

THE RIGHT TO SILENCE AS PROTECTING MENTAL CONTROL

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I. INTRODUCTION

This Article examines the idea that individuals have a moral and constitutional right of control over the use of their thoughts vis-à-vis the state. As a point of departure, I consider the prospect of a forensic neuroimaging device that was capable of eliciting recall and recognition from a criminal suspect without the suspect's having even to answer an interrogator's question. Reflection on government access to this sort of interrogation technique suggests that the state should be prohibited from either extracting a person's thoughts without her consent or making use of her compelled thoughts to lay criminal blame upon her.

Though neither judges nor scholars have defended this account of the right to silence in explicit terms, the notion of "mental control" I shall develop here underlies much that is assumed about the relation

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between the Fifth Amendment and the values of freedom and privacy. Advances in cognitive science and neurotechnology, by promising the acquisition of incriminating information from a person's brain in a way that avoids traditional concerns about physical or psychological harm, bring the moral and legal significance of mental control into sharp relief.

This Article proceeds in four parts. Part I briefly lays out the normative stakes and shows why existing accounts of the constitutional privilege against self-incrimination are ill-equipped to address the moral and legal implications of safe and reliable forensic neuroscience. Part II argues that brain imaging is importantly different, for Fifth Amendment purposes, from all other forms of evidence, such as speaking, writing, and nodding;¹ photographic and video evidence;² DNA, fingerprint and breathalyzer tests;³ hair, saliva, and blood samples;⁴ voice and handwriting exemplars for identification;⁵ appearance in a lineup⁶ or wearing certain clothing;⁷ and even polygraph tests.⁸ What makes brain imaging unique is that it enables state officials to obtain information directly from a suspect's brain, in a way that affords her no opportunity to control the transmission of that information.

Part III examines the doctrinal distinction between “testimonial” evidence, which is privileged by the Self Incrimination Clause, and “physical” evidence, which is not. Three elements—compulsion, incrimination, and testimony—must be present to trigger Fifth Amendment protection.⁹ Since brain imaging could straightforwardly

1. See, e.g., *Schmerber*, 384 U.S. at 763.

2. See, e.g., *People v. Hines*, 938 P.2d 388 (Cal. 1997) (videos); *Edwards v. Butler*, 882 F.2d 160 (5th Cir. 1989) (photographs).

3. See, e.g., *Wisconsin v. Santana-Lopez*, 613 N.W. 2d 918 (Wis. Ct. App. 2000) (DNA); *People v. Shaw*, 531 N.E.2d 650, 651 (1988) (breathalyzer); *Palmer v. State*, 604 P.2d 1106 (Alaska 1979) (breathalyzer).

4. See *Schmerber*, 384 U.S. at 757; *State v. Athan*, 158 P.3d 27 (Wash. 2007) (saliva).

5. See, e.g., *United States v. Dionisio*, 410 U.S. 1 (1973) (voice); *United States v. Wade*, 388 U.S. 218 (1967) (voice); *Doe v. United States*, 487 U.S. 201 (1988) (handwriting); *United States v. Mara*, 410 U.S. 19 (1973) (handwriting); *United States v. Euge*, 444 U.S. 707 (1980) (handwriting); *Gilbert v. California*, 388 U.S. 263 (1967) (handwriting).

6. See, e.g., *Wade*, 388 U.S. at 218; see also *Schmerber*, 384 U.S. at 764, 764 n.8 (affirming that Fifth Amendment does not protect against incriminating compulsion “to stand, to assume a stance, to walk, or to make a particular gesture”).

7. See, e.g., *Holt v. United States*, 218 U.S. 245 (1910).

8. See, e.g., *United States v. Scheffer*, 523 U.S. 303 (1998) (holding that a *per se* exclusion of polygraph evidence in a military court does not violate the Sixth Amendment right to present a defense).

9. See *Fisher v. United States*, 425 U.S. 391, 408 (1976). In addition to the compulsion, incrimination, and testimony elements, a Fifth Amendment case must also arise under a matter of criminal law. See *Chavez v. Martinez*, 538 U.S. 760, 766-67 (2003). Therefore, the privilege does

qualify as both compelled and incriminating, as in the India murder case above, the critical question is whether it counts as “testimonial.”¹⁰ This Part argues that the Supreme Court counts evidence as “testimonial” only when it conveys a suspect’s intention to communicate her thoughts.¹¹ The Court’s traditional understanding of this distinction likely leaves a suspect without constitutional protection against the use of compelled brain imaging to extract incriminating information from her brain.

Part IV argues that the physical/testimonial distinction presupposes a flawed conception of mind/body dualism.¹² Exposing this dualism reveals the normative significance we confer to a suspect’s control over his thoughts against unwanted use by the government. It is for this reason that the constitutional right to silence protects against involuntary disclosures of knowledge or understandings from an unwilling suspect for use in criminal prosecution against him. The use of compelled neuroscientific evidence is illegitimate when it deprives the accused of control over her mental life. This suggests that defendants may opt for brain imaging to exculpate themselves, but that prosecutors may not comment on a suspect’s decision to decline the testing, and that judges should instruct jurors not to draw adverse inferences from a choice to decline the testing.

II. THE PRIVILEGE AGAINST COMPELLED SELF-INCRIMINATION

Imagine a safe, painless, and non-invasive interrogation device that could ascertain thoughts and memories from an uncooperative suspect with virtually 100% precision. Would the use of this incriminating information to prosecute the suspect violate his right to silence?¹³ The prospect of reliable truth detection is, to date, an unqualified fiction, since even the most sophisticated technologies remain largely untested

not apply when the compelled information would lead to exclusively non-criminal sanctions, such as the loss of a job or a license.

10. See *Schmerber v. California*, 384 U.S. 757, 763-64 (1966).

11. See *Pennsylvania v. Muniz*, 496 U.S. 582, 589 (1990).

12. See Charles B. Nemeroff et al., Editorial, *Functional Brain Imaging: Twenty-First Century Phrenology or Psychobiological Advance for the Millennium?* 156 AM. J. PSYCHIATRY 671, 672 (1999) (“Neuroimaging offers a powerful probe of brain state, but we are now faced with metaphysical questions; i.e., what is a brain state, and how is it related to the outward manifestations of behavior? This has the potential for degenerating into the old mind-body duality of Descartes . . .”).

13. See Henry T. Greely, *Prediction, Litigation, Privacy, and Property: Some Possible Legal and Social Implications of Advances in Neuroscience*, in NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE 114, 146 (Brian Garland ed., 2004).

and prone to error. But advances in cognitive neuroscience, which make it possible to measure the properties and processes of the brain in high-resolution imagery, invite us to consider this question. Brain imaging test results were admitted into evidence in a recent murder case in India.

In June 2008, police in Maharashtra, India took 24-year-old student Aditi Sharma into custody as a suspect in the murder of her former fiancé, Udit Bharati.¹⁴ Sharma and Bharati had been living together in Pune when Sharma met another man and eloped with him to Delhi. The following year, Sharma returned to Pune, where, according to prosecutors, she asked Bharati to meet her at a McDonald's and laced his food with arsenic. Bharati died from the poisoning. Sharma insisted she was innocent.

Police read Sharma her rights and asked her to sit for a brain imaging test. Sharma agreed to the test. Officers strapped her onto a high-tech gurney and fastened 32 electrodes to her head. The sensors measured electrical brainwaves in response to targeted stimuli. Investigators read Sharma first-person statements that corresponded to their theory of the crime, as well as neutral statements to help the software distinguish between Sharma's actual remembrance and her normal cognition. Sharma said nothing in reply, but the sensors were able to measure and display her brainwave patterns to confirm that she knew some of the statements were true and that some were false.

"I bought arsenic," they said. And, "I met Udit at McDonald's." For an hour, Sharma did nothing. But the parts of her brain where memories are thought to be stored lit up on the screen when she heard these statements. At the murder trial, the brain scans were admitted into evidence. These neuroscientific test results persuaded Judge S.S. Phansalkar-Joshi that Sharma had "experiential knowledge" of having committed the murder. Sharma was convicted and sentenced to life in prison.¹⁵

Assume, for the sake of argument, that the brain imaging technique used in this case was highly reliable. Many people may nevertheless think that police committed a grave moral and legal wrong by coercing the disclosure of Sharma's thoughts.¹⁶ The Supreme Court has

14. See Anand Giridharadas, *Brain Scan a New Wave in Criminal Evidence*, INT'L HERALD TRIB., Sept. 8, 2008, at 1; Anand Giridharadas, *India's Novel Use of Brain Scans in Courts is Debated*, N.Y. TIMES, Sept. 14, 2008, at A8.

15. See *supra* note 14.

16. See Sarah E. Stoller & Paul Root Wolpe, *Emerging Neurotechnologies for Lie Detection and the Fifth Amendment*, 33 AM. J. L. & MED. 359, 371 (2007) ("[D]irect and unwanted government access to our mental life is a chilling concept.").

speculated that the involuntary transmission of incriminating lie-detection evidence would violate a suspect's right to silence.¹⁷ "To compel a person to submit to testing in which an effort will be made to determine his guilt or innocence on the basis of physiological responses, whether willed or not," Justice Brennan wrote in dicta for a 5-4 majority in the 1966 case of *Schmerber v. California*,¹⁸ "is to evoke the spirit and history of the Fifth Amendment."¹⁹ Although the compelled-response standard that Justice Brennan gestured toward in *Schmerber* was not binding then, and is not applied by courts today, its widespread appeal and influence remains.²⁰ Presuming that neuroscience test results were sufficiently reliable, however, existing accounts of the privilege against compelled self-incrimination provide no support for Justice Brennan's reflections. This mismatch between right-to-silence principles, on the one hand, and, on the other, widely held intuitions that the Fifth Amendment should protect against compelled brain imaging, is the anomaly that propels this inquiry into the implications of forensic neuroscience for the Self-Incrimination Clause.

Justification for the right to silence is fraught with murkiness. Many have observed an "ambiguous and sometimes contradictory picture of the reasons underlying the Fifth Amendment's enactment."²¹ The privilege against compelled self-incrimination has origins as a safeguard against government abuses such as the Roman Inquisition, Star Chamber, and ex officio oaths of the ecclesiastical courts, long forsaken in the modern judiciary.²² Commentators have referred to the

17. The Self-Incrimination Clause of the Fifth Amendment provides that "[n]o person . . . shall be compelled in any criminal case to be a witness against himself . . ." U.S. CONST. amend. V.

18. 384 U.S. 757, 764 (1966).

19. *Id.*

20. *See infra* Part II.

21. Peter Arenella, *Schmerber and the Privilege Against Self-Incrimination: A Reappraisal*, 20 AM. CRIM. L. REV. 31, 36 (1982) (citing LEONARD W. LEVY, *ORIGINS OF THE FIFTH AMENDMENT: THE RIGHT AGAINST SELF-INCRIMINATION* (1968)); E.M. Morgan, *The Privilege Against Self-Incrimination*, 34 MINN. L. REV. 1 (1949); R. Carter Pittman, *The Colonial and Constitutional History of the Privilege Against Self-Incrimination in America*, 21 VA. L. REV. 763 (1935); *see also* R.H. Helmholz, *Introduction*, in *THE PRIVILEGE AGAINST SELF-INCRIMINATION: ITS ORIGINS AND DEVELOPMENT* 6 (R.H. Helmholz et al. eds., 1997) ("Despite its reputation as a foundation stone of common law jurisprudence, . . . the privilege as we know it is actually the product of relatively recent choice.") (citations omitted).

22. *See Ullmann v. United States*, 350 U.S. 422, 428 (1956); *Muniz*, 496 U.S. at 595-98; *Doe v. United States*, 487 U.S. 201, 212 (1988); *see generally* Frank Riebli, *The Spectre of Star Chamber: The Role of an Ancient English Tribunal in the Supreme Court's Self-Incrimination Jurisprudence*, 29 HASTINGS CONST. L.Q. 807 (2002).

privilege as “schizophrenic,”²³ an “unsolved riddle of vast proportions, a Gordian knot in the middle of our Bill of Rights”²⁴ that is incapable of “be[ing] squared with any rational theory.”²⁵ Even the Supreme Court has conceded that while the right to silence is “an expression of the moral striving of the community[,] . . . a reflection of our common conscience,”²⁶ it remains unclear “just what it is supposed to do or just whom it is intended to protect.”²⁷

Scholars and judges have articulated a number of ways to justify the right to silence. Five are most prominent and compelling: (1) non-reliance on presumptively unreliable evidence²⁸ which “the accused reasonably believes . . . is within his power to affect the probative value of the evidence sought;”²⁹ (2) preservation of the credibility of innocent defendants;³⁰ (3) protection of innocents who fear poor performance on cross-examination;³¹ (4) pardon of suspects who make a reasonable decision to lie in their own defense,³² and (5) what scholars have called the “original American justification”³³—avoidance of the “cruel trilemma” that forces a suspect to choose among self-accusation, contempt of court, and perjury.³⁴ Assuming that neuroforensic technology was sufficiently reliable, however, none of these ways of

23. Stephen J. Shulhofer, *Some Kind Words for the Privilege Against Self-Incrimination*, 26 VAL. U. L. REV. 311, 311 (1992).

24. Akhil Reed Amar & Renee B. Lettow, *Fifth Amendment First Principles: The Self-Incrimination Clause*, 93 MICH. L. REV. 857, 857 (1995).

25. William J. Stuntz, *Self-Incrimination and Excuse*, 88 COLUM. L. REV. 1227, 1228 (1988).

26. *Malloy v. Hogan*, 378 U.S. 1, 9 n.7 (1964) (quoting DEAN ERWIN GRISWOLD, *THE FIFTH AMENDMENT TODAY* 73 (1955)).

27. *Murphy v. Waterfront Comm’n of N.Y. Harbor*, 378 U.S. 52, 56 n.5 (1964) (quoting Harry Kalven, Jr., *Invoking the Fifth Amendment—Some Legal and Impractical Considerations*, 9 BULL. ATOMIC SCIENTISTS 181, 182 (1953)).

28. See Amar & Lettow, *supra* note 24.

29. B. Michael Dann, *The Fifth Amendment Privilege against Self-Incrimination: Extorting Physical Evidence from a Suspect*, 43 S. CAL. L. REV. 597, 598 (1970) (arguing that the Self-Incrimination Clause protects against psychologically intrusive compulsion of evidence).

30. See Daniel J. Seidman & Alex Stein, *The Right to Silence Helps the Innocent: A Game-Theoretic Analysis of the Fifth Amendment Privilege*, 114 HARV. L. REV. 430 (2000).

31. See Craig M. Bradley, *Griffin v. California: Still Viable After All These Years*, 79 MICH. L. REV. 1290, 1294 (1981) (arguing that innocent defendants may choose not to testify at trial to avoid adverse inferences on cross-examination as a result of anxiety, confusion, or prior convictions).

32. Stuntz, *supra* note 25, at 1228-29.

33. See William T. Pizzi & Morris B. Hoffman, *Taking Miranda’s Pulse*, 58 VAND. L. REV. 813, 843 (2005); see also Peter Westen & Stewart Mandell, *To Talk, To Balk, or To Lie: The Emerging Fifth Amendment Doctrine of the “Preferred Response,”* 19 AM. CRIM. L. REV. 521, 535-40 (1982).

34. *Murphy v. Waterfront Comm’n of N.Y. Harbor*, 378 U.S. 52, 55 (1964). See also *Chavez v. Martinez*, 538 U.S. 760, 767 (2003); *Pennsylvania v. Muniz*, 496 U.S. 582, 596 (1990).

thinking about the privilege would bar the compelled use of certain brain imaging techniques to extort information from a criminal suspect's brain.³⁵

Consider the implications of reliable brain imaging evidence for each of the justifications above. (1) Reliability concerns fall away with an accurate brain imaging technique because "an effective and reliable lie detector test deprives the individual of any opportunity to deceive the questioner."³⁶ (2) Anxiety about the integrity of statements made by innocent defendants is put to rest by an assurance that brain imaging could accurately detect memories and capture truthfulness. (3) There would be no reason to worry about innocent defendants getting flustered by skillful prosecutors when neither the subject nor the examiner exercised any control over the results of the test. (4) Nor would the excuse theory have protected the suspect Sharma because "there [was] no falsehood to excuse and therefore no need to immunize noncooperation."³⁷ (5) And since neuroscience techniques could reliably access Sharma's responses in the absence of her participation, police were able to obtain the incriminating information without her being put to any choice among indictment, contempt, and perjury. So there was no threat that Sharma would incur the psychological cruelty thought to accompany a decision about whether to consent to her own punishment.

If we nonetheless recoil from the use of neurotechnology to extract thoughts from an unwilling suspect, it will not do simply to affirm that involuntary brain imaging "shocks the conscience" much like the stomach pumping in *Rochin v. California*.³⁸ Alternatively, we could shake off our disquiet as so much confusion and try to fit forensic neuroscience into the existing jurisprudence. Some scholars apply common law distinctions to argue that brain imaging techniques are unlikely to qualify for Fifth Amendment protection,³⁹ while others make the case that compelled neuroforensics could be readily protected by reference to the line of right-to-silence opinions in the wake of

35. See Michael S. Pardo, *Neuroscience Evidence, Legal Culture, and Criminal Procedure*, 33 AM. J. CRIM. L. 301, 333 (2006).

36. Arenella, *supra* note 21, at 44-45 n.70.

37. Stuntz, *supra* note 25, at 1276.

38. 342 U.S. 165, 172 (1952). See Sean Kevin Thompson, *A Brave New World of Interrogation Jurisprudence*, 33 AM. J. L. & MED. 341, 353 (2007).

39. See Stoller & Wolpe, *supra* note 16, at 369 ("[I]f control over results is a defining element of a testimonial act, brain fingerprinting would not qualify as such."); Ronald J. Allen & M. Kristin Mace, *The Self-Incrimination Clause Explained and Its Future Predicted*, 94 J. CRIM. L. & CRIMINOLOGY 243, 246 (2004) (providing a theory of the Self-Incrimination Clause that protects the "substantive content of cognition").

Schmerber.⁴⁰ No matter how descriptive or predictive these approaches prove, as a matter of doctrine they remain morally unsatisfying to the extent that they are “not normative or justificatory.”⁴¹ Explanatory theories might account for Fifth Amendment doctrine in a convincing way, but because they accept extant case law as legitimate and fixed, their understanding of the right to silence must be tailored to capture even anomalous or undesirable holdings. Yet the possibility that reliable brain imaging would be admitted in the courtroom invites us to rethink prevailing understandings of the privilege against compelled self-incrimination.

III. COGNITIVE NEUROSCIENCE AND FORENSIC EVIDENCE

Attempts to detect lies in criminal suspects date back thousands of years.⁴² In 900 B.C., Hindu interrogators sought to identify deceitful behavior in criminal suspects by looking for physiological markers—cagey movements, facial discoloration, or “speak[ing] nonsense, rub[b]ing the great toe along the ground, and shiver[ing]”—that were thought to correspond to a deceitful state of mind.⁴³ Centuries later, the ordeals of Christian Europe sought to expose the guilty through supernatural intervention that rarely saved the accused from hot irons, boiling water, or drowning.⁴⁴ Nineteenth-century Europe and the United States saw the rise of phrenology to detect honest or deceptive character by measuring the shape and contours of a subject’s head.⁴⁵ Brain imaging heralds a step in this project.

Contrary to some media portrayals,⁴⁶ neurotechnologies cannot read minds.⁴⁷ Even the most advanced devices are not capable of

40. George M. Dery, *Lying Eyes: Constitutional Implications of New Thermal Imaging Lie Detection Technology*, 31 AM. J. CRIM. L. 217, 248 (2004) (drawing on dicta in *Schmerber* to argue that the use of involuntarily transmitted information to incriminate a suspect in a criminal trial is “squarely within the scope of the Fifth Amendment[,]” while noting, however, that “Justice Brennan’s ruminations on lie detectors” were not within the Court’s holding) (citation omitted). Ronald Allen and Kristin Mace take a similar approach. Allen & Mace, *supra* note 39.

41. Allen & Mace, *supra* note 39, at 248.

42. Jeremy A. Blumenthal, *A Wipe of the Hands, A Lick of the Lips: The Validity of Demeanor Evidence in Assessing Witness Credibility*, 72 NEB. L. REV. 1157, 1166 (1993).

43. Paul V. Trovillo, *History of Lie Detection*, 29 J. CRIM. L. & CRIMINOLOGY 848, 849 (1939).

44. See George Fisher, *The Jury’s Rise as Lie Detector*, 107 YALE L.J. 575, 585-86 (1997).

45. See Pierre Schlag, *Law and Phrenology*, 110 HARV. L. REV. 877, 880 (1997).

46. See, e.g., Jerry Adler, *Mind Reading*, NEWSWEEK, Aug. 9, 2004, at 42, available at <http://www.newsweek.com/id/54762> (regarding fMRI lie detection); Dennis O’Brien, *Mind Readers: Scanning Technology Promises to Map the Brain’s Pathways, but Some Fear Its Ability to Expose a Patient’s Secrets and Lies*, BALTIMORE SUN, Dec. 10, 2004, at 1E.

ascertaining a subject's moral beliefs, religious convictions, or aspirations for the future.⁴⁸ Nor can they establish any objective fact about some state of affairs in the world.⁴⁹ What brain imaging promises, instead, is to determine a subject's sensory recall or perceived recognition—what a subject believes he saw, heard, or knows—about a particular set of facts or about the state of past events.⁵⁰ In a landmark 2002 study, Dr. Daniel Langleben and colleagues asked participants in a magnetic resonance imaging (MRI) study to conceal the identity of a five of clubs, while images of different playing cards appeared on the screen along with the question whether the featured card was the one in the subjects' hand.⁵¹ Langleben and colleagues found conspicuous differences between patterns of brain activity when subjects truthfully denied having other cards and when they falsely denied having the five of clubs.⁵² Subsequent studies successfully replicated Langleben's results.⁵³ Further investigation has determined that truthful behavior, because it is spontaneously facilitated, requires less cognitive control and the use of fewer brain regions (primarily the hippocampus and left prefrontal cortex, which store and regulate memory) than does deceptive behavior, which utilizes greater cognitive control in discrete premotor brain regions to produce the inhibitory feedback and conscious calculation necessary to generate new (false) "memories."⁵⁴

47. See O'Brien, *supra* note 46.

48. See Donald Kennedy, *Neuroimaging: Revolutionary Research Tool or a Post-Modern Phrenology?*, 5 AM. J. BIOETHICS 19 (2005).

49. As Martha J. Farah and Paul Root Wolpe put it: "Although brainwaves do not lie, neither do they tell the truth; they are simply measures of brain activity." Martha J. Farah & Paul Root Wolpe, *Monitoring and Manipulating Brain Function: New Neuroscience Technologies and Their Ethical Implications*, HASTINGS CENTER REP., May-June 2004, at 35, 40.

50. See Craig E.L. Stark & Larry R. Squire, *Functional Magnetic Resonance Imaging (fMRI) Activity in the Hippocampal Region During Recognition Memory*, 20 J. NEUROSCIENCE 7776, 7776 (2000); John D.E. Gabrieli, *Functional Neuroimaging of Episodic Memory*, in HANDBOOK OF FUNCTIONAL NEUROIMAGING OF COGNITION 262 (Roberto Cabeza & Alan Kingstone eds., 2001).

51. See Daniel D. Langleben et al., *Brain Activity During Simulated Deception: An Event-Related Functional Magnetic Resonance Study*, 15 NEUROIMAGE 727, 729 (2002).

52. See *id.* at 731.

53. See K. Luan Phan et al., *Neural Correlates of Telling Lies: A Functional Magnetic Resonance Imaging Study at 4 Tesla*, 12 ACAD. RADIOLOGY 164, 171 (2005).

54. See, e.g., Daniel D. Langleben et al., *Telling Truth from Lie in Individual Subjects with Fast Event-Related fMRI*, 26 HUM. BRAIN MAPPING 262, 262 (2005); Jennifer Marie Nunez et al., *Intentional False Responding Shares Neural Substrates with Response Conflict and Cognitive Control*, 25 NEUROIMAGE 267, 267 (2005); F. Andrew Kozel et al., *A Pilot Study of Functional Magnetic Resonance Imaging Brain Correlates of Deception in Healthy Young Men*, 16 J. NEUROPSYCHIATRY & CLINICAL NEUROSCIENCES 295 (2004); Frank Andrew Kozel et al., *A Replication Study of the Neural Correlates of Deception*, 118 BEHAV. NEUROSCIENCE 852, 855 (2004); Giorgio Ganis et al., *Neural Correlates of Different Types of Deception: An fMRI*

There are two classes of brain imaging devices that can be used for purposes of memory detection.⁵⁵ The first class seeks to measure blood flow patterns in the brain;⁵⁶ the second measures electrical activity patterns in the brain.⁵⁷ The first class of techniques relies on the fact that blood flow in the brain differs when people lie as compared with when they tell the truth.⁵⁸ Blood flow patterns reflect metabolic and circulatory adjustment resulting from increased brain activity, independent of whether the subject makes any effort to conceal a memory.⁵⁹ Brain imaging techniques take advantage of neural differences between truthful and deceptive behavior by measuring how much blood is flowing to different parts of the brain in response to targeted stimuli.⁶⁰ The most commonly used method for measuring blood flow in the brain, called functional Magnetic Resonance Imaging (fMRI), uses a powerful magnet to identify changes in blood oxygenation that occur when a person performs a mental activity, such as viewing an image, answering a question, listening to a voice, or telling a story.⁶¹ fMRI then projects a graphic representation of brain activity with resolution that is an order of magnitude greater than what

Investigation, 13 CEREBRAL CORTEX 830, 836 (2003); Sean A. Spence et al., *Behavioural and Functional Anatomical Correlates of Deception in Humans*, 12 NEUROREPORT 2849, 2850 (2001).

55. See Robin Marantz Henig, *Looking for the Lie*, N.Y. TIMES, Feb. 5, 2006, § 6, at 47; Joan O’C. Hamilton, *Journey to the Center of the Mind: ‘Functional’ MRI Is Yielding a Clearer Picture of What Thoughts Look Like*, BUS. WK., Apr. 19, 2004, at 78; Faye Flam, *Your Brain May Soon Be Used Against You*, PHILA. INQUIRER, Oct. 29, 2002, at A01

56. See John-Dylan Haynes et al., *Reading Hidden Intentions in the Human Brain*, 17 CURRENT BIOLOGY 323 (2007); Paul Root Wolpe et al., *Emerging Neurotechnologies for Lie-Detection: Promises and Perils*, 5 AM. J. BIOETHICS 39, 39 (2005); *Investigative Techniques—Federal Agency Views on the Potential Application of “Brain Fingerprinting,”* GAO REP. (Rep. No. GAO-02-22), Oct. 31, 2001, available at 2001 WL 1560280

57. Carter Snead has distinguished “anatomical” neuroimaging techniques (those that are “limited to the observation of the brain’s architecture”) from “functional” techniques (those that “permit [] the construction of computerized images that measure the brain’s activity with varying degrees of temporal and anatomical resolution, depending on the technology employed.”). O. Carter Snead, *Neuroimaging and the “Complexity” of Capital Punishment*, 82 N.Y.U. L. REV. 1265, 1281 (2007) (citation omitted).

58. See Luis Hernandez et al., *Temporal Sensitivity of Event-Related fMRI*, 17 NEUROIMAGE 1018, 1025 (2002).

59. See Steven D. Forman et al., *Improved Assessment of Significant Activation in Functional Magnetic Resonance Imaging (fMRI): Use of a Cluster-Size Threshold*, 33 MAGNETIC RESONANCE MED. 636 (1995).

60. F. Andrew Kozel et al., *Detecting Deception Using Functional Magnetic Resonance Imaging*, 58 BIOLOGICAL PSYCHIATRY 605, 611 (2005).

61. See David G. Norris, *Principles of Magnetic Resonance Assessment of Brain Function*, 23 J. MAGNETIC RESONANCE IMAGING 794, 794 (2006); RICHARD B. BUXTON, AN INTRODUCTION TO FUNCTIONAL MAGNETIC RESONANCE IMAGING: PRINCIPLES AND TECHNIQUES 23-45 (2002).

was not long ago the most precise brain imaging technology, the Positron Emission Tomography (PET) scan.⁶²

The reliability of fMRI is not uncontroversial.⁶³ While a private company called “No Lie MRI” purports to achieve 90% accuracy in detecting deception,⁶⁴ critics note the low number of research subjects studied in widely cited fMRI research experiments.⁶⁵ Some experts suggest that the changes in blood flow that fMRI measures are too small to yield any significant information about the content of activity in the brain.⁶⁶ Others argue that increased blood flow could result from neurological processes other than efforts to conceal, including a subject’s anxiety with the claustrophobic machine or an emotional state that is heightened for some other reason unrelated to the cognitive processes for which the fMRI tests.⁶⁷ Still others claim that blood flow patterns do not actually signify output activity in the brain at all, but rather input activity.⁶⁸ Furthermore, since the fMRI machine requires that a subject’s head remain still for several hours, even a small physical movement can impede the scanner’s ability to obtain data on blood flow patterns.⁶⁹ Finally, fMRI may call for voluntary participation from a subject who must be willing to answer a question or otherwise register a

62. See Feroze B. Mohamed et al., *Brain Mapping of Deception and Truth Telling About an Ecologically Valid Situation: Functional MR Imaging and Polygraph Investigation—Initial Experience*, 238 *RADIOLOGY* 679 (2006).

63. See Margaret Talbot, *Duped*, *NEW YORKER*, June 2, 2007, at 52-61.

64. See Henry T. Greely & Judy Illes, *Neuroscience-Based Lie Detection: The Urgent Need for Regulation*, 33 *AM. J.L. & MED.* 377, 392 (2007) (citing No Lie MRI, Market Opportunities, <http://www.noliemri.com/investors/MarketOpportunity.htm> (last visited Feb. 10, 2009)).

65. See David I. Donaldson, *Parsing Brain Activity with fMRI and Mixed Designs: What Kind of a State is Neuroimaging in?*, 27 *TRENDS IN NEUROSCIENCES* 442 (2004).

66. See Sandra Blakeslee, *Just What’s Going On Inside that Head of Yours?*, *N.Y. TIMES*, Mar. 14, 2000, at F6.

67. Orrin Devinsky and Mark D’Esposito explain:

When a subject performs a task during imaging, it is difficult to demonstrate conclusively that he or she is differentially engaging a single, identified cognitive process. The subject may engage in unwanted cognitive processes that either have no overt, measurable effects or are perfectly confounded with the process of interest. Consequently, the neural activity measured by the functional neuroimaging technique may result from some confounding neural computation that is itself not necessary for executing the cognitive process under study.

ORRIN DEVINSKY & MARK D’ESPOSITO, *NEUROLOGY OF COGNITIVE AND BEHAVIORAL DISORDERS* 53-54 (Oxford U.P. 2003).

68. See Sandie Cleland, *What Does fMRI Actually Measure?*, 17 *PSYCHOLOGIST* 388 (2004).

69. See Randy L. Buckner & Jessica M. Logan, *Functional Neuroimaging Methods: PET and fMRI*, in *HANDBOOK OF FUNCTIONAL NEUROIMAGING OF COGNITION* 28, 30 (Robert Cabeza & Alan Kingstone eds., 2001).

response to specific stimuli.⁷⁰ For the second class of neurotechnologies, however, there is no need for a subject's cooperation in order to acquire information from his or her brain.⁷¹

This second class of technologies relies on the fact that every piece of information in a person's brain is stored by specific neurons, which fire when the brain recognizes that information, producing electrical activity.⁷² This electrical activity is a direct measure of information-processing in the brain.⁷³ Neurotechnologies can measure these electrical brainwaves through the use of electroencephalographic (EEG) sensors attached to the scalp.⁷⁴ By measuring electrical brainwaves in response to targeted stimuli, the EEG technique, also known as "brain fingerprinting," can ascertain the presence or absence of information in a subject's brain, thereby confirming or denying the subject's familiarity with a particular event or image, such as a photograph of a crime scene, victim's face, or murder weapon under investigation.⁷⁵ Other neuroimaging techniques within this second class, including functional near-infrared light technology (fNIR), which reflects infrared light off the frontal cortex,⁷⁶ and thermographic technology, which detects heat emanating from the skin of the face,⁷⁷ are less reliable than EEG.

Brain fingerprinting suffers from limited testing outside of the laboratory⁷⁸ as well as empirical shortcomings, including the risk of false negative and false positive results.⁷⁹ Because the EEG sensors measure electrical activity associated with recognition, the subject needs to have retained the targeted information in his or her brain for brain fingerprinting to work.⁸⁰ If the subject has experience with the targeted

70. See Scott M. Hayes et al., *An fMRI Study of Episodic Memory: Retrieval of Object, Spatial, and Temporal Information*, 118 BEHAV. NEUROSCIENCE 885, 886 (2004).

71. See Jonathan Knight, *The Truth About Lying*, 428 NATURE 692, 692-94 (2004).

72. See Kenneth R. Foster et al., *Bioethics and the Brain*, 40 IEEE SPECTRUM 34, 36 (2003).

73. See Helen Pearson, *Lure of Lie Detectors Spooks Ethicists*, 441 NATURE 918, 918-19 (2006).

74. Brain Fingerprinting Laboratories, Scientific Procedure, Research, and Applications, <http://www.brainwavescience.com/TechnologyOverview.php> (last visited July 29, 2008).

75. See *id.*

76. Meltem Izzetoglu et al., *Functional Near-Infrared Neuroimaging*, IEEE TRANSACTIONS ON NEURAL SYSTEMS REHABILITATION ENGINEERING 153, 156-58 (2005).

77. See Dean A. Pollina et al., *Facial Skin Surface Temperature Changes During a "Concealed Information" Test*, 34 ANNALS BIOMED. ENGINEERING 1182, 1183 (2006).

78. See *Slaughter v. State*, 105 P.3d 832, 835 (Okla. Crim. App. 2005) ("[W]e have no real evidence that Brain Fingerprinting has been extensively tested . . .").

79. See Yukiyasu Kamitani & Frank Tong, *Decoding the Visual and Subjective Contents of the Human Brain*, 8 NATURE NEUROSCIENCE 679, 679 (2005).

80. Michael S. Beauchamp, *Functional MRI for Beginners*, 5 NATURE NEUROSCIENCE 397, 398 (2002) (reviewing RICHARD B. BUXTON, AN INTRODUCTION TO FUNCTIONAL MAGNETIC

information, but fails to remember it due to a head injury, for example, the EEG sensors will detect only the subject's incomplete familiarity, producing a false negative.⁸¹ If, on the other hand, the targeted information is familiar to the subject for some reason other than its association with the crime, then a false positive result will follow.⁸² So if the subject happened to collect the same kind of gun as the murder weapon, or if he or she saw a representation of the crime scene on television, then these stimuli would indicate the subject's familiarity with the information in question, even though this conclusion would be misleading.⁸³

In spite of these limitations, brain fingerprinting has been admitted into evidence in a 2003 criminal case, *Iowa v. Harrington*,⁸⁴ which involved voluntary EEG testing in a post-conviction relief action.⁸⁵ In 1977, seventeen year-old Terry Harrington was found guilty of first-degree murder in the shooting death of a retired police officer.⁸⁶ Harrington claimed he had spent the night in question at a concert with friends, several of whom confirmed his alibi at trial.⁸⁷ But one witness, Kevin Hughes, testified that he and Harrington had driven to a dealership that night to steal a car, and that Harrington had shot and killed the retired officer who was working as a night watchman at the lot.⁸⁸ A jury convicted Harrington and sentenced him to life in prison.⁸⁹

RESONANCE IMAGING: PRINCIPLES AND TECHNIQUES (2002) and FUNCTIONAL MAGNETIC RESONANCE IMAGING: AN INTRODUCTION TO METHODS (Peter Jezzard et al. eds., 2001)).

81. See Tom Buller, *Can We Scan for Truth in a Society of Liars?*, 5 AM. J. BIOETHICS 58, 59 (2005).

82. See Fang Fang et al., *Lie Detection with Contingent Negative Variation*, 50 INT'L J. PSYCHOPHYSIOLOGY 247, 252-53 (2003); Kelly Joyce, *Appealing Images: Magnetic Resonance Imaging and the Production of Authoritative Knowledge*, 35 SOC. STUD. SCI. 437, 450 (2005).

83. J. Peter Rosenfeld et al., *Simple, Effective Countermeasures to P300-based Tests of Detection of Concealed Information*, 41 PSYCHOPHYSIOLOGY 205 (2004).

84. 659 N.W.2d 509 (Iowa 2003).

85. See *id.* at 515.

86. See *State v. Harrington*, 284 N.W.2d 244, 245 (Iowa 1979).

87. See *State v. Harrington*, 659 N.W.2d 509, 515 (Iowa 2003); see also Lawrence A. Farwell, *Supplement to Forensic Science Report: Brain Fingerprinting Test on Terry Harrington, Re: State of Iowa vs. Terry Harrington in the Iowa District Court for Pottawattamie County at Council Bluff*, <http://www.brainwavescience.com/HarringtonSupplement.php> (last visited July 29, 2008).

88. See *Harrington*, 284 N.W.2d at 248.

89. See *id.* at 245; see also *Harrington v. State*, 458 N.W.2d 874 (Iowa Ct. App. 1990) (initial post-conviction relief action); *Harrington v. Nix*, 983 F.2d 872, 874 (8th Cir.1993) (federal habeas relief action).

Twenty-three years later, forensic neuroscience gave Harrington another chance.⁹⁰ In 2000, a trial judge admitted exculpatory EEG test results as grounds to open a post-conviction relief claim.⁹¹ After a day-long hearing featuring three expert witnesses, Judge Ternus cited several patents⁹² and publications⁹³ to conclude that the Brain Fingerprinting technique satisfied reliability standards for legal admissibility under *Daubert v. Merrell Dow Pharmaceuticals*.⁹⁴ The neuroscientific expert in *Harrington* was Dr. Lawrence Farwell, the scientist who developed the EEG technique, and founder and chief scientist of Brain Fingerprinting Laboratories.⁹⁵ First, Farwell conducted a test based on

90. See Andre A. Moenssens, *Brain Fingerprinting—Can it be Used to Detect the Innocence of Persons Charged with a Crime?*, 70 U.M.K.C. L. REV. 891, 916 (2002).

91. See *Harrington v. Iowa*, No. PCCV 073247 (Pottawattamie County D.C. Iowa, Nov. 14, 2000). See also *Harrington*, 659 N.W.2d at 515-16 (citing Iowa Code § 822.2(4) (1999)). Cf. *U.S. v. Taveras*, 570 F. Supp. 2d 481, 484 (E.D.N.Y. 2008) (“Confrontation rights and hearsay exclusions in practice are designed to protect defendants against inculpation, not to limit their use for exculpation.” (citing Dale A. Nance, *Allocating the Risk of Error: Its Role in the Theory of Evidence Law*, in 13 LEGAL THEORY 129, 157 (2007) (reviewing ALEX STEIN, FOUNDATIONS OF EVIDENCE LAW (2005)) (“[A] defendant is entitled to adduce in his or her defen[s]e any evidence— hearsay or non-hearsay—if that evidence is the best evidence available.”) (internal alterations omitted).

92. Method and Apparatus for Multifaceted Electroencephalographic Response Analysis (MERA), U.S. Patent No. 5,363,858 (filed May 5, 1993) (issued Nov. 15, 1994); Method and Apparatus for Truth Detection, U.S. Patent No. 5,406,956 (filed Feb. 11, 1993) (issued Apr. 18, 1995); Method for Electroencephalographic Information Detection, U.S. Patent No. 5,467,777 (filed Sep. 15, 1994) (issued Nov. 21, 1995).

93. John J. Allen, William G. Iacono & Kurt D. Danielson, *The Identification of Concealed Memories Using the Event-Related Potential & Implicit Behavioral Methods: A Methodology for Prediction in the Face of Individual Differences*, 29 PSYCHOPHYSIOLOGY 504 (1992); Lawrence A. Farwell & Emanuel Donchin, *The Brain Detector: P300 in the Detection of Deception*, 24 PSYCHOPHYSIOLOGY 434 (1986); Lawrence A. Farwell et al., *Optimal Digital Filters for Long-Latency Components of the Event-Related Brain Potential*, 30 PSYCHOPHYSIOLOGY 306 (1993); Lawrence A. Farwell & Emanuel Donchin, *Talking Off the Top of Your Head: Toward a Mental Prosthesis Utilizing Event-Related Brain Potentials*, 70 ELECTROENCEPHALOGRAPHY & CLINICAL NEUROPHYSIOLOGY 510 (1988); Lawrence A. Farwell & Emanuel Donchin, *The Truth Will Out: Interrogative Polygraphy (“Lie Detection”) with Event-Related Brain Potentials*, 28 PSYCHOPHYSIOLOGY 531 (1991); Lawrence A. Farwell, *Two New Twists on the Truth Detector: Brain-Wave Detection of Occupational Information*, 29 PSYCHOPHYSIOLOGY 20 (1992); Lawrence A. Farwell, *The Brain-Wave Information Detection (BID) System: A New Paradigm for Psychophysiological Detection of Information* (1992) (unpublished Ph.D. dissertation, University of Illinois at Urbana-Champaign).

94. 509 U.S. 579 (1993). In addition to “general acceptability” by the relevant scientific community, *Daubert* standards require rigorous testing, published peer-review, and demonstration of an acceptably low rate of error. See *Daubert*, 509 U.S. at 583, 591-94; see also, *Frye v. United States*, 293 F. 1013, 1014 (C.A.D.C. 1923) (discussing “general acceptability”); *General Electric Co. v. Joiner*, 522 U.S. 136 (1997); *Kumho Tire, Ltd. v. Carmichael*, 526 U.S. 137 (1999).

95. See Brain Fingerprinting Laboratories, <http://www.brainwavescience.com> (last visited July 29, 2008).

details about the crime scene that would be known only to the perpetrator and investigators. The test concluded, with 99.9% confidence, that the information was absent from Harrington's brain.⁹⁶ Then, Farwell tested unique details about the concert that Harrington claimed to have been at on the night of the murder for which he was convicted.⁹⁷ The test found with similar confidence that the information was present.⁹⁸

While the EEG results were not dispositive in Harrington—the Iowa Supreme Court instead granted Harrington a new trial on the basis of a *Brady* violation⁹⁹—when confronted with the test results, the single eyewitness, Kevin Hughes, recanted his testimony and confessed to perjuring himself at the original trial.¹⁰⁰ Upon reversal and remand, the prosecution announced that it was dismissing the case on the grounds that the “admissible evidence which is left after 26 years is not sufficient to sustain a conviction against Mr. Harrington.”¹⁰¹ After 25 years in jail, Terry Harrington was freed. It remains to be seen whether other state or federal courts will admit brain fingerprinting as evidence.

Having reviewed some of the capacities and limitations of the two major classes of neurotechnology and focused attention on the class that measures brainwaves, we are in a position to see what makes neuroforensic techniques such as electroencephalography different from traditional lie-detection methods like the polygraph machine. Polygraphy measures the physiological reactions that follow from emotional responses.¹⁰² These reactions are thought to express themselves as detectable changes in the peripheral nervous system.¹⁰³ While the subject is being interviewed, therefore, the polygraph machine monitors changes in a subject's perspiration (by attaching metal sensors to the fingers or palms), breathing rate (using rubber tubes wrapped around the chest), and blood pressure and heart rate (with an arm cuff).¹⁰⁴ A problem with the polygraph is that a subject may be able to

96. See Farwell, *supra* note 87.

97. *Id.*

98. *Id.*

99. See *Harrington v. State*, 659 N.W.2d 509, 522 (Iowa 2003).

100. Brain Fingerprinting Laboratories, *Brain Fingerprinting Testing Helps to Exonerate Man Falsely Convicted of Murder*, <http://www.brainwavescience.com/HarringtonSummary.php> (last visited July 29, 2008).

101. Mark Siebert, *Free Man*, DES MOINES REG., Oct. 25, 2003, at B8.

102. American Polygraph Association, *Frequently Asked Questions*, <http://www.polygraph.org/faq> (last visited Aug. 20, 2008).

103. *Id.*

104. *Id.*

control and learn to manipulate his or her emotional responses, and hence the physiological reactions that the machine is able to account for.¹⁰⁵ Subjects have been able to “fool” the polygraph machine by using simple counter-measures like stressors, such as flexing muscles or placing tacks in a shoe, to induce or inflate physiological responses, or sedatives, such as barbiturates or minor tranquilizers, to depress the central nervous system and dampen stress reactions.¹⁰⁶ That the polygraph is not immune to bluffing renders the test unreliable for purposes of lie-detection and truth-verification.¹⁰⁷

Neuroscientific forensic technology is not just high-tech polygraphy. Unlike the polygraph test, which gauges a subject’s emotional response to the act of lying, brain imaging techniques ascertain the neurological processes required for a subject’s brain even to produce a lie.¹⁰⁸ The application of cognitive neuroscience enables interrogators to sidestep the peripheral nervous system in order to gain direct access to the workings of the brain.¹⁰⁹ Whereas the polygraph measures controllable physical manifestations of emotional tension, brain fingerprinting techniques measure involuntary brain activation.¹¹⁰

105. See American Psychological Association, *The Truth About Lie Detectors (aka Polygraph Tests)*, PSYCHOL. MATTERS, Aug. 5, 2004, <http://www.psychologymatters.org/polygraphs.html>; Susan McCarthy, *Passing the Polygraph*, SALON, Mar. 2, 2000, <http://archive.salon.com/health/feature/2000/03/02/liedetection/index.html>.

106. See Dan Eggen & Shankar Vedantam, *Polygraph Results often in Question: CIA, FBI Defend Test’s Use in Probes*, WASH. POST, May 1, 2006, at A1.

107. See American Polygraph Association, Polygraph Validity Research, <http://www.polygraph.org/validity-research> (last visited Aug. 20, 2008). The American Polygraph Association (APA), which oversees scientific research and development, establishes methodologies and procedures, and maintains qualifying standards and licensing tests for all polygraph examiners in the United States, suggests that reliability rates for modern polygraph techniques approach ninety-two percent. See *id.* See also *Concerns over Use of Polygraphs: Hearing Before the Senate Committee on the Judiciary*, 107th Cong. 5-8 (2001) (statement of Michael H. Capps, Deputy Director for Developmental Programs, Defense Security Service), available at <http://www.access.gpo.gov> (“There is common agreement in the scientific community that modern polygraph techniques do produce [results] usually in excess of 90% . . . this compares favorably with many other common techniques in the behavioral sciences.”).

108. Tatia M.C. Lee et al., *Lie Detection by Functional Magnetic Resonance Imaging*, 15 HUM. BRAIN MAPPING 157, 163 (2002).

109. G. Ganis et al., *Neural Correlates of Different Types of Deception: An fMRI Investigation*, 13 CEREBRAL CORTEX 830, 830 (2003) (noting that fMRI techniques make it possible to “examine directly the organ that produces lies, the brain”).

110. To the extent that fMRI, like polygraphy, requires the subject to speak his responses to external stimuli provided by the government, this type of neuroforensic technique is somewhat less interesting for purposes of Fifth Amendment inquiry, since spoken communications are generally protected under the privilege. See, e.g., *Doe v. United States*, 487 U.S. 201, 213 (1988) (“The vast majority of verbal statements thus will be testimonial” because “[t]here are very few instances in which a verbal statement, either oral or written, will not convey information or assert facts.”).

The extra “work” that it requires for a subject’s brain to create a new memory occurs independent of stress levels, and cannot be effectively controlled.¹¹¹ The primary cognitive processes that electroencephalography measures are thus far more difficult to dissimulate than the physical manifestation of secondary emotional responses that are measured by the polygraph.¹¹² As one commentator puts it: “[E]ven a trained counter-spy must use creativity and calculation to formulate a new lie, and the most nervous Nellie will use memory to recount an event in her past.”¹¹³ Not only is intentionally bluffing the EEG machine not an option; neither is overriding memory detection unintentionally. Brain fingerprinting can detect even good-faith mistaken responses, since the machine identifies the brain activity required to create the new memory, whether the lie was deliberate or inadvertent.¹¹⁴ Moreover, the use of non-human examiners renders neurotechnologies less vulnerable to test bias than polygraphy.¹¹⁵ Polygraph tests are performed by human interrogation and interpreted by human examiners, whose behavior and judgment can affect test results.¹¹⁶ With EEG, by contrast, the subject is presented test questions on a computer screen and the analysis of brain activity is displayed in high-resolution imaging and performed using computer software.¹¹⁷ All this renders brain fingerprinting far more reliable, or at least potentially so, than traditional lie-detection techniques like polygraph testing.

IV. THE DISTINCTION BETWEEN TESTIMONIAL AND PHYSICAL EVIDENCE

Whether brain fingerprinting is privileged by right-to-silence jurisprudence turns on whether it counts as “testimonial” evidence, which is protected by the Fifth Amendment, or “physical” evidence, which is not. There are three factors—compulsion, incrimination, and

111. See Lee et al., *supra* note 108, at 163 (“controlling one’s cerebral activity to avoid detection is unfeasible”).

112. See *id.*

113. Leo Kittay, Note, *Admissibility of fMRI Lie Detection: The Cultural Bias Against “Mind Reading” Devices*, 72 BROOK. L. REV. 1351, 1355 (2007).

114. Judy Illes & Eric Racine, *Imaging or Imagining? A Neuroethics Challenge Informed by Genetics*, 5 AM. J. BIOETHICS 5, 9-10 (2005).

115. See Paul C. Giannelli, *Polygraph Evidence: Post-Daubert*, 49 HASTINGS L.J. 895, 905 (1998).

116. See *id.* (“The examiner’s role cannot be overstated, because it is the examiner who decides whether there is sufficient indication of deception.”).

117. Steve Silberman, *Don’t Even Think About Lying: How Brain Scans are Reinventing the Science of Lie Detection*, WIRE MAG., Jan. 2006, at 142.

testimony—that must be present to warrant constitutional scrutiny under the Fifth Amendment.¹¹⁸ The third factor—testimony—is where the action is.¹¹⁹ Courts have struggled to make sense of what counts as “testimonial” evidence in this “admittedly abstract and under-determined area of law.”¹²⁰ This same challenge applies to forensic neuroscience.

It is not difficult to imagine that brain fingerprinting would qualify as unambiguously compelled—in the sense that, “considering the totality of the circumstances, the free will of the [subject] was overborne”¹²¹—and unambiguously incriminating—in the sense that it “could be used in a criminal prosecution or could lead to other evidence that might be so used.”¹²² What is less clear is whether EEG evidence would qualify as “testimonial.”¹²³ The Supreme Court has held that a person is a “witness” against himself for purposes of the Fifth Amendment when he is “compelled to testify . . . or otherwise provide the State with evidence of a testimonial or communicative nature.”¹²⁴ To count as testimonial, as opposed to physical, the communication must, “explicitly or implicitly, relate a factual assertion or disclose information.”¹²⁵

The seminal case in the history of the physical/testimonial distinction came more than forty years ago, in *Schmerber v. California*.¹²⁶ *Schmerber* presented the Supreme Court with the issue of whether the use of compelled blood tests to incriminate a defendant violated his constitutional right to silence.¹²⁷ Armando Schmerber, after

118. See *Fisher v. United States*, 425 U.S. 391, 408 (1976) (“[T]he Fifth Amendment does not independently proscribe the compelled production of every sort of incriminating evidence but applies only when the accused is compelled to make a Testimonial Communication that is incriminating.”). In addition to the compulsion, incrimination, and testimony elements, a case must also arise under matter of criminal law for the privilege to apply. See *Chavez v. Martinez*, 538 U.S. 760, 766-67 (2003). So there is no Fifth Amendment protection when the compelled information would lead to exclusively non-criminal sanctions, such as the loss of a job or a license.

119. *Schmerber v. California*, 384 U.S. 757, 762-63 (1966) (noting that “[h]istory and a long line of authorities in lower courts have consistently limited” the right to silence to situations involving compelled testimonial evidence).

120. *United States v. Hubbell*, 167 F.3d 552, 570 (D.C. Cir. 1999), *aff’d*, 530 U.S. 27 (2000); see also *Schmerber*, 384 U.S. at 774 (Black, J., dissenting) (“These words [testimonial and physical] are not models of clarity and precision as the Court’s rather labored explication shows.”).

121. *United States v. Washington*, 431 U.S. 181, 188 (1977) (citing *Rogers v. Richmond*, 365 U.S. 534, 544 (1961)).

122. *Kastigar v. United States*, 406 U.S. 441, 455 (1972).

123. See *Schmerber*, 384 U.S. at 763-64.

124. *Doe v. United States*, 487 U.S. 201, 210 (1988).

125. *Id.*

126. 384 U.S. 757 (1966).

127. *Id.* at 758. Schmerber also raised Due Process, Fourth Amendment, and Sixth Amendment right to counsel claims. The Court rejected each. *Id.* at 759-72.

drinking at a local bowling alley, drove his car into a tree.¹²⁸ While at the hospital receiving treatment for injuries sustained in the crash, Schmerber was arrested for driving under the influence of alcohol and instructed to submit to a blood test to determine his level of intoxication.¹²⁹ When Schmerber refused, the arresting officer directed the attending doctor to withdraw a blood sample from his body even so.¹³⁰ Laboratory analysis of Schmerber's blood "indicated intoxication."¹³¹ At trial, California prosecutors presented the results of Schmerber's blood test, over his objections, as evidence that he had been driving drunk.¹³² Schmerber was convicted.¹³³

Schmerber appealed the case to the U.S. Supreme Court, arguing that the government's use of the involuntary blood test to establish his guilt violated his Fifth Amendment privilege against compelled self-incrimination.¹³⁴ The Supreme Court dismissed his claim. In a five-to-four decision, the Court held that the use of the blood test to convict Schmerber did not violate the Self-Incrimination Clause because that evidence, although it was obtained from Schmerber against his will, was properly characterized as "physical," as opposed to "testimonial."¹³⁵ Writing for the majority, Justice Brennan explained that the Fifth Amendment privilege excluded "physical" evidence, such as fingerprints, handwriting exemplars, appearance in a lineup, or, as in the case before the Court, a blood sample.¹³⁶ While Schmerber's blood may "testify" to something, Louis Seidman explains, "it does so in a purely physical fashion without implicating his interior, mental life."¹³⁷ Justice Brennan affirmed that the right to silence is limited in scope to evidence like a written confession or verbal communication, which is actively "testimonial" in nature.¹³⁸

Writing in dissent, Justice Black rejected the distinction between physical and testimonial evidence on grounds of conceptual coherency

128. *Id.* at 758.

129. *Id.*

130. *Id.* at 759.

131. *Id.* at 757.

132. *Id.* at 758-59.

133. *Id.* at 757.

134. *Id.* at 758.

135. *Id.* at 765.

136. *Id.* at 765 (arguing that the blood test and its results did not involve "even a shadow of testimonial compulsion upon or enforced communication by the accused").

137. Louis M. Seidman, *Points of Intersection: Discontinuities at the Junction of Criminal Law and the Regulatory State*, 7 J. CONTEMP. LEGAL ISSUES 69, 131-32 (1996).

138. *Schmerber*, 384 U.S. at 764.

and normative desirability.¹³⁹ On the coherency objection, Justice Black argued that so-called physical evidence like a blood test is the functional equivalent of oral testimony, in the sense that both are extracted from the suspect himself and that both may be comparably persuasive to the jury that will determine the suspect's verdict.¹⁴⁰ The distinction between physical and testimonial evidence was therefore a distinction without difference in Justice Black's view. On the desirability objection, Justice Black remarked that "[i]t is a strange hierarchy of values that allows the State to extract a human being's blood to convict him of a crime because of the blood's content but proscribes compelled production of his lifeless papers."¹⁴¹

In defending the physical/testimonial distinction, Justice Brennan drew for support on John Henry Wigmore's classical Evidence treatise¹⁴² and on Justice Holmes's opinion more than half a century earlier in *Holt v. United States*.¹⁴³ Wigmore cited the case of *Block v. People*¹⁴⁴ to argue that since "the public interest in obtaining [incriminating] evidence is usually sufficient to outweigh by a clear margin the private interests sacrificed in the process," only testimonial compulsion was protected by the right to silence.¹⁴⁵ Wigmore limited the bounds of "testimony" to those beliefs of the accused that have been extracted for government use:

Unless some attempt is made to secure a communication—written, oral or otherwise—upon which reliance is to be placed as involving his consciousness of the facts and the operations of his mind in expressing it, the demand made upon him is not a testimonial one.¹⁴⁶

Fingerprinting, blood tests, and appearance in a lineup did not qualify as testimonial, Wigmore argued, because these forms of

139. *Id.* at 773 (Black, J., dissenting).

140. *Id.* at 774.

141. *Id.* at 775. "Lifeless papers" referred to the Court's opinion in *Boyd v. United States*, 116 U.S. 616 (1886), in which the Court held that the Fourth and Fifth Amendments create a zone of privacy into which the government cannot intrude by using his books and papers as evidence against him in a criminal proceeding. *Boyd*, 116 U.S. at 621-22. The holding in *Boyd* has since been rejected in *Fisher v. United States*, 425 U.S. 391 (1976) and *United States v. Doe*, 465 U.S. 605 (1984).

142. 8 WIGMORE, EVIDENCE § 2263 (McNaughton rev. 1961).

143. 218 U.S. 245 (1910).

144. 240 P.2d 512 (Colo. 1951). "The purpose of the amendment against self-incrimination is to prevent a man from being compelled to utter words that will incriminate him, and not to obliterate all evidence of physical facts showing who and in what condition he is." *Id.* at 516.

145. 8 WIGMORE, *supra* note 142, at § 2265.

146. *Id.*

evidence did not involve revelation of the suspect's knowledge.¹⁴⁷ Holt involved the appeal of a murder conviction on the ground, among others, that the defendant's Fifth Amendment rights were violated when he was forced to try on an incriminating shirt to show that it fit him.¹⁴⁸ Writing for the Court, Justice Holmes rejected the defendant's claim as "an extravagant extension of the 5th Amendment."¹⁴⁹ He distinguished government compulsion as used, on the one hand, "to extort communications from [the defendant]," and, on the other hand, to use the defendant's "body as evidence when it may be material."¹⁵⁰ Justice Holmes applied a *reductio ad absurdum* to argue that the right to silence does not protect against compelled evidence from the defendant's body.¹⁵¹ To extend Fifth Amendment protection to such physical evidence would, "in principle[,] . . . forbid a jury to look at a prisoner and compare his features with a photograph in proof."¹⁵² To avoid this implausible conclusion, Justice Holmes restricted the privilege against self-incrimination to "communications."¹⁵³

In *Schmerber*, the Court applied this same distinction between "communications" or "testimony,"¹⁵⁴ and "real or physical evidence."¹⁵⁵ Justice Brennan explained that whether evidence counts as physical or testimonial depends on whether the process by which the evidence was acquired or evaluated "implicated" the suspect's "testimonial capacities."¹⁵⁶ The privilege applied to testimonial communications broadly, in "whatever form they might take," whether word of mouth, written notes, or communicative body language such as pointing or nodding.¹⁵⁷ The drawing of Schmerber's blood, although both compelled and incriminating, did not involve his testimonial capacities and did not relate to other written or verbal communications by the defendant.¹⁵⁸ The blood test therefore qualified as "physical" evidence, so it was not protected by the Self-Incrimination Clause.¹⁵⁹

147. *Id.*

148. *Holt*, 218 U.S. at 246, 252-53.

149. *Id.* at 252.

150. *Id.* at 252-53.

151. *See id.*

152. *Id.* at 253.

153. *Id.* at 252-53.

154. *Schmerber v. California*, 384 U.S. 757, 764 (1966).

155. *Id.*

156. *Id.* at 765.

157. *Id.* at 763-64.

158. *Id.*

159. *Id.*

Justice Brennan reaffirmed the basic distinction between physical and testimonial evidence in the Court's next term. *United States v. Wade*¹⁶⁰ involved a suspect accused of robbing a bank at gunpoint, disguised with "a small strip of tape on each side of his face."¹⁶¹ Police later arrested him and placed in a line-up alongside him several other prisoners, each of whom "wore strips of tape such as allegedly worn by the robber," and repeated the robber's words: "put the money in the bag."¹⁶² Witnesses to the robbery relied on the lineup to identify the suspect as the robber. Rejecting the suspect's Fifth Amendment claim, Justice Brennan wrote for the majority:

We have no doubt that compelling the accused merely to exhibit his person for observation by a prosecution witness prior to trial involves no compulsion of the accused to give evidence having testimonial significance. It is compulsion of the accused to exhibit his physical characteristics, not compulsion to disclose any knowledge he might have.¹⁶³

Nor did forcing the suspect to "utter words purportedly uttered by the robber" constitute testimonial evidence, since his voice was used merely as "an identifying physical characteristic, not to speak his guilt."¹⁶⁴ Having found that neither forced appearance in the robber's disguise nor forced vocalization of the phrase used during the robbery counted as testimonial, Justice Brennan concluded that evidence provided in the lineup was "not within the cover of the privilege."¹⁶⁵

Justice Brennan reached the same result in applying the physical/testimonial distinction to the handwriting exemplar the suspect in *Gilbert v. California*¹⁶⁶ provided to the state to compare against a handwritten robbery note demanding money from the Mutual Savings and Loan Association of Alhambra.¹⁶⁷ Although a person's "voice and handwriting are, of course, means of communication," Justice Brennan conceded, "[i]t by no means follows . . . that every compulsion of an accused to use his voice or write compels a communication within the cover of the privilege."¹⁶⁸ Given that the "voice recordings were . . .

160. 388 U.S. 218 (1967).

161. *Id.* at 218.

162. *Id.*

163. *Id.* at 222.

164. *Id.* at 219.

165. *Id.* at 224.

166. 388 U.S. 263 (1967).

167. *Id.* at 264.

168. *Id.* at 265.

used solely to measure the physical properties of the witnesses' voices, [and] not for the testimonial or communicative content of what was to be said,"¹⁶⁹ this mere exemplar, "like the voice or body itself, is an identifying physical characteristic outside its protection."¹⁷⁰ Exemplar cases do not qualify as testimonial because although the act of speaking specified words or signing one's name or trying on certain clothes, without more, conveys comprehension of and response to a command, no substantive information is thereby communicated to the government. By 1967, the Self-Incrimination Clause excluded from its coverage appearance in a lineup or in certain clothes, and voice or handwriting exemplars. These were not testimonial kinds of evidence, the Court said, and so were, like *Schmerber's* blood test, beyond the purview of the Fifth Amendment.

Returning to *Schmerber*, Justice Brennan noted that the "privilege [against self-incrimination] has never been given the full scope which the values it helps to protect suggest,"¹⁷¹ but ruminated on further extensions of the right to silence. Speaking to circumstances that lay beyond the facts of the case, Justice Brennan addressed in dicta the question of whether the logic that makes compelled blood tests immune to the Fifth Amendment also applies to compelled polygraphs.¹⁷² Justice Brennan reasoned that even though a polygraph, like a blood test, measures physical processes, lie-detection may nevertheless count as testimonial because "[s]ome tests seemingly directed to obtain 'physical evidence,' for example, lie detector tests measuring changes in body function during interrogation, may actually be directed to eliciting responses which are essentially testimonial."¹⁷³ Justice Brennan continued: "To compel a person to submit to testing in which an effort will be made to determine his guilt or innocence on the basis of physiological responses, *whether willed or not*, is to evoke the spirit and history of the Fifth Amendment."¹⁷⁴ Were Justice Brennan's musings the privilege central to the holding in *Schmerber*, those words would

169. *Id.* at 269.

170. *Id.* at 266.

171. *Schmerber v. California*, 384 U.S. 757, 762 (1966).

172. *Id.* at 764.

173. *Id.*

174. *Id.* (emphasis added). Justice Brennan's conclusion that involuntary lie detector evidence might be barred by the Self-Incrimination Clause is again consistent with Wigmore's discussion of the physical/testimonial distinction. Wigmore noted the difficulty in classifying the use of truth serums or polygraphs in cases where "not only is the person's affirmative participation essential (at least in the form of physical responses) but his knowledge, despite his will to the contrary, is extracted." 8 WIGMORE, *supra* note 142, at § 2265.

presumably apply to protect a criminal suspect from the use of brain imaging to extract incriminating information from her brain, even as she exercised no control over the transmission of the information.

In subsequent decades, however, the Court interpreted the physical/testimonial distinction as turning on whether the *process* of disclosing incriminating information bears testimonial qualities, as opposed to whether the *product* of that information is testimonial.¹⁷⁵ For evidence to count as “testimonial” on this account, the process by which the government acquires information from the suspect must convey his active and intended transmission of internal knowledge about the outside world. There are good reasons for emphasizing the process of evidence-gathering over the product of information thereby revealed. On Daniel Seidman and Alex Stein’s anti-pooling account of the privilege, for example, the lies of a guilty suspect should not be immune from moral or legal censure because, by masquerading as the truths of an innocent suspect, these lies compromise the credibility of all innocent suspects in defending themselves.¹⁷⁶ Focusing on the process of evidentiary disclosure captures this ability of guilty suspects to manipulate incriminating information and thereby hurts the innocent by rendering their truthful appeals unreliable.¹⁷⁷ Giving attention instead to the product of incriminating information would fail to capture this reliability element of compelled evidence that serves to help innocent suspects.

On this understanding of the physical/testimonial distinction, the important fact in *Schmerber* is that the accused did not play a conscious or purposeful role in the transfer of incriminating information to the government, since he was an unwilling donor for bodily material that was examined by a chemical analysis likewise beyond his control.¹⁷⁸ Since Schmerber’s blood did not “belong” to him in the way that his thoughts do, Louis Seidman explains, sticking a needle in his arm deprived Schmerber of any intentional participation that could qualify his blood test as “testimonial.”¹⁷⁹ The results of the blood test in *Schmerber* counted as physical evidence “not simply because the evidence concerned the suspect’s physical body,” the Court would later

175. See Allen & Mace, *supra* note 39, at 276. But see H. Richard Uviller, *Foreword: Fisher Goes on the Quintessential Fishing Expedition and Hubbell is Off the Hook*, 91 J. CRIM. L. & CRIMINOLOGY 311, 320-21 (2001) (observing that derivative protection in *United States v. Hubbell* “comes perilously close to treating the contents of a document as the indirect product of its production”).

176. Seidman & Stein, *supra* note 30, at 453 n.79.

177. *Id.*

178. *Id.* at 475-76.

179. Seidman, *supra* note 137, at 131-32.

write, but also because of Schmerber's passive role in providing the evidence.¹⁸⁰ *Schmerber's* progeny followed this process-based (as opposed to product-based) approach to defining testimonial evidence for purposes of the protection under the Fifth Amendment.

The Court's subpoena cases are instructive. The Self-Incrimination Clause has been held to protect not the *product*, or informational content, of whatever is produced in response to the subpoena, but rather the *process* of providing a specified entity. Compare the application of the physical/testimonial distinction when faced with a subpoena to produce known tax forms in *Fisher v. United States*,¹⁸¹ as opposed to a subpoena to produce underspecified documents in *United States v. Hubbell*.¹⁸² In *Fisher*, the privilege did not apply because the product of the subpoena papers was already known by the government, so the process by which the suspect disclosed the information involved an effectively mechanical and therefore non-testimonial response.¹⁸³ In *Hubbell*, by contrast, the Court held that Fifth Amendment prevented the government's request for documents whose existence was unknown and whose contents could not be described with any specificity.¹⁸⁴ The privilege applied in *Hubbell* because providing the documents required the suspect's active participation, and thereby made use of the "contents of his own mind."¹⁸⁵ Although the testimonial *product* was essentially identical to that in *Fisher*, because the existence and location of the documents were not a "foregone conclusion,"¹⁸⁶ the testimonial *process* revealed to the government the suspect's knowledge that the documents both existed and also were within his own possession.¹⁸⁷ It was the process and not the product of subpoenaed information that made the evidence count as testimonial.

The Court also took this approach in *Pennsylvania v. Muniz*, which involved a right to silence appeal to an answer to a question about the date of the defendant's sixth birthday at a sobriety check.¹⁸⁸ At a drunk driving stop, an officer asked Inocencio Muniz to perform "three standard field sobriety tests: a 'horizontal gaze nystagmus' test, a 'walk

180. *Pennsylvania v. Muniz*, 496 U.S. 582, 593 (1990).

181. 425 U.S. 391 (1976).

182. 530 U.S. 27 (2000).

183. *See Fisher*, 425 U.S. at 410 (acknowledging that "[t]he act of producing evidence in response to a subpoena . . . has communicative aspects of its own").

184. *See Hubbell*, 530 U.S. at 44-45.

185. *Id.* at 43.

186. *Fisher*, 425 U.S. at 411.

187. *Hubbell*, 530 U.S. at 44-45.

188. 496 U.S. 582, 587-88 (1990).

and turn' test, and a 'one leg stand' test."¹⁸⁹ Muniz failed all three.¹⁹⁰ He was arrested and driven to the police station, where the officer videotaped his slurred responses to questions including his "name, address, height, weight, eye color, date of birth, and current age."¹⁹¹ After "stumbling over his address and age," Muniz was asked whether he knew "the date of [his] sixth birthday[.]"¹⁹² He replied, "No, I don't."¹⁹³

Writing for the majority, Justice Brennan distinguished the physical qualities of Muniz's slurred speech from the testimonial qualities of the sixth birthday question.¹⁹⁴ The "slurred nature of his speech" involved Muniz's "physical inability to articulate words in a clear manner due to 'the lack of muscular coordination of his tongue and mouth.'"¹⁹⁵ The videotape evidence of the slurring, in isolation, constituted a physical process, which was "not itself testimonial."¹⁹⁶ By contrast, the sixth birthday question was testimonial because it required Muniz to make active use of his confused mental state.¹⁹⁷ Inferring Muniz's level of intoxication from his inability to answer a simple question turned on the process of his transmitting information about his drunkenness. Or so Justice Brennan contended:

The Commonwealth . . . argue[s] that this incriminating inference does not trigger the protections of the Fifth Amendment privilege because the inference concerns "the physiological functioning of [Muniz's] brain," . . . which is asserted to be every bit as "real or physical" as the physiological makeup of his blood and the timbre of his voice. But this characterization addresses the wrong question; that the "fact" to be inferred might be said to concern the physical status of Muniz's brain merely describes the way in which the inference is incriminating. The correct question for present purposes is whether the incriminating inference of mental confusion is drawn from a testimonial act or from physical evidence.¹⁹⁸

For evidence to count as "testimonial," Justice Brennan argued, it was not enough for the accused simply to impart the information from

189. *Id.* at 585.

190. *Id.*

191. *Id.* at 585-86.

192. *Id.* at 586.

193. *Id.*

194. *Pennsylvania v. Muniz*, 496 U.S. 582, 590-91 (1990).

195. *Id.* at 590 (citation omitted).

196. *Id.*

197. *Id.* at 598-99.

198. *Id.* at 593.

his body or mind; he must also take an active and deliberate part in transferring that information to the government. A “testimonial act” requires that the suspect exercise control over the transmission of information; mere submission to a state’s drawing out of information is not enough.¹⁹⁹

V. THE MIND-BODY DISTINCTION IN FIFTH AMENDMENT JURISPRUDENCE

How does the Court’s distinction between testimonial and physical evidence apply to the use of involuntary and incriminating neuroscience evidence in a criminal trial? Consider the reflections of distinguished

199. In the next section, I challenge the jurisprudential distinction between testimonial and physical evidence. I am not the first to do so. Four scholarly critiques are prominent. First, Richard Nagareda has argued that the physical/testimonial distinction is at odds with the historical understanding of what it means “to be a witness” under the Fifth Amendment, which he says is to produce compelled evidence, whether it is physical or testimonial in nature. Richard A. Nagareda, *Compulsion “to be a Witness” and the Resurrection of Boyd*, 74 N.Y.U. L. REV. 1575, 1658-59 (1999). See also *United States v. Hubbell*, 530 U.S. 27, 49-56 (2000) (Thomas, J., concurring). Second, Mike Redmayne has argued that “the most compelling rationale for the privilege is that it serves as a distancing mechanism, allowing defendants to disassociate themselves from prosecutions, [which] . . . suggests that no distinction should be drawn between requirements to speak and requirements to provide the authorities with documents, blood samples and the like.” Mike Redmayne, *Rethinking the Privilege Against Self-Incrimination*, 27 OXFORD J. LEGAL STUD. 209, 209 (2007). Third, Susan Easton has argued that there are no principled grounds on the basis of which to distinguish the communicative qualities of evidence that the Court has classified as “physical” (e.g., bodily samples or markings like scars and tattoos) as opposed to “testimonial” (e.g., words or gestures intended to impart information). SUSAN EASTON, *THE CASE FOR THE RIGHT TO SILENCE*, 217-18 (2d ed. 1998). “[W]hile the distinction might be justified on grounds of policy or expediency,” Easton concludes, “nonetheless it is artificial and problematic, because both samples and speech are subject to similar considerations and arguments.” *Id.* at 220. Finally, Daniel Seidman and Alex Stein argue that “a suspect’s ability to tell uncontradicted lies can impose externalities because guilty suspects might harm innocent suspects by pooling with them through fabrications, lies, or omissions.” Seidman & Stein, *supra* note 30, at 480; see also STEIN, *supra* note 91, at 158-64, 200-04. The question for Seidman and Stein is not whether evidence is “physical” or “testimonial” in nature, but instead whether the evidence can be manipulated in a way that harms innocent defendants by making it possible for guilty defendants to pass off lies as truths, thereby rendering the latter less credible and less capable of protecting the innocent. *Id.* at 476. Seidman and Stein argue that courts should replace the physical/testimonial distinction as a test for right-to-silence protection with a substitute distinction between externality-laden and externality-free evidence, according to which “only the existence of a meaningful fabrication alternative should . . . activate the privilege.” *Id.* at 480. My account is different from these four accounts in two important respects. First, I draw on evidence from cognitive neuroscience and metaphysical philosophy to challenge the very coherence of the physical/testimonial distinction. I argue that the distinction takes for granted a conceptual division of mind from body that new research has exposed as false. Second, my account is the only one that can explain why the Fifth Amendment should prohibit the compelled brain imaging technology to extort incriminating thoughts from an unwilling suspect.

jurist Hans A. Linde, former professor at the University of Oregon Law School and Associate Justice of Oregon Supreme Court from 1977 to 1990.²⁰⁰ Writing in concurrence in the otherwise unremarkable case of *State v. Lyon*,²⁰¹ which held that polygraph tests were inadmissible as evidence due to insufficient reliability,²⁰² Justice Linde expressed his widely shared but difficult-to-articulate reluctance to embrace even demonstrably reliable polygraph evidence.²⁰³

I doubt the uneasiness about electrical lie detectors would disappear even if they were refined to place their accuracy beyond question. Indeed, I would not be surprised if such a development would only heighten the sense of unease and the search for plausible legal objections.²⁰⁴

Justice Linde said he would hesitate to admit into evidence any interrogation method, no matter how reliable, that purports to verify veracity in the thoughts of criminal suspects.²⁰⁵ Citing a pair of obscure 1956 law review articles²⁰⁶ discussing a German case²⁰⁷ that denied admission of inculpatory polygraphy results on grounds of “personal dignity,”²⁰⁸ Justice Linde argued that polygraph testing threatened to undermine certain “fundamental tenets about human personhood.”²⁰⁹ Justice Linde’s concern about personhood had two parts. First, he

200. See generally INTELLECT AND CRAFT: THE CONTRIBUTIONS OF HANS A. LINDE TO AMERICAN CONSTITUTIONALISM (Robert F. Nagel ed., 1995); *Symposium on the Work of Justice Hans Linde*, 70 OR. L. REV. 679 (1991); Sanford Levinson, *Tiers of Scrutiny—From Strict Through Rational Basis—and the Future of Interests: Commentary on Fiss and Linde*, 55 ALB. L. REV. 745, 746 (1992) (referring to Linde as “easily one of the three most important state court judges in this century”).

201. 744 P.2d 231 (Or. 1987).

202. See *id.* at 232.

203. *Id.* at 240 (Linde, J., concurring).

204. *Id.* at 238 (Linde, J., concurring).

205. *Id.* at 238. See also Kittay, *supra* note 113, at 1390 (“[E]ven if fMRI technology could fully deliver on its potential, hopes of being welcomed in the courtroom are exceptionally hamstrung.”).

206. Henry J. Kaganiec, *Lie Detector Tests and “Freedom of the Will” in Germany*, 51 NW. U. L. REV. 446, 449 (1956) (arguing that coerced polygraph tests to “disclose the otherwise concealed psychic structure of the accused . . . are an . . . attempt to discover what might be present only in the unconscious of the accused”); Helen Silving, *Testing of the Unconscious in Criminal Cases*, 69 HARV. L. REV. 683, 693 (1956) (arguing that concern about “human dignity” weigh against the admission of incriminating polygraph tests).

207. *Lyon*, 744 P.2d at 240 (Linde J., concurring); see 5 Entscheidungen des Bundesgerichtshofes in Strafsachen [Judgment of Bundesgerichtshof, West Germany Supreme Court] (1954), cited in Silving, *supra* note 206, at 688-89, and Kaganiec, *supra* note 206, at 446.

208. *Lyon*, 744 P.2d at 240 (Linde J., concurring).

209. *Id.*

worried that admitting polygraph testing into the courtroom would compromise the performative character of criminal trials, which he regarded as a constitutive element “underlying our legal and social institutions.”²¹⁰ I take my cue from his second argument that the use of polygraph testing threatened to reduce subjects to “electrochemical systems to be certified as truthful or mendacious by a machine.”²¹¹

Justice Linde conceded that the “function of detecting a lie” among suspects and witnesses is undoubtedly a “valuable” one in the American criminal justice system,²¹² and that the polygraph is not altogether unique among interrogation techniques that seek to achieve this worthy objective by “turn[ing] its subject into an object.”²¹³ But polygraph testing is different in kind, Justice Linde argued, because of the “[i]nconsistency of physiological lie detection with fundamental tenets about human personhood [that] has been important in European objections to the polygraph, reflecting Christian and Kantian philosophical traditions as much as doubts of its accuracy.”²¹⁴ Though he did not elaborate as to what precisely those “tenets about human personhood” consisted of,²¹⁵ Justice Linde overstated such concerns as they apply to polygraph testing,²¹⁶ since polygraphy yields unreliable results that are vulnerable to manipulation by subjects, interrogators, and evaluators.²¹⁷ Justice Brennan’s reflections on the use of involuntary

210. *Id.* at 240-41 (“The cherished courtroom drama of confrontation, oral testimony and cross examination is designed to let a jury pass judgment on [the] truthfulness [of witnesses] and on the accuracy of their testimony.”).

211. *Id.* at 240.

212. *Id.* at 239 (Linde, J. concurring) (“[T]he lie detector only purports to detect whether a person is uttering a lie,” which “[b]eyond doubt . . . is often a useful thing to know.”).

213. *Id.* (acknowledging that the basic relationship between the conclusions about truthfulness and the physiological facts that polygraph testing attempts to “independently establish” are similar in principle to accepted forensic techniques such as fingerprinting and blood testing for alcohol content levels).

214. *State v. Lyon*, 744 P.2d 231, 239-40 (Or. 1987).

215. *See id.* at 240. For a compelling account of personhood applied to Fourth Amendment jurisprudence, see Christian M. Halliburton, *How Privacy Killed Katz: A Tale of Cognitive Freedom and the Property of Personhood as Fourth Amendment Norm*, 42 AKRON L. REV. 803 (forthcoming 2009) (Part III.B).

216. *See* James R. McCall, *The Personhood Argument Against Polygraph Evidence, Or “Even If the Polygraph Really Works, Will Courts Admit the Results?”*, 49 HASTINGS L.J. 925, 941-43 (1998).

217. As Department of Justice lawyer Michael R. Dreeben testified during oral argument in *United States v. Scheffer*, 523 U.S. 303 (1998), “[t]he fundamental unreliability of polygraph evidence is underscored . . . [by] the possibility that countermeasures can defeat any test.” Oral Argument Transcript of Michael R. Dreeben on behalf of the Petitioner, available at http://www.oyez.org/cases/1990-1999/1997/1997_96_1133/argument/. *See also* Catherine M. Polizzi, *A New View into the Truth: Impact of a Reliable Deception Detection Technology on the*

testing to incriminate a criminal suspect extended beyond the facts of Schmerber's blood testing. Whatever application the "spirit and history"²¹⁸ dicta might have had for forensic neuroscience, it is not binding precedent for any future cases. Thus, *Schmerber* does not resolve whether brain fingerprinting is more like forms of evidence such as speaking, writing, and nodding, which are protected by the Fifth Amendment, or more like fingerprinting, breathalyzer tests, and handwriting samples, which are not protected.

Whether the fitting analogy for neuroforensics is to traditionally "testimonial" evidence, or instead to traditionally "physical" evidence, is far from straightforward.²¹⁹ Until recently, reliable information about a subject's substantive knowledge required that a suspect actively communicate that information, whether by choosing to speak, write, or nod. But now, forensic neuroscience enables law enforcement officials to access communicative phenomena in a way that leaves the suspect "no more control over the firing of neurons than Schmerber had in the way his blood responded to the test."²²⁰ Once a suspect's blood has been drawn, or EEG sensors affixed to his scalp, the results of the blood alcohol tests or lie-detection results are, for both, altogether involuntary. "[A]ny active participation on the part of the subject [of neuroscientific testing] would be, like Schmerber's participation in the blood extraction and analysis, irrelevant to the results of the test."²²¹

Brain imaging is difficult to classify because it promises distinctly testimonial-like information about the content of a person's mind that is packaged in demonstrably physical-like form, either as blood flows in the case of fMRI, or as brainwaves in the case of EEG.²²² Forensic neuroscience measures physiological changes in the brain—chemical reactions to an outside stimulus—that reveal communicative processes such as recall and deception. When a subject is forced to undergo brain fingerprinting, the information that the test elicits is not precisely the

Legal System, 21 RUTGERS COMPUTER & TECH. L.J. 395, 398, 398 n.9 (1995) ("We are familiar with the polygraph, the most widely used and most controversial method of lie detection."); Timothy B. Henseler, Comment, *A Critical Look at the Admissibility of Polygraph Evidence in the Wake of Daubert: The Lie Detector Fails the Test*, 46 CATH. U. L. REV. 1247, 1247 (1997) ("The polygraph and other deception detection instruments have suffered through a tumultuous seventy years in the American legal system.").

218. *Schmerber v. California*, 384 U.S. 757, 764 (1966).

219. Alexandra J. Roberts, Comment, *Everything Old is New Again: Brain Fingerprinting and Evidentiary Analogy*, 9 YALE J.L. & TECH. 234, 268 (2006).

220. Stoller & Wolpe, *supra* note 16, at 368-69.

221. *Id.* at 369.

222. See Haynes et al., *supra* note 56, at 324.

subject's thoughts, at least in the way that we ordinarily tend to experience our thoughts as the deliberate transmission of ideas such as "I am familiar with the scene of the murder," or "I recognize the murder weapon." In the India murder case, for example, the defendant Sharma did not speak, write, nod, or take any other active measure to communicate her thoughts in response to targeted stimuli. Instead, EEG sensors detected patterns of electrical activity in her brain that corresponded to a physical code for her stored knowledge, the incriminating content of which was used to prosecute her for murder.

What makes brain imaging unique, therefore, is not only "that the physical characteristics the scanner 'observes' are imperceptible to the average observer."²²³ The more important reason that neuroscientific evidence is different is that it measures direct and involuntary brain activity that cannot, like polygraph testing, be effectively controlled by the subject undergoing interrogation.²²⁴ And because EEG and fMRI test results appear in the form of high-resolution computer-generated images, they are less likely than the polygraph to be misinterpreted by biased or imperfect evaluators.²²⁵

What Justice Brennan failed to appreciate is that the distinction between physical and testimonial evidence presupposes a flawed dualism between body and mind. The physical/testimonial distinction requires that exclusively mental (and not bodily) processes comprise communicative meaning.²²⁶ A division of mind and body therefore

223. Thompson, *supra* note 38, at 348. *But see id.* at 357.

224. *See* Lee et al., *supra* note 108, at 163 ("[C]ontrolling one's cerebral activity to avoid detection is unfeasible.")

225. *See* Giannelli, *supra* note 115, at 905 ("The examiner's role cannot be overstated, because it is the examiner who decides whether there is sufficient indication of deception."); Silberman, *supra* note 117, at 142.

226. Susan Easton suggests that the communicative meaning we attach to body language in itself reveals the conceptual bankruptcy of Cartesian dualism. Easton states:

[I]t is generally accepted that non-verbal gestures, whether voluntary, subconscious or involuntary, may communicate information, even where the individual does not "intend" that behavior In everyday life people constantly look for visual clues and make judgments according to demeanor, or the shape or position of the body, and often treat them as better guides to mental attitudes than the spoken word.

EASTON, *supra* note 199, at 217. "While the distinction [between physical and testimonial evidence] might be justified on grounds of policy or expediency," Easton concludes, "nonetheless it is artificial and problematic" *Id.* at 220. Easton concludes that the rigid physical/testimonial distinction should be replaced with a continuum that extends from oral communication at one end of the continuum; with body language (e.g., nodding) intended to communicate at the next point on the continuum; unintentional non-verbal communications (e.g., sweating) after that; followed by external bodily features (e.g., tattoos); then bodily materials voluntarily or involuntarily transmitted (e.g., blood or hair); and finally materials from a dead person (e.g., DNA) at the other end of the continuum. *See id.* at 218.

underlies the doctrinal distinction between physical and testimonial evidence. The so-called “mind-body problem is the problem of understanding how . . . the water of the physical brain is turned into the wine of consciousness.”²²⁷ Mind/body dualism conceives of the sphere of human psychology as distinct from the sphere of human biology.²²⁸ The contemporary version of mind/body dualism was articulated by René Descartes.²²⁹ Following Plato and Aristotle’s speculations that the faculties of intellect or soul are distinct from the physical organism,²³⁰ Descartes argued for a divorce of mind from body, distinguishing mental phenomena such as consciousness and self-awareness from material organs such as even the brain.²³¹ On this account, the mind directs the body like a “ghost in the machine.”²³²

Advances in cognitive imaging reveal the folly in the conceptual schism of mind and body.²³³ Neuroscientists agree that the complex phenomena of thought and behavior can be explained in terms of the neural activity of the brain.²³⁴ Recent research into the human nervous system has uncovered the existence of discernible correlates in our brain chemistry for what were once thought of as the purely philosophical and psychological, including thoughts, emotions, and behaviors like decision-making,²³⁵ free will,²³⁶ moral judgment,²³⁷ personality,²³⁸

227. Colin McGinn, *Can We Solve the Mind-Body Problem?*, 98 MIND 349, 349 (1989).

228. See W.D. Hart, *Dualism, A COMPANION TO THE PHILOSOPHY OF MIND* 265-67 (Samuel Guttenplan ed., 1996).

229. See Howard Robinson, *Dualism*, THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta ed., 2003), available at <http://plato.stanford.edu/archives/fall2003/entries/dualism/>.

230. See, e.g., 1 PLATO, PLATONIS OPERA (E.A. Duke et al. eds., 1995); 2 ARISTOTLE, METAPHYSICS (METAPHYSICA) (W.D. Ross ed., 1924).

231. GORDON BAKER & KATHERINE J. MORRIS, DESCARTES’ DUALISM, (1996) (citing René Descartes, *Meditations on First Philosophy* (1641), 2 THE PHILOSOPHICAL WRITINGS OF DESCARTES 1-62 (John Cottingham et al. trans., 1984)).

232. BRENT GARLAND, NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE 66 (2004).

233. See Nemeroff et al., *supra* note 12, at 672 (“Neuroimaging offers a powerful probe of brain state, but we are now faced with metaphysical questions; i.e., what is a brain state, and how is it related to the outward manifestations of behavior? This has the potential for degenerating into the old mind-body duality of Descartes . . .”).

234. See Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, 359 PHIL. TRANSACTIONS ROYAL SOC’Y LONDON B 1775, 1775 (2004) (describing the very enterprise of cognitive neuroscience as the “understanding of the mind as brain”).

235. See, e.g., Lesley K. Fellows & Martha J. Farah, *Different Underlying Impairments in Decision-making Following Ventromedial and Dorsolateral Frontal Lobe Damage in Humans*, 15 CEREB. CORTEX 58 (2005); Antonio R. Damasio, *How the Brain Creates the Mind*, SCI. AM., at 4 (2002) (originally appearing in December 1999 issue).

consciousness,²³⁹ and the self.²⁴⁰ Among these neuroscientific insights is the discovery that even the most sophisticated operations of mind are deeply integrated with the mechanical operations of biological organisms.²⁴¹ Brain imaging technologies can localize complex psychological and behavioral functions to specific neural regions through spatial and temporal resolution of functional markers in the brain.²⁴²

That the mystery we associate with our thoughts and actions can be reduced to quantifiable networks of neural activity might be difficult to accept.²⁴³ In one sense, new insight into the neurological basis of behavior merely confirms what doctors suspected in 1848, when Phineas Gage, a Vermont railroad worker, had a thirteen-pound iron rod driven through his frontal lobe with such dramatic effects on his personality and behavior that his friends declared that “Gage was no longer Gage.”²⁴⁴ In another sense, research into the human nervous system significantly advances our understanding of and confidence in the synthesis between mind and body.²⁴⁵ Neuroimaging studies provide strong evidence that there is no freestanding metaphysical being that tells our brains what to

236. See, e.g., Rudolph Friedrich Wagner & Hans Reinecker, *Problems and Solutions: Two Concepts of Mankind in Cognitive-Behavior Therapy*, 57 AM. J. PSYCHOTHERAPY 401 (2003).

237. See, e.g., Joshua D. Greene et al., *An fMRI Investigation of Emotional Engagement in Moral Judgment*, 293 SCIENCE 2105 (2001); Jorge Moll et al., *Functional Networks in Emotional Moral and Nonmoral Social Judgments* 16 NEUROIMAGE 696 (2002).

238. See, e.g., Turhan Canli & Zenab Amin, *Neuroimaging of Emotion and Personality: Scientific Evidence and Ethical Considerations*, 50 BRAIN COGNITION 414 (2002).

239. See, e.g., Giulio Tononi & Gerald M. Edelman, *Schizophrenia and the Mechanisms of Conscious Integration*, 31 BRAIN RES. REV. 391 (2000).

240. See, e.g., Seth J. Gillihan, & Martha J. Farah, *Is Self Special? A Critical Review of Evidence from Experimental Psychology and Cognitive Neuroscience*, 131 PSYCHOL. BULL. 76 (2005).

241. See Damasio, *supra* note 235, at 9 (“[B]y 2050, sufficient knowledge of biological phenomena will have wiped out the traditional dualistic separations of body/brain, body/mind, and brain/mind.”).

242. See DANIEL C. DENNETT, *CONSCIOUSNESS EXPLAINED* (1991).

243. See Stoller & Wolpe, *supra* note 16, at 369 (“[O]ur everyday conception of humanity still reflects dualistic notions of body and non-physical mind or soul”). “Perhaps we think our minds are too opaque to ever be laid bare by a machine,” another commentator speculates, “or perhaps we so desperately cling to this last frontier of privacy that we are willing it to be impossible.” Kittay, *supra* note 113, at 1394.

244. MALCOLM MACMILLAN, *AN ODD KIND OF FAME: STORIES OF PHINEAS GAGE* 11-13 (2000); JOHN FLEISCHMAN, *PHINEAS GAGE: A GRUESOME BUT TRUE STORY ABOUT BRAIN SCIENCE* 2 (2004); Malcolm Macmillan, *A Wonderful Journey through Skull and Brains: The Travels of Mr. Gage’s Tamping Iron*, 5 BRAIN & COGNITION 67, 85 (1986).

245. STEVEN R. QUARTZ & TERRENCE J. SEJNOWSKI, *LIARS, LOVERS, AND HEROES: WHAT NEW BRAIN SCIENCE REVEALS ABOUT HOW WE BECOME WHO WE ARE* 138-41 (2002).

think and do.²⁴⁶ Instead, the mind is intimately bound up with the whole of the human organism, while the organism works together with both body and brain. This neuroscientifically informed picture of the integrated body and mind powerfully undermines the dualistic premise upon which the physical/testimonial distinction is built.

Recognizing the incoherence of mind/body dualism prompts us to acknowledge that what we really care about is the individual's control over his thoughts. The relevant difference between a person's thoughts and his blood is neither that his thoughts communicate information that his blood does not, nor that thinking requires the use of communicative processes that bleeding does not. The relevant difference is instead that our blood is readily separable from what we think important about us, whereas our thoughts are not.²⁴⁷ Conventional forms of criminal evidence can disclose all sorts of personal and private information about me—where I was, what I did, or why I did it. But when the state seizes my photographs, handwriting samples, or DNA, it does not deprive me of control over my mental life. It does not, that is, compromise my ability to be in command of the use and disclosure of my thoughts. Compelled brain imaging, by contrast, does compromise this ability. The notion of mental control has normative significance because our thoughts are what anchor each of us as an individual person with an uninterrupted autobiographical narrative.²⁴⁸ It is not just that physical manifestations of brain function correspond to the exercise of subjective awareness; it is, moreover, that those neural transmissions are, as the organ of mind and consciousness, what we tend to think of as most

246. See studies discussed in ANTONIO DAMASIO, DESCARTES' ERROR: EMOTION, REASON, AND THE HUMAN BRAIN 24-30, 258-60 (2005).

247. Neuroscientist Donald Kennedy, editor of the journal *Science*, suggests that he seeks to keep his "brainome" private because "[i]t is way too close to who I am." *Major Talks on Addiction, Neuroethics, and Depression Highlight Neuroscience 2003*, NEUROSCIENCE Q. (Winter 2004), http://web.sfn.org/index.cfm?pagename=neuroscienceQuarterly_04winter_neuroscience; New York City Bar Association, Report from the Committee on Science and Law, *Are Your Thoughts Your Own? 'Neuroprivacy' and the Legal Implications of Brain Imaging* (2005), <http://www.abcny.org/pdf/report/Neuroprivacy-revisions.pdf> (citing *Harrington v. Iowa*, 659 N.W.2d 509 (Iowa 2003)).

248. Neuroscientist Antonio Damasio refers to these features of selfhood as "the individuality and continuity of a living organism." Antonio R. Damasio, *Mental Self: The Person Within*, 423 NATURE 227, 229 (2003). See also Stacey A. Tovino, *Functional Neuroimaging Information: A Case for Neuro Exceptionalism?*, 34 FLA. ST. U. L. REV. 415, 470 (2007) (exploring the "possibility that fMRI will reveal back to the individual . . . stories that are inconsistent with the individual's dominant life narrative").

important about who we are.²⁴⁹ At the core, that is, we think of ourselves as beings capable of self-reflection. The Fifth Amendment protects a suspect's control over his thoughts from unwanted government access and use.²⁵⁰

249. See GARLAND, *supra* note 232, at 34; see also HENRY T. GREELY, NEUROETHICS AND ELSI: SOME COMPARISONS AND CONSIDERATIONS (2004), <http://perpich.com/neuroed/archive/139.pdf>. Greely states:

[I] am more than my genes. The genes are an important part of me, but I can be certain that they are not my essence; they are not my soul. When we shift that notion to the neuroscience area, though, I am not so confident. Is my consciousness—is my brain—me? I am tempted to think it is.

Id.

250. The notion of protecting the individual's control over the use of his thoughts is not altogether foreign to Supreme Court reflections on the constitutional right to silence. In *United States v. Nobles*, the majority wrote that the Fifth Amendment prohibits "state intrusion to extract self-condemnation" by "protect[ing] a 'private inner sanctum of individual feeling and thought.'" 422 U.S. 225, 233 (1975) (quoting *Couch v. United States*, 409 U.S. 322, 327 (1973)); see also *Braswell v. United States*, 487 U.S. 99, 126 (1988) (Kennedy, J., dissenting) ("Physical acts will constitute testimony if they probe the state of mind, memory, perception, or cognition of the witness."). Professor Richard Uviller also argued as early as 1987 that "personal control over the production of cognitive evidence, free of official coercion, is guaranteed by the self-incrimination clause of the fifth amendment." See H. Richard Uviller, *Evidence from the Mind of the Criminal Suspect: A Reconsideration of the Current Rules of Access and Restraint*, 87 COLUM. L. REV. 1137, 1137 (1987). In light of *Hubbell's* language emphasizing protection of the "contents of [a suspect's] own mind," *United States v. Hubbell*, 530 U.S. 27, 43 (2000), Professor Uviller took Justice Brennan's opinion in *Schmerber* to mean that "no one can be forced to divulge cerebral evidence, to speak the contents and products of the mind." Uviller, *supra* note 175, at 313. Ronald Allen and Kristin Mace have since built on Uviller's insights to argue that the privilege applies to "the substantive content of cognition," which they define as "the intellectual processes of acquiring, storing, retrieving, and using knowledge . . . that allow one to gain and make use of substantive knowledge and to compare one's 'inner world' (previous knowledge) with the 'outside world' (stimuli such as questions from an interrogator)." Allen & Mace, *supra* note 39, at 246-47. Allen and Mace suggest that the Court has implicitly taken "testimony" to mean "substantive cognition," that is, the "contents of [one's] own mind," or "thoughts" that "result in holding or asserting propositions with truth value," for example, that a person was present at the scene of a crime, or that he recognizes the victim, or took part in the act in question. See *id.* at 266-67, 267 n.107 (citing *Doe v. United States (Doe II)*, 487 U.S. 201, 211 (1988) (quoting *Couch v. United States*, 409 U.S. 322, 328 (1973); *Curcio v. United States*, 354 U.S. 118, 128 (1957)); *United States v. Hubbell*, 530 U.S. 27, 43 (2000) (also quoting *Doe II* and *Curcio*); see also *Braswell v. United States*, 487 U.S. 99, 126 (1988) (Kennedy, J., dissenting). In proscribing the compulsion of incriminating "testimony," they argue, the Court is actually saying that state action cannot compel the revelation of these sorts of thoughts from the criminal suspect. Allen & Mace, *supra* note 39, at 266-67. On this account, the right to silence guarantees "that the government may not compel revelation of the incriminating substantive results of compelled cognition." *Id.* at 268. However, Allen and Mace define protected cognition too narrowly. See *id.* at 266-67, 267 n.107. Because their theory of "compelled cognition" incorporates the narrow precedential focus on those "propositions with truth-value" that are prompted by state action, *id.* at 268, their account would deny Fifth Amendment protection in a hypothetical case in which police reliably scanned a suspect's mind for incriminating thoughts, provided that state officials did nothing to provoke or induce those thoughts, such as posing a question, or presenting the suspect with an image or

At least three objections may be raised against this account of the right to silence. The first objection is that advances in forensic neurotechnology could shift the landscape of moral perceptions to eliminate the mismatch I identified between existing right-to-silence rationales and intuitions about the privilege's application to brain imaging techniques. This objection underestimates the human faculty of impulse and imagination. Recall the Indian murder case, in which police were able to use brain imaging techniques to extort incriminating thoughts from the unwilling suspect. This vision is not so different, and less radical in fact, than similar possibilities portrayed in contemporary film and literature such as George Orwell's 1984²⁵¹ and Steven Spielberg's *Minority Report*.²⁵² Popular media prompt us to reflect on or at least acknowledge the possibility of mind-reading devices and of government access to the thoughts of individuals. The premise of the Indian case should not, therefore, be so unfamiliar to most people that their present intuitions could not be taken as a reliable guide to their intuitions in a world in which such technologies were no longer imagined, but real, and their use by police interrogators were no longer impossible but routine. If present intuitions are a reliable guide, any divergence with existing principles is unlikely to disappear if the hypothetical were to become reality.

The second objection is that protection of a suspect's control over his thoughts cannot explain why the state can compel even confessions that are self-incriminating with a grant of immunity,²⁵³ or why the privilege traditionally applies only to *incriminating* evidence or to *self-incriminating* evidence.²⁵⁴ The immunity exception is overstated,

recording that was relevant to the victim or crime scene. See William Federspiel, Comment, *1984 Arrives: Thought(crime), Technology, and the Constitution*, 16 WM. & MARY BILL RTS. J. 865, 896-97 (2008). Michael Pardo tries to resolve the gaps left by Allen and Mace to argue that the Self Incrimination Clause "appl[ies] when the government compels the tests in order to obtain evidence of the incriminating informational content of subjects' propositional attitudes," including "inductive evidence of their beliefs, knowledge, and other mental states." Pardo, *supra* note 35, at 331-32. But Pardo's account of the Fifth Amendment suffers from similar limitations. He concedes that his version of the privilege "would not preclude compelled tests when used for any purpose other than those that rely on incriminating propositional content. For example, if the tests could be used to determine mental capacity, intent, bias, voluntariness, etc., without relying on incriminating propositional content, then the privilege would not preclude such uses." *Id.* at 332 n.205.

251. GEORGE ORWELL, 1984 (1949).

252. MINORITY REPORT (DreamWorks 2002).

253. See *Kastigar v. United States*, 406 U.S. 441, 445-47 (1972).

254. See Stuntz, *supra* note 25, at 1232-34 ("The privilege applies only to testimony that is incriminating.").

however, since “use immunity” applies narrowly to the act of production only.²⁵⁵ While subpoenaed documents are not protected from government use under 18 U.S.C. §6002, the state cannot use whatever information is obtained from that act of production, whether directly or indirectly, to criminally prosecute the suspect.²⁵⁶ The second point is that compelled evidence has not traditionally been protected under the Fifth Amendment unless it counts as both *incriminating*—in the sense that it could “furnish a link in the chain of evidence needed to prosecute”²⁵⁷—and also *self-incriminating*—in the sense that the information is sought to incriminate the subject himself, as opposed to someone else, even family or friends.²⁵⁸ This restraint on the privilege implies that, provided prosecutors did not use the information derived from compelled brain imaging, either directly or indirectly, as evidence against the suspect himself in a criminal proceeding, then the Fifth Amendment would not prohibit the state from gaining unwanted access to his mental life.

I reply by proposing that judges refine these limits on the right to silence, as they apply to state action that would deny a suspect control over the use of her thoughts. Whether in the course of interrogation,²⁵⁹ trial,²⁶⁰ or sentencing,²⁶¹ when state officials seek to acquire information that would deprive individuals of control over their thoughts, then traditional limitations on the privilege against self-incrimination should not apply. This exception is sufficiently narrow in scope and modest in practice and does not, however, change what it means for a person “to be a witness against himself.”²⁶²

255. See 18 U.S.C. § 6002 (1994).

256. Exceptions to this rule include prosecution for perjury, for giving a false statement, or for failing to comply with the subpoena order. See *id.*

257. *Hiibel v. Sixth Jud. Dist. Ct. of Nev., Humboldt County*, 542 U.S. 177, 190 (2004) (quoting *Hoffman v. United States*, 341 U.S. 479, 486 (1951)).

258. See *Ullmann v. United States*, 350 U.S. 422, 430-31 (1956).

259. *Doyle v. Ohio*, 426 U.S. 610 (1976) (upholding a constitutional due process right to remain silent after arrest without later penalty); see also *Miranda v. Arizona*, 384 U.S. 436 (1966) (holding that the Fifth Amendment requires that a suspect be warned of his right to silence before any custodial interrogation).

260. *Griffin v. California*, 380 U.S. 609 (1965) (holding that the Fifth Amendment prohibits prosecutors and judges from commenting adversely on a defendant’s failure to testify in a criminal proceeding).

261. *Mitchell v. United States*, 526 U.S. 314, 321, 330 (1999) (extending application of the Fifth Amendment privilege against compelled self-incrimination to criminal sentencing proceedings).

262. U.S. CONST., amend. V.

The third objection is that concerns about mental control, even if valid, should not take moral priority over the social goals of criminal justice, including the punishment of the guilty and the prevention of crime.²⁶³ “There is nothing intrinsic in privacy and other individualist values,” some Fifth Amendment scholars have argued, “that should allow them to trump such objectives of the criminal justice system as deterrence and retribution.”²⁶⁴ Yet much in modern political theory has devoted itself to the proposition that each person possesses rights over which considerations of the common good cannot take precedence. Respect for the individual, this way of thinking goes, lies in conceiving of her both *analytically* as more than just one among a collective, whose group interests may not be fused together into a single sum total; and also *normatively* as an end in herself, who may not be used exclusively for purposes incompatible with her own.²⁶⁵ What John Rawls referred to as “the plurality and distinctness of individuals,”²⁶⁶ and Robert Nozick as “the fact of our separate existences,”²⁶⁷ demands deference to certain liberties that even the well-being of society as a whole cannot override. Worthy and serious though the goals of the criminal justice system are, they fail to outweigh the injury to the individual that is done when the state deprives a suspect of control over his mental life.

VI. CONCLUSION

The law provides principles to guide research and technology of the human brain; so too can advances in cognitive neuroscience shape and inform the law.²⁶⁸

Emerging brain imaging technology forces us to reckon with the prospect of evidence-gathering techniques that would enable the state to extract information directly from a suspect’s brain, in a way that affords her no opportunity for control over the transmission of that information. In so doing, forensic neuroscience reveals a tension between existing accounts of the right to silence and the plausible idea that individuals have a right of control over their thoughts from unwanted extraction or use by the government. Some scholars have tried to resolve this tension

263. See Seidman & Stein, *supra* note 30, at 455.

264. *Id.*

265. See MARTHA C. NUSSBAUM, *SEX & SOCIAL JUSTICE* 62 (1999).

266. JOHN RAWLS, *A THEORY OF JUSTICE* 26 (rev. ed. 1999).

267. ROBERT NOZICK, *ANARCHY, STATE, AND UTOPIA* 33 (1974).

268. See Adina Roskies, *A Case Study of Neuroethics: The Nature of Moral Judgment*, in *NEUROETHICS: DEFINING THE ISSUES IN THEORY, PRACTICE, AND POLICY* 17, 18 (Judy Illes ed., 2006).

by comparing brain imaging to more familiar types of criminal evidence. They argue that if we set aside reliability concerns, then whatever suspicion with which we might greet the introduction of neuroscience to the courtroom is in principle indistinguishable from misguided resistance to forensic advances of the past such as DNA, X-rays, and photography.²⁶⁹ Yet this analogical approach is incomplete.

That we balk at the prospect of reliable brain imaging, ostensibly similar though it appears to accepted forms of evidence, suggests that the dominant right-to-silence framework—with its arguments about reliability, excuse, and psychological cruelty—cannot capture the values at stake in matters of involuntary lie-detection. The physical/testimonial distinction underlying self-incrimination doctrine is unlikely to protect a criminal suspect from the compelled use of fMRI or EEG. Yet this key distinction presupposes a flawed conception of mind/body dualism. Brain imaging techniques that deprive individuals of control over their thoughts violate the “spirit and history of the Fifth Amendment.”²⁷⁰

269. See Pardo, *supra* note 35, at 311 (“Photography, it was thought, potentially could usurp the power of courts to determine facts by shifting power to photography experts, and away from courts, to determine the true nature of reality. None of this happened, of course, because the evidence was eventually assimilated . . .”).

270. Schmerber, 384 U.S. at 764.

