

INCRIMINATING THOUGHTS

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*The neuroscience revolution poses profound challenges to current self-incrimination doctrine and exposes a deep conceptual confusion at the heart of the doctrine. In *Schmerber v. California*, the Court held that under the Self-Incrimination Clause of the Fifth Amendment, no person shall be compelled to “prove a charge [from] his own mouth,” but a person may be compelled to provide real or physical evidence. This testimonial/physical dichotomy has failed to achieve its intended simplifying purpose. For nearly fifty years scholars and practitioners have lamented its impracticability and its inconsistency with the underlying purpose of the privilege. This Article seeks to reframe the debate. It demonstrates through modern applications from neuroscience the need to redefine the taxonomy of evidence subject to the privilege against self-incrimination. Evidence can arise from the identifying characteristics inherent to individuals; it can arise automatically, without conscious processing; it can arise through memorialized photographs, papers, and memories; or it can arise through responses uttered silently or aloud. This spectrum—identifying, automatic, memorialized, and uttered—is more nuanced and more precise than the traditional testimonial/physical dichotomy, and gives descriptive power to the rationale underpinning the privilege against self-incrimination. Neurological evidence, like more traditional evidence, may be located on this spectrum, and thus doctrinal riddles of self-incrimination, both modern and ancient, may be solved.*

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INTRODUCTION

The neuroscience revolution poses profound challenges to current self-incrimination doctrine and exposes a deep conceptual confusion at its core. In *Schmerber v. California*, the Court codified the basic dichotomous principle that the Self-Incrimination Clause ensures that no person shall be forced to give self-incriminating testimony in a criminal case, but may be compelled to provide real or physical evidence.¹ The Fifth Amendment protects against “coercion [to] prove [a] charge against an accused out of his own mouth,”² but not extracting saliva from the same.³

1. 384 U.S. 757, 763-64 (1966).

2. *Rogers v. Richmond*, 365 U.S. 534, 541 (1961).

3. See *Schmerber*, 384 U.S. at 764 (“The distinction which has emerged, often expressed in different ways, is that the privilege is a bar against compelling ‘communications’

The dichotomy between testimonial and physical evidence has failed to achieve its simplifying purpose of making easier determinations of when Fifth Amendment privilege applies. And it opens the door to a future in which the government might easily target and obtain the hidden contents of the mind—from undisclosed thoughts to ideas and emotions. Scholars and practitioners lament the impracticability of a testimonial/physical dichotomy,⁴ lambast its flawed historical roots,⁵ and introduce a myriad of new approaches for respecting its purpose.⁶ This Article seeks to reframe the debate over what “to be a witness” means in the context of self-incrimination. It demonstrates both historically and through modern examples from neuroscience the inadequacy of defining “to be a witness” through a testimonial/physical dichotomy. It proposes a new taxonomy of evidence that squares prior case law with the predominant descriptive rationale underlying the privilege. Yet in so doing it foretells a discomfiting fate for a sphere of mental privacy.

The following fictitious scenario provides a framework to understand how neuroscience reveals the need for a new taxonomy underlying the privilege against self-incrimination:

A woman is murdered in her home, and the crime captured on a home-security video recording. The recording reveals the woman struggling with an unidentifiable masked man holding a hammer with a uniquely patterned handle. In the ensuing struggle, the woman delivers a dizzying blow to the back of his head. A second masked man enters the room, and says to the first, “Let’s go!” The second man uses the hammer to fatally wound the woman. The video ends with the two men dragging the woman out of the home. When the police arrive at the crime scene the next day, they find no trace of the crime save the videotape and the hammer. The police correctly suspect that the woman’s husband is one of the perpetrators and two weeks later bring him in for questioning.

or ‘testimony,’ but that compulsion which makes a suspect or accused the source of ‘real or physical evidence’ does not violate it.”).

4. See, e.g., Ronald J. Allen & M. Kristin Mace, *The Self-Incrimination Clause Explained and Its Future Predicted*, 94 J. CRIM. L. & CRIMINOLOGY 243, 259-66 (2004) (discussing the problem of defining “testimony”); B. Michael Dann, *The Fifth Amendment Privilege Against Self-Incrimination: Extorting Physical Evidence from a Suspect*, 43 S. CAL. L. REV. 597, 598, 611 (1970) (arguing for a privacy-based theory of self-incrimination and finding it at odds with the testimonial/physical distinction); Charles Gardner Geyh, *The Testimonial Component of the Right Against Self-Incrimination*, 36 CATH. U. L. REV. 611, 612-14 (1987) (finding the testimonial/physical framework at odds with the purposes of the Self-Incrimination Clause). *But see* Michael S. Pardo, *Self-Incrimination and the Epistemology of Testimony*, 30 CARDOZO L. REV. 1023 (2008) (offering a defense of the distinction between physical and testimonial evidence on epistemological grounds).

5. See, e.g., Richard Nagareda, *Compulsion “to Be a Witness” and the Resurrection of Boyd*, 74 N.Y.U. L. REV. 1575, 1578-80 (1999) (employing an originalist approach to Fifth Amendment interpretation).

6. See, e.g., Dann, *supra* note 4, at 598, 611 (promoting a privacy-based theory behind the Fifth Amendment); Geyh, *supra* note 4, at 612-15 (suggesting a new way to interpret the testimonial/physical distinction to improve consistency with the purposes underlying the Fifth Amendment).

Now in the police interrogation room and faced with the husband, an uncooperative suspect who sits silently before them, the police contemplate methods by which they could obtain further evidence from him. At their disposal are the following techniques: (1) obtain structural images of the husband's brain to see if he suffers from head trauma in the region where the perpetrator suffered a blow to the head; (2) measure his automatic emotional and physiological responses to stimuli such as a photograph of his wife; (3) obtain his spoken, written, or stored memories of the night of the crime; or (4) elicit brain-based but interpretable responses to their questions by whatever means necessary, including torturous ones.

Each technique the police could use would yield tangible *physical* evidence detectable through modern neuroscientific methods. The police could use such evidence to make inferences about the husband's involvement in the crime. Faithful application of the testimonial/physical dichotomy should therefore predict that the police could compel any of the brain-based evidence without running afoul of the Fifth Amendment. And yet something seems amiss with this prediction—it fails to capture intuitions about mental privacy and autonomy of self.

Other scholars have already recognized the potential conflict between emerging neuroscience and current self-incrimination doctrine.⁷ That scholarship has been limited by its narrow focus on particular neuroimaging technologies and by an understandable attempt to fit new neuroscience into old categories.⁸ Even the more nuanced discussions have included only stimuli-based imaging without considering the myriad of other applicable neuroscientific technologies at issue. This narrow approach makes suspect the predictions these scholars make for how certain neuroimaging technologies would fare under current doctrine.⁹ Using outmoded and historically rejected rationales such

7. See, e.g., Sarah E. Stoller & Paul Root Wolpe, *Emerging Neurotechnologies for Lie Detection and the Fifth Amendment*, 33 AM. J.L. & MED. 359, 365-66 (2007) (discussing the difficulty of fitting newly emerging brain imaging and brain fingerprinting technology into the testimonial/physical framework); Matthew Baptiste Holloway, Comment, *One Image, One Thousand Incriminating Words: Images of Brain Activity and the Privilege Against Self-Incrimination*, 27 TEMP. J. SCI. TECH. & ENVTL. L. 141, 166 (2008) (arguing that fMRI images are both physical and testimonial).

8. See, e.g., Jody C. Barillare, Comment, *As Its Next Witness, the State Calls . . . the Defendant: Brain Fingerprinting as "Testimonial" Under the Fifth Amendment*, 79 TEMP. L. REV. 971, 974 (2006) (focusing on brain fingerprinting technology); Benjamin Holley, *It's All in Your Head: Neurotechnological Lie Detection and the Fourth and Fifth Amendments*, DEV. MENTAL HEALTH L., Jan. 2009, at 1 (exploring the intersection of brain-based lie detection technologies and self-incrimination).

9. See, e.g., Holloway, *supra* note 7, at 166 ("I argue that BOLD fMRI data should be considered testimonial. . . . I conclude that BOLD fMRI is a unique form of evidence that is simultaneously physical and testimonial.").

as mental privacy¹⁰ these scholars divide on whether neuroimaging is physical and unprivileged or testimonial and privileged.¹¹

This Article instead takes a more integrated view of cognitive neuroscience to bring coherence and restore meaning to self-incrimination doctrine. An integrated approach reveals that evidence can arise from identifying characteristics concerning individuals; it can arise automatically, without conscious processing; it can arise through memorialized photographs, papers, and memories; or it can arise as uttered responses, whether made silently or aloud. A spectrum of evidence that spans identifying, automatic, memorialized, and uttered evidence offers more nuance and precision than the traditional testimonial/physical dichotomy, and gives descriptive power to the rationale underpinning the privilege. That rationale, the excuse model of the privilege, provides a constitutional excuse for a suspect's silence when failing to do so would put the defendant in the difficult position of choosing between lying, facing contempt, or incriminating himself.

But the spectrum also does more. The excuse-based model, now imbued with greater descriptive force, reveals that current doctrine is misaligned with moral intuitions about mental privacy. The limited excuse for silence has been described as balancing societal interests in securing truth in criminal prosecutions, in promoting law-abiding behavior, and in preserving the legitimacy of the criminal justice system. Although descriptively robust, that limited excuse may simply be too weak to protect individuals against self-incrimination in the post-neuroscientific era.

This Article begins with the doctrinal underpinnings of the testimonial/physical divide, including *Schmerber v. California* and its progeny. Because this landscape is already well groomed,¹² the discussion here focuses on the nuances of the dichotomy and how it aligns with an excuse-based rationale of privilege. Part II then uses modern examples from neuroscience to reveal the impracticability of the testimonial/physical dichotomy and its inapplicability to emerging technology. Neuroscience offers more than a mere axe to cleave the divide. It provides an analogical tool by which a new taxonomy of evidence can

10. Cf. Barillare, *supra* note 8, at 993 (“In addition to disclosing the contents of a suspect’s mind, Brain Fingerprinting has the ability to record the presence of a link between facts and to determine whether the person had any role in the crime. . . . A person possessing actual knowledge of the criminal event being examined, however, would subconsciously connect the fact to the criminal event and the resulting electrochemical brain wave would be recorded by the neuroimaging technique employed by Brain Fingerprinting.”).

11. See, e.g., *id.* at 993-94 (claiming that because brain fingerprinting technology reveals factual assertions of the suspect’s mind they are testimonial in nature); Holloway, *supra* note 7, at 166-75 (arguing that the communicative nature of the evidence should govern analysis of privilege and that functional imaging techniques reveal communicative content).

12. See, e.g., Allen & Mace, *supra* note 4, at 260-61; Dann, *supra* note 4, at 598; Geyh, *supra* note 4, at 612-14; Pardo, *supra* note 4, at 1023-24; Stoller & Wolpe, *supra* note 7, at 365-66; Barillare, *supra* note 8, at 982-84; Holloway, *supra* note 7, at 157-61; Holley, *supra* note 8, at 16-17.

be constructed. Along that spectrum of evidence, past cases and future ones are located, which both explains current doctrine and predicts its evolution. The spectrum runs from identifying, to automatic, memorialized, and finally uttered evidence. Realignment self-incrimination privilege along this new spectrum instead of the testimonial/physical dichotomy brings coherence to existing doctrine and enables a more meaningful prediction of how emerging neuroscience will fare. That prediction—that identifying, automatic, and even voluntarily memorialized evidence go beyond the scope of privilege—motivates a timely discussion in Part III about how an excuse-based model of privilege fails to reflect modern intuitions about the purpose of the Self-Incrimination Clause. Part III concludes by finding that although other constitutional guarantees may provide some protection for cognitive liberty, it is unlikely that our existing constitutional structure will ensure a sphere of mental privacy that will safeguard individual autonomy.

I. THE DEVELOPMENT OF THE TESTIMONIAL/PHYSICAL DICHOTOMY

A. *Early Conflict over the Scope of Privilege*

Well before *Schmerber v. California*¹³ or the incorporation of the Self-Incrimination Clause of the Fifth Amendment against the states, courts disagreed about when a criminally accused person could be compelled to be a witness against himself. Some state courts believed the privilege guarded against the compulsion of any form of self-incriminating evidence, while others found it applicable only to testimonial statements.

States that interpreted the privilege broadly held that an accused could not be forced to exhibit his physical features to a jury,¹⁴ to try on articles of clothing before the jury,¹⁵ to submit to a physical medical examination,¹⁶ or to match a footprint impression found at the crime scene.¹⁷ By contrast, state courts that interpreted the privilege more narrowly found it permissible to compel an accused to grow a beard,¹⁸ to try on articles of clothing before the jury,¹⁹

13. 384 U.S. 757 (1966).

14. *E.g.*, *Blackwell v. State*, 67 Ga. 76 (1881); *State v. Jacobs*, 50 N.C. (5 Jones) 259, 259 (1858).

15. *E.g.*, *Ward v. State*, 228 P. 498 (Okla. Crim. App. 1924); *Turman v. State*, 95 S.W. 533, 536 (Tex. Crim. App. 1906).

16. *E.g.*, *People v. Akin*, 143 P. 795, 796 (Cal. Dist. Ct. App. 1914); *State v. Newcomb*, 119 S.W. 405, 409 (Mo. 1909); *People v. McCoy*, 45 How. Pr. 216, 217 (N.Y. Sup. Ct. 1873).

17. *E.g.*, *Cooper v. State*, 6 So. 110, 111 (Ala. 1889); *Day v. State*, 63 Ga. 668, 669 (1879).

18. *E.g.*, *Ross v. State*, 182 N.E. 865, 867-68 (Ind. 1932).

19. *E.g.*, *State v. Oschoa*, 242 P. 582, 587 (Nev. 1926).

to provide handwriting exemplars,²⁰ to submit to physical examination,²¹ to provide fingerprints²² or other exemplars, or to illustrate the fit of his foot to a crime scene footprint.²³

The disagreement was fundamental to the purpose and the scope of the privilege against self-incrimination. The broad approach favored a liberal construction guarding against governmental invasion of personal rights,²⁴ and consequently interpreted the privilege as a prohibition against compelling from a criminal accused *any* evidence that in any manner would tend to self-incriminate.²⁵ Even cases adopting the broad approach show internal disagreement, where upon careful reading one sees these courts parsing related precedents to distinguish between compelled physical evidence furnished in open court from out-of-court compulsions.²⁶ The narrow approach, by contrast, found a common purpose among the various constitutional texts²⁷ to protect the accused against inquisitions that extracted guilt either from a suspect's own lips or by her own communication, written or oral, which revealed her conscious mind. Because physical evidence, particularly when used for purely identifying purposes, did not run afoul of this purpose, the privilege did not extend to such compulsions.

B. *Schmerber v. California: A Codified Divide*

In the post-incorporation²⁸ case of *Schmerber v. California*, the Supreme Court resolved anew whether involuntarily taking physical evidence from an

20. *E.g.*, *Sprouse v. Commonwealth*, 81 Va. 374, 378 (1886).

21. *E.g.*, *O'Brien v. State*, 25 N.E. 137, 139 (Ind. 1890); *State v. Ah Chuey*, 14 Nev. 79, 88 (1879); *Noe v. Monmouth Cnty. Common Pleas Court*, 143 A. 750, 752 (N.J. 1928).

22. *E.g.*, *United States v. Kelly*, 55 F.2d 67, 70 (2d Cir. 1932); *People v. Jones*, 296 P. 317, 318-19 (Cal. Dist. Ct. App. 1931).

23. *E.g.*, *Magee v. State*, 46 So. 529, 532 (Miss. 1908); *Walker v. State*, 7 Tex. Ct. App. 245, 264-66 (1879).

24. *See, e.g.*, *Ward v. State*, 228 P. 498, 499-500 (Okla. Crim. App. 1924).

25. *See, e.g.*, *State v. Jacobs*, 50 N.C. (5 Jones) 259, 259-61 (1858) (explaining that even if the evidence itself was competent, the manner in which it was being presented—through the compelled production by the defendant—violated the privilege).

26. *See, e.g.*, *Ward*, 228 P. at 500 (holding that out-of-court production of evidence does not force the accused to bear witness against himself); *Turman v. State*, 95 S.W. 533, 536 (Tex. Crim. App. 1906) (finding related cases inapposite because they dealt with out-of-court collection of evidence).

27. *See, e.g.*, *Ross v. State*, 182 N.E. 865, 868-69 (Ind. 1932) (citing 4 JOHN HENRY WIGMORE, A TREATISE ON THE ANGLO-AMERICAN SYSTEM OF EVIDENCE IN TRIALS AT COMMON LAW § 2263, at 863 (2d ed. 1923), for the proposition that various textual distinctions between state constitutional texts protecting against “testifying,” “furnishing evidence,” “giving evidence,” or “being a witness” had a common purpose and meaning).

28. In 1964, the Court held that the Self-Incrimination Clause of the Fifth Amendment was incorporated against the states in *Malloy v. Hogan*, 378 U.S. 1, 8 (1964). The textual challenge for the *Schmerber* Court was a peculiar one: to determine whether bodily evi-

accused compels him “to be a witness against himself” contrary to the Fifth Amendment privilege against self-incrimination.²⁹ While *Schmerber* did not create the testimonial/physical dichotomy, it did codify the rule and establish its parameters.

Schmerber challenged the involuntary taking of his blood sample after he was arrested and taken to the hospital for drunk driving. Justice Brennan wrote the opinion for the Court, which rejected the Fifth Amendment claim that the forcible taking of a blood sample from the accused had “compelled [him] ‘to be a witness against himself.’”³⁰ The Self-Incrimination Clause, observed the Court, “protects an accused only from being compelled to testify against himself, or otherwise provide the State with evidence of a testimonial or communicative nature.”³¹ Despite the evident conflict between the states on this issue, the Court opined that its own prior history had made clear that seizure of non-communicative items like blood, fingerprints, or a suspect’s resemblance (for example, facial identification from a lineup) does not implicate the privilege.³²

Many argue that to arrive at this result, the *Schmerber* Court departed from the origins and doctrinal development of the Self-Incrimination Clause.³³ Some scholars have persuasively argued that a more historically rooted analysis of the privilege directly refutes the divide the Court created.³⁴ What the Court did rely upon illuminates the operating rationale behind the privilege at that time. Justice Brennan cited *Holt v. United States*³⁵ as the “leading case” in his formulation of the testimonial/physical dichotomy.³⁶ *Holt* addressed the admissibility of evidence when the accused, prior to trial and over his protest, put on a blouse that fitted him.³⁷ *Holt* argued that compelling him to submit to the modeling of the blouse violated his privilege against self-incrimination.³⁸ Justice Holmes, writing for the Court with little explanation or analysis, rejected that argument as “based upon an extravagant extension of the Fifth Amendment,” and found instead:

[T]he prohibition of compelling a man in a criminal court to be witness against himself is a prohibition of the use of physical or moral compulsion to extort

dence, taken forcibly from an accused and used against him in a criminal trial compels the defendant “to be a witness against himself” at odds with the Fifth Amendment.

29. 384 U.S. 757 (1966).

30. *Id.* at 761.

31. *Id.*

32. *See id.* at 763-64.

33. *See, e.g.,* Nagareda, *supra* note 5, at 1602-03 (discussing the Court’s misconstruction of the phrase “to be a witness”).

34. *See, e.g., id.* at 1605-23.

35. 218 U.S. 245 (1910).

36. *Schmerber*, 384 U.S. at 763. The Court also relied on *Breithaupt v. Abram*, 352 U.S. 432 (1957), the pre-incorporation case perhaps most factually on point with *Schmerber*. *See Schmerber*, 384 U.S. at 759-60.

37. 218 U.S. at 252.

38. *Id.*

communications from him, not an exclusion of his body as evidence when it may be material. The objection in principle would forbid a jury to look at a prisoner and compare his features with a photograph in proof.³⁹

In other words, the privilege did not extend so far as to stymie all reasonable and ordinary investigative techniques available.

Both *Holt* and the other cases upon which the Court relied make clear that the privilege is not absolute and will be interpreted in a manner that allows reasonable criminal investigations to proceed. Some argue that instead of a balancing approach, the *Schmerber* Court adopted the approach to the privilege that John Henry Wigmore articulated in his treatise on evidence law.⁴⁰ Wigmore advanced the perspective that “the privilege is limited to testimonial disclosures. It was directed at the employment of legal process to *extract from the person’s own lips* an admission of guilt, which would thus take the place of other evidence.”⁴¹ While Brennan did cite favorably to Wigmore in a footnote,⁴² he nevertheless emphasized that the Court’s approach was not meant to adopt Wigmore’s formulation.⁴³ Brennan instead blended Wigmore and *Miranda v. Arizona*⁴⁴ to find that the privilege strikes a balance between the individual interest in being free from coercive measures of the state and the societal interest in the evidence sought.⁴⁵ Rather than a bright-line rule, Justice Brennan was instead introducing a balancing test using the form of evidence as a guide to courts in assessing its admissibility under the rule.

The resulting framework from *Schmerber* is that the privilege against self-incrimination creates a “bar against compelling ‘communications’ or ‘testimony’” from an accused, but not against making the accused a source of real evidence when his testimonial capacities are not also implicated.⁴⁶ Because *Schmerber* served only as a “donor,” his blood sample was unprivileged.⁴⁷ The important caveat to the physical evidence rule—that one cannot be compelled to be a donor if doing so implicates his testimonial capacities—has resulted in considerable confusion about when evidence falls within or outside the scope

39. *Id.* at 252-53.

40. *See, e.g.,* Dann, *supra* note 4, at 597.

41. 8 JOHN HENRY WIGMORE, EVIDENCE IN TRIALS AT COMMON LAW § 2263, at 378 (John T. McNaughton ed., rev. ed. 1961).

42. *Schmerber v. California*, 384 U.S. 757, 764 n.8 (1966) (citing 8 WIGMORE, *supra* note 41, § 2265).

43. *Id.* at 763 n.7.

44. 384 U.S. 436 (1966).

45. *See Schmerber*, 384 U.S. at 762-63. In *Miranda*, the Court said of the interests protected by the privilege: “All these policies point to one overriding thought: the constitutional foundation underlying the privilege is the respect a government—state or federal—must accord to the dignity and integrity of its citizens.” 384 U.S. at 460.

46. *Schmerber*, 384 U.S. at 764-65.

47. *Id.* at 765.

of privilege.⁴⁸ The spectrum I propose restores meaning to this nuanced exception.

C. Rationalizing Privilege

The testimonial/physical dichotomy purportedly aligns with the rationale that the privilege against self-incrimination serves. Locating a simple and coherent rationale has proven an elusive task for courts and scholars over time. The three most popular rationales⁴⁹—protecting individual privacy,⁵⁰ protecting individual autonomy, and avoiding placing the defendant in a cruel trilemma of choice—each suffer substantial descriptive shortcomings.⁵¹ The excuse-based model of privilege—understood as a limited right to remain silent balanced against societal interests in law-abiding behavior—provides the best descriptive account of settled Fifth Amendment law. This rationale, introduced by William Stuntz over twenty years ago, nevertheless lacks normative appeal as emerging technology takes hold.

By contrast, self-incrimination as a protection against physical or mental privacy⁵² has significant normative appeal, but is descriptively unsupportable.

48. See Peter Arenella, Schermerber *and the Privilege Against Self-Incrimination: A Reappraisal*, 20 AM. CRIM. L. REV. 31, 41-42 (1982) (arguing that the mental privacy aspect of the privilege helps distinguish between testimonial evidence and real or physical evidence); Dann, *supra* note 4, at 598 (arguing that “the true distinction is not whether the result of investigation is labelled ‘real’ or ‘testimonial,’ but whether the accused can or cannot reasonably believe that he can affect the result”). *But cf.* William J. Stuntz, *Self-Incrimination and Excuse*, 88 COLUM. L. REV. 1227, 1277 (1988) (“[T]he state may always seize, and may sometimes compel production of, documents whose creation was not compelled. In such cases, the privilege protects only the testimonial aspects of the act of producing the document and not the document itself. In other words, for the privilege to apply, that which is testimonial about the evidence in question must also have been compelled” (footnote omitted)).

49. Less popular but appealing is the claim that anytime cognition—defined as the “acquisition, storage, retrieval and use of knowledge,” or “intellectual processes that allow one to gain and make use of substantive knowledge”—is involved, the privilege is available. Allen & Mace, *supra* note 4, at 247, 267.

50. William Stuntz has persuasively demonstrated that although the historical source of privilege has roots in protecting informational privacy, since *Boyd*, Fifth Amendment analysis has focused on the coercive pressure applied by the police and the choice between confession and perjury faced by the suspect. William J. Stuntz, *The Substantive Origins of Criminal Procedure*, 105 YALE L.J. 393, 443-44 (1995).

51. Stuntz, *supra* note 48, at 1232-42.

52. See *Murphy v. Waterfront Comm’n*, 378 U.S. 52, 55 (1964) (recognizing “our respect for the inviolability of the human personality and of the right of each individual ‘to a private enclave where he may lead a private life’” (quoting *United States v. Grunewald*, 233 F.2d 556, 581-82 (2d Cir. 1956) (Frank, J., dissenting), *rev’d*, 353 U.S. 391 (1957))); see also *United States v. Nobles*, 422 U.S. 225, 233 (1975) (discussing the Fifth Amendment as a protection of the individual’s “private inner sanctum”); *Bellis v. United States*, 417 U.S. 85, 90-91 (1974); *Couch v. United States*, 409 U.S. 322, 327 (1973); *United States v. White*, 322 U.S. 694, 698 (1944).

Proponents of the privacy-based rationale⁵³ argue the privilege does and should protect human dignity.⁵⁴ Compelled self-incrimination, they argue, would interfere with the ability of the accused to assess the moral implications of her actions⁵⁵ and would thereby “inhibit[, stultif[y], or interrupt[] the process by which the accused decides what to do about whatever criminal responsibility rests at his doorstep.”⁵⁶ Matters such as “the admission of wrongdoing, the self-condemnation, [and] the revelation of remorse . . . [are] a matter between a man and his conscience,” and lie at the heart of the Fifth Amendment.⁵⁷

In *Fisher v. United States*,⁵⁸ the Supreme Court expressly rejected a privacy-based rationale for the privilege. The Court held that compelled production of accountants’ documents in possession of a suspect’s attorney did not violate the Fifth Amendment.⁵⁹ In so doing, it concluded that “the Court has never on any ground, personal privacy included, applied the Fifth Amendment to prevent the otherwise proper acquisition or use of evidence which, in the Court’s view, did not involve compelled testimonial self-incrimination of some sort.”⁶⁰ Rather than finding a broad individual interest in keeping certain things private, the Court directed its Fifth Amendment inquiry at the nature of the evidence compelled. Real evidence, such as papers in the hands of a third party, is beyond the scope of privilege even if that evidence contains private information.⁶¹ Instead, irrespective of whether the evidence takes the form of one’s physical body or one’s physical papers, the privilege does not bar the compulsion of otherwise private information from being revealed.⁶² Moreover, a state

53. *E.g.*, Dann, *supra* note 4, at 611-12 (arguing for a mental privacy approach while recognizing that the core value of the privilege turns on whether the accused is put in the position of having to choose whether to alter the evidence). The cognition model advanced by Ronald Allen and Kristin Mace seeks to distinguish cognition from mental privacy, but both theories seem to focus on the same concern. *See* Allen & Mace, *supra* note 4, at 261-64, 266-67.

54. *See* Helen Silving, *Testing of the Unconscious in Criminal Cases*, 69 HARV. L. REV. 683, 700 (1956) (“[I]n the administration of justice, truth is but a means, whereas dignity is an end. Criminal justice would be devoid of meaning were it incidentally to deny the very human dignity which it is its ultimate purpose to protect.”).

55. *See, e.g.*, Robert S. Gerstein, *Punishment and Self-Incrimination*, 16 AM. J. JURIS. 84, 90-91 (1971).

56. Thomas S. Schrock et al., *Interrogational Rights: Reflections on Miranda v. Arizona*, 52 S. CAL. L. REV. 1, 49 (1978).

57. Robert S. Gerstein, *Privacy and Self-Incrimination*, 80 ETHICS 87, 90 (1970).

58. 425 U.S. 391 (1976). *Fisher* was reinforced by *United States v. Quarles*, in which Justice O’Connor stated in her concurring opinion that a suspect in custody based on probable cause “cannot seriously urge that the police have somehow unfairly infringed on his right ‘to a private enclave where he may lead a private life.’” 467 U.S. 649, 670 (1984) (O’Connor, J., concurring in the judgment in part and dissenting in part) (quoting *Murphy v. Waterfront Comm’n*, 378 U.S. 52, 55 (1964)).

59. 425 U.S. at 397.

60. *Id.* at 399.

61. *See id.* at 397-99.

62. *See* Stuntz, *supra* note 48, at 1232-33.

may compel testimony once immunity has been granted, even for the most preciously guarded private secret.⁶³ If the privilege in fact protected privacy, “or even only ‘mental privacy,’” the relevant inquiry should focus on the substantive content of the compelled disclosure; instead, “settled fifth amendment law focuses on the criminal *consequences* of disclosure.”⁶⁴ The immunity doctrine further underscores this point. If privacy were at the heart of the privilege, one would expect that immunity from prosecution could not override it. An excuse theorist, by contrast, would expect that granting immunity would indeed render the privilege inapplicable, since immunity puts no pressure upon the defendant to lie when questioned. Privilege as excuse ensures that defendants have only one legal and rational choice: to testify truthfully.⁶⁵

The attractive and yet elusive theory that the privilege protects individual autonomy similarly lacks descriptive grounding. Whether autonomy refers to the dignity against bodily intrusions or against being forced to condemn oneself, neither squares with self-incrimination doctrine. Compelled production of bodily evidence and forced public self-condemnation are both permissible under settled Fifth Amendment law. Defendants can be compelled to be donors of real evidence when applicable and compelled to testify when immunized, thereby assisting in their own public and governmental condemnation.⁶⁶

Balancing governmental and individual interests provides one descriptively appealing alternative to the absolute privacy rationale. In both *Schmerber* and other cases the Court has characterized the privilege as a balance between an individual interest against self-incrimination and societal interest in the evidence that the suspect holds.⁶⁷ Yet standing alone, this rationale fails to explain much of the doctrine. A balancing test traditionally yields individual interests to societal ones when the governmental interest is the most essential, but the privilege against self-incrimination works in nearly the opposite way⁶⁸: it allows compelled testimony only when immunity has been granted, thereby withholding from society the benefit of using that evidence to prosecute the testifying witness.⁶⁹ And a generic balancing test fails to explain much by virtue of its generality. For the balancing test to be robust, the factors to be considered and the weight to accord each must be identified *ex ante*. Otherwise, the bald claim that the privilege seeks to balance governmental and individual interests ex-

63. *Id.* at 1234.

64. *Id.*

65. *See id.* at 1229.

66. *See id.* at 1235.

67. *Cf. Murphy v. Waterfront Comm'n*, 378 U.S. 52, 55 (1964) (articulating as justifications for the privilege our preference for an adversarial instead of inquisitorial system of justice, equilibrium between individual liberty and government interference, and the belief that the government should shoulder the entire burden of proof when prosecuting a criminal defendant).

68. Stuntz, *supra* note 48, at 1236.

69. *Id.*

plains all cases equally well and all cases equally poorly through ad hoc backward rationalization.

The rationale that enjoys the most widespread support is that the privilege seeks to protect the criminal defendant from the “cruel trilemma of self-accusation, perjury or contempt.”⁷⁰ While this rationale has faced forceful attack,⁷¹ it has both historical and normative force, such that courts⁷² and scholars⁷³ frequently cite it as the purpose underlying the privilege. Historically, the privilege was said to protect against the “use of legal compulsion to extract from the accused a sworn communication of facts which would incriminate him.”⁷⁴ This was the procedure employed in the Star Chamber, in which a suspect was put under oath and compelled to testify, often for crimes yet unknown and uncharged.⁷⁵ Informed by this history, both scholars and courts describe the privilege as a way to guard against official abuse such as torture and other “third degree” tactics used by investigators.⁷⁶ In *Miranda v. Arizona*, the Court

70. *Murphy*, 378 U.S. at 55.

71. *See, e.g.*, David Dolinko, *Is There a Rationale for the Privilege Against Self-Incrimination?*, 33 UCLA L. REV. 1063, 1090-107 (1986) (arguing that no satisfactory explanation has been presented of why it is cruel to force an accused person to harm himself); Henry J. Friendly, *The Fifth Amendment Tomorrow: The Case for Constitutional Change*, 37 U. CIN. L. REV. 671, 680 (1968) (suggesting that the privilege runs counter to ordinary standards of morality); Stephen A. Saltzburg, *The Required Records Doctrine: Its Lessons for the Privilege Against Self-Incrimination*, 53 U. CHI. L. REV. 6, 7-8 (1986) (noting that the notion that “no person may be required to provide evidence against himself” has been persuasively attacked, and arguing that some of the privilege’s historical uses are now better served by alternative legal protections such as the First Amendment and the Due Process Clause).

72. *See, e.g.*, *Pennsylvania v. Muniz*, 496 U.S. 582, 595 & n.8 (1990); *Doe v. United States*, 487 U.S. 201, 212 (1988); *Andresen v. Maryland*, 427 U.S. 463, 475-76 & n.8 (1976).

73. *See, e.g.*, Gerstein, *supra* note 57, at 90 (arguing that individuals should have absolute control over revelations of guilt and remorse); R. Kent Greenawalt, *Silence as a Moral and Constitutional Right*, 23 WM. & MARY L. REV. 15, 39 (1981) (arguing that government compulsion to force admissions is intuitively inhumane); Schrock et al., *supra* note 56, at 49 (claiming that the purpose of the privilege is to enhance autonomy by protecting the individual’s right to choose how he “takes responsibility”).

74. *Muniz*, 496 U.S. at 595 (quoting *Doe*, 487 U.S. at 212).

75. *See id.* at 595-96 (quoting *Doe*, 487 U.S. at 212).

76. *Miranda v. Arizona*, 384 U.S. 436, 443 (1966) (discussing the origins of the doctrine in England, where the “the temptation to press the witness unduly, to browbeat him if he be timid or reluctant, to push him into a corner, and to entrap him into fatal contradictions” became so odious that the right against self-accusation developed by popular demand (quoting *Brown v. Walker*, 161 U.S. 591, 596 (1896))); *Murphy v. Waterfront Comm’n*, 378 U.S. 52, 55 (1964) (listing “our fear that self-incriminating statements will be elicited by inhumane treatment and abuses” among the justifications of the privilege); *Ullmann v. United States*, 350 U.S. 422, 428 (1956) (describing the historical background of the Inquisition and the Star Chamber as the impetus for the Founders to “close the doors against like future abuses by law-enforcing agencies”). *But see* Dolinko, *supra* note 71, at 1079-80 (arguing that irrespective of the privilege against self-incrimination’s historical origins, due process now adequately protects against physically coercive interrogations).

discussed numerous severe police abuses involving beatings, hangings, whippings, and sustained questioning in order to extort confessions.⁷⁷ Such flagrant violations of the law by police tended to produce false confessions and make the police and prosecutors less zealous in searching for objective evidence. The *Miranda* Court sought to limit these practices through its interpretation of Fifth Amendment privilege.⁷⁸

Both the history of its adoption and subsequent developments in the doctrine suggest the privilege at least exists to protect individuals against brutal and violent police tactics, if not the more modern psychological ones as well.⁷⁹ A major descriptive problem nevertheless keeps the cruel trilemma from fully succeeding. “[T]he law often forces witnesses to make choices at least as cruel” as the privilege purportedly protects against.⁸⁰ Why would it be any different under the Fifth Amendment? Additionally, while an innocent suspect may feel pressure to prove his innocence or to seem cooperative to investigators, the innocent suspect does not risk self-incrimination or perjury by telling the truth. Yet the privilege protects both the guilty and innocent alike from being compelled to give testimonial self-incriminating evidence. So while it seems certain that at least some element of balancing autonomy and restraining investigators factors into Fifth Amendment analysis, something more must be said to make sense of the underlying rationale.

1. *The excuse-based model of privilege*

In his article *Self-Incrimination and Excuse*, William Stuntz provides a useful way to positively reconcile the two most popular but seemingly divergent rationales: societal balancing and the cruel trilemma.⁸¹ His theory analogizes the privilege against self-incrimination to criminal excuse. Criminal excuse concerns hard but not cruel choices, “choices that many of us might make wrongly.”⁸² In previous work, I describe criminal excuse more fully as societal recognition of human frailty—choosing to hold individuals less responsible for wrongdoing when the average person would likely succumb to the same temptation to which the defendant did.⁸³ By allowing criminal excuse in some situations, the criminal justice system recognizes that society ought not

77. 384 U.S. at 446.

78. *Id.* at 447.

79. *See id.* at 448.

80. Stuntz, *supra* note 48, at 1238 (suggesting as an example “the immunized witness who must testify against criminal associates, notwithstanding their threat to injure or kill him if he talks”).

81. *See id.* at 1228.

82. *Id.* at 1239.

83. *See* Nita A. Farahany & James E. Coleman Jr., *Genetics and Responsibility: To Know the Criminal from the Crime*, LAW & CONTEMP. PROBS., Winter/Spring 2006, at 115, 150.

hold a criminal defendant to a higher standard of conduct under the circumstances than could be expected of the average member of society.⁸⁴ The average person often chooses poorly when his judgment is clouded by extreme external pressure.⁸⁵ And yet, as Stuntz aptly points out, criminal excuses are not absolute and become unavailable when the societal costs of recognizing an excuse are high enough to warrant holding the individual fully responsible for his crime.⁸⁶

Stuntz's excuse model converges with the cruel trilemma rationale by focusing on the temptation a defendant faces to falsify his responses to avoid self-incrimination. Similar to criminal excuse, the history and development of self-incrimination doctrine reveals an inclination to give criminal defendants immunity for their silence rather than an excuse for perjury. Immunized silence applies only when an accused faces a choice that would tempt the average member of society to commit perjury, whether because of the force used to extract an admission or the threatened criminal penalty.⁸⁷ To instead force the suspect to cooperate and then penalize his perjury would hold the suspect to a higher standard of conduct than those judging him could meet.⁸⁸

Like any criminal excuse, the privilege is not absolute. It is balanced against societal interest in encouraging law-abiding behavior and the pursuit of truth in criminal justice. Unlike finding that any cruel choice is an impermissible one, an excuse-based privilege makes piercing silence permissible when the social costs of recognizing a right against self-incrimination would be too expensive in terms of criminal deterrence.⁸⁹

As a balancing test, excused silence is merited only when a suspect is compelled to communicate a potential falsehood. This idea of choice is easiest to understand by considering a suspect on the witness stand. If he is asked about his involvement in the crime while he is on the stand, he faces a difficult and pressurized moment of truth during which he must decide whether to communicate falsehood, remain silent, or self-incriminate.⁹⁰ The temptation to commit perjury, the consequent risk of falsehood, and the availability of other means by which the government can seek evidence all predict that under such circumstances the defendant would be immunized from testifying.

As a rationale, the model has great descriptive force, but only when used in conjunction with the spectrum of evidence proposed in this Article. By contrast to the approach in this Article, Stuntz demurs to the testimonial/physical dichotomy, arguing merely that "the general thrust of the distinction between

84. See Stuntz, *supra* note 48, at 1245.

85. *Id.*

86. See *id.* at 1246-51.

87. See *id.* at 1239.

88. See *id.*

89. See *id.* at 1247.

90. See *id.* at 1258-59.

physical and testimonial evidence makes sense from an excuse perspective,” while the same cannot be said of privacy or autonomy theories.⁹¹ But he gives no more than one paragraph of discussion to the dichotomy in the paper and fails to appreciate how blurred those categories have become. His excuse-based rationale regains its descriptive force and applicability through the spectrum proposed in this Article, a power otherwise lost and until now never before applied to the grey area between testimonial and physical evidence.

Together with the spectrum proposed herein, the excuse-based model provides the best positive account of how self-incrimination cases are decided.⁹² By grounding the privilege in a theory that “incorporates society’s moral preference for truth” and law-abiding behavior, the theory seems also to have normative force.⁹³ As a limited right to remain silent, the theory gives legitimacy to perjury as a criminal offense. By giving the defendant the option to remain silent rather than to state falsehoods, when the defendant chooses to create a falsehood he is appropriately condemned. Excuse-as-privilege maximizes the reliability of the testimony obtained. The temptation to commit perjury when faced with the difficult choice of self-incrimination does and should make us doubt the reliability of compelled testimony. We reasonably suspect that physical and psychological force yields false confessions rather than reliable truth upon which the state can rely for legitimate criminal prosecutions.

Despite the existing model’s accolades, Part II reveals through emerging neuroscience that the existing model will likely fail to protect some individual liberties that society may value. As discussed in Part III, the coming siege against cognitive liberties may require new ways to protect incriminating and even innocent thoughts.

II. THE SPECTRUM FROM NEUROSCIENCE

Neither “physical” nor “testimonial” accurately describes neurological evidence. Neuroscience involves noninvasive testing of the physical brain to gain evidence that has physical form. Just as nodding the head can communicate a response, so too can neurological changes in the brain. Using the hypothetical arrest and interrogation of the husband introduced above, the following discussion challenges the testimonial/physical dichotomy at the heart of current self-incrimination doctrine. Neuroscience provides an analogical tool to construct a new spectrum of evidence and a way to test its utility. Aligning old and new cases on that spectrum helps to predict which investigative techniques, if any, would compel the hypothetical husband to “be a witness” against himself. And

91. *Id.* at 1277.

92. *See id.* at 1231-32 (arguing that “a great deal” of Fifth Amendment doctrine is “consistent with what the Justices would have done” had they viewed the privilege within the framework of the excuse-based model).

93. *Id.* at 1242.

the spectrum itself helps to predict how hard and contentious cases would be resolved in accordance with current doctrine.

Each investigative technique described in the hypothetical would extract from the husband evidence that is physical in form. Should the husband speak answers to the authorities, a series of neurological changes in his brain will cause him to expel air through his larynx, creating variations in air pressure that produce sound. The variations of air pressure cause the surrounding air to vibrate, which causes the human eardrum to vibrate, which the listener's brain interprets as sound.⁹⁴ Should the police evoke thoughts in the husband's mind and then intercept those thoughts using brain imaging techniques, they would possess a physical representation of his thoughts. The husband's memories of the fateful evening have physical representation in his brain, as do his feelings for his wife, or any brain damage that he may have suffered. As discussed more fully herein, it is now at least theoretically possible to compel spoken words, evoke thoughts, detect stored memories and feelings, and visually "see" brain damage. As self-incrimination doctrine presently operates, it would be logically consistent to treat all of this evidence the same.

Yet by using the form of the evidence as its guide to privilege, the Court has left unsettled techniques that are difficult to classify. In part, this is because a testimonial/physical dichotomy does not distinguish between functional tests of physical characteristics—such as measuring the metabolism of alcohol over time—and a static measure of physical characteristics at a single point in time, such as blood alcohol content. Functional tests such as compelled lie-detection tests and tests using behavioral traits revealed through questioning remain unsettled under Fifth Amendment doctrine. New cases, too, present thorny issues to resolve, such as whether a suspect can be compelled to reveal a tattoo of an incriminating phrase, to disclose a password to an encrypted computer, or to produce his personal papers.

One important caveat is in order before delving into the topic of the spectrum of evidence. The use of neuroscience to construct this spectrum is neither an explicit nor an implicit endorsement of the scientific reliability or admissibility of the studies discussed herein. Neuroscience is a nascent field of study with new scientific results reported daily that challenge the results of prior ones. The techniques described below in Part II may likewise prove scientifically untenable or may be replaced as refinements in understanding of the human brain and body develop. The value of neuroscience comes not in the reliability of the studies presented, but in the ability to use a single field to understand the myriad of evidence that one confronts in self-incrimination cases. It provides an analogical tool to compare "apples to apples," instead of the "apples to oranges" comparisons that the present hodgepodge of prior cases

94. See NAT'L INST. ON DEAFNESS & OTHER COMMUN DISORDERS, NAT'L INSTS. OF HEALTH, HOW YOUR BRAIN UNDERSTANDS WHAT YOUR EAR HEARS 29-30 (2003), available at http://science.education.nih.gov/supplements/nih3/hearing/guide/nih_hear_curr-suppl.pdf.

provides. And yet the availability of these studies in leading peer-reviewed scientific journals suggests that neuroscience is neither a fanciful science fiction tale nor a merely futuristic technology. This spectrum makes clear that society is already facing the dawn of a neuroscientific era.

A. *Identifying*

Compelling a suspect to reveal identifying evidence about his physical characteristics and likeness is beyond the scope of Fifth Amendment privilege.⁹⁵ Identifying evidence includes information about the suspect's characteristics or physical likeness, and other static and descriptive information. It includes a person's name, birth date, weight, height, clothing size, shoe size, blood type, or DNA. Such information may help to connect a suspect with the known attributes of the criminal perpetrator.

Neuroscience can be used to obtain real or physical identifying evidence from an accused. In the hypothetical above, the police know that the perpetrator suffered a blow to the head. Much like a fingerprint or footprint may prove the identity of the accused and the criminal perpetrator, so too could the static image of the head trauma. Such evidence provides direct identification, rather than a factual inference to be drawn between the image and its evidentiary purpose. Compelling the husband to submit to static brain imaging for identification would be no different than compelling a suspect to reveal stab wounds concealed by clothing in order to match his wounds to a torn shirt found at the crime scene. Both are hidden from public view and yet a suspect may be compelled to bare both to an investigative gaze.

The police could obtain a static brain image from the husband without him facing any choice or opportunity to manipulate the evidence. Much like obtaining his DNA via blood sample or saliva swab, performing a dental exam, or observing his height or eye color, a brain image provides evidence about the static physical state of the accused.⁹⁶ No real-time information about any mental processes is revealed. Other than submitting one's body for examination, there is no sense in which a suspect must produce, contemplate, or create a response to any external stimuli. Put otherwise, the defendant is neither faced with a cruel trilemma of choice, nor put in an excusable position that would warrant extending the privilege against self-incrimination to encompass a refusal to submit to the examination. So if the government seeks static brain images from an accused, existing rationales justifying the privilege would provide no support to the uncooperative defendant.

95. See *infra* text accompanying notes 106-13 (discussing the *Schmerber-Wade-Gilbert* trilogy).

96. Real and physical evidence in the form of vital records such as health records, a birth certificate, a driver's license, or a social security number likewise provides identifying information about an individual that might be gathered for a criminal case.

The investigators could use structural neuroimaging technology to determine whether the suspected husband has brain abnormalities or brain damage.⁹⁷ These techniques would enable the police to peer into the husband's brain to determine recent head injuries he may have suffered. Such techniques are particularly useful for detecting primary brain injuries—the injury that occurs at the moment of impact resulting in diffuse axonal injuries, contusions, or blood clotting at the site of impact.⁹⁸ Among the most popular of these technologies for structural imaging are computerized tomography (CT) scans and magnetic resonance imaging (MRI).

A CT scan would enable the investigators to visualize even mild-to-moderate primary head injury, meaning the injury suffered at the moment of the impact between the unidentified object and the perpetrator's head.⁹⁹ CT scans generate many two-dimensional x-ray images to render a three-dimensional image of the brain.¹⁰⁰ Like other neuroimaging technologies, the CT scan allows one to view a particularized region of the brain, and to view brain structure along different axes.¹⁰¹

If the husband suffered damage to brain tissue instead of internal bleeding, MRI may prove more sensitive than a CT scan in detecting his head injuries.¹⁰² MRI technology produces a clear and detailed picture of brain structure. The images are cross-sectional slices of the brain, which allows a technician to pinpoint the exact area of head injury in the subject's brain.¹⁰³ Thus, structural

97. See generally Joseph H. Baskin et al., *Is a Picture Worth a Thousand Words? Neuroimaging in the Courtroom*, 33 AM. J.L. & MED. 239, 248-50 (2007), for a brief introduction to the technologies and complications associated with structural brain imaging.

98. Zwany Metting et al., *Structural and Functional Neuroimaging in Mild-to-Moderate Head Injury*, 6 LANCET NEUROLOGY 699, 699 (2007).

99. See *id.* (noting that CT scanning can be used in cases with mild and moderate head injuries, although there is substantial variation in the rate at which doctors actually order a CT scan under such circumstances). The CT scan can be used to detect hemorrhage and skull fractures, and is achieved rapidly and easily even with agitated subjects. *Id.* CT scans are 63% to 75% sensitive to detecting abnormalities in acute head trauma. *Id.* at 700. Note that, although such imaging techniques might be useful tools, “about 20% of patients who sustain mild-to-moderate head injury without abnormalities on the admission CT have problems with resuming work, suggesting that the conventional CT scan has limited ability in detecting structural and functional abnormalities.” *Id.* (footnote omitted).

100. *CAT (Computerized Axial Tomography) Scans*, PBS, <http://www.pbs.org/wnet/brain/scanning/cat.html> (last visited Feb. 16, 2012).

101. See *id.* The same technology also allows measurement of changes in cerebral blood flow to particularized areas of the brain as the subject performs tasks, thereby allowing the measurement of brain activity. *Id.*

102. See Metting et al., *supra* note 98, at 700.

103. See *MRI (Magnetic Resonance Imaging)*, PBS, <http://www.pbs.org/wnet/brain/scanning/mri.html> (click “Next” as necessary) (last visited Feb. 16, 2012). The MRI uses magnetic fields to realign the hydrogen atoms in the head. Normally, absent a magnetic field, the nuclei of the atoms in the body are aligned in different directions. The magnets of the MRI realign the protons of the hydrogen atoms in the head, so that they spin along the same axis. *Id.* Once they are aligned, the MRI machine sends a radio pulse to the head, making

MRIs can detect damage to particularized regions of neurons, bleeding in the brain, swelling in the brain, or other indications of traumatic brain injury.¹⁰⁴ MRI either alone or in combination with other techniques could yield meaningful incriminating evidence of the husband's involvement in the crime.¹⁰⁵

Each time it has been presented with the issue, the Court has held that the privilege against self-incrimination does not protect an accused from compelled submission to physical testing for identifying evidence. Recall that *Schmerber* was compelled to be a "donor" of his own blood sample, which could have been used to match blood from a crime scene.¹⁰⁶ On the heels of *Schmerber*, in two companion cases, *United States v. Wade*¹⁰⁷ and *Gilbert v. California*,¹⁰⁸ the Court found it permissible to compel a suspect to give his identifying physical evidence to investigators even when the evidence took the form of traditional modes of testimonial communication such as speaking and handwriting. These holdings implicitly recognize that the form the evidence takes does not determine its privileged status.

In *Wade*, the defendant sought to exclude a victim's identification of him from a lineup during which he appeared wearing strips of tape allegedly worn, and speaking words allegedly spoken, by a perpetrator of a bank robbery.¹⁰⁹ Relying on *Schmerber* for support, the Court held that neither the lineup itself nor anything required of the defendant during the lineup violated his privilege against self-incrimination.¹¹⁰ Instead, his voice and body were used for their *identifying characteristics* rather than for factual content.¹¹¹ The distinction, the Court explained, arises not from the testimonial/physical nature of the evidence, but from the differences between "an accused's 'communications' in whatever form, *vocal or physical*, and 'compulsion which makes a suspect or accused the source of real or physical evidence.'"¹¹² In the hypothetical crime investigation the police could likewise begin their investigation of the husband

some of the atoms spin at a particular frequency, depending on their tissue type. When the pulse is turned off, the atoms are returned to their natural alignment, and release energy. The MRI machine detects the energy releases, and the computer processes the signals and produces an image of the tissue types in the region. *Id.*

104. See Baskin et al., *supra* note 97, at 254-55.

105. Cf. Metting et al., *supra* note 98, at 700 ("The difficulty of using MRI to evaluate skull fractures, the limitations in monitoring patients during MRI, and the susceptibility to motion artefacts related to the relatively long exposure time discourage the use of this technique in the acute phase of head injury.")

106. See *Schmerber v. California*, 384 U.S. 757, 765 (1966); see also *supra* Part I.B.

107. 388 U.S. 218 (1967).

108. 388 U.S. 263 (1967).

109. *Wade*, 388 U.S. at 220.

110. *Id.* at 221.

111. See *id.* at 222-23.

112. *Id.* at 223 (emphasis added) (quoting *Schmerber v. California*, 384 U.S. 757, 764 (1966)) (internal quotation marks omitted); see also *United States v. Dionisio*, 410 U.S. 1, 5 (1973) (reaffirming that compelling a suspect to provide voice exemplars did not violate the Fifth Amendment).

by compelling him to say “Let’s go!” to see if his voice matches the perpetrator’s voice on the video recording. In other words, a compelled response from an accused may be unprivileged when the response is used for identification rather than its substantive content. The division thus arises between compelled responsive communications from the accused—whether vocal or physical—and evidence merely identifying in nature; it is not simply a division between physical and spoken evidence. The Court took a similar approach in *Gilbert* in holding that while “[o]ne’s voice and handwriting are, of course, means of communication[, 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.”¹¹³

In accord with the *Schmerber-Wade-Gilbert* trilogy, compelling a suspect to submit to static brain imaging would yield merely identifying information.¹¹⁴ In balancing societal interest in truth and law-abiding behavior against an excusable choice to commit a falsehood, the individual choice would be raised only weakly, if at all.¹¹⁵ A suspect could attempt to mask his voice or have a tattoo removed, or even inflict himself with additional stab wounds to conceal his crime scene wounds. But when forced to reveal his identifying characteristics, the defendant faces no more temptation to falsify evidence and even less opportunity to do so than before he was brought in for questioning. If a criminal suspect wants to conceal his identity by altering his physical appearance, then he will be tempted to do so absent any governmental compulsion. When compelled to be a donor of identifying evidence he is asked only to submit or resist—neither option requiring that he communicate *any* response, let alone a false one. Given the weak impact on individual choice, society should have a high degree of confidence in the reliability and value of the evidence. The

113. 388 U.S. at 266; *see also* *United States v. Euge*, 444 U.S. 707, 711 (1980) (holding that the IRS had authority to compel a taxpayer to provide a handwriting exemplar and that the exercise of that authority “is not in derogation of any constitutional rights”); *United States v. Mara*, 410 U.S. 19, 22 (1973) (holding it appropriate under Fourth Amendment search and seizure doctrine for a grand jury to require handwriting exemplars).

114. When analyzing “stop and identify” statutes, the Court has similarly found that to compel a person to disclose his identity to the police does not violate the privilege against self-incrimination except in “unusual circumstances” where identification might in fact be incriminating. *See Hiibel v. Sixth Judicial Dist. Court*, 542 U.S. 177, 189, 191 (2004). The premise for finding such evidence generally beyond the scope of the privilege is that real or physical evidence speaks for itself rather than by forcing the accused “to be a witness against himself.” *See id.* at 189. The Court found that a police officer could not have used Hiibel’s name in any way to incriminate him. *See id.* at 190. But the Court reserved answering whether all identification-forcing statutes were permissible, stating that “a case may arise where there is a substantial allegation that furnishing identity at the time of a stop would have given the police a link in the chain of evidence needed to convict the individual.” *Id.* at 191.

115. Stuntz claims that the “excuse theory offers a fairly plain explanation” of the testimonial/physical dichotomy. Because one cannot falsify physical characteristics, there is no falsehood (or perjury) to excuse, and so no need to immunize a failure to cooperate. Stuntz, *supra* note 48, at 1276.

excuse-based model would therefore predict against immunizing a suspect's refusal to give identifying physical evidence or refusal to allow physical examination of his identifying characteristics. Both generally and with respect to the hypothetical husband, a suspect would not be able to successfully invoke the Fifth Amendment when asked to allow inspection of identifying evidence.

Likewise, because submission to physical testing could be constitutionally compelled, the refusal to submit such identifying information can also be used against a suspect without fear of offending the Fifth Amendment. In *South Dakota v. Neville*, the Court held that the defendant's refusal to submit to physical examination could be used as inferential evidence against him.¹¹⁶ In doing so, the Court rejected the more simplistic approach advanced by Justice Traynor in *People v. Ellis*, finding the refusal to submit to be a physical act rather than a communication protected by the privilege.¹¹⁷ Instead, the Court found that "no impermissible coercion is involved when the subject refuses to submit to take the test, regardless of the form of refusal" (such as head nodding, complete inaction, or substantively responding).¹¹⁸ While compulsion may exist when someone *complies* with a forced test, such compulsion is not directly present when a respondent *refuses* that test.¹¹⁹

The choice between submitting to testing and refusing cannot be a meaningless one. The privilege at least protects against coercive and abusive investigative tactics. The test at issue therefore cannot be so painful or abusive that any rational person would refuse. Rather, when the test at issue is a simple and painless one, and the suspect has a meaningful opportunity to refuse testing or to submit, his refusal can be used as evidence against him.¹²⁰ Static brain scanning requires only that a defendant lie still while the images are taken, risking neither physical invasion nor physical abuse. Under current doctrine, then, a suspect may be compelled to submit to structural brain scanning, and his refusal to comply could be used as inferential evidence against him.

B. *Automatic*

Evidence produced automatically rather than through the conscious thought process has created the greatest murkiness in self-incrimination doctrine. Au-

116. 459 U.S. 553, 554 (1983).

117. *Id.* at 561-62 (citing *People v. Ellis*, 421 P.2d 393 (Cal. 1966)).

118. *Id.* at 562.

119. *See id.*

120. To illustrate this point, the *Neville* Court explained that the test at issue was a "simple blood-alcohol test," which was "so safe, painless, and commonplace that respondent concede[d], as he must, that the State could legitimately compel" him to comply. *Id.* at 563 (citation omitted). By contrast, as the *Schmerber* Court had intimated, a refusal to submit to a test could be compelled testimonial evidence if the test were so dangerous, painful, severe, or contrary to the suspect's religious beliefs that the suspect would prefer "confession" to compliance. *Id.*

omatic evidence encompasses those actions and reactions that occur with little or no conscious control by the individual. Neuroscience provides the ideal analogue to understand the nuances of this category and to reveal how the excuse model of privilege would predict that automatic functioning falls outside the privilege.

Static identifying information is often unavailable or inadequate to meaningfully incriminate a suspect. Measurements of automatic functions could fill in the evidentiary gaps. Blinking, the beating of the heart, sweating—these are all simple automatic functions of the human body that neither require nor follow a conscious action of the will. Simple automatic activities involve the autonomic systems of the body. The autonomic nervous system (ANS) is the part of the peripheral nervous system that acts as a control system, maintaining equilibrium in the body. The ANS affects heart rate, digestion, respiration rate, salivation, perspiration, pupil diameter, urination, and sexual arousal. Most ANS actions are involuntary, but some actions such as breathing work in tandem with the conscious mind. One may exercise temporary control over automatic functions like breathing or heart rate, but the automatic functioning of these bodily processes soon takes over.

More complex automatic functions relate to visceral or emotional reactions to external events. A scary movie, an amorous kiss, or a sudden and painful burn can all influence our internal physical state. Stimuli external to the body can increase our heart rate and cause us to experience deep inward feelings—states of being that are physically represented and modulated by our brains. These physiological reactions appear to operate via independent neural pathways from our cognitive or “rational” thought processes.¹²¹ Such reactions are more complex than simple bodily functions like breathing or blinking in that we often, although not always, consciously experience them. But like simple autonomic processes, no conscious willing, effort, or reflection by the individual is required.

1. *Autonomic (functional impairment)*

When our hypothetical husband is brought in two weeks after the crime for questioning, any primary evidence of head trauma the perpetrator suffered will have vanished. Transient head trauma is akin to blood alcohol level, which steadily decreases over time from the moment one imbibes liquor until the liver finishes metabolizing it. Within a matter of days or weeks of suffering a head injury, primary brain damage resolves, leaving only secondary brain damage as evidence of the initial trauma suffered. Secondary brain damage begins to develop within hours of the initial injury as the affected area of the brain begins to

121. See Hugo D. Critchley, *Psychophysiology of Neural, Cognitive and Affective Intergration: fMRI and Autonomic Indicators*, 73 INT’L J. PSYCHOPHYSIOLOGY 88, 88 (2009).

receive decreased and often inadequate blood supply.¹²² Static brain imaging techniques will fail to identify the injury after the primary injury resolves. Functional neuroimaging techniques will instead be required to identify the head trauma in the region of interest.

One technique the investigators could use to detect secondary brain damage the husband may be suffering is positron emission tomography (PET). Together with scanning software, PET generates images of cross-sectional slices of the brain.¹²³ Because PET scanning enables a much greater depth of measurement into the brain than structural brain-scanning techniques, even subtle structural changes in the brain may be detectable.¹²⁴ PET scanning can also be used to measure local neuronal activity and mental functioning, such as “seeing faces, reading sentences, and touching or moving a part of the body.”¹²⁵ This technology has already been widely used in criminal cases to demonstrate mental state, traumatic and organic brain injury, and brain abnormalities.¹²⁶

In both *Schmerber* and other cases,¹²⁷ the Court has already considered and found beyond the scope of privilege some analogous automatic-functioning-testing techniques,¹²⁸ as have the majority of courts to have addressed them.¹²⁹ An excuse-based model of privilege predicts this. Compelled functional impairment testing would pose no greater choice than compelling a suspect to submit identifying evidence. The defendant has a choice of whether to submit

122. See Metting et al., *supra* note 98, at 699.

123. *PET Scan*, CLEV. CLINIC, <http://www.clevelandclinic.org/health/health-info/docs/3400/3462.asp?index=10123> (last visited Feb. 16, 2012).

124. See *id.*

125. Stacey A. Tovino, *Imaging Body Structure and Mapping Brain Function: A Historical Approach*, 33 AM. J.L. & MED. 193, 213 (2007).

126. The author has on file a database including 700 cases between 2004 and 2009 in which neuroscience has been used for these purposes. In sixteen percent of those cases, a neuroimaging scan was introduced. See, e.g., *Sexton v. State*, 997 So. 2d 1073, 1077 (Fla. 2008); *Zink v. State*, 278 S.W.3d 170, 177-78 (Mo. 2009).

127. See, for example, *Pennsylvania v. Muniz*, 496 U.S. 582, 586, 604 (1990), in which the defendant refused to take a breathalyzer test to measure his blood alcohol level, instead offering to wait several hours and then comply. By that time, his bodily evidence of intoxication would have dissipated, rendering the test irrelevant.

128. See, e.g., *id.* at 603-04 (noting that the Court has found physical field sobriety tests to be permissible and legitimate police procedures).

129. See, e.g., *State v. Theriault*, 696 P.2d 718, 719 (Ariz. Ct. App. 1984) (“The great majority of jurisdictions have held that field sobriety tests do not involve testimonial or communicative evidence.”); *State v. Allen*, 440 So. 2d 1330, 1334 (La. 1983) (“This court has indicated that “[i]ntoxication, with its attendant behavioral manifestations, is an observable condition about which a witness may testify.” (alteration in original) (quoting *State v. Spence*, 418 So. 2d 583, 589 n.5 (La. 1982))); *State v. Badon*, 401 So. 2d 1178, 1179 (La. 1981) (“Field sobriety tests are based on the relationship between intoxication and the loss of coordination which intoxication causes. These tests . . . only compel the suspect to exhibit his physical characteristics of coordination as a source of real or physical evidence” (quoting *City of Wahpeton v. Skoog*, 300 N.W.2d 243, 245 (N.D. 1980))); *State v. Roadifer*, 346 N.W.2d 438, 440 (S.D. 1984) (“Dexterity tests are real physical evidence and are not protected by the constitutional privilege against self-incrimination.”).

or refuse to submit to testing, but no otherwise meaningful choice. He is not put in the position of contemplating whether to communicate a falsehood, risk contempt, or self-incriminate. His functional impairment is not created in response to questioning and he cannot choose whether to create or destroy such evidence when brought in for questioning. The evidence about his present functional state, like identifying information, exists independently of any governmental compulsion. Neither his submission nor his refusal would likely be immunized. The husband could therefore be compelled to submit to brain scanning of his automatic functioning, and any refusal to do so could be used as evidence against him.

2. *Visceral (emotional state)*

What if the investigators could detect the husband's "true feelings" toward his wife? Suppose the investigators put photographs of his wife before him, and could gauge the feelings of love, hate, or fear he experienced. An investigator could employ novel or well-developed testing techniques to detect the husband's emotions without him even being consciously aware of being tested. Contemporary neuropsychology and neuroscience are now replete with examples of unconscious perception of emotion-inducing stimuli.¹³⁰ Could the husband's unconscious emotions be used as evidence against him?

Researchers can detect changes in individuals' emotional states after presenting them with visual stimuli that they don't consciously perceive.¹³¹ One example of this approach is the use of attentional distraction—presenting a subject with visual stimuli outside of his visual zone of attention—such that the subject unconsciously processes the stimuli without consciously experiencing or realizing their presence.¹³² Other techniques abound for circumventing conscious awareness, such as the use of backward masking. In backward masking, the stimulus of interest is presented to the subject followed within milliseconds by another related stimulus that masks the effect of the first. The subject reacts to the initial stimulus although he is not consciously aware of it. Researchers using these paradigms have proven that unconsciously perceived stimuli elicit physiological responses, including specific neurological changes and spontaneous facial activity, which reflect a subject's emotional reaction to the target stimuli.¹³³

The unconscious perception of emotionally salient stimuli by individuals triggers physiological changes including increases in skin conductivity, more

130. Marco Tamietto & Beatrice de Gelder, *Neural Bases of the Non-Conscious Perception of Emotional Signals*, 11 NATURE REV. NEUROSCIENCE 697, 697 (2010).

131. *Id.* Open questions remain in this research, including whether the emotional state physiologically represented reflects the perceived emotive content of the stimulus, or represents the subject's subjective emotional reaction to it.

132. *See id.* at 698.

133. *See id.*

frequent eye-blinking, changes in stress hormone levels, dilation of the pupils, and changes in heart rate.¹³⁴ An investigator can differentiate between emotional stimuli that are unconsciously perceived and reacted to, and stimuli that are consciously perceived, because distinct and detectable neural mechanisms underlie each process.¹³⁵

The ability to detect minute physiological responses to unconsciously perceived stimuli has already spurred the development of commercialized security products. An Israel-based company, WeCU Technologies, is marketing a technique that can be incorporated into airline e-ticket check-in kiosks to present travelers with subliminal stimuli.¹³⁶ While the airport passenger goes through his normal check-in process, images, words, or symbols are displayed to him while a concealed remote detector “reads” his emotional response.¹³⁷ WeCU claims that the emotional response is highly predictive of a passenger’s potential security threat.¹³⁸ Other scientific studies confirm that individuals react to faces or stimuli that hold personal relevance, such that an emotional response reveals an individual’s personal experience with the stimuli rather than a more generalized recognition response.¹³⁹ Personally relevant stimuli are encoded by a larger proportion of neurons than stimuli that are less relevant, most likely because personally relevant items are linked to a larger variety of experiences and memories of these experiences.¹⁴⁰ WeCU or similar products could at least theoretically detect whether a passenger had personal experience with a known terrorist or other stimulus, rather than more generalized awareness of that target through media exposure.

At least two features seem to distinguish an airport passenger’s (or the hypothetical husband’s) visceral reaction to stimuli from functional impairment that he might suffer. First, the police do not evoke functional impairment but merely detect its presence. Emotional and physiological responses to pictures or stimuli seem to create new factual evidence from the recesses of the suspect’s mind that otherwise would not exist. Second, recording functional im-

134. *Id.* at 704.

135. *See id.* at 703.

136. *See Technology: How It Works*, WECU TECHS., http://www.epicos.com/epicos/extended/israel/wecu/wecu_technology.html (last visited Feb. 16, 2012); *see also* Michael Tarm, *Mind-Reading Systems Could Change Air Security*, U.S. NEWS & WORLD REP. (Jan. 8, 2010), <http://www.usnews.com/science/articles/2010/01/08/mind-reading-systems-could-change-air-security>.

137. *See Technology: How It Works*, *supra* note 136.

138. *See* David Rose, “Are You a Terrorist?” *The Simple Question Being Asked at an Airport Which Could Rumble a Suicide Bomber*, MAIL ONLINE (Dec. 15, 2010, 12:34 PM), <http://www.dailymail.co.uk/home/moslive/article-1336571/Terrorism-Can-really-stop-bomber-asking-Are-terrorist.html#ixzz1bMYUUhXZ>.

139. *See, e.g.*, K. Luan Phan et al., *Neural Correlates of Individual Ratings of Emotional Salience: A Trial-Related fMRI Study*, 21 NEUROIMAGE 768 (2004).

140. *See* Indre V. Viskontas et al., *Human Medial Temporal Lobe Neurons Respond Preferentially to Personally Relevant Images*, 106 PNAS 21,329 (2009).

pairment intuitively seems more like examining a physical object and less like peering into the recesses of the human mind, while recording emotion seems more like reading thoughts than observing blood flow. And yet neither of these differences would predict a different treatment under self-incrimination using the excuse model of privilege. Whether functional or visceral, the method used requires merely that the husband submit to physical testing. As the discussion below explains, unconscious emotional reactions would go unprotected using the excuse model of privilege.

3. *Visceral (behavioral traits)*

Assuming the husband is guilty of murdering his wife and convicted of that crime, to enhance his sentence the prosecutor may seek to establish his future dangerousness. An unresolved question in current self-incrimination doctrine is whether prosecutors may rely upon the mannerisms, speech patterns, or other automatic indicators of a defendant's visceral state as evidence against him in a criminal case. If such evidence does not implicate the privilege, neither should neurological tests of visceral behavioral dispositions.

Scientific assessment of future dangerousness could evolve such that an expert need not rely upon a defendant's verbal communications for diagnosis. In addition to future dangerousness, impulsiveness, sexual deviance, violent tendencies, or other behavioral dispositions may be demonstrable through behavioral neuroscience.

By way of example, several studies have examined the neural correlates of behavioral dispositions including pedophilia. In one such study,¹⁴¹ male patients who met the diagnostic criteria for pedophilia and a matched control group were asked to view 256 erotic, emotional, and neutral photographs for five seconds each, in eight trial runs, while recording their brain activation using functional magnetic resonance imaging (fMRI) technology.¹⁴² To determine if there were any neural correlates to the sexual anomalies present in pedophilia, the researchers then compared the sexual and emotional arousal of pedophilic subjects to the control group.¹⁴³ During sexual arousal, the brain activity of the subjects with pedophilia differed significantly from those in the control group in the cortical and subcortical regions of their brain.¹⁴⁴ The researchers posited that this “[a]ssessment of altered neural activation could

141. Martin Walter et al., *Pedophilia Is Linked to Reduced Activation in Hypothalamus and Lateral Prefrontal Cortex During Visual Erotic Stimulation*, 62 *BIOLOGICAL PSYCHIATRY* 698, 698 (2007).

142. *Id.* at 698-99.

143. *Id.* at 699.

144. *Id.* (“Our results demonstrate . . . abnormal neural activity in subcortical and cortical regions in pedophilia during sexual arousal. Subcortical regions like the hypothalamus and the dorsal midbrain are involved in the vegetative-autonomic component of sexual arousal in healthy subjects.”).

therefore be considered a complementary tool to investigate the pedophilic patient's 'true' feelings of sexual arousal."¹⁴⁵ Such speculation has not gone unheeded. Prosecutors are already relying upon neuroscience to predict the future dangerousness of criminal defendants.¹⁴⁶

The Court has nevertheless dodged the question of whether the privilege applies to inferences drawn from a criminal suspect's automatic physiological responses to stimuli. In *Estelle v. Smith*, the Court raised but did not address whether the privilege extends to automatic responses to questions.¹⁴⁷ Smith was charged with felony murder as the accomplice to a fatal grocery store robbery, and the State of Texas sought the death penalty in his trial.¹⁴⁸ The court ordered a pretrial psychiatric examination to assess Smith's competency to stand trial.¹⁴⁹ The State called the expert who had examined Smith to testify at the penalty phase of the proceedings. The expert testified that Smith was a severe sociopath whose condition would only worsen and that he would reoffend if given the opportunity.¹⁵⁰

The expert drew inferences about Smith's future dangerousness from the substantive content of the defendant's description of the crime. The Court found that the compelled psychiatric examination was permissible but the substantive content of Smith's answers was privileged testimonial evidence.¹⁵¹ Yet in a footnote, the Court reserved the question of whether the privilege would apply if the diagnosis had been founded only "on respondent's mannerisms, facial expressions, attention span, or speech patterns"; noting that the record revealed no evidence that such inferences could be reliably drawn, the Court passed on resolving this issue.¹⁵² Masked emotional testing, WeCU technology, and the ability to detect behavioral dispositions of an accused all suggest that the technological hurdle enabling reliable inferences has or will soon be overcome.

An excuse-based model of privilege would predict that these tests of automatic functioning would be treated just like the first category of identity-based

145. *Id.* at 700.

146. *Cf.* *Cantu v. Thaler*, 632 F.3d 157, 160-61 (5th Cir. 2011), *petition for cert. filed*, No. 10-11031 (June 9, 2011). In *Cantu*, in response to defendant's claim that he received ineffective assistance counsel at his capital trial, trial counsel testified that he decided not to submit the defendant to a psychological examination because he feared the results could have strengthened the State's position that the defendant was a sociopath and thus a future danger warranting the death penalty. *Id.*; *cf.* *United States v. Williams*, 731 F. Supp. 2d 1012, 1020 (D. Haw. 2010) (allowing compelled government psychiatric exam of defendant, over Fifth Amendment objections, to rebut defendant's mental status evidence but not to establish that the defendant suffers from psychosis or antisocial personality disorder).

147. 451 U.S. 454, 464 n.8 (1981).

148. *Id.* at 456.

149. *Id.* at 456-57.

150. *Id.* at 459-60.

151. *Id.* at 465-66.

152. *Id.* at 464 n.8.

functioning. The defendant can choose to submit or refuse to submit to testing, but otherwise faces no meaningful choice. Such testing does not create a choice between communicating a falsehood, risking contempt, or incriminating oneself. Investigators do not compel visceral attitudes but simply detect emotional dispositions. These tests measure the suspect's existing emotional feelings toward salient stimuli or his behavioral predispositions more generally. Rather than creating new evidence, such tests intercept existing evidence. Instead of implicating testimonial capacities, the suspect is a source of real evidence. Put simply, to obtain functional, dispositional, or predictive automatic evidence, a suspect need never face the difficult choice of whether to lie or self-incriminate. His body may simply answer for him.

C. *Memorialized*

Recorded traces of everyday activities are at the heart of many self-incrimination disputes. Yet deciding whether and on what grounds previously recorded evidence constitutes testimonial or physical evidence has stumped courts and commentators alike. In this category more than any other, the moral intuitions that the privilege against self-incrimination should protect one's cognitive processes are most directly aroused, and most sorely disappointed.

Individuals record their transactions, communications, relationships, and events in written documents, depictions, and photographs. Appointments and meetings are memorialized in calendars. Banking transactions are noted on bank ledgers. Increasingly, every communication between individuals is memorialized in e-mails, text messages, and electronic invitations and replies. Whether voluntarily created or created as an unintended byproduct of our voluntary interactions, personal and commercial interactions leave a lengthy and often detailed record behind.

Memories of our everyday activities and encounters are similarly stored in our brains. These memories include the people we have met, the timbre of their voices, foods that we eat, smells and sounds, visual imagery we encounter, and even episodic memories of our experiences. Our brains process memories by memory type, and each memory type is mediated by different neural structures and mechanisms.¹⁵³ It may now be possible to detect and differentiate between these stored memories.

1. *Recognition*

Police often withhold from the public salient facts about a criminal investigation to facilitate their investigative process. Such facts could prove useful in

153. See Morris Moscovitch et al., *Functional Neuroanatomy of Remote Episodic, Semantic and Spatial Memory: A Unified Account Based on Multiple Trace Theory*, 207 J. ANATOMY 35, 38 (2005).

determining whether a suspect *recognizes* details about the crime that would be unknowable by someone unassociated with the crime. Neuroimaging techniques can detect an individual's recognition of people, places, or things he has previously encountered. An ever-growing and substantial body of evidence from neuroscience already demonstrates that a person's brain responds with detectable differences to stimuli it has already encountered compared to novel ones.¹⁵⁴ Two examples—voice recognition and guilty-knowledge tests—help to illuminate memory recognition. Like the other categories of memory, these examples put substantial pressure on how the privilege against self-incrimination does and should apply to memorialized evidence. Just as police may directly retrieve papers during a search and without a suspect's cooperation or awareness, they may soon be able to retrieve memories stored within the brain. In the future, one might also be able to query the brain directly without the cooperation or conscious awareness of the individual.

a. *Voices and faces*

In the hypothetical above, the video recording captured a second perpetrator crying out "Let's go!" in the background. Suppose the husband did not speak the words "Let's go!" during the crime but he heard the second perpetrator speak them instead. The recording may nevertheless yield important evidence linking the husband to the crime. The husband will remember, as a stored memory in his brain, the sound of the phrase and the voice of the speaker, and neuroimaging could detect each. Investigators could discover whether the husband knew the other perpetrator and if he had heard that perpetrator speak the words "Let's go!" before being questioned.

Based on the neural patterns that speech and voice leave on a listener's auditory cortex, researchers have decoded to what and to whom a person is listening.¹⁵⁵ Just like real fingerprints, neural patterns are both unique and specific: the neural fingerprint of a speech sound does not change if uttered by somebody else, and a speaker's fingerprint remains the same even if he says something different.¹⁵⁶ Researchers are now discovering that speech content and speaker identity have separate representations in the brain.¹⁵⁷

The following study is illustrative: Seven study subjects listened to three different speech sounds (the vowels *a*, *i*, and *u*), spoken by three different people, while a data-mining algorithmic machine recorded their fMRI-signal

154. See Jesse Rissman et al., *Detecting Individual Memories Through the Neural Decoding of Memory States and Past Experience*, 107 PNAS 9849, 9849 (2010).

155. See Elia Formisano et al., "Who" Is Saying "What"? Brain-Based Decoding of Human Voice and Speech, 322 SCIENCE 970, 970 (2008).

156. See *id.*

157. See generally Attila Andics et al., *Neural Mechanisms for Voice Recognition*, 52 NEUROIMAGE 1528 (2010) (describing research into the neural mechanisms that support voice speaker recognition and voice content recognition).

brain activity.¹⁵⁸ After training the machine, in each subsequent trial the machine could correctly classify whether the subject had an evoked response to one of the vowels or one of the speakers.¹⁵⁹ Even with novel stimuli, meaning a speech sound or speaker that had not been used in the training, the researchers were able to decode the brain activity of the speech content or speaker identity.¹⁶⁰ Applying this algorithm to fMRI imaging of the auditory cortical activation patterns of a listener could allow investigators to identify a speaker to whom the listener has previously been exposed, or the content of a sound to which he has been exposed.¹⁶¹

Technological hurdles remain for the accurate recognition of speakers to whom a person has been exposed.¹⁶² But technological hurdles do not change the question that these studies raise—does the privilege against self-incrimination guard against probing a suspect’s brain to determine whether he recognizes another person or another fact of interest to investigators? Could the police probe the hypothetical husband’s brain to see if he recognized the speaker and the phrase “Let’s go!”? These questions are addressed together with the other memory detection examples that follow.

b. *Guilty knowledge*

Assume also that the investigators and the perpetrators of a crime share the unique knowledge that the hammer was used as the weapon in the murder. Memories of places and things in one’s autobiographical history also have neural representations.¹⁶³ Brain fingerprinting technology could therefore prove valuable in determining whether the husband knows this unique and undisclosed fact about the weapon used in the crime.

Brain fingerprinting purportedly tests for “guilty knowledge,” or memory of a kind that only a guilty person could have. Whereas the traditional lie detector test involves asking the suspect whether they committed the crime in question, brain-based guilty knowledge tests involve testing a suspect for his recognition of salient crime facts. The test could be thought of as asking a yes-or-no question about whether the suspect has relevant and not-generally-revealed information memorialized in his brain.

158. Formisano et al., *supra* note 155, at 971.

159. *Id.* at 971. Future studies should determine the extent to which decoding can be used to classify words or sentences, the building blocks of natural language. *Id.* at 973.

160. *Id.* at 972.

161. *See id.* at 972-73.

162. The study described here includes only three speakers and three sounds. While it demonstrates the ability to detect the different regions of the brain associated with speech content and speaker recognition, it has yet to be applied to test recognition of speech and speakers from real-life situations. *Id.* at 973.

163. *See* Rissman et al., *supra* note 154, at 9849.

In a brain fingerprinting test, relevant words, pictures, or sounds are presented to a subject by a computer in a series with irrelevant and control stimuli.¹⁶⁴ Each stimulus appears on the screen for only a mere fraction of a second.¹⁶⁵ A suspect could be presented, for example, with a series of multiple-choice questions, each having one relevant alternative (e.g., asking about the murder weapon and including a picture of the hammer as the probe answer option) and several neutral alternatives, all chosen to be indistinguishable by an innocent participant. If the subject's physiological (brain imaging) responses to the relevant alternative are consistently greater than for the neutral alternatives, then knowledge of the event is inferred.¹⁶⁶

The physiological response to recognized stimuli is measured through electroencephalography (EEG) output. The specific measurable brain response is known as the P300 signal,¹⁶⁷ which is detected as a bump in the line traced by electrical detection equipment. The P300 signal occurs between three hundred and eight hundred milliseconds after a stimulus is presented to a subject who has the relevant information in his brain, but does not occur in subjects who do not have the relevant information.¹⁶⁸ The P300 signal is visible *before* the subject is aware of the stimulus and therefore before he can change his response to it.¹⁶⁹ This characteristic distinguishes brain fingerprinting from the polygraph, which operates by examining indirect physiological symptoms like blood pressure and pulse rate—symptoms that a trained operator can control in response to questions that are asked out loud.¹⁷⁰ The ability to control or alter one's re-

164. See *Brain Fingerprinting Laboratories: Scientific Procedure, Research, and Applications*, BRAIN FINGERPRINTING LABORATORIES, <http://brainfingerprinting.com/TechnologyOverview.php> (last visited Feb. 16, 2012) [hereinafter *Brain Fingerprinting Laboratories*].

165. See *id.*; Lawrence A. Farwell, *Detection of FBI Agents Using Brain Fingerprinting Technology: A New Paradigm for Psychophysiological Detection of Concealed Information*, BRAIN FINGERPRINTING LABORATORIES, <http://www.brainwavescience.com/FBIStudy.php> (last visited Feb. 16, 2012).

166. See Geraint Rees, *The Scope and Limits of Neuroimaging*, in BRAIN WAVES MODULE 1: NEUROSCIENCE, SOCIETY AND POLICY 7, 13 (2011), available at http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2011/4294974932.pdf.

167. Recent research has shown that the P300 is actually one aspect of a longer brainwave response known as a Memory and Encoding Related Multifaceted Electroencephalographic Response (MERMER). A MERMER includes a P300 response, but also includes additional patterns occurring more than 800 ms after the stimulus, providing even more accurate results. *Brain Fingerprinting Laboratories*, *supra* note 164.

168. See *id.*

169. See Benjamin Libet, *Do We Have Free Will?*, in THE OXFORD HANDBOOK OF FREE WILL 551, 552-55 (Robert Kane ed., 2002) (noting that the brainwave preceding a voluntary act appears before the subject is aware of a desire to act).

170. See Chris Morrison, *A New Way to Detect Lies Gaining Credibility*, VENTUREBEAT (Oct. 8, 2008), <http://venturebeat.com/2008/10/08/a-new-way-to-detect-lies-gaining-credibility>.

sponse to questioning is of central concern in an excuse-based model of privilege.

2. *Episodic memories*

If the hypothetical husband killed his wife, in addition to recognizing crime scene details he will likely have an episodic memory of the crime. Episodic memories—not just bits of recognizable information—are consolidated and stored in the brain. Episodic memories are the neural representations of the autobiographical details experienced in everyday life, including the substantive content and the geographic, spatial, and temporal orientation of those experiences.¹⁷¹ Such memories may now be detectable and retrievable from the brain.

Using fMRI, researchers have detected individual and rich episodic memories and distinguished those memories from other similar memories.¹⁷² In a recently published groundbreaking study, researchers were able to distinguish between highly similar episodic memories recalled by subject participants.¹⁷³ The study subjects were first shown three short video clips of related everyday events. Then, during fMRI scanning, the researchers asked each participant to recall each of the three episodes a number of times. By applying a multivariate decoding technique to analyze the fMRI activation signals, the researchers were able to predict which specific episodic memory was being recalled with forty-five percent accuracy (higher than the thirty-three percent accuracy of chance-level performance).¹⁷⁴ Moreover, the location of the individual episodic memories was consistent across the participants and over multiple reactivations. The results demonstrate that episodic information is concentrated within specific regions of the brain and that it is possible to decode *specific episodic memories* from these regions of the brain. The tremendous advances in pattern recognition technology¹⁷⁵ with neuroimaging have even enabled researchers to decode spatial orientation of an individual in a virtual reality environment.¹⁷⁶

171. See Moscovitch et al., *supra* note 153, at 39.

172. See Martin Chadwick et al., *Decoding Individual Episodic Memory Traces in the Human Hippocampus*, 20 *CURRENT BIOLOGY* 544 (2010).

173. *Id.*

174. See *id.* at 545 fig.2.

175. See, e.g., Stephenie A. Harrison & Frank Tong, *Decoding Reveals the Contents of Visual Working Memory in Early Visual Areas*, 458 *NATURE* 632 (2009) (showing that spatial orientations held in working memory can be decoded from activity patterns in the human visual cortex); Demis Hassabis et al., *Decoding Neuronal Ensembles in the Human Hippocampus*, 19 *CURRENT BIOLOGY* 546 (2009) (“[U]sing multivariate pattern classification and high spatial resolution functional MRI, we decoded activity across the population of neurons in the human medial temporal lobe while participants navigated in a virtual reality environment. Remarkably, we could accurately predict the position of an individual within this environment solely from the pattern of activity in his hippocampus even when visual input and task were held constant.”); Rissman et al., *supra* note 154 (reporting the results of two expe-

Today, such studies require the conscious cooperation of the research subject who must recall or experience the memory for the investigator to detect the memory. Yet just as recognition may occur subconsciously, the retrieval of memories might also be detectable through subliminal priming. Some researchers believe that conscious awareness of the individual is a technological barrier that cannot be bridged. But others point to our current ability to detect, with a high degree of accuracy, recognition memories without conscious recall by the subject. Although rich episodic memories are substantially more complex, in time they could become detectable without the conscious awareness or cooperation of the subject. Under current doctrine, whether the privilege against self-incrimination will guard against retrieval of one's memories could very well turn on whether the retrieval occurs subconsciously or requires the conscious participation of the criminal suspect.

3. *Papers and memorialized evidence*

a. *Categorizing papers*

The Supreme Court has implicitly but not explicitly held that the substantive content of voluntarily memorialized evidence is unprivileged. This doctrinal history provides the backdrop for how the Court would likely address unconscious memory retrieval.

Beginning with *Fisher v. United States*¹⁷⁷ and spanning the next thirty-five years up to the present day, courts have held that voluntarily created records, whether business or private, fall beyond the scope of Fifth Amendment privilege.¹⁷⁸ The extent to which such memorialized evidence lacks Fifth Amendment protection is an area prime for renewed analysis. Since the most recent Supreme Court case discussing the question,¹⁷⁹ a circuit split has emerged as three of the seven circuits to address the issue have admitted the possibility of an exception for private records where “compelled disclosure would break the heart of our sense of privacy.”¹⁸⁰

riments to investigate whether “neural signatures of recognition memory can be reliably decoded from fMRI data,” and concluding that “[m]ultivoxel pattern analysis (MVPA) revealed a robust ability to classify whether a given face was subjectively experienced as old or new . . . [and that] a participant’s subjective mnemonic experiences could be reliably decoded”).

176. See Hassabis et al., *supra* note 175.

177. 425 U.S. 391 (1976).

178. See *Balt. Dep’t of Soc. Servs. v. Bouknight*, 493 U.S. 549, 555 (1990); *United States v. Doe*, 465 U.S. 605, 610-12 (1984); *Andresen v. Maryland*, 427 U.S. 463, 472-74 (1976); *Fisher*, 425 U.S. at 397.

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

180. *Barrett v. Acevedo*, 169 F.3d 1155, 1168 (8th Cir. 1999); see *infra* notes 203-04 and accompanying text.

This heartbreak exception was first identified in *Boyd v. United States*.¹⁸¹ *Boyd* involved a civil forfeiture proceeding against two business partners who were charged with importing glass without paying the required customs taxes.¹⁸² On appeal from their convictions, the Supreme Court reversed an order that had required the partners to produce the invoice for the glass, holding that “a compulsory production of the private books and papers of the owner of goods sought to be forfeited . . . is compelling him to be a witness against himself, within the meaning of the Fifth Amendment to the Constitution.”¹⁸³ Running the Fourth and Fifth Amendments together, the Court likened breaking into a house and opening boxes and drawers to the forcible compulsory extortion of a man’s private papers.¹⁸⁴ The Court’s holding was interpreted to mean that “the Fourth and Fifth Amendments delineate a ‘sphere of privacy’ which must be protected against governmental intrusion,” which the extortion of private papers ran against.¹⁸⁵ On this view, the extortion of private books and papers was just as invasive and therefore not “substantially different from compelling [a person] to be a witness against himself.”¹⁸⁶ As discussed above in Part I.C, this “sphere of privacy” approach was at odds with the dominant rationale for the privilege, namely balancing individual and societal interests.¹⁸⁷ Over time, commentators have criticized the shaky foundations of *Boyd*, which eventually crumbled.¹⁸⁸

After enduring for nearly a century, *Boyd*’s ground began to give way as a result of *Fisher v. United States*.¹⁸⁹ *Fisher* provides the framework and foundation regarding both the content and the production of private records. Two taxpayers asserted a Fifth Amendment privilege to withhold subpoenaed documents prepared by their accountants.¹⁹⁰ The taxpayers relied upon *Boyd*, prompting the Court’s response: “[T]he prohibition against forcing the production of private papers has long been a rule searching for a rationale consistent with the proscriptions of the Fifth Amendment against compelling a person to give ‘testimony’ that incriminates him.”¹⁹¹ The Court differentiated the “compelled production of every sort of incriminating evidence” from compelling the

181. 116 U.S. 616 (1886).

182. *See id.* at 617-18.

183. *Id.* at 634-35.

184. *Id.* at 630.

185. *Couch v. United States*, 409 U.S. 322, 339-40 (1973) (Douglas, J., dissenting) (referring to *Boyd*, 116 U.S. 616).

186. *Boyd*, 116 U.S. at 633.

187. *See, e.g., Pennsylvania v. Muniz*, 496 U.S. 582, 596-97 (1990) (discussing the cruel trilemma); *New York v. Quarles*, 467 U.S. 649, 669-70 (1984) (O’Connor, J., concurring in the judgment in part and dissenting in part) (same).

188. *See In re Grand Jury Subpoena Duces Tecum*, 1 F.3d 87, 90 & n.2 (2d Cir. 1993) (citing 1 MCCORMICK ON EVIDENCE § 127, at 464 (John William Strong ed., 4th ed. 1992)).

189. 425 U.S. 391 (1976).

190. *Id.* at 394-95.

191. *Id.* at 409.

accused “to make a *testimonial* communication that is incriminating.”¹⁹² Because the accountant and not the taxpayers prepared the papers, the subpoenaed documents were not the taxpayer’s “testimonial declarations.”¹⁹³ Most significantly, the *Fisher* Court disavowed any implications resonating from *Boyd* that the Fifth Amendment protects privacy, finding instead that “the Fifth Amendment protects against ‘compelled self-incrimination, not [the disclosure of] private information.’”¹⁹⁴ Just because private information has been memorialized does not mean that evidence is privileged.

In *Andresen v. Maryland*¹⁹⁵ that same year, the Court picked up where the *Fisher* Court left off. In *Andresen*, the defendant had been convicted of fraudulent misappropriation by a fiduciary and obtaining property by false pretenses.¹⁹⁶ His personal business records were seized in the course of an investigation into fraudulent real estate settlement activities, and he challenged the use of those records under the Fifth Amendment.¹⁹⁷ On review, the Court held that introducing the records did not compel the defendant to incriminate himself, because the records had been “voluntarily committed to writing” and the defendant had not been forced to produce them or authenticate them.¹⁹⁸

In the most recent of these cases, *United States v. Doe*, the Court addressed the question left unresolved by *Fisher* and *Andresen*: does the privilege extend to business records owned by an individual and in her possession?¹⁹⁹ The Court held that such business records were not privileged under the Fifth Amendment, reasoning that, because the Amendment “protects the person asserting the privilege only from *compelled* self-incrimination,” voluntarily prepared documents “cannot be said to contain compelled testimonial evidence in and of themselves.”²⁰⁰ Although the Court’s holding was confined to the facts, Justice O’Connor wrote separately “just to make explicit what is implicit in the analysis of [the Court’s] opinion: that the Fifth Amendment provides absolutely no protection for the contents of private papers of any kind.”²⁰¹ Justices Marshall and Brennan were not quite ready to acquiesce, refusing to embrace the notion that the majority’s holding reaches private records. In concurrence, Justice Marshall wrote: “This case presented nothing remotely close to the question

192. *Id.* at 408.

193. *Id.* at 409.

194. *Id.* at 401 (alteration in original) (quoting *United States v. Nobles*, 422 U.S. 225, 233 n.7 (1975)).

195. 427 U.S. 463 (1976).

196. *Id.* at 467.

197. *Id.* at 465-67.

198. *Id.* at 473-74; see also *In re Grand Jury Subpoena Duces Tecum*, 1 F.3d 87, 92 (2d Cir. 1993) (citing *Andresen*, 427 U.S. at 473).

199. *United States v. Doe*, 465 U.S. 605, 606 (1984).

200. *Id.* at 610, 612 n.9 (quoting *In re Grand Jury*, 680 F.2d 327, 334 (3d Cir. 1982) (internal quotation marks omitted), *aff’d in part, rev’d in part sub nom.* *United States v. Doe*, 465 U.S. 605 (1984)).

201. *Id.* at 618 (O’Connor, J., concurring).

that Justice O'Connor eagerly poses and answers. . . . [T]he documents at stake here are business records which implicate a lesser degree of concern for privacy interests than, for example, personal diaries."²⁰² The Court's divide presaged a circuit split that has followed on that same issue.

Since *Doe*, the circuits have parted ways with respect to private papers. Those seeking to build on the foundation established by the trilogy of *Fisher*, *Andresen*, and *Doe* have constructed a blanket rule rejecting any protection for the contents of voluntarily created records. The Second, Fourth, Ninth, and D.C. Circuits have chosen this path.²⁰³ The First, Sixth, and Eighth Circuits have retained the ghost of *Boyd*, and have admitted the possibility of a narrow exception where contents of personal papers will be protected in the rare instance that "compelled disclosure would break the heart of our sense of privacy."²⁰⁴

Most recently, in *United States v. Hubbell*, the Court affirmed the holding of *Fisher*, stating that it is now a "settled proposition that a person may be required to produce specific documents even though they contain incriminating assertions of fact or belief because the creation of those documents was not 'compelled' within the meaning of the privilege."²⁰⁵

Hubbell makes plain the inadequacy of "testimonial" or "physical" as categories of evidence to answer whether evidence is privileged or not. The Court focused not on the testimonial, quasi-testimonial, or physical character of the

202. *Id.* at 619 (Marshall, J., joined by Brennan, J., concurring in part and dissenting in part) (footnote omitted).

203. See *Grand Jury Subpoena*, 1 F.3d at 93; *United States v. Wujkowski*, 929 F.2d 981, 983 (4th Cir. 1991); *In re Sealed Case*, 877 F.2d 83, 84 (D.C. Cir. 1989); *In re Grand Jury Proceedings*, 759 F.2d 1418, 1419 (9th Cir. 1985). The Second Circuit, for example, pointed to the Court's subsequent opinion in *Baltimore City Department of Social Services v. Bouknight*, 493 U.S. 549 (1990), as evidence that a majority of the Court at that time agreed with the O'Connor concurrence in *Doe*. *Grand Jury Subpoena*, 1 F.3d at 92. At issue in *Bouknight* was a juvenile court order requiring the defendant to produce her infant son. 493 U.S. at 551. Referring to O'Connor's concurrence in *Doe*, the Court stated, "[A] person may not claim the Amendment's protections based upon the incrimination that may result from the contents or nature of the thing demanded." *Id.* at 555 (citing, inter alia, *Doe*, 465 U.S. at 618 (O'Connor, J., concurring)). Only the act of production can give rise to the Amendment's protection because "[w]hen the government demands that an item be produced, 'the only thing compelled is the act of producing the [item].'" *Id.* at 554-55 (second alteration in original) (quoting *Fisher v. United States*, 425 U.S. 391, 410 n.11 (1976)).

204. *Barrett v. Acevedo*, 169 F.3d 1155, 1168 (8th Cir. 1999); see also *In re Steinberg*, 837 F.2d 527, 530 (1st Cir. 1988); *Butcher v. Bailey*, 753 F.2d 465, 468-69 (6th Cir. 1985). In its most recent case on point, *In re Grand Jury Proceedings*, 632 F.2d 1033 (3d Cir. 1980), the Third Circuit found the contents of personal records protected by the Fifth Amendment. *Id.* at 1044. The Third Circuit has not reexamined this holding in the wake of *Doe*, and thus, how a Third Circuit court would rule on this issue is unclear. The Fifth, Seventh, Tenth, and Eleventh Circuits also have yet to rule on the issue since the Supreme Court's decision in *Doe*. See also *infra* text accompanying notes 217-25 (discussing Fifth Amendment doctrine on papers and their production).

205. *United States v. Hubbell*, 530 U.S. 27, 35-36 (2000).

evidence. Instead, the Court focused on whether the suspect was compelled to create the evidence. This adds yet another contortion to the otherwise seemingly straightforward question of whether a suspect has been compelled to be a witness against himself. The Court has thus created a two-part test about compulsion to address memorialized evidence, irrespective of its communicative content: (1) Did the suspect create the evidence in response to government compulsion? (2) If not, can the government compel the production of evidence created passively or voluntarily?

b. *Reconciling papers and other memories*

Memories and papers share much in common, but one important difference—creating papers discloses from the safeguard of the mind facts that might otherwise have remained private. Still, much tangible evidence arises automatically as a byproduct of intentional conduct rather than through intentional disclosure. Each e-mail message an individual sends includes an automatically generated, detailed header containing specific information about the machine used and the location from which the message was generated. Each banking transaction generates a detailed log and recording of activities one may not wish to memorialize or may not even realize have been recorded. Modern technology also enables the automatic tracking of nearly every movement in public, whether through GPS-enabled smartphones or via smart video cameras installed in public and private places. These automatic traces of our lives create evidence in both tangible hard-copy form and intangible electronic form irrespective of our conscious intent. Intentionally engaging with the world, and consciously perceiving, contemplating, and experiencing events also creates autobiographical traces of actions whether in the brain, in a computer, or on paper.

Under the Fifth Amendment, the excuse-based model of privilege predicts that evidence memorialized in our brains and evidence memorialized in other forms should be treated alike. Following *Hubbell*, one would ask whether the suspect created the memory in response to government compulsion, and if not, whether the government could compel the production of those memories. If recognition memories or episodic memories were created by voluntary actions and conscious awareness of the suspect, then that suspect faces no compulsion and no hard choice. Instead, such memories are just like commercial papers and other memorialized documentation that the individual created in tangible form. They are stored and recorded evidence of conscious awareness, experience, and inward reflection. This analysis envisions memories as analogous to tangible records that are stored in the brain and can be retrieved without evoking the conscious awareness, expression, or contemplative cooperation of a defendant. An excuse model of privilege predicts that the substantive content of memories falls beyond the scope of the privilege. As the category of *utterances* reveals, however, the act of producing those memories may itself be protected even if the substantive content of those memories is not.

This result seems deeply unsatisfying and at odds with ordinary intuitions about mental autonomy. The circuit split over private papers suggests that some circuits wish to revive a privacy-based rationale for the privilege against self-incrimination. These circuits would undoubtedly find a heartbreak exception applicable to the subconscious retrieval of memories. Yet this approach is unlikely to prevail under current doctrine because it suffers at least two shortcomings: (1) privacy-based rationales have been expressly rejected by the Supreme Court, and (2) unless compelled to remember and thereby produce the memory, a defendant faces no hard choice that would warrant immunity for his silence. Instead, the retrieval of memorialized evidence, whether stored in the brain, in electronic circuits, or on paper, balances in favor of the societal interests in obtaining real evidence of crime, discovering truth, and preserving law-abiding behavior.

D. *Utterances*

The central tenet of self-incrimination doctrine is the privilege against being forced to utter responses to questions during custodial interrogations. Compelled utterances define most basically the concept of witnessing against oneself. Utterances are thoughts, visual images, memories, or statements that are verbalized or recalled to the conscious mind. Whether spoken aloud or ruminated silently in the conscious mind, they are utterances just the same. Absent extraordinary societal justification, any of the rationales that underlie the privilege against self-incrimination will provide a criminal suspect with a privilege against compelled utterances.

In our hypothetical investigation, when the police contemplate forcing the husband to speak against his will and without immunity, they seek to evoke uttered responses to their questions. If they succeed, the husband may provide a contemporaneous confession by recalling—either silently or aloud—the salient details of the crime.

1. *Voluntary utterances*

A voluntary utterance by definition is one given freely and without governmental compulsion. The voluntariness of the divulgence allows its use against a criminal defendant even though his silence or his refusal to answer questions is immunized. Such was the case when the defendant in *Pennsylvania v. Muniz* made audible and incriminating statements while he was attempting to understand the field sobriety test to be administered to him.²⁰⁶ The test instructions did not require him to make any response, let alone a communicative

206. See 496 U.S. 582, 585-86 (1990).

one.²⁰⁷ So although his utterances were testimonial, they were admissible because they were not compelled.²⁰⁸

Less obvious than spoken utterances, but still plausible, are voluntary brain utterances. During a custodial interrogation, the police are required to read a suspect his *Miranda* rights: the right to remain silent, the right to an attorney, and the right to an appointed attorney if the suspect cannot afford counsel.²⁰⁹ A defendant who exercises his right to remain silent is presumably insulated from his silent thoughts being used against him. But *Miranda* warnings are just a method by which constitutional protections are enforced. A post-neuroscientific world could require more robust *Miranda* warnings, if silence can be pierced through neuroimaging. In addition to advising a suspect of his right to remain silent, right to an attorney, and right to an appointed attorney when warranted, neuroscience may require the custodial suspect to be advised that should he choose to remain silent, any incriminating thoughts he consciously ruminates or recalls may be used against him. So warned, a defendant—here our hypothetical husband—could nevertheless choose to silently relish his participation in the crime and the location of the stashed body, or to silently dictate his full confession. These voluntarily recalled memories or present thoughts could be deemed voluntary utterances beyond the scope of the privilege.

2. *Evoked utterances*

Evoked utterances differ from voluntary ones by the manner in which they are obtained. Evoked utterances, like voluntary ones, include audible and inaudible answers, spoken words, written answers, and visual depictions. Even when no audible communication is made, the police may evoke a silent utterance, causing the suspect to consciously but silently respond. These responses create distinct physiological changes in the brain that can be decoded into contemplated words, thoughts, recalled memories, and visual imagery.

a. *Active memory recall*

If compelled to recall his memories of the crime, the husband will admit to the existence, context, substantive content, temporal encoding of, and whereabouts of those memories in his brain. To recall a particular memory, “the constellation of representations that was active during that event” will be reactivated.²¹⁰ Moreover, a person must go through “mental time travel” in which knowledge about the general properties of events in the category recalled are

207. *See id.* at 603-04.

208. *See id.* at 605.

209. *See Miranda v. Arizona*, 384 U.S. 436, 444-45 (1966).

210. Sean M. Polyn et al., *Category-Specific Cortical Activity Precedes Retrieval During Memory Search*, 310 SCIENCE 1963, 1963 (2005).

activated, such that the person continues to probe his memory until the set of representations that are active in his conscious mind resembles those active when the event first occurred.²¹¹ Accessing a memory is akin to rifling through a filing cabinet to find the relevant file, going backwards in time through files while discovering the storage system, associated files, and their contents. Such a process forces hard and excusable choices upon an accused. Should he comply and recall the relevant memory, he will admit to its existence (and more) as he probes for the memory. The mere existence of a responsive memory could implicate him in the crime. To avoid self-incrimination, for example, the hypothetical husband might instead conjure a false memory, just as he might falsify documents when asked to produce them. By responding to demands to recall those memories, he will be forced to contemplate these options, or to remain silent and keep his mind focused on irrelevant distractions.

When his memory is activated, the husband will recall complex visual imagery that is more complex and detailed than simple words and sentences can convey. Humans imagine and process visual landscapes in complex imagery. Spoken vocabulary is often inadequate to capture this subjective internal experience. If compelled to answer questions such as what murder weapon was used, the suspect could respond either by describing the weapon, drawing a picture of it, or imagining the visual image of the weapon, which would then be physically represented in his brain.

In two recent cutting-edge studies, researchers have reconstructed the visual imagery in the visual cortex region of the brain.²¹² In one such study, Miyawaki et al. developed a new brain analysis technology that can reconstruct the visual contrast images inside a person's visual cortex and display them on a computer monitor. The researchers claim that with further refinement, their decoding technology might be used to decode the subjective state of individuals

211. *See id.* at 1966 (“Whereas previous applications of classification techniques have focused on brain activity elicited by specific perceptual cues, our study shows that classification algorithms can be used to extract a time-varying trace of the subjects’ cognitive state as they search through memory in the absence of specific cues.”).

212. Yoichi Miyawaki et al., *Visual Image Reconstruction from Human Brain Activity Using a Combination of Multiscale Local Image Decoders*, 60 *NEURON* 915 (2008) (“In this study, we reconstructed visual images by combining local image bases of multiple scales, whose contrasts were independently decoded from fMRI activity by automatically selecting relevant voxels and exploiting their correlated patterns. Binary-contrast, 10×10 -patch images (2^{100} possible states) were accurately reconstructed without any image prior on a single trial or volume basis by measuring brain activity only for several hundred random images.”); Svetlana V. Shinkareva et al., *Using fMRI Brain Activation to Identify Cognitive States Associated with Perception of Tools and Dwellings*, *PLoS ONE* (Jan. 2, 2008), <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0001394> (“Here we demonstrate the ability to reliably . . . identify which of the 10 drawings a participant was viewing, based on that participant’s characteristic whole-brain neural activation patterns, excluding visual areas . . . [and] identify, for the first time, both individual objects and the category of the object the participant was viewing, based only on other participants’ activation patterns.”).

while they sleep, including those individuals' illusions and dreams.²¹³ They were able to reconstruct various images—defined by binary contrast patterns consisting of ten-by-ten square patches—by analyzing changes in the blood flow in the subjects' brains. Using functional magnetic resonance imaging, the researchers measured cerebral blood flow in the visual cortex area of the brain while a subject was presented with various images.²¹⁴ While the fMRI machine monitored the changes in subjects' brain activity, a computer program recorded the association between particular changes in fMRI activity and the different image designs. Then, when the test subjects were shown a completely new set of images, such as the letters *N-E-U-R-O-N*, the system was able to reconstruct and display what the test subjects were viewing based solely on their brain activity.²¹⁵ While these studies have relied upon the cooperative participation of research subjects, research into remote imaging technology that could detect brain imaging without awareness of imaging is proceeding.²¹⁶ Admittedly, in both of these studies the reconstructed images were of the pictures the subjects were viewing at the time, rather than in their "mind's eye." But this research, together with the emerging research in the neuroscience of memories, demonstrates a convergence between neuroimaging and pattern recognition technology. If pattern recognition and "reading" from the visual cortex is possible, it may also be possible to do pattern reconstruction from the regions of the brain actively involved in memory recall.

Settled Fifth Amendment doctrine on papers and their production provides useful insight into whether the privilege against self-incrimination protects evoked utterances. The Court has recognized Fifth Amendment protection in the act of producing documents in response to a subpoena. The act itself "may have a compelled testimonial aspect."²¹⁷ When an act is "sufficiently testimonial"—meaning it creates evidence either novel or unknown that the investigators could not otherwise lawfully obtain—the suspect may invoke the privilege to protect his refusal to comply. Neither his silence nor his refusal can be used against him.

213. Miyawaki et al., *supra* note 212, at 926.

214. Subjects were shown ten-by-ten checkerboard-pattern images, made up of random, geometric, or alphabet-letter patterns, for a period of six or twelve seconds each, followed by a six- or twelve-second period of rest. *Id.* at 926-27.

215. *Id.* at 916-18 & fig.2.

216. See, e.g., Yu M. Chi & Gert Cauwenberghs, *Wireless Non-Contact EEG/ECG Electrodes for Body Sensor Networks*, 2010 INT'L CONF. ON BODY SENSOR NETWORKS PROC. 297, available at <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5504776>; Adam Wang, *Handheld Device for Remotely Measuring Brain Function*, 2005 SUNFEST 173, available at <http://www.seas.upenn.edu/sunfest/docs/SunfestReport05.pdf>; R.J. Prance et al., *Biological and Medical Applications of a New Electric Field Sensor*, PROC. ANN. MEETING ON ELECTROSTATICS (Electrostatics Soc'y of Am., Minneapolis, Minn.), June 2008, at N2 available at http://www.case.edu/cse/eche/ESA2008_Proceedings.

217. *United States v. Hubbell*, 530 U.S. 27, 36 (2000).

The *Fisher* Court first recognized the testimonial aspect of “the act of producing” evidence with respect to paper records.²¹⁸ Complying with a subpoena may itself be tacit concession as to the “existence of the papers demanded,” “their possession or control by the taxpayer,” and “the taxpayer’s belief that the papers are those described in the subpoena.”²¹⁹ The Court did not, however, find Fisher’s act of production to be sufficiently testimonial. The existence of the tax records was a foregone conclusion. In producing those papers, Fisher “add[ed] little or nothing to the sum total of the Government’s information by conceding that he in fact ha[d] the papers.”²²⁰ The subpoena required the defendant to surrender documents that were already discovered rather than to testify as to their existence.

In *United States v. Hubbell*, the Court found the compelled act of production to be privileged.²²¹ Hubbell had promised to give certain information to the Independent Counsel investigating the Whitewater Development Corporation.²²² The Counsel served the defendant with a subpoena ordering the production of eleven categories of documents.²²³ The act of complying with the subpoena was sufficiently testimonial, the Court held, because “the prosecutor needed [Hubbell]’s assistance both to identify potential sources of information and to produce those sources.”²²⁴ *Hubbell* and *Fisher* differ in that the government already knew of the existence of the memorialized documents in *Fisher*, while in *Hubbell* it lacked any prior knowledge either about the documents’ existence or their whereabouts.²²⁵ Together, these cases extend privilege to acts of production that are “sufficiently testimonial” because those acts are tantamount to admitting to the possession or the whereabouts of incriminating evidence.

The excuse model best explains the nuances of the existing evidence/production divide. When a suspect is served with a subpoena or asked to produce real evidence he has three choices: he can comply by handing over the papers, lie by claiming that the papers do not exist, or both lie about their existence and destroy them.²²⁶ The first option puts the same pressure upon the defendant as it does upon the suspect on the witness stand. He must decide whether to produce falsified documents, submit truthful but incriminating documents, or destroy the documents. The excuse model would predict that when presented with these choices, a suspect’s silence in response to the subpoena would be immunized, while producing falsified documents or answers would

218. *Fisher v. United States*, 425 U.S. 391, 410 (1976).

219. *Id.*

220. *Id.* at 411.

221. *See* 530 U.S. at 45.

222. *Id.* at 30.

223. *Id.* at 31.

224. *Id.* at 41.

225. *Id.* at 44-45; *see also* *United States v. Ponds*, 454 F.3d 313, 320 (D.C. Cir. 2006).

226. Stuntz, *supra* note 48, at 1257.

give legitimate grounds for prosecution for perjury. Of course, it would be irrational to produce falsified evidence in this circumstance—to do so would put the defendant in a worse position than he otherwise would have been in, since the police could obtain a search warrant to recover the evidence and use that evidence to punish him for both the crime and for perjury. The rational choice lies either in complying with the subpoena or in destroying the evidence. Stuntz solves this riddle by focusing on the timing of the demand. On the witness stand, the defendant faces a “moment of truth” to confess, perjure, or remain silent, while no such pressure exists with a subpoena. The defendant could hide the evidence or deny its existence, while the harm to society from the destruction of irreplaceable real evidence is worse than a false statement. Consequently, society should immunize silence in response to the subpoena but not immunize the destruction of evidence.²²⁷ Notice here that the protection extends to the act of producing the papers, and by analogy to the act of recalling the memory, but does not extend to the memorialized evidence itself. The defendant faced no hard choice in memorializing the evidence, and likewise enjoys no privilege in its protection.

b. *Binary responses*

The police could simply ask the husband a series of yes-or-no questions to compel his response to their inquiries. Brain imaging to detect the truthfulness of answers to binary questions is already available to investigators. This technology depends on the conscious processing of both the questions and the answers to those questions. If the police compelled the husband to undergo brain-based lie detection, they could ask him a series of yes-or-no questions about whether he killed his wife or was involved in her murder. His yes-or-no answers could then be compared to his brain activation patterns when asked baseline questions, and the police could infer whether he was lying.

The newest incarnation of lie detection testing uses fMRI to analyze truthfulness in response to questioning. The premise behind fMRI lie detection is that lying and truth-telling responses are associated with distinctive activity in different areas of the brain. By comparing blood-flow patterns during deception with blood-flow patterns when people are telling the truth, researchers have been able to learn which parts of the brain are activated while lying. Studies have concluded that a few key areas of the brain are more active during deception than during truth-telling.²²⁸

227. *See id.* at 1257-59.

228. These include the anterior cingulate cortex, which is involved in attention and monitoring processes, and the left dorsolateral and right anterior prefrontal cortices, areas of executive function involved in working memory and behavioral control. Researchers have hypothesized that these regions are recruited to inhibit a prepotent response (the truth) while simultaneously constructing new information (the lie). Joseph R. Simpson, *Functional MRI*

Two companies—Cephos Corporation in Tyngsboro, Massachusetts, and No Lie MRI in San Diego, California—are already marketing the technology to clients. “Cephos pays particular attention to blood flow in one thousand ‘voxels,’ or three-dimensional pixels measuring brain space, in the brain regions associated with deception. (The entire area of the brain can be represented by about ten thousand voxels.)”²²⁹ The computer provides two values indicating how many of those spaces, out of a thousand, are activated when a person admits or denies allegations. These data are then checked against the activation seen when a person admits or denies innocuous questions, in order to control against subjects who try to fool the test by lying about true details of their lives. Certain parts of the brain work harder to deceive, so testers see more oxygenated blood flow to those particular voxels when subjects lie.²³⁰

Some countries are already using similar technology in their criminal investigations. In India, at least seventy-five crime suspects and witnesses have undergone a similar brain-based polygraph test.²³¹ In June of 2008, a judge convicted a woman of killing her former fiancé after she was subjected to this polygraph. During the woman’s trial, investigators placed an electrode cap on her head and read her a series of declarative statements, such as “I bought arsenic” or “I met [my fiancé] at McDonald’s.” The investigators compared her brain signal responses with responses to neutral baseline questions. The court placed great weight on the difference that emerged between these sets of measurements. The software algorithm that interpreted the EEG signals, it reasoned, effectively divined her answers to the underlying (but technically unasked) questions of guilt that the declarative statements were designed to stir.²³²

The *Schmerber* Court recognized that certain physiological tests could evoke privileged self-incriminating evidence by “eliciting responses which are essentially testimonial.”²³³ The Court used traditional lie detection technology—in which a suspect is asked yes-or-no questions and his response is inferred from his breathing rate, pulse, blood pressure, and perspiration—as its paradigmatic example. Traditional lie detection, like fMRI lie detection, requires the conscious awareness and participation of the suspect in the questioning. With each question one can envision the conscious deliberation a suspect faces about whether to lie or whether to self-incriminate.

Lie Detection: Too Good to Be True?, 36 J. AM. ACAD. PSYCHIATRY & L. 491, 492-93 (2008).

229. Christopher Intagliata, *Is the MRI Lie Detector Test Reliable?*, SCIENCELINE (Nov. 3, 2008), <http://www.scienceline.org/2008/11/ask-intagliata-lie-detection-fmri-brain-scan>.

230. *Id.*

231. Anand Giridharadas, *Brain Scan a New Wave in Criminal Evidence*, INT’L HERALD TRIB., Sept. 8, 2008, at 1.

232. *See id.*

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

c. *Complex words and thoughts*

In the not-too-distant future, brain imaging techniques might also enable the decoding of thoughts detected by measuring brain activity. Imagine here the police decoding the husband's silent but verbal responses to their questions. Rather than simple yes-or-no questions, they could ask him questions that require complex answers and then detect and decode the answers from the physiological changes in his brain.

Already, researchers have decoded thoughts concerning visual perception and motor activity. With startling accuracy, a research team led by Jack Gallant at Berkeley reconstructed novel Hollywood movie clips that a subject watched, by analyzing his brain activity patterns through fMRI and decoding them through pattern-recognition computer algorithms.²³⁴ Focusing on the activity in the visual cortex region of the brain, Gallant's team reconstructed video images relying solely on the fMRI measurements of the subject's brain activity put through a computer "decoder" program that the team created. Three test subjects first watched several hours of movie trailers during which fMRI was used to measure the brain activity in the visual cortex region of their brains. Then, the researchers built "dictionaries" to associate shapes, edges, and motion in the movies with measured brain activity. They created separate dictionaries for each of the several thousand voxels in which the brain activity was measured. The subjects were next shown a new set of movie trailers, during which their brain activity was again measured using fMRI. Finally, the group built a library of approximately 18,000,000 seconds of video that they downloaded at random from YouTube, and then put each of the clips through the dictionary decoders to generate predictions of what the fMRI-measured brain activity would look like for each of these images. The computer selected the hundred clips for which the predicted brain activity would be the most similar to the brain activity that was observed when the subjects viewed the new set of movie trailers. The computer averaged these hundred clips together to produce a reconstructed video image. The results are both extraordinary and startling. The reconstructed videos bear a remarkable resemblance to the videos that the subjects had seen, and show remarkable consistency across all three subjects.²³⁵

Brain-machine interface technology has also been used to "read" a person's thoughts from the motor cortex region of his brain. In 1999, Erik Ramsey, who was then a young teenager, suffered a brain stem stroke from a car crash injury that left him with "locked-in syndrome."²³⁶ Though he is completely paralyzed, he has total cognitive and sensory awareness. Ramsey has almost no voluntary

234. See Shinji Nishimoto, An T. Vu, Thomas Naselaris, Yuval Benjamini, Bin Yu & Jack L. Gallant, *Reconstructing Visual Experiences from Brain Activity Evoked by Natural Movies*, 21 *CURRENT BIOLOGY* 1641 (2011).

235. *Id.*

236. Joshua Foer, *The Unspeakable Odyssey of the Motionless Boy*, *ESQUIRE*, Oct. 2008, at 212, 213-14.

control over his body, except for his eyes, which he uses to answer questions by looking up for “yes” or down for “no.” Now, a new technological approach may enable him to speak—and for a computer to “read” his thoughts. Researchers are working to create a “speech prosthesis” that combines a wireless electrode and transmitter implanted in Ramsey’s brain with a voice synthesizer run by software modeled on the brain’s language centers. If successful, this would effectively turn Ramsey’s thoughts into words.²³⁷

The computer model mimics the neural networks involved in producing words—from moving the jaw, lips, and tongue, to babbling, to processing the “auditory targets” of how words should sound that are stored in the brain. New data from individuals performing speech tasks has helped to refine the model, and to allow it to learn to control a computer-simulated vocal tract and translate neural signals into sounds. A “brain-computer interface” system picks up signals from the electrode implanted in Ramsey’s brain and transmits them to a recording system. By means of a neural decoder and synthesized voice, vowel sounds are produced in real time as Ramsey thinks about each sound.²³⁸

More recently, Tim Hemmes became one of only a few human subjects to move a robotic arm by a computer “reading” his brain activity that signaled his intent to move the arm. In a program funded by the Defense Advanced Research Projects Agency (DARPA), a handful of individuals who are quadriplegic are “train[ing] their brains” to operate the DARPA robotic arm in sophisticated ways, including “feel[ing] what they touch” via the robotic arm.²³⁹ Such technology is only possible if, in some real sense, brain activity is being read and decoded.

Reading the visual cortex to recreate what a person is seeing, or reading the motor cortex to interpret motor-based intentions, are just the first amazing steps toward a future of more expansive mind-reading. Our ability to already read these areas of the brain through coupling brain activity with pattern recognition algorithms as decoders suggests that mind-reading is more than just a remote possibility. More sophisticated than brain-based lie detection would be a system whereby an individual would immediately and unwillingly answer questions through his thoughts or the visual imagery the questions evoked, all while the individual outwardly remained in silent contemplation. Such techniques would measure physical functioning of the human body. Yet they would yield evidence that would contain content at least as communicative as the spoken word.

To map this technology onto existing doctrine, *Pennsylvania v. Muniz* may again be instructive. Muniz was arrested for driving while intoxicated and taken

237. *See id.* at 214-15.

238. *See id.*

239. *See* Lauran Neergaard, *Paralyzed Man Uses Mind-Powered Robot Arm to Touch*, USA TODAY (Oct. 14, 2011, 5:01 PM), <http://www.usatoday.com/money/industries/health/story/2011-10-15/robotic-touch/50774398/1>.

to the stationhouse for booking, where the booking process was video- and audio-recorded.²⁴⁰ The police informed him of the recording but did not advise him of his *Miranda* rights.²⁴¹ During the process, the police asked him a series of identifying questions such as his name, address, height, and weight.²⁴² Muniz then performed a series of sobriety tests, during which he continued to slur his words.²⁴³ However, he refused to take a breathalyzer test to measure the alcohol content of his expelled breath.²⁴⁴ The police then asked Muniz if he knew the date of his sixth birthday, to which he slurred a reply that he did not.²⁴⁵

The trial court found the video and audio portions of the recording admissible, despite Muniz's objection that the evidence was incriminating and elicited before he received *Miranda* warnings.²⁴⁶ On appeal, the Supreme Court began its analysis by invoking *Schmerber* and developing a testimonial/physical framework. It explained that testimonial evidence includes those communications that either explicitly or implicitly relate to a factual assertion or disclose information.²⁴⁷ A statement may be testimonial and not compelled; only those statements that are "both testimonial in nature and elicited during custodial interrogations" should be suppressed.²⁴⁸ Applying this rule to the different aspects of the evidence admitted against Muniz, the Court distinguished between compelled physical evidence and the testimonial byproduct of obtaining the physical evidence, holding that the former, but not the latter, was admissible.²⁴⁹

The Court's treatment of Muniz's answer to his sixth-birthday question predicts that the Court will treat evoked utterances—silent or audible—as privileged. When Muniz was asked whether he knew the date of his sixth birthday, his statement was an evoked response being used for its substantive content—his response enabled the inference that he had a confused mental state.²⁵⁰ That the inference concerned "the physiological functioning" of Muniz's brain did not render it physical.²⁵¹ It revealed the manner in which the evidence was incriminating. Adopting O'Connor's approach from *New York v. Quarles*,²⁵² the

240. *Pennsylvania v. Muniz*, 496 U.S. 582, 585 (1990).

241. *Id.* at 585-86.

242. *Id.* at 586.

243. *Id.*

244. *Id.*

245. *Id.*

246. *Id.* at 587.

247. *Id.* at 589 (quoting *Doe v. United States*, 487 U.S. 201, 210 (1988)).

248. *Id.* at 590.

249. *See id.* at 589-605.

250. *See id.* at 592.

251. *Id.* at 593 (quoting Brief of Petitioner at 21, *Muniz*, 496 U.S. 582 (No. 89-213), 1989 WL 428937).

252. 467 U.S. 649 (1984). In *Quarles*, Justice O'Connor, concurring in the judgment in part and dissenting in part, focused on how the incriminating inference arose. Quarles was charged with criminal possession of a weapon, but moved to suppress his response to a po-

Court held that the correct way to ask the self-incrimination question is to ask whether the inference used arose from a compelled testimonial act or from physical evidence.²⁵³ Because Muniz responded with a substantive reply, and the substance of that reply gave the inference of his mental state, the Court found it to be a compelled testimonial response.

A more sound approach, and one consistent with the Court's treatment of papers, would focus on how the substantive answer was created rather than on the testimonial or physical character of the response. Because Muniz created the evidence—here, the substantive response—by compulsion, the Court could altogether avoid the question of whether the government could compel the evidence. The government could not compel the evidence because of how the evidence was created. Such an approach would align better with the Court's treatment of papers and records, and gives insight into a better normative approach to self-incrimination doctrine.

Nevertheless, although the testimonial/physical analysis in *Muniz* is strained, the results of the case align with the excuse model of privilege. Compelled utterances force a suspect into a moment of truth—to decide in response to questioning whether to lie, to self-incriminate, or to remain blankly silent. Particularly when a suspect is faced with a near-certain criminal penalty, socie-

liceman who asked about the whereabouts of the gun before reading Quarles his *Miranda* warnings. *See id.* at 651-52. The majority found Quarles's statement admissible because of a "public safety" exception to the requirement that *Miranda* warnings be given before a suspect's answers may be admitted into evidence. *Id.* at 655-56. Moreover, the police did not literally coerce the defendant's admissions. *See id.* at 654; *cf.* *Brewer v. Williams*, 430 U.S. 387, 399-401 (1977) (deciding on Sixth Amendment grounds that statements by a police officer while transporting the defendant were designed to elicit information from the defendant just as deliberately and effectively as if he had formally interrogated him); *Massiah v. United States*, 377 U.S. 201, 206 (1964) (finding that a federal agent who surreptitiously listened to incriminating statements made by a suspect in the absence of counsel violated the suspect's Sixth Amendment rights, because "'if [the Sixth Amendment] is to have any efficacy it must apply to indirect and surreptitious interrogations as well as those conducted in the jailhouse,'" and noting further that the suspect "was more seriously imposed upon . . . because he did not even know that he was under interrogation by a government agent'" (omission in original) (quoting *United States v. Massiah*, 307 F.2d 62, 72-73 (2d Cir. 1962) (Hays, J., dissenting in part), *rev'd*, 377 U.S. 201 (1964))). Justice O'Connor saw the issue differently. She distinguished between the gun, which the defendant was legitimately compelled to supply because of its real or physical nature, and his admission of the gun's whereabouts in response to questioning. Justice O'Connor invoked *Miranda v. Arizona*, 384 U.S. 436 (1966), to find that when the state uses investigative techniques to discover real evidence, the privilege against self-incrimination may require it forego the testimonial products of those tests. *See Quarles*, 467 U.S. at 663-65, 667-69 (O'Connor, J., concurring in the judgment in part and dissenting in part).

253. The Court likewise invoked a "purpose" analysis to find that the Self-Incrimination Clause was designed to protect against legal compulsion such as that employed by the ecclesiastical courts and the Star Chamber. *Muniz*, 496 U.S. at 595-96. This protection would ensure that a criminal suspect would not be subject to the cruel trilemma of self-accusation, perjury, or contempt. Hence, whatever else the protection may include, all responses to questions that if asked could place the suspect in the cruel trilemma are privileged.

ty grants a limited excuse for a suspect's silence. The temptation to lie is one to which the average member of society would often succumb. To hold a suspect to a higher standard than that which the average member of society could meet seems unjust, and delegitimizes a criminal prosecution for perjury. Absent immunity, the temptation to lie undermines the reliability and societal value in the evidence retrieved. The balance weighs heavily in favor of an excuse for protected silence under these circumstances.

Replacing the testimonial/physical dichotomy with this spectrum that spans identifying, automatic, memorialized, and uttered evidence frees the analysis of privilege from the anchor of the form the evidence takes. An audible response, a nod of the head, or a physiological change in the brain—when made in response to compelled questioning—are all evoked utterances, and should be treated just the same.

III. RECOGNIZING COGNITIVE LIBERTY

The spectrum of evidence—identifying, automatic, memorialized, and uttered—does more than just align with settled Fifth Amendment doctrine. It addresses hard and unanswered doctrinal questions in self-incrimination doctrine while also predicting the likely fate of evidence gathered through future investigative techniques. What it means “to be a witness” gains restored coherence by displacing the antiquated model of categorizing evidence as testimonial or physical. On the spectrum of evidence, the privilege against self-incrimination most naturally protects a defendant from being compelled to utter new evidence by which his condemnation will be secured. While evidence that a suspect does not originate or author—including identifying and automatic evidence—falls beyond the scope of the privilege, even evidence a suspect has memorialized without government compulsion raises primarily Fourth instead of Fifth Amendment concerns.²⁵⁴

A. *Riddles Revealed*

By locating both ancient and modern cases along the new spectrum of identifying, automatic, memorialized, and uttered evidence, the riddles of old and new self-incrimination cases are solved. The spectrum reflects both dimensions of self-incrimination—whether the evidence was compelled, and the degree of control or authorship that the individual suspect had in the creation of that evidence. Evidence created without provocation by the government is not compelled and therefore does not run afoul of the privilege against self-incrimination. And evidence that arises without conscious editing, manipula-

254. See Nita A. Farahany, *Searching Secrets*, 160 U. PA. L. REV. (forthcoming Apr. 2012) (manuscript at 27-32) (on file with author) (applying the Fourth Amendment to the spectrum of evidence).

tion, or conscious mental processing is not controlled by, or originally authored by, a suspect, and therefore does not put the defendant in a position of excusable choice. Identifying evidence and automatic evidence arise without the conscious editing, manipulation, or mental processing of the individual and so do not place the defendant in a position of excusable choice. Memorialized evidence is created through conscious editing and mental processing but without government compulsion. Only when an individual is forced to consciously produce memorialized evidence is the individual potentially placed in a position of excusable choice. The *process* by which memorialized evidence is obtained could therefore implicate the privilege against self-incrimination, when the defendant is provoked to create evidence through conscious processing that the police otherwise would not have known. (Such evidence could include, for example, the fact that the defendant has a memory of the crime, and the contents of the memory itself.) That official provocation puts the defendant in the position of trying to suppress his memory, create a false one, or accurately recall and potentially self-incriminate. Absent a compelling societal justification, the defendant would enjoy a privilege against such compulsion. Yet the privilege with respect to memorialized evidence is limited to the acts of production and does not extend to the substantive contents of the memorialized evidence itself. Again, the Fourth Amendment, not the Fifth Amendment, has greater relevance when memorialized evidence is at stake.²⁵⁵

Utterances are at the heart of the privilege against self-incrimination. Compelling a suspect to recall past events or to utter responses to questioning (whether silently or aloud) provokes a substantive response, which places upon the defendant the hard choice of lying, remaining silent, or condemning himself. Such hard choices undermine societal interests in promoting law-abiding behavior and discovering truth. Under these circumstances, whether the evidence comes in physical or testimonial form, the privilege should apply. Subjecting a defendant to conscious recall of memories or requiring that he utter a response to questions creates new and provoked evidence. Because the underlying evidence itself was created by provocation, the government cannot now compel its production. Now we can see that voluntary utterances are not compelled, while evoked utterances compel a defendant to reveal evidence that arises from conscious editing, manipulation, or mental processing.

This new taxonomy of evidence helps to predict how unresolved past cases—such as using evidence of involuntary physiological responses or statements from private diaries—should be resolved. And it clarifies more recent cases, such as whether a suspect can be made to reveal a written body tattoo or provide the password to a seized computer. The spectrum enables this prediction in a way that the Stuntz model alone could not. By demurring to the testimonial/physical dichotomy, Stuntz conceded that physical evidence would be unprivileged while compelled testimonial communications would not. By refin-

255. *See id.*

ing Stuntz's model with this new spectrum, one can categorize otherwise seemingly physical evidence and predict the outcome—whether the conundrum arises from emerging neuroscience or another modern concern.

In *Estelle v. Smith*, the Court posited that inferences about a defendant could not reliably be drawn from the defendant's physiological reactions alone.²⁵⁶ That previously unavailable technology has now arrived and will undoubtedly be used along with the handheld facial recognition systems that police departments are implementing across the country.²⁵⁷ Researchers have developed and commercialized special sunglasses that enable the wearer to detect microfacial changes in others and know their meaning.²⁵⁸ A tiny camera is embedded within the glasses and connected by an undetectable wire to a small computer about the size of a card deck. The embedded camera tracks twenty-four different points on the face of the observed person, and the computer's pattern recognition software decodes the facial changes and explains them to the observer via an earphone.²⁵⁹ Even heart rate and other physiological changes can be remotely detected without the subject's awareness. Using software linked to an ordinary webcam, the same researchers have demonstrated how heart rate, blood pressure, and skin temperature can be measured using changes in the facial coloring and microfacial reflexes.²⁶⁰ Now an investigator could simply don the glasses to infer the suspect's emotional state and likelihood of future dangerousness.

Applying the spectrum categories, the microfacial reflex test clearly seeks visceral evidence, which consists of automatic reactions of the individual. While an individual exercises limited control over automatic nervous system actions, that control quickly gives way as the automatic processes of the body take over. The defendant faces only the choice of whether to submit or refuse to submit to testing. Because such testing does not create a choice between communicating a falsehood, risking contempt, or incriminating oneself, the privilege would not apply.

Private papers would fare no better than microfacial reflexes under the Fifth Amendment. Such papers fit easily within the category of "memorialized" evidence. Confusion about the testimonial or physical nature of such papers, and intuitions of justice, have driven a circuit split on the papers' protection whereby three of the seven circuits to address the question have admitted the possibility of an exception if "compelled disclosure would break the heart of

256. 451 U.S. 454, 464 n.8 (1981).

257. See Farhad Manjoo, *Smile, You're on Everyone's Camera*, SLATE (July 13, 2011 5:36 PM), <http://www.slate.com/id/2299134>.

258. See Sally Adee, *Specs That See Right Through You*, NEW SCIENTIST (July 5, 2011), <http://www.newscientist.com/article/mg21128191.600-specs-that-see-right-through-you.html?full=true>.

259. *Id.*

260. *See id.*

our sense of privacy.”²⁶¹ Yet private papers arise no differently from other memorialized papers when created without government compulsion. Only when the production of the diary would compel the defendant to reveal new facts unknown by investigators—for example, the existence of the diary, that the diary was written by the suspect, and that the diary was within the suspect’s control—can a suspect successfully assert the privilege to shield its discovery. But the substantive content of the diary—like other memorialized evidence—enjoys no protection, so the police could use the private papers if they lawfully obtained them by other means.

The category of memorialized evidence brings new clarity to the otherwise muddled doctrine concerning previously recorded evidence. Had this category been available to the Second Circuit, it would have made easier the potentially intricate task of adjudicating the admissibility of a defendant’s tattoo as evidence against him. In *United States v. Greer*, the police searched an abandoned car and found within it an ammunition magazine and a car rental agreement with the name “Tangela Hudson.”²⁶² When they took a suspect into custody, a detective observed that the suspect had a tattoo of the word “Tangela” on his arm.²⁶³ On appeal from his conviction, the defendant claimed the government violated his right against self-incrimination by relying on the tattoo in question to connect him to the car.²⁶⁴ The Second Circuit grappled with whether the tattoo was testimonial or physical evidence. Straining the concept of testimonial to its limit, the court deemed the tattoo a testimonial communication because the “government relied on the tattoo not as an ‘identifying physical characteristic’ but for the ‘content of what [was] written.’”²⁶⁵ Greer made the testimonial communication voluntarily, the court held, because the detective passively observed rather than forcibly searched the defendant’s body. And even if physical compulsion had been used, the court would have found it permissible because the “voluntary tattooing of an incriminating word . . . was, like the voluntary preparation of documents, not the product of government compulsion.”²⁶⁶ Despite its contortions, then, the court ultimately relied upon whether the evidence had been created by government provocation, and the case turned on that issue alone.

It strains credulity to think of a permanent tattoo as a testimonial communication or as “being a witness” just because it has memorialized content. So the court rightly found that the substantive content of the evidence does not alone determine privilege. But the court’s reasoning would have been far more

261. *Barrett v. Acevedo*, 169 F.3d 1155, 1168 (8th Cir. 1999); *see also United States v. Doe*, 465 U.S. 605, 617 (1984).

262. 631 F.3d 608, 611 (2d Cir.), *cert. denied*, 131 S. Ct. 1841 (2011).

263. *Id.*

264. *Id.*

265. *Id.* at 613 (alteration in original) (quoting *Gilbert v. California*, 388 U.S. 263, 266-67 (1967)).

266. *Id.*

coherent had it asked whether the tattoo was identifying or memorialized evidence. Having found it to be the latter, and created without government compulsion, the court need only ask whether the defendant had been forced to reveal the tattoo to the police, and in so doing conveyed new information to the police that they otherwise could not have known. Here the detective observed the tattoo passively, so the only relevant question—whether the defendant had been forced to reveal the tattoo and in so doing produce new evidence—did not even arise.

Whether a defendant can be compelled to provide the passwords to a password-protected device raises a new issue at the boundary between brain-based memories and traditional memorialized evidence. Applying the spectrum to this issue reveals the real power of the new approach. Ramona Fricosu has been accused of trying to take title to foreclosed homes and charged with twenty-two counts of bank fraud, four counts of wire fraud, five counts of false statements to a financial institution, and seven counts of money laundering.²⁶⁷ In a raid of her home, the police found an encrypted laptop and requested that Fricosu turn over the password for decryption. Fricosu has refused, arguing that to compel her to reveal the password would violate her right against self-incrimination.²⁶⁸ No U.S. Court of Appeals has ever ruled on this issue and the spectrum provides an analogical tool for its resolution.

Fricosu memorialized the password in her brain and did so without any government provocation. Like papers, tattoos of words, bank records, and private papers, a password is memorialized evidence, and its substantive content falls outside the scope of the privilege. It matters little whether the password was recorded in her brain or on a hidden piece of paper. As unprovoked memorialized evidence, the only question is whether the act of producing the password itself is incriminating. If the police know already that the password belongs to Fricosu, and that it was within and under her control, then the act of production conveys no new incriminating evidence to the police. If providing the password would itself reveal evidence that the police do not already know, Fricosu cannot be compelled to consciously recall and provide the password without the government running afoul of the privilege.

Recognizing the potentially incriminating nature of the production, the government has granted Fricosu limited immunity for the act of entering and providing the password.²⁶⁹ With Fricosu thus immunized, the police cannot use

267. Molly McHugh, *Federal Case Will Decide If the Government Can Make You Decrypt Your Laptop*, DIGITAL TRENDS (July 13, 2011), <http://www.digitaltrends.com/computing/federal-case-will-decide-if-the-government-can-make-you-decrypt-your-laptop>; see also Brief of Amicus Curiae Electronic Frontier Foundation in Support of Defendant Fricosu's Opposition to Government's Application Under the All Writs Act Requiring Defendant to Assist in the Execution of Previously Issued Search Warrants, *United States v. Fricosu*, No. 10-cr-00509-01-REB (D. Colo. July 8, 2011) [hereinafter EFF Brief].

268. EFF Brief, *supra* note 267, at 6-8.

269. *Id.* at 11.

the fact that she knew the password to demonstrate her knowledge of the computer, her control over the computer, or her control over the files contained therein. Thus immunized, Fricosu can be made to sing.²⁷⁰ The district court has ordered Fricosu to provide the government with an unencrypted copy of the hard drive from the computer, and has precluded the government from using Fricosu's act of production against her in any prosecution.²⁷¹

Even more provocatively, consider whether the police could surreptitiously and subliminally detect and retrieve the memorialized password from Fricosu's brain without her conscious awareness or conscious processing of the retrieval. No compulsion will have occurred, and if the substantive evidence itself enjoys no protection, then the memorialized password, like any other memory, could be detected and retrieved without running afoul of Fifth Amendment concerns. Fricosu faces no hard choice when she has no choice at all.

B. *Discomforting Thoughts*

The descriptive force of the excuse-based model when applied to the new spectrum of evidence creates a discomforting prediction of things to come. This model and its implications for emerging technologies make evident the disquieting shortcomings of an excuse-based model with respect to the privilege against self-incrimination. A future where unconscious emotions, dispositions, and memories can be detected without running afoul of the privilege against self-incrimination is an alarming one. It is no wonder that three circuits have already created a "heartbreak exception" to protect private papers when to do otherwise would wound the social commitment to privacy.

And yet the Supreme Court has decisively rejected a privacy-based model of self-incrimination and has repeatedly balanced societal interests with the hard choices faced by a criminal defendant. Could it be that new technologies make obsolete a once-robust privilege intended to guard against brutal police tactics? In disclaiming a privacy-based rationale to self-incrimination, the Court located that same protection in the Fourth Amendment's Search and Seizure Clause, suggesting there may be hope for privacy yet. In a companion piece to this one, *Searching Secrets*,²⁷² I explore this question in depth with some optimism concerning memorialized evidence. At least with respect to information authored and undisclosed or unpublished, individuals may have privacy interests both in secluding the evidence from others and in the substantive secrecy of the same. Yet those individual interests will yield in the face of sufficiently powerful government interests. Particularly because such evidence can be obtained with little physical offense to the individual, society will have to recog-

270. *But see id.* at 12 (arguing that the government's offer of immunity is too limited).

271. *United States v. Fricosu*, No. 10-cr-00509-REB-02, 2012 WL 182121, at *5 (D. Colo. Jan. 23, 2012).

272. Farahany, *supra* note 254.

nize a substantial interest in substantive secrecy of information to provide robust and meaningful cognitive freedom in the days ahead.

A society interested in robust cognitive freedom would likely wish to protect its citizens from unwarranted detection of automatic, memorialized, and uttered evidence in the brain. That current self-incrimination doctrine is unlikely to do so should give us pause. Private thoughts, private memories, and undisclosed ideas in the mind help to define our sense of autonomy and inviolate personality. A sphere of private rumination is essential to our fundamental concepts of freedom of thought, freedom of expression, freedom of will and individual autonomy. Whether or not we preserve that sphere may come to define us as a society as emerging neuroscience begins to take hold. And yet none of our constitutional doctrines currently contemplate or afford adequate protection against such intrusions.

Of course, society could choose to abandon the historically rooted and descriptively sound but normatively wanting excuse-based model of privilege. The spectrum provides a useful tool by which that could occur. Using the spectrum, one could test moral intuitions of society and use it to draw a new line between the categories of evidence society will protect and those it will not under self-incrimination. Yet the Self-Incrimination Clause does not include within it the same concept of “reasonable expectations of privacy” that has become the touchstone of Fourth Amendment search and seizure analysis, and does not turn as naturally on changing societal expectations of privacy. Even the Fourth Amendment, which focuses on securing reasonable expectations of privacy against unwarranted government intrusions, acts in a limited fashion, simply requiring that a neutral magistrate issue a warrant before private barriers may be breached. Mental privacy is not sacrosanct under either the Fourth or Fifth Amendment, which provide procedural safeguards but not substantive ones to adequately protect mental privacy.

Rather than rely upon courts to glean and enforce ever-changing moral intuitions about mental privacy, I propose that Congress should adopt legislation akin to the Genetic Information Nondiscrimination Act of 2008 to protect cognitive liberty. Such legislation—a Neuroscience Information Technology Act—should define a sphere of private rumination that would balance cognitive liberties for individuals and the interests of society in law enforcement and security more generally. A statutory approach would enlist democratic deliberation over the issue, and would make transparent the balance of societal and individual rights. A statutory scheme would enable an *ex ante*, holistic approach rather than an *ex post*, case-based approach, and would create a democratic process by which cognitive liberties could be defined and enforced. The scope of the concern and the novelty of the technology suggest both the timeliness and importance of such legislation.

Whichever approach one favors, whether endorsing the excuse-based model, finding a fundamental interest in cognitive liberty, or advancing statutory change, the spectrum of neuroscience provides the path for doing so. By replac-

ing the antiquated testimonial/physical divide with the spectrum of identifying, automatic, memorialized, and uttered evidence, the riddles of self-incrimination are revealed and its future foretold.

CONCLUSION

Neuroscience provides an ideal analogical tool to construct a more coherent spectrum of evidence by which the privilege against self-incrimination can be judged. Emerging neuroscience will provide new types of physical evidence, ranging from static images to more complex forms. Yet each category of the new spectrum—identifying, automatic, memorialized, and uttered—presents an opportunity to reevaluate the testimonial/physical dichotomy. Each category reveals a growing incoherence in determining Fifth Amendment privilege based on the form the contested evidence takes. In the era of neuroscience, self-incrimination may now occur *silently* just as aloud.

Other scholars including Stuntz have mistakenly assumed that individuals do not face threatened choices or the opportunity to meaningfully manipulate physical evidence. Conscious recall of memorialized evidence and compelled brain utterances are just as likely to “tempt[] otherwise honest witnesses to lie”²⁷³ as voiced and audible testimonial responses. But conscious recall and compelled brain utterances are still just physiological processes that are most naturally categorized as physical in kind.

By locating both ancient and modern cases along the spectrum, riddles both old and new are solved. The spectrum reflects both the process by which the evidence was created and the manner by which it was obtained from a criminal suspect. Identifying, automatic, and memorialized evidence is generated without conscious editing, manipulation, or processing by individuals. By contrast, compelling a suspect to recall facts or respond to questioning (whether silent or audible) creates an understandable temptation to lie, to remain silent, or to self-incriminate. The resulting choice undermines societal interests in promoting law-abiding behavior and discovering truth. Under these circumstances, the privilege should apply even with respect to “physical” evidence.

Even hard questions until now left ambiguous or unanswered can be resolved. A suspect’s subconscious microfacial changes elicited by a psychological exam, for example, would be automatic responses that are unprotected by the privilege. The substantive contents of private papers are memorialized evidence voluntarily created and thereby unprotected. The act of producing those same papers would present an excusable choice to which the privilege would apply.

And yet, while the spectrum renders descriptively sound the excuse-based rationale, it leaves much to be desired. This description of privilege reveals that the inner self is not safeguarded from self-incrimination. Such a result should

273. Stuntz, *supra* note 48, at 1287.

give pause. In response, society should adopt more robust protections to safeguard cognitive liberty as emerging neuroscience begins to take hold. Whether by reimagining the constitutional right against self-incrimination or developing new constitutional or statutory protections such as the Neuroscience Information Technology Act proposed here, society must now consider a new model to safeguard a sphere of cognitive liberty.

The spectrum of evidence—identifying, automatic, memorialized, and uttered—does more than just align with settled Fifth Amendment doctrine. It addresses hard and unanswered questions while also predicting the likely fate of future investigative technologies from neuroscience and beyond. It provides a coherent improvement over the antiquated model of categorizing evidence as testimonial or physical to address the privilege against self-incrimination. And it provides a necessary tool to test our intuitions about whether and how society should protect our thoughts—be they innocent or incriminating.