *United States v. Timbana*, 222 F.3d 688 (9th Cir. 2000), the examining psychologist testified that although the defendant was competent to stand trial, his frontal lobe deficits would "clearly interfere with the quality of his ability to participate in his defense." *Id.* at 691. The court asked the psychologist for recommendations on how best to structure the proceedings to facilitate the defendant's participation. (The development of neuropsychological tools and standards to assess defendants for FLD and its impact on their adjudicative competence is an important area for future research. Neuropsychological testing would also be valuable for assessing defendants' potential for competency restoration. Martell, *supra* note 158, at 323-24).

In addition, evidence of FLD has been used to challenge a defendant's competence to plead guilty or waive constitutional rights. In *State v. Marshall*, 27 P.3d 192 (Wash. 2001), the defendant sought to withdraw his guilty plea, arguing that he was incompetent to enter the plea due to FLD and other serious mental disorders. The Supreme Court of Washington remanded the case for a competency hearing to determine whether the plea was entered voluntarily, given evidence of the defendant's significant mental impairment, including the "MRI [which] revealed [that] the decision-making area of his brain had shrunk significantly . . . . and frontal lobe damage that affects his ability to plan ahead, conceptualize the future and make reasoned decisions." *Id.* at 196-97. In *Ward v. Sternes*, 209 F. Supp. 2d 950 (C.D. Ill. 2002), the U.S. District Court granted the defendant's habeas corpus petition, finding that the defendant's waiver of his Sixth Amendment right to testify was not a voluntary, knowing, and intelligent waiver since FLD impaired the defendant's understanding of the important right he was waiving. *Id.* at 959-60.

FLD evidence has also been used to argue that a defendant's confession should be suppressed because the *Miranda* rights waiver was not given knowingly, voluntarily, or intelligently. *See* People v. Wilson, 732 N.E.2d 498, 502 (Ill. 2000). These claims are seldom successful, however. In *Roberts v. State*, a neurologist testified that "if it were not for the injury [the defendant] sustained in 1980 he would not have committed this crime. Prior to [his] accident in 1980 he had no behavioral problems." 102 S.W.3d 482, 499 (Ark. 2003). MRI scans showed that portions of his right and left frontal lobes were missing due to a traumatic brain injury sustained when he was twelve-years-old. *Id.* He also had an IQ of seventy-six, placing him in the borderline mentally-retarded range of intellectual functioning. *Id.* But the Supreme Court of Arkansas refused to conclude that FLD made him especially vulnerable to the police

The first formal test for insanity in English jurisprudence arose from the celebrated 1843 trial of Daniel McNaghten,[180] who shot and killed British Prime Minister Peel's personal secretary. The shot was intended for the Prime Minister. McNaghten pleaded insanity, based on a theory of impaired control,[181] with nine medical experts describing him as suffering from extreme paranoia "entangled in an elaborate system of delusions."[182] Among these was the belief that Prime Minister Peel was the devil in human form who was conspiring to kill him.[183] McNaghten was found not guilty by reason of insanity,[184] and he was committed to an insane asylum where he remained until his death. Public indignation, fueled by Queen Victoria's dissatisfaction with the verdict, prompted the House of Lords to request the Queen's Bench to develop an insanity standard.[185] The result came to be known as the *McNaghten* test, which provided that a defendant is presumed sane unless it can be shown that he was "labouring under such a defect of reason, from

officer's inducements to confess. *Id.*; *see also* State v. Mears, 749 A.2d 600, 605-06 (Vt. 2000) (holding that despite FLD and other mental impairments, defendant's understanding was sufficient to establish a knowing voluntary, and intelligent waiver of his waiver *Miranda* rights).

179. Some states also provide juries with the option of returning a verdict of Guilty But Mentally Ill ("GBMI") when the jury finds that the defendant suffers from a mental illness but does not find that he or she was insane. Typically, the defendant receives a sentence similar or identical to the one he or she would have received if found guilty, but is evaluated to determine the need for psychiatric treatment. *See generally* REISNER, SLOBOGIN & RAI, *supra* note 15, at 604-13. There are several reported cases in which it appears that the jury's GBMI verdict was based, in substantial part, on evidence of the defendant's FLD. *See* Adams v. State, 330 S.E.2d 869, 871 (Ga. 1985); Ward v. Sternes, 334 F.3d 696, 699-701 (7th Cir. 2003).

180. *McNaghten's Case*, 8 Eng. Rep. 718 (1843).

181. *See* Mensel, *supra* note 177, at 412.

182. RITA J. SIMON, THE JURY & THE DEFENSE OF INSANITY 20 (1967) (quoting Dr. Isaac Ray, the father of forensic psychiatry, who participated indirectly in the *McNaghten* proceedings).

183. *Id.*

184. Lord Chief Justice Tindal submitted the case to the jury with the following instruction:

> The point I shall have to submit to you is, whether on the whole of the evidence you have heard, you are satisfied that at the time the act was committed . . . the prisoner had that competent use of his understanding as that he knew that what he was doing, by the very act itself, a wicked and wrong thing? If the prisoner was not sensible at the time . . . that it was a violation of the law of God or of man, undoubtedly he was not responsible for that act . . . If on balancing the evidence in your minds, you think the prisoner capable of distinguishing between right and wrong, then he was a responsible agent and liable to all the penalties the law imposes. If not . . . then you will probably not take upon yourselves to find the prisoner guilty. If this is your opinion, then you will acquit the prisoner.

McNaghten's Case, at 719.

185. *See* Anthony Platt & Bernard L. Diamond, *The Origins of the "Right and Wrong" Test of Criminal Responsibility and Its Subsequent Development in the United States: An Historical Survey*, 54 CAL. L. REV. 1227, 1236-37 (1966).

disease of the mind, as not to know the nature and quality of the act he was doing; or, if he did know it, that he did not know that what he was doing was wrong."[186] The justices implicitly rejected a volitional standard.[187]

English and American courts were using a crude "right and wrong" test for insanity before *McNaghten* and readily adopted *McNaghten* as a formalization of that standard.[188] Today it remains the most widely accepted test for insanity. By the 1950s, most American jurisdictions had adopted the *McNaghten* rule.[189] *McNaghten* is known as a "cognitive test," because it requires the defendant to show that he or she did not *understand* the nature[190] and consequences of the criminal act or did not *understand* that the act was (legally or morally) wrong.[191] Such a lack of understanding is usually due to serious mental illness, typically a psychotic disorder or other mental disorder having psychotic features (e.g., delusions or hallucinations).[192]

In contrast, "irresistible impulse" (also called "volitional" or "control")[193] standards (or "tests") for insanity provide an insanity defense to defendants who are unable, due to mental disorder, to exercise behavioral control. Control tests come in many variations,[194]

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186. 67 HANSARD'S PARLIAMENTARY DEBATES 722 (1843).

187. Mensel, *supra* note 177, at 413-14.

188. *See* Platt & Diamond, *supra* note 185, at 1250-57 (summarizing twelve American cases between 1816 and 1841 that used a "right and wrong" test for insanity); *see also* JOHN BIGGS, THE GUILTY MIND: PSYCHIATRY AND THE LAW OF HOMICIDE 116 (1967) (describing adoption of the *McNaghten* rule across U.S. jurisdictions).

189. AMERICAN LAW INSTITUTE, MODEL PEN. CODE AND COMMENTARIES § 4.01, at 165 (1985).

190. The classic example of a lack of awareness of the nature of one's act is provided in the MODEL PEN. CODE (§ 4.01, cmt., at 166)—a man strangles his wife, thinking that he is squeezing lemons.

191. *See* United States v. Segna, 555 F.2d 226, 232-33 (9th Cir. 1977) (discussing the debate in the criminal law on whether the standard should be the defendant's understanding of legal versus moral wrongfulness); SAMUEL J. BRAKEL & ALEXANDER D. BROOKS, LAW AND PSYCHIATRY IN THE CRIMINAL JUSTICE SYSTEM 34-35 (2001).

192. Psychosis entails a break with reality, usually involving delusions, hallucinations, or confused and irrational thinking. DSM-IV, *supra* note 5, at 827. A delusion is "[a] false belief based on incorrect inference about external reality that is firmly sustained despite what almost everybody else believes and despite what constitutes incontrovertible and obvious proof or evidence to the contrary." *Id.* at 821. Hallucinations are false or distorted sensory experiences, which may be in the form of visions, sounds or voices, tactile feelings, smells, or taste. *Id.* at 823. Most defendants acquitted under cognitive tests for insanity suffer from schizophrenia or other psychotic condition, or bipolar disorder or major depression (with psychotic features). *See* BRAKEL & BROOKS, *supra* note 191, at 83-91.

193. "Control" is the more legally accurate term because the insanity defense does not entail a claim of involuntary action or lack of volition. *See infra* note 254.

194. *See, e.g.*, N.M. STAT. § 14-51-01 (West 2005) ("The defendant was insane at the time of the commission of the crime if . . . [he or she] *could not prevent himself [or] herself from committing the act.*") (emphasis added); State v. Johnson, 399 A.2d 469, 476

but rarely do they use the term "irresistible impulse,"[195] instead framing the test in terms of the defendant's inability to control his or her conduct.[196] Thus, juries are not usually required to find that the defendant's acts were, in fact, completely irresistible.[197] Instead, the jury is asked to consider the defendant's capacity for self-control.[198] According to the American Law Institute's Model Penal Code formulation, the control test most commonly found in state statutes (*see Appendix B*): "A person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or defect he lacks substantial capacity either to appreciate the criminality [wrongfulness] of his conduct or *to conform his conduct to the requirements of law.*"[199]

The "irresistible impulse" concept predates the *McNaghten* case in both English and American jurisprudence.[200] "[W]ritings in the field of medical jurisprudence emphasized that a criminal defendant might have known what he was doing and that it was wrong, but nonetheless have been unable to control his conduct."[201] After

(R.I. 1979) ("A person is not responsible for criminal conduct if . . . *[his capacity] to conform his conduct to the requirements of law is so substantially impaired that he cannot justly be held responsible.*") (emphasis added); Godley v. Commonwealth, 343 S.E.2d 368, 370 (Va. Ct. App. 1986) ("The [irresistible impulse] defense is applicable only where the accused's mind has become 'so impaired by disease that [the accused] is *totally deprived of the mental power to control or restrain his [or her] act.*'" (emphasis added) (quoting Thompson v. Commonwealth, 70 S.E.2d 284, 292 (1954))).

195. *See* Appendix B.

196. *See* WAYNE R. LAFAVE, Criminal Law § 7.3a, 390 (4th ed. 2003) (citing Isaac Ray, THE MEDICAL JURISPRUDENCE OF INSANITY 263 (1838)).

197. *See id.* ("[F]or the jury is not ordinarily told that the defendant must have acted upon a sudden impulse or that his acts must have been totally irresistible."). The classic example, taught in criminal law, of a truly irresistible impulse is one that satisfies the "policeman at the elbow test," which asks whether the defendant would have committed the offense had a policeman been present. *See* United States v. Kunak, 17 C.M.R. 346, 357-58 (C.M.A. 1954) (describing the "policeman at the elbow test").

198. *See* LAFAVE, *supra* note 196, at 390.

199. MODEL PENAL CODE § 4.01 (1962) (emphasis added). Although the Model Penal Code ("MPC") test contains the cognitive and control prongs of earlier tests, they are modified by the term "substantial." Thus, complete cognitive incapacity or lack of control is not required under the MPC. "The adoption of the standard of substantial capacity may well be the Code's most significant alteration of the prevailing tests. It was recognized, of course, that 'substantial' is an open-ended concept, but its quantitative connotation was believed to be sufficiently precise for purposes of practical administration." AMERICAN LAW INSTITUTE, MODEL PENAL CODE COMMENTARIES § 4.01, at 172 (1985).

200. *See generally* Mensel, *supra* note 177, at 414.

201. *See See* LAFAVE, *supra* note 196, at 389 (stating that some individuals are "*irresistibly* impelled to the commission of criminal acts while fully conscious of their nature and consequences"); FORBES WINSLOW, THE PLEA OF INSANITY IN CRIMINAL CASES 92 (1843) (stating that some individuals "may be perfectly competent to draw a correct distinction between right and wrong . . . [yet are] driven by an irresistible impulse").

McNaghten, however, English courts typically refused to allow lack of control claims, but medical and legal commentators of the time argued that the defense should be available, and many courts began to allow it by the early 1900s.[202]

But a crude form of the control test appeared in American jurisprudence much earlier—in 1834,[203] the term "irresistible impulse" was first used in American caselaw in 1844,[204] and a few jurisdictions apparently adopted control tests during the 1860s and 1870s.[205] In the 1887 Alabama case of *Parsons v. State*,[206] the court formulated the following jury instructions for use in cases where the defense of insanity is raised:

> *First.* Was the defendant at the time of the commission of the alleged crime, as a matter of fact, afflicted with a *disease of the mind*, so as to be either idiotic, or otherwise insane? *Second.* If such be the case, did he know right from wrong as applied to the particular act in question? If he did not have such knowledge, he is not legally responsible. *Third.* If he did have such knowledge, he may nevertheless not be legally responsible if the two following conditions concur: (1) If, by reason of the duress of such mental disease, he had so far lost the *power to choose* between the right and the wrong, and to avoid the act in question, as that his free agency was at the time destroyed; (2) and if, at the same time, the alleged crime was so connected with such mental disease, in the relation of cause and effect, as to have been the product of it *solely*.[207]

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202. *See* Edwin R. Keedy, *Irresistible Impulse as a Defense in the Criminal Law*, 100 U. PA. L. REV. 956, 961-65 (1952) (discussing cases and commentaries); *see also id.* at 969-76 (reviewing the criminal codes of European, Asian and South American countries providing a control defense).

203. State v. Thompson, Wright 617, 622 (Ohio 1834) (instructing the jury that "if his mind was such that he retained the power of discriminating, or to leave him conscious he was doing wrong, *a state of mind in which at the time of the deed he was free to forbear*, or to do the act, he is responsible as a sane man") (emphasis added).

204. Commonwealth v. Rogers, 7 Met. 500, 502 (Mass. 1844) (instructing the jury to consider whether the defendant "acted from an irresistible and uncontrollable impulse"); *see also* Commonwealth v. Mosler, 4 Pa. 264, 267 (Pa. 1846) (instructing the jury to consider whether defendant had "an irresistible inclination to kill").

205. *See* Parsons v. State, 2 So. 854, 863-64 (Ala. 1887) (discussing earlier cases).

206. *Id.*

207. *Id.* at 866-67. In discussing the need for an insanity test to supplement *McNaghten*, the court stated:

> The following practicable suggestion is made in the able treatise of Baifour Browne above alluded to: 'In a case of alleged insanity, then,' he says, 'if the individual suffering from enfeeblement of intellect, delusion, or any other form of mental aberration, was looked upon as, to the extent of this delusion, under the influence of duress, (the dire duress of disease,) and in so far *incapacitated to choose* the good and eschew the evil, in so far, it seems to us,' he continues, 'would the requirements of the law be fulfilled; and in that way it would afford an opening, by the evidence of experts, for the proof of the amount of self-duress in each individual case, *and thus alone can the*

In 1962, the American Law Institute drafted a Model Penal Code insanity standard that addressed the objections of psychiatrists and jurists who believed that *McNaghten* was too restrictive because it did not apply to defendants who lacked the capacity to control their conduct.[208] By 1980, the Model Penal Code standard had been adopted by most of the federal circuits and more than half the states.[209] (In addition, several jurisdictions adopted the expansive *Durham* test, which provided an insanity defense for criminal offenses that were "the product of mental disease or defect.")[210] But a number of jurisdictions still refused to adopt a control test, viewing it as an unnecessary broadening of the insanity standard, a longstanding concern of courts.[211] In 1924, for example, the British House of Lords refused to adopt a control test despite the recommendation of the British Medical Association and a government commission.[212]

> *criterion of law and the criterion of the inductive science of medical psychology be made to coincide*.' This, in our judgment, is the practical solution of the difficulty before us, as it preserves to the courts and the juries, respectively, a harmonious field for the full assertion of their time-honored functions. So great, it may be added, are the embarrassments growing out of the old rule, as expounded by the judges in the house of English lords, that in March, 1874, a bill was brought before the house of commons, supposed to have been draughted by the learned counsel for the queen, Mr. Fitzjames Stephen, which introduced into the old rule the new element of an absence of the power of self-control, produced by diseases affecting the mind; and this proposed alteration of the law was cordially recommended by the late Chief Justice Cockburn, his only objection being that the principle was proposed to be limited to the case of homicide.

Id. at 862.

208. *See, e.g.*, Bazelon, *supra* note 18, at 395-96; Bernard L. Diamond, *From* M'Naghten *to* Currens, *and Beyond*, 50 CAL. L. REV. 189, 189 (1962) (arguing that "*M'Naghten* is dead"); KARL MENNINGER, THE CRIME OF PUNISHMENT 114-15 (1968) (criticizing *M'Naghten* as an "absurdity"); *see also* ABRAHAM S. GOLDSTEIN, THE INSANITY DEFENSE 68 (1967) (stating that "[t]he 'irresistible impulse' rule was widely heralded by many lawyers and psychiatrists as the way to remedy all that was wrong with *NcNaghten*"); Keedy, *supra* note 202, at 989 (citing numerous medical authorities). A survey conducted in the early 1950s found that ninety-one percent of forensic psychiatrists agreed that there are "cases where a person, suffering from mental derangement knows that it is wrong to inflict bodily harm (killing, maiming, ravishing) upon another person, but owing to the mental derangement is incapable of controlling (resisting) the impulse to commit such bodily harm." *Id.* at 989 (reporting survey conducted by Dr. Philip Roche, Chairman of the Committee on Forensic Psychiatry, Group for the Advancement of Psychiatry).

209. 4 MICHAEL L. PERLIN, MENTAL DISABILITY LAW: CIVIL AND CRIMINAL § 9A-3.5, at 162 (2d ed. 2001).

210. Durham v. United States, 214 F.2d 862, 874-75 (D.C. Cir. 1954).

211. *See* GOLDSTEIN, *supra* note 208, at 77 (stating that numerous jurisdictions were concerned that the irresistible impulse test "broaden[ed] the [insanity] defense far too much, making it available to psychopaths, to neurotics, perhaps to all who commit crime. This is said to follow from the impossibility of determining which acts were uncontrollable, rather than merely uncontrolled, and the attendant suspicion that the former category does not really exist.").

212. Keedy, *supra* note 202, at 963-64.

Lord Hewart expressed the concern that "it would be impossible to distinguish between the impulse of the person said to be suffering from mental disease, and the impulse of the ordinary offender who is moved to commit a crime by the desire for gain or revenge."[213] Indeed, as far back as 1897, the Supreme Court of California opined:

> We do not know that the impulse was irresistible, but only that it was not resisted. Whether irresistible or not must depend upon the relative force of the impulse and the restraining force, and it has been well said that to grant immunity from punishment to one who retains sufficient intelligence to understand the consequences to him of a violation of the law, may be to make a resistible impulse irresistible, which before was not.[214]

The popularity of control tests began to wane by the 1970s, and grew even more unpopular in the wake of John Hinckley's acquittal, under the Model Penal Code standard, for the shooting of President Reagan in 1981.[215] In any event, the ground already was fertile for the abandonment of control tests. The heyday of optimism about our ability to treat and rehabilitate criminal offenders had passed,[216] and mental health professionals and jurists alike had grown increasingly skeptical about the validity of the irresistible impulse concept.[217] Currently, only eighteen states and the District of Columbia incorporate a control test in their insanity standards (*see Appendix B*), and five states (Idaho, Kansas, Montana, North Dakota, and Utah) have abolished the insanity defense altogether. Most states, as well as the federal courts, use only a cognitive test for insanity.[218]

B. A Proposal to Revive Control Tests for Insanity

McNaghten, which gained prominence during a "rationalist era" when personality functioning was viewed primarily from a cognitive

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213. *Id.* at 964.

214. People v. Hubert, 51 P. 329, 331 (Cal. 1897).

215. *See* Jennifer S. Bard, *Re-Arranging Desk Chairs on the Titanic: Why the Incarceration of Individuals with Serious Mental Illness Violates Public Health, Ethical, and Constitutional Principles and Therefore Cannot Be Made Right by Piecemeal Changes to the Insanity Defense*, 5 HOUS. J. HEALTH. L. & POL'Y 1, 35-36 (2005) (summarizing insanity defense reforms after *Hinckley*).

216. The disease theory of crime had gained popularity during the 1950s and 1960s, and there was great optimism about the ability of mental health professionals to treat and rehabilitate offenders. One of the best known proponents of this view was the psychiatrist Karl Menninger, whose book *The Crime of Punishment* represented the leading treatise on the subject. *See* MENNINGER, *supra* note 208, at 116-18.

217. *See infra* notes 283-296 and accompanying text.

218. *See* Kimberly Collins et al., *The John Hinckley Trial & Its Effects on the Insanity Defense*, http://www.law.umkc.edu/faculty/projects/ftrials/hinckley/hinckleyinsanity.htm (discussing the response of various states and the federal government post-*Hinckley*).

perspective,[219] is a narrow test that excludes from exculpation the defendant who knew right from wrong yet could not control his or her behavior. But frontally-damaged individuals, particularly those having the form of FLD that produces primarily impulsivity and behavioral disinhibition, do not lack *understanding*, they lack *behavioral control*. Thus, insanity defenses based on FLD are few in number and apparently have not fared well.[220] In the thirty-two states lacking a control test for insanity, defendants with FLD cannot plead insanity due to impaired impulse control, leaving most without a viable insanity plea under prevailing cognitive tests for insanity.[221] As

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219. *See* Laura Reider, Comment, *Toward a New Test for the Insanity Defense: Incorporating the Discoveries of Neuroscience into Moral and Legal Theories*, 46 UCLA L. REV. 289, 303-06 (1998) (citing RUDOLPH JOSEPH GERBER, THE INSANITY DEFENSE 30 (1984)).

220. *See, e.g.*, State v. Sopczak, 823 So. 978, 986 (La. Ct. App. 2002) (holding that defendant's evidence of FLD failed to satisfy the *McNaghten* test for insanity since experts testified that he could distinguish right from wrong, though perhaps he could not have restrained his impulses); Ward v. Sternes, 209 F. Supp. 2d 950, 954 (C.D. Ill. 2002) (discussing jury's rejection of defendant's insanity defense); State v. Thompson, No. E202-02631-CCA-R3-CD, 2003 WL 22018899, at *14-15 (Tenn. Crim. App. Feb. 2, 2004) (reversing trial court's decision to set aside jury verdict of guilty and enter a judgment of not guilty by reason of insanity); Commonwealth v. Monico, 488 N.E.2d 1168, 1173-76 (Mass. 1986) (noting trial court's failure to give insanity defense instructions to the jury and reversing conviction on this failure).

In lieu of the insanity defense, some defendants with FLD may rely on the doctrine of diminished capacity. Available in only a few states, "diminished capacity" is a partial defense claiming that the defendant did not have the capacity to form the mental state (usually the specific intent of acting "intentionally," "purposely," or "knowingly") for the crime charged. *See* State v. Atsbeha, 981 P.2d 883, 887 (Wash. Ct. App. 1999) (asserting that diminished capacity exists when "a mental disorder . . . impaired the defendant's ability to form the specific intent to commit the crime charged") (quoting State v. Ellis, 963 P.2d 843, 843 (Wash. 1998)). Similarly, some states allow the defendant to argue that he did not form the specific intent at the time the offense was committed. *See, e.g.*, State v. Balderama, 88 P.3d 845, 851-53 (N.M. 2004) (noting the defendant's lack of "willful, deliberate, and premeditated killing" intent necessary for a first degree murder conviction); State v. Joseph, 590 S.E.2d 718, 722-23 (W. Va. 2003) (discussing rationale behind "diminished capacity" defense). Evidence that the defendant acted impulsively, due to FLD, may refute the prosecution's case that the defendant formed the specific intent to commit the crime or acted with premeditation (*e.g.*, as may be required to obtain a conviction for first-degree murder). Therefore, the defendant could only be convicted of a lesser offense (e.g., a crime defined as acting with a mental state of "recklessness" or "negligence"). Thus far, however, it appears that diminished capacity claims have seldom been successful. *See, e.g.*, State v. Coulter, 67 S.W.3d 3, 72-73 (Tenn. Crim. App. 2001) (rejecting diminished capacity defense despite significant evidence of mental impairment). In *State v. Papasavvas*, 751 A.2d 40 (N.J. 2000), for instance, the defendant argued that FLD rendered him incapable of forming the specific intent or purpose to kill. Nonetheless, the Supreme Court of New Jersey found that trial judge's failure to admit evidence of the defendant's FLD did not warrant a reversal of his conviction or death sentence. *Id.* at 90-91.

221. Some defendants may fare better in jurisdictions with a cognitive test for insanity that allows defendants to claim that they did not appreciate the moral wrongfulness of their actions, since FLD can impair moral reasoning. As Professor Price puts it, "bifrontal dysfunction acquired early in life may lead to a specific

we have seen, many defendants[222] suffering from substantial FLD are cognitively intact yet have substantial impairments in impulse control. They understand the difference between right and wrong, but are unable to apply this knowledge to control their behavior. They "know the rules of civilized behavior but [are] unable *to follow them*."[223]

Control tests are needed to ensure that defendants with FLD have the opportunity to prove that they lacked criminal responsibility for the charged offense, a right that is essential in our system of retributive justice. Defendants who have a limited physiological ability to control their criminal behavior should be allowed to present evidence of a lack of culpability based on impaired impulse control. "[T]o exclude volitional impairments violates contemporary conceptualizations about brain-behavior relationships. From a neuropsychological perspective, this *is tantamount to saying that some brain lesions are morally superior to others*."[224]

Revival of control tests for insanity, however, should be accompanied by three doctrinal modifications. First, the qualifying mental disease or defect for an insanity defense[225] under a control test

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subtype of learning disability by selectively interfering with the acquisition (or development) of many complex faculties such as insight, foresight, social judgement, empathy and abstract reasoning." Price et al., *supra* note 125, at 1391. In most cases, however, it would be difficult to show that a defendant's FLD impaired his moral reasoning to the point that he could not differentiate right from wrong, particularly in jurisdictions that construe the moral wrongfulness test as requiring the defendant to have perceived that society generally would have condoned, on moral grounds, the criminal act. *See, e.g.*, State v. Wilson, 700 A.2d 633, 640 (Conn. 1997) (holding that defendant must prove that he or she "substantially misperceived reality and harbored a delusional belief that society, *under the circumstances as the defendant honestly but mistakenly understood them*, would not have morally condemned his actions"); State v. Cole, 755 A.2d 202 (Conn. 2000) (accord); State v. Uyesugi, 60 P.3d 843 (Haw. 2002) (accord).

222. GOLDBERG, *supra* note 149, at 149; *see also id.* at 150 (suggesting the need for "[a] new legal construct of 'inability to guide one's behavior despite the availability of requisite knowledge'").

223. Ely, *supra* note 95, at 9.

224. Hall, *Criminal-Forensic Neuropsychology*, *supra* note 41, at 72 (emphasis added).

225. All legal tests for insanity require, as a predicate to proving insanity, that the defendant prove that he or she suffers from a "mental disease or defect." Thus, a formal diagnosis improves the chances of satisfying this predicate requirement. SEYMOUR L. HALLECK ET AL., THE USE OF PSYCHIATRIC DIAGNOSES IN THE LEGAL PROCESS: REPORT OF THE AMERICAN PSYCHIATRIC ASSOCIATION TASK FORCE ON USE AND MISUSE OF PSYCHIATRIC DIAGNOSES IN THE COURTS 9 (Rev. ed. 1992). In a 1991 case, the defense requested that the jury instructions on insanity be changed to read "mental condition" rather than "mental disease," since the experts could not opine that the defendant's organic personality syndrome was a defined mental disease or illness. State v. Plante, 594 A.2d 1279, 1281-82 (N.H. 1991).

Frontal lobe dysfunction is a recognized syndrome in the World Health Organization's *International Classification of Diseases*. INTERNATIONAL CLASSIFICATION OF DISEASES, F07.0 (10th ed. 2003) ("frontal lobe syndrome"). But frontal lobe syndrome is not yet included in the primary diagnostic guide used by American mental health professionals, the DSM-IV, *see supra* note 5. However, depending on

should be defined as a "*substantial dysfunction of the frontal lobes and/or limbic system due to brain damage or illness*." The requirement that there be a *substantial* dysfunction due to *brain injury or illness* prevents insanity claims based only on "soft" neurological signs of frontal lobe impairment without any evidence of brain damage.[226] (It also prevents claims based on a diagnosis of ADHD, for example, which produces impulsive behavior and may be due to low-grade, diffuse frontal lobe dysfunction.)[227] Sub-clinical FLD absent brain damage or illness should not be exculpatory, and probably could not be so without exculpating a large minority of criminal defendants, given the high prevalence rate of neuropsychological dysfunction in the criminal defendant population.[228] (Frontal lobe functioning, like other aspects of brain functioning, exists along a continuum. Many people may have frontal lobe dysfunction to some degree, and there is room for criminogenic situations to produce criminal behavior in any one of us.) At the same time, an overly narrow description of the qualifying brain disorder should also be avoided,[229] as we must be wary of over-localizing psychological processes to particular brain regions.[230] The brain's emotional circuitry includes a complex interrelationship between the frontal lobes and neuronal projections running to other parts of the brain, particularly the limbic system.[231] Second, to guard against fraudulent insanity claims, states should follow the precedent

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the behavioral manifestation of a defendant's dysfunction, FLD may fit within several DSM diagnoses, including Intermittent Explosive Disorder (§ 312.34, at 663-66) or Dementia Due to Head Trauma (§294.1x, at 164). Or, if due to a brain tumor, FLD may be diagnosed under Axes III (General Medical Conditions Related to Mental Disorders) of the DSM (pp. 29-30), which refers to the diagnostic medical codes under the INTERNATIONAL CLASSIFICATION OF DISEASES.

226. Similarly, to prevent insanity claims based on less serious mental disorders, the revised Federal Test requires that the mental disease or defect be "severe." *See infra* note 285.

227. *See supra* notes 76-79 and accompanying text.

228. *See supra* notes 32-34 and accompanying text.

229. For example, mania due to bipolar disorder would also qualify as the predicate mental disease or defect for an insanity defense based on impaired impulse control. *See* Michael J. Vitacco & Ira K. Packer, *Mania and Insanity: An Analysis of Legal Standards and Recommendations for Clinical Practice*, 4 J. FORENSIC PSYCHOL. PRAC. 83, 88-91 (2004) (discussing how some manic episodes of bipolar disorder could excuse criminal responsibility).

230. WILLIAM R. UTTAL, THE NEW PHRENOLOGY: THE LIMITS OF LOCALIZING COGNITIVE PROCESSES IN THE BRAIN 14-15 (2001) (arguing that it is difficult to link a specific brain area to one specific human action); *see also* Elizabeth A. Phelps, *Brain Versus Behavioral Studies of Cognition*, *in* THE NATURE OF COGNITION 295, 316-19 (Robert J. Sternberg ed., 1999) (discussing limitations of brain localization techniques using neuroimaging).

231. Morgan & Lilienfeld, *supra* note 35, at 130-31. An upper-brain stem injury, for instance, may produce symptoms of FLD when the neuronal projections from the brain stem to the frontal lobes are disrupted. Elkhonon Goldberg et al., *A Reticulo-Frontal Disconnection Syndrome*, 25 CORTEX 687, 690 (1989).

of *Bennett v. Commonwealth*,[232] in which the Virginia Court of Appeals held that "*[e]vidence that an accused planned his or her criminal acts precludes, as a matter of law, any finding that the accused acted under an irresistible impulse.*"[233] Virginia is the only state with such a doctrine, and most states have long allowed insanity defenses under a control test even when there is clear evidence of substantial advanced planning before the offense.[234] Third, because FLD can only be diagnosed through medical and psychological testing, defendants should be required to introduce expert testimony on the presence of brain dysfunction. Currently, not all states with a control test for insanity require expert testimony.[235]

C. Why Control Tests for Insanity are Needed

Writing in 1952, Professor Edwin Keedy observed that "[o]ne of the most controversial questions in the field of Criminal Law is whether an irresistible impulse, produced by mental disease, should be a defense."[236] The controversy continues to this day. Opponents of control tests have offered, and continue to offer, three rationales for their abandonment: (1) that cognitive tests for insanity are sufficient, since those with impaired impulse control will also be cognitively impaired;[237] (2) that mental health professionals are incapable of reliably assessing the capacity for impulse control, particularly in relation to criminal behavior, or of differentiating between a truly irresistible impulse and an impulse that is merely difficult to resist;[238] and, therefore, that control tests lead to erroneous insanity acquittals;[239] and (3) that because "they directly

232. 511 S.E.2d 439 (Va. Ct. App. 1999).

233. *Id.* at 447 (citing Rollins v. Commonwealth, 151 S.E.2d 622, 625 (Va. 1966)) (emphasis added). Planning in this context should mean evidence of "deliberation," and not simply premeditation—i.e., pre-existing intent.

234. Although poor judgment in executing a criminal plan may also reflect FLD, see PINCUS, BASE INSTINCTS, *supra* note 43, at 221, prior planning with respect to the charged offense(s) runs counter to an excuse predicted on impaired impulse control. *See* GOLDSTEIN, *supra* note 35, at 70-75.

235. *See, e.g.*, Commissioner v. Cook, 784 N.E.2d 608, 617 (Mass. 2003) (stating that insanity is a jury question that can be proven through the facts of the case, lay witnesses, or expert witnesses).

236. Keedy, *supra* note 202, at 956.

237. *See infra* notes 248-256 and accompanying text.

238. *See infra* notes 283-298 and accompanying text.

239. *See generally* DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 8-1.2.4 (2d ed. 2003) ("Many in the legal community believed that impulsivity could easily be feigned, and feared that the test would lead to numerous invalid insanity acquittals."); GOLDSTEIN, *supra* note 208, at 77 (citing cases and authorities); REISNER, SLOBOGIN & RAI, *supra* note 15, at 558-60 (discussing various concerns with irresistible impulse test); *see also* United States v.

pose the question of whether a person could control his or her behavior,"[240] control tests run counter to the law's assumption of free will and notion that criminals should be held accountable for their crimes.[241] As I demonstrate below, current neuroscience and clinical research challenges each of these claims.

1. Existing cognitive tests are insufficient

> The principle behind *McNaghten*, namely, that defect of cognition as a consequence of mental disease is the primary exculpating factor in the determination of legal sanity, has probably never been other than a legal fiction.[242]

There is no empirical evidence supporting the contention that cognitive tests for insanity are always sufficient, either because individuals who have impairments in impulse control are also cognitively impaired or because any impairment in control sufficient to justify exculpation necessarily is part and parcel of an impairment in rationality. On the contrary, as discussed in Part I, FLD provides an excellent example of how individuals can be cognitively intact yet have substantial impairments in impulse control. Indeed, "in a substantial number of cases, the difference between the ALI volitional test and the other insanity tests [is] clearly distinguishable to psychiatrists"[243] and thus "the primary logical division between the volitional and cognitive standards appears to be powerful . . . ."[244] A 1991 study that examined 164 insanity evaluations (conducted by four forensic psychiatrists in one jurisdiction) found that seventy percent of defendants met the ALI cognitive test for insanity, whereas ninety-eight percent met the ALI control test. Importantly, twenty-four percent met only the control test.[245] These results must be viewed with considerable caution, however, as their generalizeability may be limited given the small, restricted sample and the lack of independent measures of control or cognitive impairment. A recent large-scale study is more instructive. Professor Janet Warren and colleagues examined 5,175 insanity evaluations conducted over a ten-year period in Virginia, which has both a cognitive and control test in

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Lyons, 731 F.2d 243, 245-46 (5th Cir. 1984) (stating that a control test increases the risk of a defendant fabricating insanity).

240. REISNER, SLOBOGIN & RAI, *supra* note 15, at 558.

241. *See infra* notes 336-343 and accompanying text.

242. Diamond, *supra* note 208, at 189.

243. Robert M. Wettstein, Edward P. Mulvey & Richard Rogers, *A Prospective Comparison of Four Insanity Defense Standards*, 148 AM. J. PSYCHIATRY 21, 24-25 (1991).

244. *Id.* at 26.

245. *Id.* at 24-25.

its insanity standard.[246] Of those evaluations supporting a finding of insanity, both the cognitive and control tests were met in fifty-seven percent of cases, but in nine percent of cases only the control test was met.[247] These two studies reveal that there is a group of criminal defendants who can avail themselves of an insanity defense only when a control test is available. Moreover, in many cases the defendant had impairments in control as well as cognition, but undoubtedly in some cases (e.g. when defendants suffer from substantial FLD) the lack of control claim would be stronger than the cognitive impairment claim.

Some have argued that control tests for insanity are misplaced because the effect of mental disorder on criminal behavior is best understood as a failure of rationality rather than of volitional control, and that irrationality is always at the heart of legitimate insanity–based excuses for criminal behavior. This claim has been advanced by several scholars,[248] particularly in an influential series of articles by Professor Stephen Morse,[249] a leading retributivist, who argues that "[v]irtually all cases of so-called control problems that plausibly raise a substantial question about the agent's responsibility will prove on

246. Janet I. Warren, Daniel C. Murrie, Preeti Chauhan, Park E. Dietz & James Morris, *Opinion Formation in Evaluating Sanity at the Time of the Offense: An Examination of 5175 Pre-Trial Evaluations*, 22 BEHAV. SCI. & L. 171, 172 (2004).

247. *Id.* at 182.

248. *See* R.A. Duff, *Who is Responsible, for What, to Whom?*, 2 OHIO ST. J. CRIM. L. 441, 447-49 (2005) (equating an irresistible impulse to a lack of sound reasoning); MODEL PENAL CODE § 4.01, at 191 (Official Draft & Revised Comments 1985) (statement of Dr. Guttmacher) (stating that individuals laboring under an irresistible impulse "would in all probability be sufficiently out of touch with reality" to satisfy the *McNaghten* test); Stephen J. Morse, *Excusing the Crazy: The Insanity Defense Reconsidered*, 58 S. CAL. L. REV. 777, 783-86 (1985) (discussing similarities between "rationality" and "compulsion" defenses); ROBERT F. SCHOPP, AUTOMATISM, INSANITY AND THE PSYCHOLOGY OF CRIMINAL RESPONSIBILITY 56-63 (1991) (drawing connections among criminal responsibility excuses based on lack of cognition and lack of self-control); *see also* GOLDSTEIN, *supra* note 208, at 75 ("Professor Jerome Hall speaks for those who see the 'control tests' as unnecessary if *M'Naghten* is properly construed. Starting from the premise that the human personality is integrated, he concludes that any case of impaired volition which can satisfy the 'control' rule will also be marked by the failure of knowledge demanded by *M'Naghten*, provided the word 'know' is given a broad construction.").

249. *See generally* Stephen J. Morse, *Culpability and Control*, 142 U. PA. L. REV. 1587 (1994) [hereinafter Morse, *Culpability and Control*]; Stephen J. Morse, *Brain and Blame*, 84 GEO. L.J. 527, 544 (1996) [hereinafter Morse, *Brain and Blame*]; Stephen J. Morse, *Rationality and Responsibility*, 74 S. CAL. L. REV. 251 (2001) [hereinafter Morse, *Responsibility*]; Stephen J. Morse, *From Sikora to Hendricks: Mental Disorder and Criminal Responsibility*, *in* THE EVOLUTION OF MENTAL HEALTH LAW 129 (Lynda E. Frost & Richard J. Bonnie eds., 2001) [hereinafter Morse, *From Sikora to Hendricks*]; Stephen J. Morse, *Uncontrollable Urges and Irrational People*, 88 VA. L. REV. 1025 (2002) [hereinafter Morse, *Uncontrollable Urges*]; Stephen J. Morse, *New Neuroscience, Old Problems*, *in* NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE, 157, 177-81 (Brent Garland ed., 2004) [hereinafter Morse, *New Neuroscience*].

close analysis to be instances of irrationality, especially if the law continues to require that an abnormality is present."[250] Professor Morse explains:

> Many people believe, for example, that a compulsion theory explains the control test for legal insanity. One metaphorical notion is that some abnormal mental or emotional states act like an internal gun to the head, even if these people seem otherwise rational. Consider, for example, the pedophile, whose allegedly abnormal desire for sexual contact with a child may make the temptation feel irresistible, but who is clearly rational . . . .
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> . . . .
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> Impulse control disorders are an established category of mental disorders . . . some of which, such as intermittent explosive disorder, kleptomania, pathological gambling, and pyromania, may produce behavior for which the agent will seek an excuse. Moreover, impulsive behavior is blamed for much criminal conduct and other antisocial behavior . . . . Human beings incontrovertibly can be subject to momentary and apparently capricious passions that leave them feeling subjectively unfree and that seem to compromise their ability to control themselves.[251]

Clearly, Professor Morse is referring here to compulsions, extreme desires, or inner cravings,[252] not the inability to inhibit highly impulsive, reactive episodic behavioral responses due to substantial FLD,[253] a very different kind of impairment. Professor Morse opines, however, on how difficult it is to find a case having "coercive" features, but where the defendant was substantially rational:

> [I]n virtually all cases in which a defendant presents a plausible claim for a pure control excuse, careful analysis demonstrates that the claim collapses into an irrationality claim and should be

250. Morse, *From Sikora to Hendricks*, *supra* note 249, at 162.
251. *Id.* at 136, 153 (internal citations omitted).
252. *See* Morse, *New Neuroscience*, *supra* note 249, at 178-79 (emphasis added).
253. It should be noted that the Automatism Defense, which is predicated on a claim that the offense committed was an involuntary act (i.e., reflexive or unconscious), would not apply in these situations. *See, e.g.*, Deborah Denno, *Crime and Consciousness: Science and Involuntary Acts*, 87 MINN. L. REV. 269, 282-85 (2002-03) (discussing involuntary acts and criminal responsibility); Donald Apostle, *The Unconsciousness Defense as Applied to Post Traumatic Stress Disorder in a Vietnam Veteran*, 8 BULL. AM. ACAD. PSYCHIATRY & L. 426, 430 (1980) (arguing that the automatism defense should apply to some actions of Vietnam veterans suffering from post-traumatic stress disorder). Typically, the FLD defendant did not lack conscious control of his or her bodily movements that produced the physical act constituting the offense.

> adjudicated on that basis. In sum, fair criminal law does not require a control or volitional test for excuse.[254]

Yet, as we have seen, neuroscience research and clinical case examples demonstrate the reality of rationality in the absence of behavioral control in some individuals who suffer from substantial frontal lobe dysfunction.[255] As Professors Donald Stuss and Frank Benson put it, FLD produces "a curious dissociation between knowing and doing."[256]

a. The possibility of more expansive cognitive tests

In his recent essay *Brain and Blame*, Professor Morse again claims, and specifically with respect to defendants who suffer from FLD, that "[t]he real question is whether this impairment undermines rationality sufficiently to excuse the agent."[257]

Yet, although Professor Morse insists that criminal responsibility depends upon the "reasons for action,"[258] he at times suggests an expansive application of "the rationality requirement"[259] that may encompass some of the more extreme forms of FLD, by incorporating a cognitive test that exculpates for a lack of moral understanding. (Such an approach, however, may be incongruent with the "moral wrongfulness" tests found in existing cognitive standards for insanity, which some jurisdictions construe as requiring

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254. Stephen J. Morse, *Diminished Rationality, Diminished Responsibility*, 1 OHIO ST. J. CRIM. L. 289, 295 (2003).

255. *See supra* notes 53-157 and accompanying text.

256. Stuss & Benson, *supra* note 104, at 18.

257. Morse, *Brain and Blame*, *supra* note 249, at 542.

> Whatever the causes of human action may be, they will ultimately be expressed through reasons for action, which are the true objects of responsibility analysis. Suppose, for example, that a confirmed lesion, such as a tumor, is a but-for cause of behavior. . . . Make the further, strong assumption that once the tumor is removed, the probability that this agent will reoffend drops to zero. Although one's strong intuition may be that this agent is not responsible for the undesirable behavior, the given assumptions do not entail the conclusion that the agent should be excused. The undesirable behavior is human action, not a literally irresistible mechanism . . . .
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> . . . .
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> Suppose, for example, that the tumor . . . makes the agent irritable or emotionally labile. . . . [T]hese people would not be excused if they offended while in an uncharacteristic emotional state, unless that state sufficiently deprived them of rationality.

Id. at 535-36. As I argue below, however, though one *could* characterize the impulsive and more or less automatic behavioral responding of frontally-damaged individuals as a failure of rationality, not only is such a characterization a stretch, but it fails to fit within the framework of existing cognitive tests for insanity.

258. *Id.* at 536.

259. *See* Morse, *Culpability and Control*, *supra* note 249, at 1635 (suggesting that a rationality standard could excuse psychopaths).

a delusional belief by the defendant that *society* would have condoned, on moral grounds, his or her criminal act.)[260] In suggesting, for example, that the psychopath may be excused under cognitive (or "rationality") tests for insanity, Professor Morse wonders "whether the law should adopt a standard of rationality that is 'thin' . . . or, . . . a standard that is 'thick,' requiring moral content in addition."[261] "Viewed thusly, the psychopath seems 'morally insane,' unable successfully to reason practically about moral issues."[262]

In a similar vein, one *could* characterize the impulsive and more or less automatic behavioral responding of frontally-damaged defendants as reflecting a failure of rationality, since the "rational" part of the brain (the frontal lobes) was unable to engage in considered reflection and exert executive inhibitory control over the primitive, emotional brain (the amygdala and limbic system). As Professor Morse puts it, "if the terror of the choice set renders the agent 'unable to think,' such that no choice is possible, this is a rationality defect."[263] Yet such a characterization seems forced, conflating the meanings of "impulse"[264] and "rationality."[265] Under

260. *See supra* note 221.
261. Morse, *Culpability and Control*, *supra* note 249, at 1636.
262. *Id.*
263. *Id.* at 1604.
264. The Oxford English Dictionary defines an impulse as "mental incitement . . . a sudden desire or tendency *to act without reflection*." THE OXFORD ENGLISH REFERENCE DICTIONARY 710-11 (Judy Pearsall & Bill Trumble eds., 2d ed. 1996) (1995) (emphasis added). *See, e.g.*, Rollins v. Commonwealth, 151 S.E.2d 622, 625 (Va. 1966) ("The word 'impulse' implies that which is sudden, spontaneous, unpremeditated.").
As one commentator points out:

> "Impulsivity" has not been comprehensively, clearly, or even consistently defined. Most definitions, however, contrast impulsive behavior to planned behavior: "We may define the term impulse for our purposes as the generally unpremeditated welling-up of a drive toward some action that usually has the qualities of hastiness, lack of deliberation, and impetuosity."
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> A review of WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY (1976) indicates that in common usage, in order to be called "impulsive" a person may manifest one of three quite different characteristics:
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> 1. Acting momentarily, and in a way that is inconsistent with the prevailing behavior (i.e., manifesting behavior that can be described as whimsical, capricious, and even unpredictable); in this instance, behavior seems to represent a brief pulse or surge of energy, rather than a steady, consistent drive.
> 2. Generally acting, or being prone to act, with little apparent intellectual consideration of the appropriateness or consequences of so acting (i.e., manifesting behavior that could be described as spontaneous, impetuous, or rash).
> 3. Generally acting, or being prone to act, as if driven or compelled to act in a particular kind of way (i.e., manifesting behavior that appears to be more reflexive than volitional, and manifesting what might be called an "irresistible impulse").

Professor Morse's approach, impulsive behavior is a subset of irrational behavior, and all that is needed to account for control problems is an expanded cognitive test for insanity. "What is primarily required is simply a thick description of the agent's cognitive, emotional, and behavioral functioning, and ultimately, of the agent's reasons for action."[266] But, as Professor Christopher Slobogin asks, "[w]hy is irrationality . . . singled out? What is it about irrationality that makes it the excusing condition? The proponents of the Rationality Test do not give a sufficient answer to this question."[267]

According to Morse, an expanded cognitive test would be more parsimonious and workable than a separate control test, because jurors have a better grasp of what is meant by irrationality than they do lack of control.[268] He asserts that the law's concern must be the defendant's ability to exercise practical reason, not his or her ability to exercise physiological control over his or her actions (unless there is a claim of involuntary action):

> No logical or legal reason prevents a court from understanding and interpreting "control" problems as rationality defects. . . . Brief reflection on the concept of the person that law and morality employ and on the nature of law and morality suggests that the capacity for rationality must be the central condition of responsibility. What distinguishes human beings from the rest of the natural world is that we are endowed with the capacity for reason, the capacity to use moral and instrumental reasons to guide our conduct. . . . Law and morality consistently use the lack of capacity for reason as the central non-responsibility criterion. It is a thoroughly familiar standard that is applicable in a wide variety of legal, moral, and everyday contexts.[269]

> The professional literature reflects three basic assumptions about the nature of impulsivity: An impulsive response is rapid, undesirable, and/or error-prone; it is likely to occur in the presence of appealing stimuli; and/or it is likely to occur in the absence of strong cognitive control.

E. Michael Coles, *Impulsivity in Major Mental Disorders*, *in* IMPULSIVITY: THEORY, ASSESSMENT, AND TREATMENT 180, 183 (Christopher D. Webster & Margaret A. Jackson eds. 1997) (internal citations omitted).

265. *See* THE OXFORD ENGLISH REFERENCE DICTIONARY, *supra* note 264, at 1198, 1203 (defining "rationality" and "reason"). Irrationality is not the absence of considered judgment, but rather, it is judgment predicated on illogical or demonstrably false motives, beliefs, or causal reasoning.

266. Morse, *Uncontrollable Urges*, *supra* note 249, at 1075.

267. CHRISTOPHER SLOBOGIN, MINDING JUSTICE: LAWS THAT DEPRIVE PEOPLE WITH MENTAL DISABILITY OF LIFE AND LIBERTY 46 (2006) [hereinafter SLOBOGIN, MINDING JUSTICE].

268. Morse, *Uncontrollable Urges*, *supra* note 249, at 1064-74.

269. *Id.* at 1064-67.

Morse says that "if one examines closely most cases of alleged 'loss of control,' they essentially raise claims that, for some reason, the agent could not 'think straight' or bring reason to bear under the circumstances."[270] But whether the frontal-lobe deficit is characterized as a rationality defect due to the "inability to think straight" or a control defect, the forensic mental health evidence used to support the insanity claim would likely be the same. The claim would be that FLD affects practical reason by removing the opportunity for meaningful practical reason to occur.

Perhaps in some ways, then, we are merely left with a semantic argument over whether the problem is labeled one of irrationality or lack of control. But the difficulty—and perhaps this is what Morse aims to achieve—lies in the fact that the irrationality characterization would likely result in fewer successful insanity claims, due to "the slight of hand by which we are persuaded first that all exculpatory psychological conditions . . . are defects of rationality, and then . . . are not to be excused because they do not suffer either from a defect of perception or a defect of inference."[271] In other words, most people (including jurors) distinguish between impulsivity and irrationality—the former being acting without thinking, the latter being acting from wrongheaded thinking.

Thus I, along with some other scholars,[272] disagree with Morse that rationality provides a more readily understood umbrella concept for impulse control problems. As Professor Michael Corrado observes, "[t]he notion that some people cannot control their behavior . . . is a notion with a foundation in common sense . . . [i]t will not easily be put down."[273] Under Morse's formulation, all deficits:

> [A]re crammed into the category of irrationality; yet rarely are we told precisely what rationality or irrationality is for the purposes of the law. Every condition that undermines responsibility is said to be a rationality defect; and then the category of rationality is so loosely defined that every troublesome case can be coerced into it. . . . The problem is that when we go looking for the cognitive defect we find none, and end up with Morse classifying most of these offenders as responsible for their behavior.[274]

270. *Id.* at 1065.
271. Michael Louis Corrado, *Responsibility and Control*, 34 HOFSTRA L. REV. 59, 84 (2005).
272. *See id.* (arguing that compulsions and addictions are properly understood in terms of control deficits).
273. *Id.* at 76.
274. *Id.* at 84, 89.

Except in cases involving extreme FLD or significant frontal lobe damage occurring early in life,[275] frontally-damaged individuals typically do not lack an *understanding* of moral or legal wrongfulness (at least not to the degree that would be exculpatory), they lack the ability to exercise *behavioral control*, and thus would not meet a *McNaghten*-type cognitive test for insanity. It is true that if we were to adopt an expansive definition of rationality, then FLD evidence for lack of control may loosely fit under the "*appreciation* standard" that many states have incorporated into their cognitive tests for insanity[276] (similar to that included in the ALI-MPC as well as the Federal Test, which asks whether the defendant "was unable to appreciate the nature and quality or the wrongfulness of his acts").[277] It could be said that FLD defendants fail to "appreciate" the wrongfulness of their actions because their control mechanisms failed—i.e., the frontal lobes failed to exercise inhibitory control over the impulsive, emotional response generated by the amygdala, thus disallowing the defendant the opportunity to rationally appreciate the circumstances he or she faced. The incorporation of an appreciation standard would not be the functional equivalent of a control test, however.[278] As Professor Corrado points out, those who conceptualize control problems as rationality defects usually end up concluding that the offender is criminally responsible.[279] It is likely that juries would do the same, given common meanings of "understanding" and "appreciation."

Professor Morse does not proffer a compelling philosophical rationale for privileging rationality over control in insanity jurisprudence, particularly in view of the empirical and clinical evidence demonstrating the reality of rationality in the absence of behavioral control, as those terms are most commonly understood. At bottom, Professor Morse's case against control tests appear to be based on what are, no doubt, compelling practical concerns: (1) that the assessment of impulse control is too speculative,[280] (2) that truly

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275. *See supra* notes 150-155 and accompanying text.

276. *See* State v. Wilson, 700 A.2d 633, 638-39 (1997) (explaining the appreciation standard as derived from the Model Penal Code). *See generally* SLOBOGIN, MINDING JUSTICE, *supra* note 267, at 42-46 (discussing application of the appreciation test).

277. 18 U.S.C.A. § 17 (2000).

278. *See generally* SLOBOGIN, MINDING JUSTICE, *supra* note 267, at 42-46.

279. Corrado, *supra* note 271, at 89.

280. *See, e.g.*, Morse, *Brain and Blame*, *supra* note 249, at 546-47:

> The impressive theorizing and extensive medical and psychological findings . . . are unlikely to provide precise data concerning the level of [the defendant's frontal lobe] impairment in the capacity for rational conduct. There is no quantitative scale with which to compare him to normal or

compelled or irresistible impulses cannot be distinguished from those merely difficult to resist,[281] and, (3) that clinicians lack the ability to link a defendant's brain dysfunction to the type and degree of behavioral dyscontrol he or she exhibited when committing the charged offense.[282] These concerns, shared by other critics of control tests, are addressed in the next Section.

2. Impulse control disorders exist and can be assessed

In large measure, the waning of control tests was fueled by longstanding skepticism over the very existence of irresistible impulses and the ability of mental health professionals to assess impulse control,[283] and the attendant belief that control tests lead to erroneous insanity acquittals. The reform of the Federal Test for insanity is instructive. In 1984, Congress enacted the first federal

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> abnormal populations. All we know is that there is some defect of indeterminate real-world effect. Although the uncharacteristic homicidal behavior was not inconsistent with the defect, we cannot even be sure that the defect played a causal role in the conduct. Opinions that it did or did not are both speculations, not confirmed scientific or clinical fact.

281. *See, e.g.*, Morse, *Culpability and Control*, *supra* note 249, at 1601 (stating that "it is impossible to differentiate 'irresistible' impulses from those simply not resisted," and defining impulsivity as "a disposition or tendency to act with less forethought, or steeper time discounting, than most people of similar ability and knowledge").

282. Professor Morse correctly points out that "it is a mistake to assume that specific brain pathology inevitably produces highly specific, complex intentional action. . . . [T]here is no region or site in the frontal lobes or anywhere else in the brain that controls specific, complex intentional actions." Morse, *Brain and Blame*, *supra* note 249, at 535. But this does not serve as an indictment of control tests, as there likewise is no specific area of the brain responsible for "rationality" or the delusions and hallucinations of "irrationality."

283. Morse, *From Sikora to Hendricks*, *supra* note 249, at 161 ("We cannot distinguish between irresistible impulses and those impulses simply not resisted."); MODEL PENAL CODE § 4.01, app. A (Official Draft and Revised Comments 1962) (Statement of Dr. Guttmacher) ("The problem is not primarily whether there are impulses and unconscious drives that overwhelm some mentally disordered individuals . . . . The real difficulty is to draw the nice line between those who can and who can not resist them."); Keedy, *supra* note 202, at 987-88 (citing cases and authorities); *see, e.g.*, Cunningham v. State, 56 Miss. 269, 279 (1879) ("The possibility of the existence of such a mental condition is too doubtful."); State v. Harrison, 15 S.E. 982, 990 (W. Va. 1892) (Brannon, J.) ("I cannot see how a person who rationally comprehends the nature and quality of an act, and knows that it is wrong and criminal, can act through irresistible innocent impulse."); People v. Hubert, 51 P. 329, 331 (Cal. 1897) ("We do not know that the impulse was irresistible, but only that it was not resisted."); Flanagan v. People, 52 N.Y. 467, 470 (N.Y. 1873) ("The vagueness and uncertainty of the inquiry [make the irresistible impulse test unworkable]."); Lady Barbara Wooten, *The Insanity Defense. By Abraham S. Goldstein*, 77 YALE L.J. 1019, 1026 (1968) (book review):

> [A] volitional test raises practical difficulties far more formidable even than those involved in a purely cognitive formula. . . . [I]f I assert that I have an uncontrollable impulse to break shop windows, in the nature of the case no proof of uncontrollability can be adduced. All that is known is that the impulse was not in fact controlled; and it is perfectly legitimate to hold the opinion that, had I tried a little harder, I might have conquered it.

insanity statute, the Insanity Defense Reform Act of 1984 ("the Act"). The Act was passed by Congress in the wake of John Hinckley's acquittal, under the American Law Institute–Model Penal Code standard then in place in the federal courts, for the shooting of President Reagan.[284] The Act eliminated the control prong from the Federal Test,[285] leaving in place only a cognitive "appreciation" test.

> [T]his had the ultimate effect of returning to a test that compelled the law to "do its punitive worst," that had "the rigidity of an army cot and the flexibility of a Procrustean bed," that retained the flavor "of the celebrated concepts of Hale and Coke of the 17th century," and that was, simply, "bad psychiatry and bad law."[286]

However, both the American Psychiatric Association[287] and the American Bar Association[288] supported the change, asserting that impulse control cannot be reliably assessed and that the concept

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284. *See* RICHARD J. BONNIE ET AL., A CASE STUDY IN THE INSANITY DEFENSE: THE TRIAL OF JOHN W. HINCKLEY, JR. 121-27 (2d ed. 2000) (discussing questions raised by the Model Penal Code test and public discomfort with Hinckley's acquittal); *see also* Lisa Callahan et al., *Insanity Defense Reform in the United States-Post-Hinckley*, 11 MENTAL & PHYSICAL DISABILITY L. REP. 54, 55 (1987) (surveying insanity reform efforts after the *Hinckley* case). It was reported that John Hinckley's jury was persuaded to render an insanity verdict due, in part, to the CT scan of Hinckley's brain, which the defense used to support its claim that Hinckley suffered from schizophrenia. *See* Kulynych, *Neuroimages as Scientific Evidence*, *supra* note 72, at 235-36.

285. The Federal Test for insanity provides:

> It is an affirmative defense to a prosecution under any Federal statute that, at the time of the commission of the acts constituting the offense, the defendant, as a result of a severe mental disease or defect, was unable to appreciate the nature and quality or the wrongfulness of his acts.

18 U.S.C.A. § 17 (2000); United States v. Cameron, 907 F.2d 1051, 1061 (11th Cir. 1990). The Act also required the defendant to establish insanity by clear and convincing evidence, recognized a special verdict of "not guilty by reason of insanity," and created a comprehensive civil commitment procedure. *See* 18 U.S.C.A. § 17 (2000).

286. Michael L. Perlin, "*The Borderline Which Separated You From Me": The Insanity Defense, the Authoritarian Spirit, the Fear of Faking, and the Culture of Punishment*, 82 IOWA L. REV. 1375, 1382 (1997) (quoting Jodie English, *The Light Between Twilight and Dusk: Federal Criminal Law and the Volitional Insanity Defense*, 40 HASTINGS L.J. 1, 47 (1988)).

287. *See* INSANITY DEFENSE WORK GROUP, *American Psychiatric Association Statement on the Insanity Defense*, 140 AM. J. PSYCHIATRY 681, 685 (1983) asserting:

> [P]sychiatric information relevant to determining whether a defendant understood the nature of his act, and whether he appreciated its wrongfulness, is more reliable and has a stronger scientific basis than, for example, does psychiatric information relevant to whether a defendant was able to control his behavior. The line between an irresistible impulse and an impulse not resisted is probably no sharper than that between twilight and dusk.

288. The insanity defense standard in the 1989 ABA CRIMINAL JUSTICE MENTAL HEALTH STANDARDS included only a cognitive, and not a volitional, test. *See* Standard 7-6.1 (1989) (Insanity) ("Experience confirms that there is still no accurate scientific basis for measuring one's capacity for self control or for calibrating the impairment of such capacity.").

lacked a scientifically sound basis, *though neither organization presented any empirical data to support these claims.*[289]

Professor Richard Bonnie, of the University of Virginia School of Law, a key witness in the congressional hearings, argued that the irresistible impulse test should be eliminated from the Federal Test because "there is *no scientific basis for measuring a person's capacity for self control or for calibrating the impairment of that capacity. There is, in short, no objective basis for distinguishing between . . . the impulse that was irresistible and the impulse not resisted*"[290] and no moral basis for excusing those with impaired control:

> Are there clinically identifiable cases involving defendants whose behavior controls were so pathologically impaired that they ought to be acquitted although their ability to appreciate the wrongfulness of their actions was [un]impaired? I do not think so. The most clinically compelling cases of volitional impairment involve the so-called impulse disorders—pyromania, kleptomania, and the like. These disorders involve severely abnormal compulsions that ought to be taken into account in sentencing, but the exculpation of pyromaniacs would be out of touch with commonly shared moral intuitions.[291]

Thus, Congress was persuaded that it was impossible to reliably establish whether a defendant could control his impulses, and that "moral mistakes would result from juror speculation regarding the defendant's capacity for self control."[292] Indeed, in examining the legislative history of the Act, the U.S. Court of Appeals for the Eleventh Circuit concluded that "[a] primary reason that the definition of insanity was altered by the Insanity Reform Act is that psychiatrists themselves are unable to agree upon the meaning of 'an irresistible impulse.'"[293]

Doubts about the conceptual validity of irresistible impulses long preceded the debate in the U.S. Congress, however. In 1886, the Supreme Court of South Carolina opined that "the difficulty would be great, if not insuperable, of establishing by satisfactory proof

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289. Richard Rogers, *APA's Position on the Insanity Defense*, 42 AM. PSYCHOL. 840, 840-41 (1987). The American Psychological Association, however, did not support the abolition of the volitional prong but instead urged that empirical research be conducted on the usefulness of the construct and its susceptibility to measurement. *Id.* at 841.

290. *See* Richard J. Bonnie, *The Moral Basis of the Insanity Defense*, 69 A.B.A. J. 194, 196 (1983) (emphasis added).

291. *Id.* at 196-97.

292. *Id.* at 196.

293. United States v. Freeman, 804 F.2d 1574, 1576 (11th Cir. 1986).

whether an impulse was or was not 'uncontrollable.'"[294] A survey of psychiatrists in 1952 found that while most believed that some offenders were incapable of controlling their impulses, they also believed that the legal concept of an "irresistible impulse" was unsound and unworkable.[295] The Supreme Court of Nevada rejected a control test in 1957, concluding:

> Among the psychiatrists themselves there is much doubt as to the validity of the concept of irresistible impulse in the sense of a loss of volitional control through mental disorder which does not necessarily affect the intellectual powers of the defendant. . . . Further, there is doubt among the psychiatrists as to their ability to distinguish between those cases where lack of volitional control is properly attributable to mental illness and those where it is due simply to a failure to resist that which could have been resisted had the power to resist been exercised.[296]

These claims were made before much of the recent neuroscience research on frontal lobe dysfunction. Through advances in forensic neuropsychological assessment and neuroimaging, the ability of mental health professionals to assess FLD and its impact on impulse control is now sufficiently established to merit the introduction of such evidence in support of an insanity defense under a control test.

Consider, however, Professor Slobogin's contention that:[297]

> [D]istinguishing between the irresistible impulse and the impulse that is not resisted is difficult, if not impossible. Considerable research on impulsivity has taken place in recent years. . . . Compulsion is not susceptible to measurement. If we nonetheless

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294. State v. Bundy, 24 S.C. 439, 445 (1886); *see also* Keedy, *supra* note 202, at 987 n.196 (citing People v. Coleman, 1 N.Y. Crim. R.1, 3 (1881); State v. Levelle, 13 S.E. 319, 321 (1890)).

295. Keedy, *supra* note 202, at 989.

296. Sollars v. State, 316 P.2d 917, 920 (Nev. 1957) (citing studies finding that psychiatrists were divided on the soundness of the irresistible impulse concept); *see also* Finger v. State, 27 P.3d 66, 76 (Nev. 2001) (holding that *Sollars* still applies).

297. Professor Slobogin has proposed an "integrationist" (or mens rea) approach that abolishes the insanity defense and makes evidence of mental illness relevant to determinations of the defendant's mens rea and beliefs about self-defense, coercion, or duress, thus limiting mentally-ill defendants to the same defenses available to other defendants. *See generally* Christopher Slobogin, *An End to Insanity: Recasting the Role of Mental Disability in Criminal Cases*, 86 VA. L. REV. 1199 (2000). As Professor Slobogin points out, this scheme would exclude defenses based on impaired impulse control. Christopher Slobogin, *The Integrationist Alternative to the Insanity Defense: Reflections on the Exculpatory Scope of Mental Illness in the Wake of the Andrea Yates Trial*, 30 AM. J. CRIM. L. 315, 322-39 (2003) [hereinafter Slobogin, *Integrationist Alternative*]. Kansas recently abolished the insanity defense in favor of a mens rea approach. *See* State v. Bethel, 66 P.3d 840 (Kan. 2003). *See generally* Jenny Williams, Note, *Reduction in the Protection for Mentally Ill Criminal Defendants: Kansas Upholds the Replacement of the* M'Naughten *Approach with the Mens Rea Approach, Effectively Eliminating the Insanity Defense*, 44 WASHBURN L.J. 213 (2004).

> engage in guessing about volitional impairment, and conclude, for instance, that some psychotic individuals are so compelled that they should be excused, then we probably have to excuse pedophiles and many other garden-variety criminals as well, because they also claim to experience very strong urges.[298]

Again, as with those advanced by Professors Morse and Bonnie, these arguments are not germane to the type of control impairment characteristic of FLD.

It is true, however, that many crimes are committed impulsively and that many criminal defendants are impulsive actors. What, then, distinguishes the frontally-damaged defendant from others whose psychological makeup makes conforming to the law difficult? *Substantial frontal lobe dysfunction represents a neurologically-based (and typically episodic) inability to exert behavioral control, and not merely extreme urges or desires, or the (relatively stable) personality trait of impulsivity that is present in a sizeable percentage of the non brain-injured general population.* To be sure, desires, compulsions, and the personality trait of impulsivity also are the product of brain physiology, perhaps partly in the frontal lobes. However, unlike substantial FLD,[299] they typically do not produce highly impulsive response behaviors that occur without a meaningful opportunity for considered reflection.[300] For example, while there is growing scientific evidence about the "disease" aspects of pedophilia, drug addiction, and kleptomania,[301] these disorders do not preclude the individual from entertaining reasoned considerations of moral choices.[302] The impulsivity

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298. Slobogin, *Integrationist Alternative*, *supra* note 297, at 322-23. Slobogin argues that:

> [G]auging the strength of criminal desires, or the weakness of the will to resist them, is a scientific impossibility at this point. Despite repeated attempts to develop instruments that measure impulsivity, there is no generally accepted, or even partially accepted, formulation of the construct. . . . [I]nstruments for assessing volitional impairment are in a very primitive state.

Christopher Slobogin, *A Jurisprudence of Dangerousness*, 98 NW. U. L. REV. 1, 38 (2003-04).

299. *See supra* note 228 and accompanying text (arguing that sub-clinical, low-grade frontal lobe dysfunction should not be exculpatory).

300. *See infra* notes 232-34 and accompanying text (proposing that evidence that the defendant planned his or her criminal acts should preclude a finding of insanity based on a control test).

301. *See, e.g.*, Alan I. Leshner, *Addiction is a Brain Disease—and it Matters*, NAT'L INST. JUST. J. 2, 4 (Oct. 1998); Alan I. Leshner, *Science-Based Views of Drug Addiction and its Treatment*, 282 J. AM. MED. ASS'N 1314-15 (1999).

302. Moreover, unlike many who suffer from FLD, those who suffer from addictive or compulsive disorders usually are aware of their problem. Thus, it could be argued that they have the responsibility to seek treatment or take reasonable steps to prevent or reduce the behavior. Although such behaviors may not be the product of free will

accompanying frontal lobe dysfunction is distinct from a disorder such as pathological gambling. There is little opportunity for reasoned choice when the frontally-damaged individual responds reactively and impulsively when confronted with an emotionally provocative situation, whereas the gambler has the time and freedom to ponder whether or not to drive to the casino.

Furthermore,

> [T]he practical difficulty of requiring the criminal justice system to distinguish between offenders who lack the capacity to control their actions and offenders who merely refrain from using their ability to control their actions is not insurmountable. . . . [T]he legal system already imposes this line-drawing burden in innumerable other contexts.[303]

"Whether the issue is 'control' or 'knowledge' or 'intent' or 'negligence,' it will be impossible to draw absolute lines."[304] One distinction that can be made, of course, between these common legal inquiries and control inquiries is that the former focuses on conscious thought whereas control tests focus on the capacity to control actions. All, however, are brain-based phenomena that cannot be measured directly, requiring strong inferences by the finder of fact. In Professor Morse's view, it is problematic that "there is no consensus about the conceptual meaning, the definition, or the measurement [of impulsivity]."[305] Yet Morse also concedes that there is "[n]o consensual, technical definition of the capacity for rationality"[306] (though he would rely on jurors' common-sense understanding of rationality to make judgments about responsibility). Several older studies—with the waning of control tests, newer studies have not been conducted—suggest that clinicians can assess control impairments as reliably as cognitive impairments (though the studies must be viewed cautiously because of their small and limited samples and their lack of independent measures of control or rationality). These studies found that clinicians' assessments of cognitive and volitional impairment had the same level of reliability (.75 to .80) and concordance (eight-eight percent) with the ultimate legal outcome.[307] In addition, psychiatrists had somewhat greater confidence in their evaluations of control than in their evaluations of cognitive

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in the scientific sense, they still may warrant criminal sanction if the sanctions serve as meaningful deterrents. *See infra* notes 347-48 and accompanying text.

303. Reider, *supra* note 219, at 308-09 (citing commentators).
304. GOLDSTEIN, *supra* note 208, at 77-78.
305. Morse, *Uncontrollable Urges*, *supra* note 249, at 1060.
306. *Id.* at 1067.
307. *See* Rogers, *supra* note 289, at 842 (citing unpublished studies).

understanding,[308] and clinicians gave almost twenty-four percent fewer insanity recommendations when relying on the control prong rather than the cognitive prong of the Model Penal Code Test for insanity.[309]

To be sure, even with recent advances in neuroimaging and neuropsychological testing, the assessment of control is not an easy task.[310] Yet, the availability of control tests should not turn on how satisfactorily we can measure control. If lack of control is a reality for some defendants, such that they should not be held responsible for their conduct, then it is unjust to deny them an insanity defense only because mental health professionals have difficulty in measuring and quantifying control. As the *Parsons* court noted in 1887, the difficulty in assessing impulse control is not a reason to reject control tests:

> It is no satisfactory objection to say that the rule above announced by us is of difficult application. The rule in *McNaghten's case* . . . is equally obnoxious to a like criticism. The difficulty does not lie in the rule, but is inherent in the subject of insanity itself.[311]

Perhaps the scalar quality of impulse control, as compared to the more dichotomous quality of rationality impairments (e.g., a psychotic delusion is present or it is not), is what many find troublesome about control tests. As Morse puts it, we do not know "whether failure to resist is 'controllable' . . . [or] how many 'desire units' are necessary mechanically to flip the 'action switch'."[312] (Generally speaking, we seem to have difficulty in making scalar, as opposed to binary, moral judgments.)[313]

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308. *See* Wettstein, Mulvey & Rogers, *supra* note 243, at 24.

309. *See* Richard Rogers, *Assessment of Criminal Responsibility: Empirical Advances and Unanswered Questions*, J. PSYCHIATRY & L. 73, 75, 79 (1987).

310. There are only a few measures available for assessing impulse control. *See* Eric Hollander et al., *Conceptualizing and Assessing Impulse-Control Disorders*, *in* CLINICAL MANUAL OF IMPULSE-CONTROL DISORDERS 13-15 (Eric Hollander & Dan J. Stein eds., 2006) (summarizing impulse-control measures and characterizing their availability as "limited").

311. Parsons v. State, 2 So. 854, 864-65 (Ala. 1887). *See also* Keedy, *supra* note 202, at 990.

> Insanity in all its forms is frequently difficult to determine with certainty, and yet courts all recognize that, if an accused does not know right from wrong and does not know the nature of quality of the act charged he should not be punished. Some physical diseases are difficult to prove, yet it is not likely that a court would refuse to receive evidence, otherwise admissible, of the existence of any of these diseases merely because of the difficulty of proof.

Id. (quoting State v. Green, 6 P.2d 177, 185 (Utah 1931)) (citation omitted).

312. Morse, *Uncontrollable Urges*, *supra* note 249, at 1061.

313. *Cf.* Larry Alexander, Scalar Properties, Binary Judgments, presented at the University of San Diego School of Law (2006) (arguing that "in the moral realm, our deontic judgments are usually [always?] binary. . . . Yet the determination of an act's deontic status frequently turns on the existence of properties that are matters of degree," and asking "[w]hy aren't our moral judgments of acts scalar in the way that

Thus, in theory, the assessment of cognitive impairment (typically due to psychosis) is more clear-cut than the scalar assessment of control. In practice, however, determining whether a defendant's delusions or hallucinations were directly responsible for the criminal conduct, and whether they distorted the defendant's perceptions of legal or moral wrongfulness to the degree that he or she should not be held criminally responsible, also poses significant line-drawing problems. Distinguishing between the irresistible impulse and the impulse not resisted may be no more nebulous an inquiry than determining whether an irrational perception made it impossible (versus merely difficult) for the defendant to grasp the wrongness of their actions.[314] As Professor Slobogin explains, "just as the existence of a disorder cannot tell us how hard it is to *do* what is right, the existence or nonexistence of irrationality usually cannot tell us how hard it is to *perceive* what is right."[315] Merely because a defendant is delusional (and, thus, irrational) does not necessarily mean that the criminal act was also wholly the product of irrationality, for "psychosis may enhance and enact the drama already present, and the drama is not necessarily an innocent one."[316]

Indeed, even when psychiatrists first began to question the feasibility of assessing control, they voiced similar concerns about the assessment of rationality. The 1985 Comments on the Model Penal Code note "the inability of the psychiatrist to determine the existence or the nonexistence of the individual's capacity to distinguish right from wrong at the time of the crime."[317] Although Professor Morse allows that "[c]ases of impulse disorders and related diagnoses may be exceptions" to the rule that irrationality is the touchstone of virtually all legitimate insanity defenses, he nonetheless argues that even these disorders "are probably best characterized as cases of irrational desires."[318] Yet, the move to characterize control

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the properties on which those judgments are based are scalar, so that acts, like states of affairs, can be morally better or worse rather than right or wrong?").

314. SLOBOGIN, MINDING JUSTICE, *supra* note 267, at 47-51 (providing examples of cases where both kinds of line-drawing prove difficult).

315. *Id.* at 51.

316. *Id.* (quoting DREW ROSS, LOOKING INTO THE EYES OF A KILLER: A PSYCHIATRIST'S JOURNEY THROUGH THE MURDERER'S WORLD 87 (1998)).

317. MODEL PENAL CODE § 4.01, app. A (Official Draft and Revised Comments 1962) (Statement of Dr. Guttmacher). This comment, provided by Dr. Guttmacher, was based on his surveys of psychiatrists. *See* Deborah W. Denno, *Criminal Law in a Post-Freudian World*, 2005 U. ILL. L. REV. 601, 626-27 (2005).

318. Morse, *Culpability and Control*, *supra* note 249, at 1626 n.111.

impairments as rationality defects does nothing to solve the measurement problem.[319]

In any case, the assessment of impulse control is conducted using the same principles of forensic assessment that are used when assessing cognitive impairment.[320] The clinician diagnoses (through neuropsychological testing and possibly also neuroimaging) the predicate mental disease or defect (FLD), and evaluates the defendant's account of the offense and the behavioral evidence surrounding it (along with the defendant's past behavior), to infer whether the offense was committed impulsively and the role the defendant's FLD likely played in its commission. This is no different than the assessment of cognitive impairment: the forensic mental health professional makes a diagnosis (typically of a psychotic condition involving delusions or hallucinations), and then evaluates the defendant's behaviors and account of the offense to reach a determination as to whether those delusions or hallucinations likely affected the defendant's reasoning at the time of the offense. Rarely can we be certain that the offense was impulse rather than premeditated, or that it was the defendant's FLD that caused him or her to react impulsively in a particular instance, though a convergence of test results along with relevant behavioral evidence might permit a reasonable inference. It is equally true, however, that

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319. It is difficult to discern whether Professor Morse is arguing that it is only compulsive behaviors that are reducible to questions of rationality, or whether he believes that truly irresistible impulses exist, and, if so, whether they also are best characterized as a failure of rationality rather than control. Morse most frequently uses the terms "coercive," "compelled," or "compulsions" when arguing against control tests. *See, e.g.*, *id.* at 1619-37. At other times, however, he argues against control tests in the context of brain tumors, frontal lobe dysfunction, and other disorders that produce similar impulsive behavior. *See, e.g.*, Morse, *Brain and Blame, supra* note 249, at 537-48 (arguing against the volitional impairment perspective in the case of "Spyder Cystkopf," a murderer with a sub-arachnoid cyst and probably impaired frontal lobe functioning). Citing Intermittent Explosive Disorder as one example, Professor Morse argues that:

> Cases of impulse disorders and related diagnoses may be exceptions, but these are probably best characterized as irrational desires . . . if there are situations of purely impulsive, thoughtless conduct in which the agent is incapable of any form of reflective awareness . . . there are clearly cases of irrationality by any reasonable rationality criteria.

Morse, *Culpability and Control*, *supra* note 249, at 1626. Frontal lobe dysfunction is often diagnosed as Intermittent Explosive Disorder, *see supra* note 225, a disorder characterized by episodes of impulsive aggression.

One must assume, therefore, that Morse is broadly opposed to volitional tests, whether the volitional impairment is arguably due to compulsions, extreme desires or irresistible impulses. In his most recent writing, Professor Morse makes the definitive statement that "lack of control can *always* be reduced to a cognitive deficiency." Morse, *Brain Overclaim*, *supra* note 72, at 407 n.8 (emphasis added).

320. *See generally* KIRK HEILBRUN, PRINCIPLES OF FORENSIC MENTAL HEALTH ASSESSMENT (2001).

even when we are relatively certain that a defendant suffers from a psychotic condition impairing his or her rationality, rarely are we certain that the psychotic symptoms were directly responsible for the criminal conduct.[321]

There are, however, some tools available to assist the forensic evaluator in determining whether an act was impulsive or premeditated.[322] For example, Dr. Hall has developed an inventory for assessing how and whether a defendant's FLD contributed to the criminal offense, by evaluating the defendant's degree of self-control before, during, and after the offense (*see* Table 2).[323] The protocol guides the forensic evaluator in assessing the defendant's base rate for violence, diagnosing disorders in executive functions, assessing the defendant's degree of dyscontrol during the commission of the offense, and linking the disorder to the defendant's dyscontrol during the offense. In assessing whether the offense was committed impulsively, factors to be considered are whether it had a predatory or reactive quality, the length of time between the trigger to violence and the offense, whether complex planning or behavior preceded the offense, and the flexibility of the defendant's responses (*see* Table 2).[324] Evidence of planning or concealment is strong evidence cutting against a claim of impaired control. The defendant's history of violence is likewise analyzed to determine whether there is a pattern of impulsive or reactive versus instrumental or predatory violence. Importantly, *the types of executive deficits and behavioral dyscontrol suggested by the defendant's behaviors at the time of the offense should be*

321. SLOBOGIN, MINDING JUSTICE, *supra* note 267, at 51.

322. *See* Ernest S. Barratt, M.S. Stanford, Alan R. Felthous & T.A. Kent, *The Effects of Phenytoin on Impulsive and Premeditated Aggression: A Controlled Study*, 17 J. CLIN. PSYCHOPHARMACOLOGY 341, 341 (1997) (providing a semi-structured interview protocol to differentiate between impulsive and premeditated aggression); Ernest S. Barratt & Alan R. Felthous, *Impulsive versus Premeditated Aggression: Implications for Mens Rea Decisions*, 21 BEHAV. SCI. & L. 619, 626-27 (2003) (reporting techniques, including the use of interview protocols and electroencephalography, to differentiate between impulsive and premeditated aggression); Ernest S. Barratt et al., *Neurological and Cognitive Psychophysiological Substrates of Impulsive Aggression*, 41 BIOOGICAL PSYCHIATRY 1045, 1045 (1997) (reporting study showing clear differences in the electroencephalography patterns of inmates exhibiting impulsive versus premeditated aggression).

323. Hall, *Criminal-Forensic Neuropsychology*, *supra* note 41, at 37; Harold V. Hall, *Linkage of Evaluation and Crime Behavior: Inventory of Defendant Competencies and Self-Control*, *in* DISORDERS OF EXECUTIVE FUNCTIONS: CIVIL AND CRIMINAL LAW APPLICATIONS 166-70 (Harold V. Hall & Robert J. Sbordone eds., 1998) [hereinafter Hall, *Evaluation and Crime*]. There is, however, apparently no data available on the validity or reliability of the inventory.

324. *See, e.g.*, People v. Craig, No. RIF089100, 2003 WL 1735544, at *2 (Cal. Ct. App. Apr. 2, 2003) (stating that experts testified that evidence of planning by the defendant suggested that his criminal behavior was not due to FLD).

roughly equivalent in type and degree as the deficits shown through neuropsychological testing. As with other mental disorders, there are standard techniques and criteria available for reliably assessing whether defendants are malingering (faking) FLD symptoms.[325] (For a summary of techniques available for assessing FLD, *see Appendix A—Forensic Assessment of Frontal Lobe Dysfunction.*)

325. *See* Daniel J. Slick et al., *Diagnostic Criteria for Malingered Neurocognitive Dysfunction: Proposed Standards for Clinical Practice and Research*, 13 CLINICAL NEUROPSYCHOLOGIST 545, 561 (1999).

Table 2. Self-control of instant violence behavior

Synthesizing all self-control factors, judge whether the highest type of self-control called for at each of the levels has been attained. The suggested degree of maximum self-control this implies for the instant offense is presented on the left margin. Generic examples of each level of self-control are presented for each type.

Maximum level of self-control implied	Routine Mental/Psychological Behaviors (Before)	Goal Formulation (Before)	Planning and Preparation (Before)	Effective Performance (During)	Recovery Period Behaviors (After)	Post-Violence Depression Phase (After)	Routine Mental/Psychological Behaviors
Substantial				Coordination of multiple behavior to achieve objective goal; change in principle with shifting and monitoring			
Considerable			Ability to show cognitive and behavioral preparation for violence to follow; use of time in planning		Efforts to avoid detection and apprehension; ability to recall instant violence		
Moderate		Ability to integrate internal and external information and to choose which action to follow; use of env'tal cues				Ability to avoid suicidal or self-mutilative behavior; presence of remorse or apology	
Mild	Awareness of inner and outer state and events; sensory and motor skills; short-and long-term memory; homeostatic and visceral activity						Aware of inner and outer state and events; sensory and motor skills; short and long-term memory; homeostatic and visceral activity
STAGE	A	B	C	D	E	F	G

Reprinted from Harold V. Hall, *Linkage of Evaluation and Crime Behavior: Inventory of Defendant Competencies and Self-Control, in* DISORDERS OF EXECUTIVE FUNCTIONS: CIVIL AND CRIMINAL LAW APPLICATIONS 172 (Harold V. Hall & Robert J. Sbordone eds., 1998).

Professor Morse, however, has argued that testimony from mental health experts is not helpful to judges and juries, particularly on questions of control.[326] This claim is belied by a recent study finding that trial judges rated testimony about clinical diagnoses, as well as clinical opinions that link the diagnosis to the relevant legal standard, as among the most valuable kinds of evidence in insanity cases.[327] According to Professor Morse, however, "[t]he law's central concern is how [a defendant] performs in the real world, not the structure of his brain or how he performs on various tests."[328] "Lack of control can only be finally demonstrated behaviorally, by evaluating action. Although neuroscience evidence may surely provide assistance in performing this evaluation, neuroscience could never tell us how much control ability is required for responsibility. That question is normative, moral, and ultimately, legal."[329]

To be sure, neuropsychological or neuroimaging evidence cannot establish a defendant's lack of criminal responsibility, which is a legal determination, not a medical one. Taken together, however, behavioral, neuropsychological, and/or neuroimaging evidence can paint a rich portrait of a defendant's frontal lobe dysfunction and its causal role in the criminal behavior in question. Consider the case with which this Article began—the forty-year-old school teacher whose sexual offending ended when his frontal lobe brain tumor was removed.[330] This is an unusually stark case, to be sure, but one that illustrates the power and persuasiveness of neuroscience evidence. Without the neuroimages showing the brain tumor together with the behavioral evidence correlating its presence and absence with the defendant's sexual offending, a judge or jury would be left wholly to

326. *See* Stephen J. Morse, *Crazy Behavior, Morals, & Science: An Analysis of Mental Health Law*, 51 S. CAL. L. REV. 527, 554-60 (1978) (asserting that who the law deems "crazy" is a social and moral judgment). *But see* Richard Bonnie & Christopher Slobogin, *The Role of Mental Health Professionals in the Criminal Process: The Case for Informed Speculation*, 66 VA. L. REV. 427, 452-66 (1980) (arguing that clinical information can be relevant and helpful in three contexts: diagnosis, mental elements of offenses and explaining certain behavior). In a more recent writing, Morse concedes that "abnormal clinical, laboratory, and psychological test findings *may add plausibility to claims concerning impairments in the capacity for rational conduct. . . .*" Morse, *Brain and Blame*, *supra* note 249, at 545 (emphasis added).

327. Richard E. Redding, Marnita Y. Floyd & Gary Hawk, *What Do Judges and Lawyers Think About What Mental Health Experts Say in Court? A Survey of the Courts and Bar*, 19 BEHAV. SCI. & L. 583, 589-92 (2001).

328. Morse, *Brain and Blame*, *supra* note 249, at 545.

329. Morse, *New Neuroscience*, *supra* note 249, at 179; *see also* Jacob R. Waldbauer & Michael S. Gazzaniga, *The Divergence of Neuroscience and Law*, 41 JURIMETRICS J. 357, 363 (2001) (arguing that neuroscience evidence ultimately cannot answer moral and legal questions about criminal responsibility).

330. *See supra* note 1 and accompanying text.

speculate about possible reasons for the defendant's aberrant behavior.

Finally, concerns often voiced about the insanity defense generally—that defendants can readily fake insanity and that there are too many insanity acquittals, are myths that have long since been debunked. Research has consistently shown that: (1) insanity rarely is feigned (in fact, feigning *sanity* is far more common), and malingering (faking) is almost always detected;[331] (2) insanity is pled in less than one percent of all felony cases; (3) less than twenty-five percent of those who plead insanity are found Not Guilty by Reason of Insanity (NGRI);[332] (4) many defendants found NGRI spend as long or longer in a mental hospital than the prison term they would have received if found guilty;[333] and (5) when NGRI acquittees ultimately are released, their recidivism rate is less than that of convicted felons.[334] Moreover, a 2005 national study found statistically identical success rates of insanity pleas when comparing *ALI-MPC* (a test that includes both cognitive and control prongs) and *McNaghten* jurisdictions.[335]

3. Control tests for insanity do not threaten the law's free-will assumption

For some, control tests for insanity, which "directly pose the question of whether a person could control his or her behavior,"[336] run counter to the law's assumption that rational actors have free-will and should bear responsibility for their actions.[337] In Professor

331. *See* MICHAEL PERLIN, THE JURISPRUDENCE OF THE INSANITY DEFENSE 236-47 (1994) (reviewing studies and commentary refuting the myth that defendants successfully feign insanity).

332. *See* Randy Borum & Soloman M. Fulero, *Empirical Research on the Insanity Defense and Attempted Reforms: Evidence Toward Informed Policy*, 23 L. & HUM. BEHAV. 375, 378 (1999) (citing studies and arguing that the publicity from the winning cases make the public believe that the insanity defense is more successful than it actually is); Eric Silver, C. Cirincione & Henry J. Steadman, *Demythologizing Inaccurate Perceptions of the Insanity Defense*, 18 L. & HUM. BEHAV. 63, 66-68 (1994); Stephen G. Valdes, Comment, *Frequency and Success: An Empirical Study of Criminal Law Defenses, Federal Constitutional Evidentiary Claims, and Plea Negotiations*, 153 U. PA. L. REV. 1709, 1723 (2005) (finding average occurrence rate of 0.87% and average success rate of 23.55%).

333. *See* Borum & Fulero, *supra* note 332, at 379 (citing studies).

334. *See id.* (stating that only twenty-four percent of NGRI acquittees are rearrested, as opposed to twenty-seven percent of released felons).

335. Valdes, *supra* note 332, at 1724. However, studies conducted in varying jurisdictions during the 1970s and 1980s produced mixed findings, with some finding no change in the rate of insanity acquittals after a jurisdiction adopted a control test and others finding an increase in the acquittal rate. *See* Wettstein, Mulvey & Rogers, *supra* note 243, at 22 (reviewing studies).

336. REISNER, SLOBOGIN & RAI, *supra* note 15, at 558.

337. *See* Michele Cotton, *A Foolish Consistency: Keeping Determinism Out of the Criminal Law*, 15 B.U. PUB. INT. L.J. 1, 16 (2005) (concluding that states "often

Morse's view, insanity defenses based on impaired control (whether due to FLD or other brain disorders)[338] frequently are exemplars of what he calls "the fundamental psycholegal error," which is the erroneous assumption that the identification of a brain-based cause for behavior is necessarily exculpatory.[339] As Morse correctly points out, "causation can not per se be an excuse . . . because all behavior is caused and thus all behavior would have to be excused."[340]

But importantly, control tests do *not* rest on any particular claims about whether human beings have free-will or causal agency. The moral case for control tests does not rest on the claim that the behavior was determined or caused, but rather, on the claim that it is unfair to blame and punish individuals who lacked substantial control over their behavior at the time of the offense. As Professor Corrado explains,

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specifically expressed a desire to avoid legitimizing determinism by adding a volitional prong"); Cole v. State, 128 A.2d 437, 439 (Md. 1957) ("A modification of the existing rule to relieve an accused of the criminal consequences of his acts . . . would . . . remove responsibility for a crime where there is some element of determinism in the case . . . ."); Commonwealth v. Weinstein, 451 A.2d 1344, 1349 (Pa. 1982) ("The concept of irresistible impulse . . . is grounded in determinism. It denies choice. For this reason, it is an alternate test of sanity in those jurisdictions, not including Pennsylvania, which accept it.").

At least to the extent that the criminal law is retributive in nature, it is based on the assumption that people have free-will. *See generally* Cotton, *supra*, at 16 (documenting how the free-will assumption pervades the criminal law); GARY B. MELTON ET AL., PSYCHOLOGICAL EVALUATIONS FOR THE COURTS: A HANDBOOK FOR MENTAL HEALTH PROFESSIONALS AND LAWYERS 8-9 (2d ed. 1997) (comparing the law's free-will assumption with the deterministic assumption of the behavioral sciences).

338. *See* Morse, *Brain and Blame*, *supra* note 249, at 537-48 (discussing the case of "Spyder Cystkopf," a murderer who had a sub-arachnoid cyst, which probably impaired frontal lobe functioning).

339. Morse, *New Neuroscience*, *supra* note 249, at 180.

340. Morse, *Brain and Blame, supra* note 249, at 537-48.

> The mind is what the brain does, and the brain is a causal machine [that follows the laws of physics, chemistry, and biology]. Consequently, deliberations, beliefs, decisions, and ensuing behavior are the outcome of causal processes. . . . The "user illusion," nevertheless, is that a decision is created independently of neuronal causes, by one's very own "act of will." Some philosophers—usually called libertarians—resolutely believe that voluntary decisions *actually are* created by will, free of causal antecedents. Like flat-earthers and creationists, libertarians glorify their scientific naiveté by labeling it transcendental insight.

Patricia S. Churchland, *Brain-Based Values*, 93 AM. SCIENTIST 356, 356-57 (2005) (emphasis in original).

As the famous trial lawyer (a well -known hard determinist) Clarence Darrow explained,

> All people are products of two things, and two things only–their heredity and their environment. And they act in exact accord with the heredity which they took from all the past, and for which they are in no wise responsible, and the environment, which reaches out to the farthest limit of all life that can influence them. We all act from the same way.

Clarence Darrow, *supra* note 18, at 98.

> When the defense attorney claims that her client cannot help himself . . . she is not claiming that the offender's action should be excused because it is caused. She is not claiming that he is an automaton. She is claiming instead that the offender is unlike other human beings in [that] . . . conforming his actions to the law is so difficult for him that he ought to be excused and committed . . . .[341]

There is the worry, however, that control tests provide a ready opportunity for mental health experts to "smuggle in alleged mechanistic explanations and completely irrelevant talk of free-will along with question-begging and conclusory expert evidence [about lack of control]."[342] Professor Morse claims that:

> [a]ll too often, "expert" opinions about whether an agent was capable of self-control are based on a purely common-sense evaluation that anyone could perform, informed implicitly or explicitly by the expert's private, subjective moral view about whether the agent should be held responsible. They are clearly not based on expert, scientifically, or clinically grounded understandings or measurements of lack of control.[343]

This need not be the case, however, if prosecutors (when raising evidentiary challenges) and judges (when making admissibility rulings) do their jobs properly. Such evidence is irrelevant under a control test, and would likely fail to satisfy the prevailing reliability standards (*Frye* or *Daubert*)[344] for admitting scientific evidence.

Even if control tests are seen by some as a threat to law's free-will assumption, fortunately, the revival of control tests do not require us to resolve the age-old debate over free-will versus determinism.[345] The concept of free-will is difficult to defend on scientific grounds (few behavioral scientists give it credence),[346] especially in view of ongoing

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341. Corrado, *supra* note 271, at 80.

342. E-mail from Stephen Morse, Professor of Law, University of Pennsylvania to Richard E. Redding (Feb. 5, 2006) (on file with author).

343. Morse, *Uncontrollable Urges*, *supra* note 249, at 1062-63.

344. *See supra* notes 159-63 and accompanying text.

345. *See generally infra* note 346.

346. *See, e.g.*, Donald N. Bersoff, *Some Contrarian Concerns About Law, Psychology and Public Policy*, 26 L. & HUM. BEHAV. 565, 573 (2002) (stating that "[f]ree will is a legal fiction, but an enduring one impervious to the findings of science"); Lee Ross & Donna Shestowsky, *Contemporary Psychology's Challenges to Legal Theory and Practice*, 97 N.W. U. L. REV. 1081, 1108, 1114 (2003).

> To academically trained social psychologists, much of the discussion about bad and good excuses seems to hinge on dubious distinctions and incoherent notions of behavioral causation and personal agency. . . . The workings of the criminal justice system should not continue to be guided by . . . comforting but largely fanciful notions of free will, any more than it should be guided by once common notions about witchcraft or demonic possession.

advances in neuroscience that trace behaviors to particular structural and functional aspects of brain functioning, thus demonstrating the metaphysical reality that the human mind is derived from the functioning of the physical brain.[347] But the scientific account of a

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JAMES Q. WILSON, MORAL JUDGMENT: DOES THE ABUSE EXCUSE THREATEN OUR LEGAL SYSTEM? 40 (1997) (stating that free-will is a "convenient fiction").

Thus, for many, though by no means all behavioral scientists, see DANIEL C. DENNETT, ELBOW ROOM: THE VARIETIES OF FREE WILL WORTH WANTING 50-73, 131-64 (1984), the fact that behavior is casually determined necessarily implies the non-existence of free-will. But not so for philosophers. The view called *compatibilism*, which has many adherents among philosophers, holds that determinism and free-will coexist and are compatible. *Incompatibilism* represents the opposite philosophical view. Galen Strawson, *Free Will*, *in* ROUTLEDGE ENCYCLOPEDIA OF PHILOSOPHY (E. Craig ed. 2004), *available at* http://www.rep.routledge.com/article/vo14. Moreover, most philosophers insist that the question of whether free-will is the philosopher's province and is not a question that science can answer. Much of the difficulty lies in conceptualizing exactly what one means by "free will" and whether determinism and free-will are compatible. Most scientists who argue against free-will are presupposing, *a priori*, an incompatibilist view of free-will.

347. Professors Greene and Cohen argue that modern neuroscience will, in the long run, change the way in which the law views and responds to criminal offenders:

> At some time in the future we may have extremely high-resolution scanners that can simultaneously track the neural activity and connectivity of every neuron in a human brain, along with computers and software that can analyse and organize these data. Imagine, for example, watching a film of your brain choosing between soup and salad. The analysis software highlights the neurons pushing for soup in red and the neurons pushing for salad in blue. You zoom in and slow down the film, allowing yourself to trace the cause-and-effect relationships between individual neurons – the mind's clockwork revealed in arbitrary detail. You find the tipping-point moment at which the blue neurons in your prefrontal cortex out-fire the red neurons, seizing control of your pre-motor cortex and causing you to say, 'I will have the salad, please'
>
> . . . .
>
> Suppose a man has killed his wife in a jealous rage. Will jurors of the future wonder whether the defendant acted in the moment *of his own free will*? Will they wonder if it was *really him* who killed his wife rather than his *uncontrollable anger*? Will they ask whether he *could have done otherwise*? Whether he really *deserves* to be punished, or if he is just a victim of unfortunate circumstances? We submit that these questions, which seem so important today, will lose their grip in an age when the mechanical nature of human decision-making is fully appreciated. The law will continue to punish misdeeds, as it must for practical reasons, but the idea of distinguishing the truly, deeply guilty from those who are merely victims of neuronal circumstances will, we submit, seem pointless.
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> . . . .
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> Neuroscience is unlikely to tell us anything that will challenge the law's stated assumptions. However, we maintain that advances in neuroscience are likely to change the way people think about human action and criminal responsibility by vividly illustrating lessons that some people appreciated long ago. Free will as we ordinarily understand it is an illusion generated by our cognitive architecture. Retributivist notions of criminal responsibility ultimately depend on this illusion, and, if we are lucky will give way to consequentialist ones, thus radically transforming our approach to criminal justice. At this time, the law deals firmly but mercifully with individuals whose behavior is obviously the product of forces that are ultimately beyond

deterministic universe does *not* erase the need for accountability and criminal sanctions. On the contrary, a control test in insanity jurisprudence retains—indeed, enhances—the utilitarian work of law's free-will assumption, which is the use of sanctions to deter criminal behavior. Though neuroscience may explain the causal brain mechanisms underlying certain types of criminal behavior, and in some cases even provide compelling moral exculpation, criminal sanctions may nonetheless have general or specific deterrent effects on some of the same offenders by acting as environmental shapers of brain functioning. Under this utilitarian analysis, the insanity defense provides the prototypical example of "a psychological explanation that nullifies responsibility," *because the "inhibitory brain systems" of insane individuals do not respond to the typical deterrence effects of criminal sanctions.*[348] *Like the cognitively impaired, those lacking control are unlikely to be deterred.*

Thus, defendants with significant FLD who satisfy a control test for insanity may require incapacitation in a psychiatric hospital and the limited treatments available to ameliorate their maladaptive behaviors.[349] But punishing such persons is inappropriate under a

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their control. Some day, the law may treat all convicted criminals this way. That is, humanely.

Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, *in* LAW & THE BRAIN 218, 224 (S. Zeki & O. Goodenough eds., 2006). As John Steinbeck put it, "There ain't no sin and there ain't no virtue. There's just stuff people do". Kirchmeier, *supra* note 18, at 728 (quoting JOHN STEINBECK, THE GRAPES OF WRATH 28 (1939)).

348. STEVEN PINKER, THE BLANK STATE 183 (2002) (emphasis added); *see also* Greene & Cohen, *supra* note 347, at 222. Some older case law expressed the concern that legal recognition of the irresistible impulse defense would decrease the deterrent effect of the criminal law. *See* Keedy, *supra* note 202, at 987-88 (discussing cases from the 1800s).

349. Although frontal lobe brain damage cannot be repaired, behavioral modification and psychosocial education programs are available to help defendants compensate for the behavioral and decision making impairments accompanying FLD. *See generally* NATIONAL INSTITUTES OF HEALTH, *Rehabilitation of Persons with Traumatic Brain Injury*, 16 N.I.H, Consensus Statement 1-41 (1998), *available at* http://consensus.nih.gov/1998/1998TraumaticBrainInjury109PDF.pdf; Paul W. Burgess & Ian H. Robertson, *Principles of the Rehabiliation of Frontal Lobe Function*, *in* PRINCIPLES OF FRONTAL LOBE FUNCTION 557 (Donald T. Stuss & Robert T. Knight eds., 2002). Pharmacological treatment with antidepressants, mood stabilizers, sedating medications, or Ritalin may reduce impulsive aggression. *See* Emil F. Coccaro & Melany Denehy, *Intermittent Explosive Disorder*, *in* CLINICAL MANUAL OF IMPULSE-CONTROL DISORDERS, *supra* note 310, at 19, 28-32 (describing treatments); Pincus, *Aggression and Frontal Lobes*, *supra* note 6, at 550-555. In addition, FLD often exists alongside substance abuse or other mental health problems that exacerbate symptoms. Treatment of these co-occurring disorders can alleviate some of the behavioral problems associated with FLD. Evidence of FLD may be relevant to a court's consideration of treatment issues at sentencing, particularly in jurisdictions that require judges to do so. *See, e.g.,* IDAHO CODE ANN. § 19-2523 (2005) ("Consideration of Mental Illness in Sentencing"). In *State v. Harper*, for instance, the

utilitarian analysis, because their neurologically-based behavioral disinhibition cannot be deterred through criminal sanctions. And, an impairment in control also nullifies responsibility under a retributive analysis. As we have seen, the truly volitionally impaired are unable to control their behavior, just as the cognitively impaired are unable to control their irrationality.

Some have suggested, however, that people with FLD have a duty to take preventive measures to avoid placing themselves in situations that might trigger behavioral disinhibition and that they bear responsibility for their criminal acts when they fail to do so.[350] The problem with this argument is that "responsibility and self-reflection are not disembodied, ethereal processes, but are firmly rooted in the brain."[351] That is, in many cases, the FLD that caused the behavioral disinhibition also impaired the individual's social judgment and ability to adjust his or her behavior to changing circumstances.[352] Nor can one always anticipate or avoid provocative situations, particularly when one's judgment is substantially impaired in the first place.

Another familiar objection is that FLD-based theories of insanity (and mitigation) fail to explain why most individuals with FLD do *not* engage in criminal conduct.[353] Two scientific facts belie this appealing, common-sense argument. First, a substantial number of persons with FLD *do* exhibit impulsive and aggressive behavior, albeit

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defense and prosecution experts testified about the need for testing to determine the defendant's risk for future violence, whether he should be committed to a maximum security facility, and whether his FLD could be treated. 922 P.2d 383, 388 (Idaho 1996).

350. *Cf.* Duff, *supra* note 248, at 448 n.17 (arguing that an individual "afflicted by an irresistible impulse" has a responsibility to take "such steps as he can to deal with his pathological impulses"); CHRISTINA HOFF SOMMERS & SALLY SATEL, ONE NATION UNDER THERAPY: HOW THE HELPING CULTURE IS ERODING SELF-RELIANCE 102 (2005); Morse, *Uncontrollable Urges*, *supra* note 249, at 1071:

> It is the citizen's duty in such circumstances to take all reasonable steps to prevent oneself from acting wrongly in an irrational state in the future, including drastically limiting one's life activities if such an intrusive step is necessary to prevent serious harm. If the agent does not take such steps, the agent may indeed be responsible, even if at the moment of acting he suffers from substantially compromised capacity for rationality.

351. Raine, *Psychopathy, Violence, and Brain Imaging*, *supra* note 31, at 51 (emphasis added).

352. *See supra* notes 107-155 and accompanying text.

353. *See, e.g.*, Morse, *Brain and Blame*, *supra* note 249, at 540 (observing that most people with frontal lobe abnormalities do not commit homicide); SOMMERS & SATEL, *supra* note 350, at 90 (arguing, with respect to neuroscience evidence suggesting a link between adolescent frontal lobes immaturity and delinquent behavior, that "even if we accept that almost all teenagers have relatively immature brains, [those arguing that this diminishes adolescent responsibility] need[] to explain why so few engage in impulsive criminality").

perhaps not rising to the level of detectable or serious criminality.[354] Second, modern criminological research has shown that criminal behavior is the product of a combination of risk factors inherent in the individual and environment.[355] Criminal behavior occurs when a tipping point is reached vis-à-vis the *accumulation* or *strength* of risk factors present in a particular *individual* (e.g., genetic predisposition, FLD, mental illness) and *environmental* (e.g., poor parental supervision, history of abuse, living in a high-crime neighborhood) context. This explains why only a minority of persons with FLD engage in criminal behavior—those having substantial frontal lobe dysfunction that particularly affects behavioral control and/or a particular combination or strength of risk factors that tip the individual into criminal offending.

CONCLUSION

> Brain imaging research on violence and psychopathy is troubling to some because it challenges the way we conceptualize crime. It questions our treatment of violent [criminals] in just the same way that we now look back 200 years and question the way in which the mentally ill were kept in shackles and chains, treated little better than animals. The history of civilization has shown that as time progresses, society becomes more ennobled, wiser, and humane. In 200 years from now, will we have reconceptualized . . . serious criminal behavior as a clinical disorder with its roots in early social, biological, and genetic forces beyond the individual's control?[356]

This sentiment, expressed by Professor Raine, a leading researcher on the biology of violence, reflects what some consider to be the misplaced "medicalization of morality."[357] The human need to exact punishment on wrongdoers is a strong one.[358] We want to hold

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354. *See supra* notes 60-64 and accompanying text.

355. *See generally* David DeMatteo & Geoffrey Marczyk, *Risk Factors, Protective Factors, and the Prevention of Antisocial Behavior Among Juveniles*, *in* JUVENILE DELINQUENCY: PREVENTION, ASSESSMENT, AND INTERVENTION 19 (Kirk Heilbrun, N.E. Sevin Goldstein & Richard E. Redding eds., 2005); JOHN MONAHAN ET AL., RETHINKING RISK ASSESSMENT: THE MCARTHUR STUDY OF MENTAL DISORDER AND VIOLENCE (2001); NATIONAL RESEARCH COUNCIL, UNDERSTANDING AND PREVENTING VIOLENCE 101-81; 357-403 (1993), *available at* http://www.nap.edu/catalog/1861.html#toc.

356. Raine, *Psychopathy, Violence, and Brain Imaging*, *supra* note 31, at 52; *see also* Christopher Slobogin, *The Civilization of the Criminal Law*, 58 VAND. L. REV. 121, 157-65 (2005) (arguing that the current system of retributive justice should be replaced with a rehabilitative and preventive regime that would be consistent with current and evolving scientific knowledge about human behavior and the deterministic viewpoint).

357. *See* SOMMERS & SATEL, *supra* note 350, at 77-109.

358. *See* Morris B. Hoffman & Timothy H. Goldsmith, *The Biological Roots of Punishment*, 1 OHIO ST. J. CRIM. L. 627, 627-28 (2004) (stating that punishment is an

individuals accountable for their criminal conduct, and we resist ascribing immoral behavior to an uncontrollable brain dysfunction.[359] But "there is an important difference between *being* immoral and *acting* immoral. A defendant who *acts* immorally as a result of [frontal lobe brain dysfunction] is arguably not as culpable as a defendant who simply *is* immoral."[360] In the age of science, we cannot ignore what neuroscience tells us about the causal role of brain dysfunction in criminal behavior.

Indeed, evidence of frontal lobe dysfunction will continue to be introduced in American courtrooms to litigate a variety of pre-trial, adjudicatory, and dispositional issues in criminal cases.[361] This trend is likely to accelerate, as the technologies available for diagnosing frontal lobe dysfunction improve, and as attorneys and courts become more familiar with, and receptive to, neuroscience evidence.

In particular, modern neuroscience provides a basis for concluding that some criminal defendants with frontal lobe brain dysfunction lack culpability for their crimes. Control tests for insanity must be available to ensure that these defendants have the opportunity to prove that they lacked criminal responsibility for the charged offense. A defendant with a limited physiological ability to control his or her criminal behavior should be allowed to present evidence of a lack of culpability due to impaired impulse control.

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aspect of every legal system in the world and humans seem to instinctively punish wrongdoers); Greene & Cohen, *supra* note 347, at 223 (discussing studies suggesting that the instinct to punish may be "a crucial development in the biological and cultural evolution of human sociality . . . . driven by phylogenetically old mechanisms in the brain"). Interestingly, research suggests that people with a high need for cognition (those who seek out and enjoy effortful cognitive activity) tend to be somewhat "less supportive of punitive responses to crime because they tend to generate more complex attributions for human behavior." Michael J. Sargent, *Less Thought, More Punishment: Need for Cognition Predicts Support for Punitive Responses to Crime*, 30 P.S.P.B. 1485, 1490 (2004).

359. Jessie A. Seiden, Comment, *The Criminal Brain: Frontal Lobe Dysfunction Evidence in Capital Proceedings*, 16 CAP. DEF. J. 395, 419 (2004).

360. *Id.* at 419 (emphasis in original).

361. *See* Richard E. Redding, *Evidence of Frontal Lobe Dysfunction in Criminal Cases: Emerging Research and Caselaw* (on file with author) (reviewing use of FLD evidence in cases involving issues of incompetence to stand trial, waivers of constitutional rights, sentencing, and ineffective assistance of counsel).

APPENDIX A. FORENSIC ASSESSMENT OF FRONTAL LOBE DYSFUNCTION (FLD)

Many defendants who suffer from FLD fail to disclose any symptoms or that they had suffered a head injury,[362] often because they lack insight that their behavior is maladaptive or socially inappropriate. They also tend to present an unrealistically favorable image of themselves.[363] Thus, defense attorneys must vigorously investigate the possibility of brain dysfunction and obtain diagnostic evaluations whenever they suspect (based on their interactions with the defendant, the defendant's self-report of head injury or symptoms, medical records, or collateral reports from family, friends, or witnesses) that their client may have a brain disorder. Attorneys often fail to do this, however. For example, a recent neuropsychological study of eighteen youthful defendants on Texas' death row found that although fifteen showed symptoms of FLD, only four had received a pretrial mental health evaluation (and these were incomplete evaluations).[364]

To effectively represent a defendant with possible FLD, the attorney must obtain a competent and thorough neuropsychiatric assessment of the client. While there are no published cases involving ineffective assistance of counsel claims based on an attorney's failure to obtain a competent expert, an attorney using unqualified experts may be relying upon inaccurate or inadequately developed evidence. Thus, "[a]ttorneys utilizing mental health expertise in criminal cases are well advised to review national and local standards of practice, ethical codes, and treatises pertaining to the effective monitoring of relevant assessment and reporting techniques."[365]

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362. Damasio & Anderson, *supra* note 51, at 414, 425; *see also* Lewis et al., *15 Death Row Inmates, supra* note 35, at 846; Cato et al., *supra* note 109, at 455 (reporting case of "a modern-day Phineas Gage," in which the patient "reported that he did not have any cognitive or emotional problems"). Indeed, the public is largely unaware of the psychological and neurological symptoms that may result from head injury. *See* Jocelyn B. Aubrey, Allen R. Dobbs & Brendan Gail Rule, *Laypersons' Knowledge About the Sequelae of Minor Head Injury and Whiplash*, 52 J. NEUROLOGY, NEUROSURGERY, & PSYCHIATRY 842 (1989) (reporting study results showing that laypeople failed to recognize that psychological and neurological problems could result from non-serious head injuries).

363. Daniel Tranel, *Acquired Sociopathy, supra* note 106, at 290.

364. Lewis et al., *Ethics Questions*, *supra* note 66, at 425.

365. *See generally* Eric Y. Drogan, *Jurisprudent Therapy, Ineffective Assistance, and Social Scientific Evidence*, 4 BULL. L., SCI. & TECH. 4 (2002).

Like most forensic assessments, a competent assessment for FLD will include a collection of past medical and behavioral history and collateral source information, a psychiatric or neurological examination, neuropsychological testing, and perhaps electroencephalography ("EEG") or neuroimaging. Without a comprehensive examination, individuals with frontal lobe damage may go undiagnosed,[366] particularly since those with FLD often fail to report any symptoms.[367] Or, inadequate examinations may result in the misdiagnosis of FLD as true psychopathy or antisocial personality disorder,[368] disorders that likely carry more negative consequences for the defendant.[369] When used alone, neuroimaging or neuropsychological testing can overestimate, under-detect, or fail to detect the type and degree of brain damage present.[370] Persons with FLD may score within the normal range on standard neuropsychological tests, even those designed to assess frontal lobe functioning.[371] Importantly, once a diagnosis of FLD is made, the forensic clinician must then assess the relationship between the cognitive or behavioral symptoms of the dysfunction and their causal connection (if any) to the relevant legal capacities.

Neuropsychological tests commonly used to assess frontal lobe functioning include the Wisconsin Card Sorting Test ("WCST")—a measure of cognitive flexibility and abstracting ability; the Sequential Matching Memory Test ("SMMT")—a measure of the capacity to sustain attention; the Trail Making Test ("TMT")—a measure of sequential processing and planning; the Stroop Interference Test—a measure of selective attention and response inhibition; the Iowa Gambling Task—a measure of real-life decision making under conditions of risk, reward, and punishment, the Auditory Verbal Learning Test ("AVLT")—a measure of verbal memory; the Porteus Maze Test—a measure of advanced planning skills; and the Category Test of the Halstead-Reitan Neuropsychological Battery ("HRNB"), among others. Of these, the WCST and the SMMT are among the

366. Knight & Stuss, *supra* note 38, at 587.
367. Damasio & Anderson, *supra* note 51, at 414, 425.
368. Pincus, *Aggression and Frontal Lobes*, *supra* note 6, at 553 ("A person can be a social imbecile because of frontal [lobe] damage and still have a normal IQ.").
369. Lewis et al., *Ethics Questions*, *supra* note 66, at 425.
370. Erin D. Bigler, *Neuropsychological Testing Defines the Neurobehavioral Significance of Neuroimaging-Identified Abnormalities*, 16 ARCHIVES CLINICAL NEUROPSYCHOLOGY 227-28 (2001).
371. *See* Brower & Price, *supra* note 35, at 721. "You can be fooled into thinking, 'the IQ is fine, the neurologic exam is fine.' Yet these patients are brain damaged." Ely, *supra* note 95, at 3 (quoting Professor Kirk Daffner, a behavioral neurologist at Harvard University).

most sensitive and discriminating tests for frontal lobe damage.[372] A variety of computer-based measures of executive function are currently under development that will likely replace the WCST and the Category Test. A new method, the Delis-Kaplan Executive Function System,[373] is perhaps the best currently available method for assessing executive functioning, particularly in forensic contexts.

Neuroimaging technologies available for assessing frontal lobe functioning include the structural techniques of computerized axial tomography ("CAT") and magnetic resonance imaging ("MRI"). Functional techniques, used with the assistance of computer analysis programs, include Functional Magnetic Resonance Imaging ("FMRI"), Positron Emission Tomography ("PET") and Single-Photon Emission Computerized Tomography ("SPECT"). Each technique differs in "sensitivity, precision, accuracy, and fidelity for the physiological process being measured."[374] An emerging practice is to conduct functional imaging while the patient is challenged with various neuropsychological tests and neurobehavioral probes that activate frontal lobe functioning. "The successful implementation of neurobehavioral probes on line with neuroimaging will likely replace many of the current methods of neuropsychological assessment".[375]

Although neuroimaging can provide powerful visual evidence of FLD, the interpretation of imaging results is as much an art as a science.[376] Results may differ over short time periods and as a function of the conditions under which the scan was taken. Differences in signal intensity and color coding of brain regions across scans may also produce markedly different images of brain functioning. Thus, differentiating normal from abnormal imaging results can be difficult. Scans that appear structurally normal do not necessarily indicate a lack of deficits, since diffuse axonal brain damage may affect behavior and yet be structurally undetectable, and functionally abnormal findings do not necessarily indicate organic pathology. "The definition of normal is still more slippery in forensic evaluations in which the brain activity being evaluated is purported to relate to function or behavior."[377] Thus, imaging alone cannot

372. *See generally* Bruce F. Pennington & Sally Ozonoff, *Executive Functions and Developmental Psychopathology*, 37 J. CHILD PSYCHOL. & PSYCHIATRY 51 (1996) (providing comprehensive listing of tests for assessing executive and frontal lobe functioning).
373. *See* D. DELIS, E. KAPLAN & J. KRAMER, DELIS-KAPLAN EXECUTIVE FUNCTION SYSTEM MANUAL (2001).
374. Reeves et al., *supra* note 168, at 89.
375. Bigler, *supra* note 39, at 124.
376. Knight & Stuss, *supra* note 38, at 588.
377. Reeves et al., *supra* note 168, at 90.

establish a definitive relationship between brain functioning and criminal behavior or forensically relevant abilities. "To date, a functional deviation shown by imaging has never been causally associated with an isolated, complex [criminal] behavior . . . ."[378] While a neuroimage can be helpful in the identification of brain injury,[379] "[t]he behavioral effects of a neuroimaging-identified brain lesion can only be fully appreciated in the context of neuropsychological [testing],"[380] which probably provides the best means for assessing frontal lobe functioning.

378. *Id.* at 94.

379. Kulynych, *Neuroimages as Scientific Evidence*, *supra* note 72, at 239-43 (stating that neuroimaging is far more valid and useful in research studies than it is for diagnosing mental disorders in individual patients).

380. *See* Bigler, *supra* note 370, at 227-36.

APPENDIX B. STATES HAVING CONTROL TESTS FOR INSANITY.

State	Statute	Operative Control Test Language
Connecticut	CONN GEN. STAT. ANN. § 53a-13(a) (West 2005)	"In any prosecution for an offense, it shall be an affirmative defense that the defendant, at the time he committed the proscribed act or acts, lacked substantial capacity, as a result of mental disease or defect, either to appreciate the wrongfulness of his conduct or *to control his conduct within the requirements of the law.*"
District of Columbia	n/a	In order to prevail in an insanity defense, the defendant must "prove by a preponderance of the evidence that, as a result of mental disease or defect, he lacked substantial capacity either *to conform his conduct to the requirements of law* or to 'recognize' the wrongfulness of his conduct." *Bethea v. United States,* 365 A.2d 64, 75 (D.C. 1976).
Georgia	GA. CODE ANN. § 16-3-3 (West 2006)	"A person shall not be found guilty of a crime when, at the time of the act, omission, or negligence constituting the crime, the person, because of mental disease, injury, or congenital deficiency, *acted as he did because of a delusional compulsion as to such act which overmastered his will to resist committing the crime.*"
Hawaii	HAW. REV. STAT. ANN. § 704-400 (Lexis Nexis 2005).	"A person is not responsible, under this Code, for conduct if at the time of the conduct as a result of physical or mental disease, disorder, or defect the person lacks substantial capacity either to

		appreciate the wrongfulness of the person's conduct or *to conform the person's conduct to the requirements of law*."
Idaho	n/a	"[O]nce a defendant's sanity is put in issue, the State must prove beyond a reasonable doubt either (1) that the defendant had no mental disease or defect at the time of the act, or (2) that, if such disease or defect existed, it did not cause a lack of substantial capacity either to appreciate the wrongfulness of his conduct or *to conform his conduct to the requirements of law*." *State v. White*, 456 P.2d 797, 804 (Idaho 1969).
Iowa	IOWA CODE ANN. § 701.4 (West 1979)	The irresistible impulse instruction "is limited to situations in which the defendant either was unable to comprehend the nature and consequences of the act or to know that the act was wrong . . . the record must also contain substantial evidence that the defendant's illness was 'overpowering' so that the defendant was 'irresistibly forced' to commit the act." *State v. Hamann*, 285 N.W.2d 180, 185 (Iowa 1979).
Kentucky	KY. REV. STAT. ANN. § 504.020 (West 2005).	"A person is not responsible for criminal conduct if at the time of such conduct, as a result of mental illness or retardation, he lacks substantial capacity either to appreciate the criminality of his conduct or *to conform his conduct to the requirements of law*."
Maryland	MD. CODE ANN., [CRIM. LAW] § 3-109 (West 2005).	"A defendant is not criminally responsible for criminal conduct if, at the time of that conduct, the

		defendant, because of a mental disorder or mental retardation, lacks substantial capacity to: (1) appreciate the criminality of that conduct; or (2) *conform that conduct to the requirements of law*."
Massachusetts	n/a	"A person is not responsible forcriminal conduct if at the time of such conduct as a result of mental disease or defect he lacks substantial capacity either to appreciate the criminality [wrongfulness] of his conduct or to *conform his conduct to the requirements of law*." *Commonwealth v. McHoul,* 226 N.E. 2d 556, 558 (Mass. 1967).
Michigan	MICH. COMP. LAWS ANN. § 768.21(a) (West 2005).	"An individual is legally insane if, as a result of mental illness . . . or as a result of being mentally retarded . . . that person lacks substantial capacity either to appreciate the nature and quality or the wrongfulness of his or her conduct or *to conform his or her conduct to the requirements of the law*."
New Mexico	N.M. STAT. ANN. § 14-51-01 (West 2005).	"The defendant was insane at the time of the commission of the crime if, because of a mental disease, as explained below, the defendant: did not know what [he] [she] was doing or understand the consequences of [his] [her] act, [or] did not know that [his] [her] act was wrong, [or] *could not prevent [himself] [herself] from committing the act* . . . ."
Ohio	n/a	An accused is not guilty by reason of insanity if, "at the time of the criminal act, he did not know that such act was wrong *or he did not have the ability to refrain from*

		doing that act." *State v. Anders*, 277 N.E.2d 554, 556 (Ohio 1972).
Oregon	OR. REV. STAT. ANN. § 161.295 (West 2005).	"A person is guilty except for insanity if, as a result of mental disease or defect at the time of engaging in criminal conduct, the person lacks substantial capacity either to appreciate the criminality of the conduct or *to conform the conduct to the requirements of law.*"
Rhode Island	n/a	"A person is not responsible for criminal conduct if at the time of such conduct, as a result of mental disease or defect, his capacity either to appreciate the wrongfulness of his conduct or *to conform his conduct to the requirements of law is so substantially impaired that he cannot justly be held responsible.*" *State v. Johnson*, 399 A.2d 469, 476 (R.I. 1979).
Vermont	VT. STAT. ANN. tit. 13, § 4801 (2004).	"A person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or defect he lacks adequate capacity either to appreciate the criminality of his conduct or *to conform his conduct to the requirements of law.*"
Virginia	n/a	Virginia recognizes the irresistible impulse doctrine. The defense is applicable only where the defendant's mind has become "so impaired by disease that the accused is *totally deprived of the mental power to control or restrain his or her acts.*" *Godley v. Commonwealth,* 343 S.E.2d 368, 373 (Va. App. Ct. 1986).
West Virginia	n/a	"When a defendant in a criminal case raises the issue of insanity, the test of defendant's

		responsibility for act is whether, at time of commission of act, the act was the result of a mental disease or defect causing the defendant to lack the capacity either to appreciate the wrongfulness of his/her act or *to conform his/her acts to the requirements of law*." *State v. Lockhart*, 490 S.E.2d 298, 302 (W. Va. 1997).
Wisconsin	WIS. STAT. ANN. § 971.15 (West 2005)	"A person is not responsible for criminal conduct if at the time of such conduct as a result of mental disease or defect the person lacked substantial capacity either to appreciate the wrongfulness of his or her conduct or *conform his or her conduct to the requirements of law*."
Wyoming	WYO. STAT. ANN. § 7-11-304 (1977).	"A person is not responsible for criminal conduct if at the time of the criminal conduct, as a result of mental illness or deficiency, he lacked substantial capacity either to appreciate the wrongfulness of his conduct or *to conform his conduct to the requirements of law*."