

Emerging Neurotechnologies for Lie Detection and the Fifth Amendment

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I. INTRODUCTION

The development of a successful lie detector has been a dream of governments and law enforcement since ancient times. A Hindu Veda written around 900 B.C.E. suggests a strategy for detecting lying behavior in suspects:

A person who gives poison may be recognized. He does not answer questions, or they are evasive answers; he speaks nonsense, rubs the great toe along the ground, and shivers; his face is discolored; he rubs the roots of the hair with his fingers; and he tries by every means to leave the house¹

Six hundred years later, the Greeks were attempting to detect lies by feeling the suspect's pulse.² What is interesting about both the early Hindu and Greek examples is that the methods employed were empirical; the interrogators were looking for physiological changes in the body that corresponded to the mental state in question. In contrast, the "Ordeal" strategy that dominated Christian Europe (and other places, including India) for centuries was based on a belief that God would intervene to reveal who was guilty and who was innocent.³ Interrogators determined whether subjects were lying by seeking a variety of supernatural indicators. Psychological and physiological factors were deemed irrelevant (except, perhaps, the psychology of wrenching confessions from those fearful of red-hot irons, boiling water, or drowning).⁴ Interrogators determined whether subjects were lying by seeking

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¹ Paul V. Trevillo, *History of Lie Detection*, 29 AM. INST. CRIM. L. & CRIMINOLOGY 848, 849 (1939).

² *Id.*

³ See George Fisher, *The Jury's Rise as Lie Detector*, 107 YALE L.J. 575, 585-86 (1997).

⁴ See, e.g., THOMAS ANDREW GREEN, VERDICT ACCORDING TO CONSCIENCE: PERSPECTIVES ON THE ENGLISH CRIMINAL TRIAL JURY, 1200-1800 8 n.18 (1985) (describing ordeals such as those involving the ordeal of drowning and hot-irons).

supernatural intervention.

Lie detection strategies have advanced little over the methods used by the ancient Greeks. Asking calculated questions and "feeling the subject's pulse" is still a dominant strategy.⁵ Of course, modern polygraphy includes measures of respiration, perspiration, and blood pressure, and can determine changes in heart rate much more accurately than placing a finger on the suspect's wrist. Still, using physiological changes in the peripheral nervous system (PNS) to measure deception has proven to be unreliable.⁶ Even strategies that do not use physiological measurements, like Paul Ekman's use of microfacial expressions, still involve analyzing an indirect measure of deception expressed by the PNS.⁷

Recently, however, neuroscience has, for the first time in history, allowed researchers to bypass the PNS and gather data directly from the brain.⁸ Several new technologies use measurements of blood flow or electrical impulses in the brain to identify distinct indicators of deceptive communication. These technologies are referred to as "Neurotechnological Lie Detection" (hereinafter "NTLD"). They endeavor to measure lying more directly by measuring brain activity rather than second-order indicators like pulse or respiration.

A. TYPES OF NTLD

There are two main categories of NTLD. The first involves determining blood flow patterns in the brain. By studying blood flow patterns during deception and comparing them to blood flow patterns during non-deception in similar situations, researchers can learn which regions of the brain are activated when people are lying.⁹ Functional Magnetic Resonance Imaging (fMRI) is currently the most commonly used method for measuring blood flow in the brain.¹⁰ While such brain imaging technologies are the most robust means of determining blood flow during deception, two other techniques have also been shown to have utility: (1) functional near-infrared light technology (fNIR),¹¹ which reflects infrared light off the frontal cortex

⁵ Fisher, *supra* note 3, at 577.

⁶ See AM. POLYGRAPH ASS'N, VALIDITY AND RELIABILITY OF POLYGRAPH TESTING, <http://www.polygraph.org/validityresearch.htm> (last visited Feb. 26, 2007). See also Kevin Muenster, Note and Comment, *The Re-Lie-ability of Polygraph Evidence: An Evaluation of Whether Texas's Per Se Rule Against the Admissibility of Polygraph Evidence is Violative of the Texas Rules of Evidence*, 58 BAYLOR L. REV. 265, 281 (2006) (stating that "[e]ven skeptics of the polygraph who attempt to diminish the test's reliability place polygraph accuracy at seventy percent.").

⁷ Paul Ekman & Maureen O'Sullivan, *Who Can Catch A Liar?*, 46 AM. PSYCHOL. 913, 913 (1991).

⁸ Paul R. Wolpe et al., *Emerging Neurotechnologies for Lie-Detection: Promises and Perils*, 5 AM. J. BIOETHICS 39, 39 (2005) (stating that "[f]or the first time, using modern neuroscience techniques, a third party can, in principle, bypass the peripheral nervous system—the usual way in which we communicate information—and gain direct access to the seat of a person's thoughts, feelings, intention, or knowledge.").

⁹ See, e.g., F. Andrew Kozel et al., *Detecting Deception Using Functional Magnetic Resonance Imaging*, 58 BIOLOGICAL PSYCHIATRY 605, 611 (2005) (stating that with the use of an fMRI, "it is possible to detect deception within cooperative individuals.").

¹⁰ *Id.*

¹¹ Meltem Izzetoglu et al., *Functional Near-Infrared Neuroimaging*, 13 IEEE TRANSACTIONS ON NEURAL SYSTEMS REHABILITATION ENGINEERING 153, 153-59 (2005).

transcranially, and (2) thermographic technology, which detects heat emanating from the skin of the face.¹² Researchers have conducted experiments with these techniques using playing cards and other constructed scenarios that elicit lying behavior.¹³

Newer imaging technologies may be even more reliable as lie detectors. Traditionally, for example, neuroimaging has correlated external situations to responses in specific areas of the brain.¹⁴ The goal was to determine which discrete areas of the brain were employed in specific kinds of tasks, behaviors, or cognitive and affective states. Once it was known which areas of the brain were activated, researchers could use activation of those parts to determine what target behavior the subject was engaged in.¹⁵ Now, however, the science has advanced to the study of general patterns of brain activation distributed over many regions of the brain.¹⁶ Researchers attempt to use these patterns to predict generally what kinds of actual cognitive activities the person is engaged in. If perfected, this strategy could enable much more accurate predictions of cognitive and affective states.

Brain imaging requires large machinery and sophisticated technicians,¹⁷ and although fNIR and thermographic equipment is much more mobile,¹⁸ these methods are almost certainly less accurate at present.¹⁹ Even the most accurate lie detection techniques are, at this point, unproven. Nevertheless, two companies have already been incorporated with the intention of offering these services to the public.²⁰

The second category of NTLD covers techniques that use event related potentials (ERPs) through electroencephalogram (EEG) to identify patterns of recognition.²¹ Proponents claim that these techniques can be used to confirm or refute a subject's claims, or to indicate the presence of certain kinds of concealed information.²² With EEG, the researcher uses electrodes placed on the subject's scalp to detect and measure patterns of electrical activity emanating from the brain.²³

For the purposes of this Article, it is instructive to look at one patented form of this technology: "brain fingerprinting." Developed by Dr. Lawrence Farwell, founder and chief scientist of Brain Fingerprinting Laboratories, brain fingerprinting attempts to discern whether a person has knowledge of a particular event or an image (such as a crime scene under investigation)

¹² Dean A. Pollina et al., Facial Skin Surface Temperature Changes During a "Concealed Information" Test, 34 *Annals Biomedical Engineering* 1182, 1182 (2006).

¹³ See, e.g., Daniel D. Langleben et al., 15 *NEUROIMAGE* 722, 722 (2002).

¹⁴ Editorial, *What's on Your Mind?*, 9 *NATURE NEUROSCIENCE* 981, 981 (2006) (stating that "[c]onventional neuroimaging analysis correlates external regressors such as task condition with activity in specific brain areas.").

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ See Izzetoglu et al., *supra* note 11, at 153.

¹⁸ *Id.*

¹⁹ See *id.*

²⁰ Helen Pearson, *Lure of Lie Detectors Spooks Ethicists*, 441 *NATURE* 918, 918-19 (2006).

²¹ Wolpe et al., *supra* note 8, at 41.

²² See *id.*

²³ See *id.*

stored in his brain.²⁴ The subject is seated in front of a computer screen and wears a headband with sensors that measure EEG responses at several locations on the scalp.²⁵ The subject is told that he will be presented with a series of words or images.²⁶ Before the testing begins, he is given a list of target stimuli, to which he is told to pay particular attention.²⁷ He is instructed to hit one button when a target stimulus appears, and another button when any other stimulus appears.²⁸ The subject is then presented with a variety of stimuli for a fraction of a second each.²⁹ In addition to these "targets," two other types of stimuli are presented: "probes" and "irrelevants."³⁰ The "probes" are stimuli that relate to the topic at issue, such as a photograph of a crime scene. The "irrelevants" bear no relation at all to the topic at issue.³¹ As the subject views these images, his EEG responses are recorded.³²

Practitioners believe that each bit of information stored in the brain is stored by specific neurons and that if the brain recognizes a salient piece of information, specific neurons fire in response.³³ The firing of neurons generates an ERP component called the P300.³⁴ This occurs 300 milliseconds after the subject is exposed to a stimulus.³⁵ Because the subject has been told to pay particular attention to the target, this stimulus will be salient to the subject and will create a baseline P300 response or "Memory and Encoding Related Multifaceted Electroencephalographic Response" ("MERMER").³⁶ A MERMER response indicates that information regarding the stimulus is stored in the subject's brain.³⁷ The "irrelevants," by contrast, should not elicit a MERMER.

The real test, however, is the subject's responses to the probes. If the subject has knowledge of the topic at issue, the probes will presumably be noteworthy to the subject, and like the targets, will elicit a MERMER. If the suspect lacks such knowledge, the probes, like the irrelevants, should not elicit a MERMER.³⁸ By comparing the brainwaves from probes, targets, and

²⁴ *Id.*

²⁵ Kenneth R. Foster et al., *Bioethics & the Brain*, 40 IEEE SPECTRUM 34, 34 (2003).

²⁶ Jonathan Knight, *The Truth About Lying*, 428 NATURE 692, 692-94 (2004); Brain Fingerprinting Laboratories: Scientific Procedure, Research, and Applications, <http://www.brainwavescience.com/TechnologyOverview.php> (last visited June 18, 2007).

²⁷ Knight, *supra* note 26, at 692-694; Brain Fingerprinting Laboratories, *supra* note 26.

²⁸ Knight, *supra* note 26, at 692-694; Brain Fingerprinting Laboratories, *supra* note 26.

²⁹ Knight, *supra* note 26, at 692-694; Brain Fingerprinting Laboratories, *supra* note 26.

³⁰ Knight, *supra* note 26, at 692-694; Brain Fingerprinting Laboratories, *supra* note 26.

³¹ Brain Fingerprinting Laboratories, *supra* note 26.

³² *Id.*

³³ Foster et al., *supra* note 26, at 36.

³⁴ *Id.*

³⁵ Knight, *supra* note 26, at 693.

³⁶ Brain Fingerprinting Laboratories: Research and Summary Information, <http://www.brainwavescience.com/research.php> (last visited June 18, 2007).

³⁷ Interview by Brain Fingerprinting Laboratories with Dr. Lawrence Farwell, <http://www.brainwavescience.com/FreqAskedQuestions.php> (last visited June 18, 2007).

³⁸ See generally Brain Fingerprinting Laboratories: Scientific Procedure, Research, and Applications, <http://www.brainwavescience.com/TechnologyOverview.php> (last visited June 18, 2007) (describing general information about brain science).

irrelevants, Farwell claims his system can determine whether the probes represent information that is known to the subject, even if the subject claims no knowledge of or familiarity with the probe. He maintains that this information can be used to determine whether a suspect is guilty of a crime.³⁹

Farwell claims that in "over 170 scientific studies on Brain Fingerprinting testing, test results were found to be 100% accurate in determining whether subjects did or did not recognize the probe stimuli."⁴⁰ However, all of these tests were conducted by his own research teams, and his results have never been independently verified because his method of analysis is patented and undisclosed.⁴¹ Additionally, brain fingerprinting faces various obstacles that could render it unreliable when used in a real life situation outside of a laboratory.⁴² For one, since the P300 wave measures recognition, the suspect must, of course, remember the particular detail being shown to him. Conversely, the stimulus must not be salient to the suspect for any reason other than its association with the crime. For example, if he collects the kind of gun being presented to him as a stimulus, that image will most likely elicit a MERMER. The suspect must also not be familiar with the stimulus through media coverage of the crime. Accordingly, the examiner must be extremely careful in his choice of stimuli. There are also questions concerning whether a memory of a crime might change over time, or in response to drugs or stress.⁴³ Lastly, evidence suggests that there might be effective countermeasures to Brain Fingerprinting, allowing subjects to "defeat" the test. In one study, subjects were taught to make the irrelevant stimuli more salient to them by responding with covert actions like wiggling their toes, thereby reducing the discrepancy between the responses to the irrelevants and the probes.⁴⁴

Nevertheless, brain fingerprinting is grounded in valid science. It is well established that the P300 event is a response to a salient stimulus, even if the cognitive processes underlying it are not clear.⁴⁵ Moreover, brain fingerprinting has already been introduced into evidence in a criminal case, *Iowa v. Harrington*,⁴⁶ a post-conviction relief action undertaken twenty-three years after a murder.⁴⁷ In his testing, Farwell claimed that Harrington's EEG responses to probes such as "across street," "parked cars," and "weeds and grass," all of which related to the crime scene, showed that he had no memory of the crime.⁴⁸ The state argued, however, that a response to probes of such a general nature was not robust or specific enough to prove Harrington's

³⁹ Foster, *supra* note 25, at 34-39.

⁴⁰ See Brain Fingerprinting Laboratories, <http://www.brainwavescience.com/research.php>, (last visited June 18, 2007) ("Scientific studies, field tests and actual criminal cases involving over 175 individuals described in various scientific publications and technical reports by Dr. Lawrence A. Farwell have verified the extremely high level of accuracy, utility, cost-effectiveness, and overall credibility of the Brain Fingerprinting system.")

⁴¹ Wolpe, *supra* note 8, at 39, 44-45.

⁴² *Id.* at 42.

⁴³ Knight, *supra* note 26, at 692-94.

⁴⁴ J. Peter Rosenfeld, et al., *Simple, Effective Countermeasures to P300-based Tests of Detection of Concealed Information*, 41 *PSYCHOPHYSIOLOGY* 205, 205-219 (2004).

⁴⁵ Knight, *supra* note 26. See Foster, *supra* note 25.

⁴⁶ 659 N.W.2d 509 (Iowa 2003).

⁴⁷ Wolpe, et al., *supra* note 8, at 43.

⁴⁸ Judy Illes & Eric Racine, *Imaging or Imagining? A Neuroethics Challenge Informed by Genetics*, 5 *AM. J. BIOETHICS* 5, 18 (2005).

innocence. The judge ultimately allowed the data to be admitted, but denied Harrington's petition on other grounds, and suggested that Farwell's evidence would not have affected the outcome of the proceedings. An appellate court ultimately reversed the district court's decision, but on grounds unrelated to the brain fingerprinting testing.⁴⁹⁻⁵⁰ Although the district judge ultimately did not find the evidence persuasive, it is reasonable to believe that after further development of the technique, brain fingerprinting or similar technology may one day become an accepted procedure in the criminal system.

B. EVALUATION OF NTLD

NTLD has several advantages over peripheral nervous system measurement techniques like polygraphy. Directly measuring the activity in the brain that accompanies deception is more accurate and specific than measuring physiological responses to deception, such as changes in the PNS. Also, fear or other strong emotions may affect respiration, perspiration, or other physiological responses, and thus may confound the data in polygraphy; these emotions might not have the same effect, or same degree of effect, on brain patterns. Furthermore, polygraphy requires highly trained experts to read the graphs, while it may be possible to simplify some NTLDs for routine use with computers or simply trained personnel reading the data.⁵¹ Thus, it is possible not only that NTLD will eventually be validated and judged to be reliable evidence, but also that it will be used routinely in the criminal justice system. That is, of course, if it is constitutional.

II. NTLD AND THE FIFTH AMENDMENT

The government could one day use NTLD to obtain information that was previously thought of as limited to the private confines of individual consciousness. The technology therefore raises personal privacy issues of constitutional proportions. NTLD will be highly desirable for forensic, security, and military purposes. However, the public most likely sees subjective thought as a domain of privacy, and will demand new laws to protect technological incursions because existing laws are probably insufficient. The expanding use of NTLD challenges our existing system of legal devices for protecting against invasions of privacy and coercions to produce evidence. In particular, NTLD will raise profound questions about the scope and purpose of the self-incrimination clause of the Fifth Amendment.

⁴⁹ Wolpe, et al., *supra* note 8, at 43.

⁵⁰ Interestingly, however, the brain fingerprinting results may have had some bearing on the case. When confronted with the test results, a key witness recanted his testimony and admitted that he had falsely accused Harrington of committing the crime, thus playing a role in the reversal of the district court's decision. *Illes & Racine, supra* note 48, at 18 (citing *Harrington v. Iowa*, 659 N.W.2d 509 (Iowa 2003)).

⁵¹ See, e.g., *Foster et. al., supra* note 25 (discussing technological advancement in NTLD).

A. THE HISTORICAL BACKGROUND OF THE FIFTH AMENDMENT

The self-incrimination clause of the Fifth Amendment states that no person "shall be compelled in any criminal case to be a witness against himself."⁵² Determining the scope of the privilege against self-incrimination has challenged the judiciary since its inception. As legal scholar John B. Taylor writes:

The privilege against self-incrimination is now firmly enshrined in American constitutional law, but arguments about its fundamental purpose and, consequently, its appropriate scope, continue to arouse lively controversy. Problems arise with respect to disagreements about what the purpose of the privilege should be and to inconsistencies in the way the Supreme Court has applied it.⁵³

The Supreme Court has delineated many of the justifications for the privilege, including distrust of defendants' testimony, concerns about privacy, and the "cruel trilemma" of forcing a suspect to choose among self-accusation, contempt of court, and perjury.⁵⁴ However, legal scholars have critically examined these rationales and many conclude that none is entirely satisfactory.⁵⁵ As one Supreme Court Justice notes, "the law and the lawyers have never made up their minds just what it is supposed to do or just whom it is intended to protect."⁵⁶

The introduction of NTLD and other technologies that can extract information directly from the brain will likely increase this confusion. The Supreme Court has held that the Fifth Amendment does not prevent the government from compelling a suspect to provide physical evidence such as a blood or a handwriting sample, but that it does prevent the government from compelling and using "testimonial" evidence from the suspect, such as a verbal account or a gesture like nodding.⁵⁷ Brain imaging and brain fingerprinting (at least in their current forms) require some type of clear testimonial response from the suspect, such as pressing a button. However, it is possible that modified versions of NTLD would not require such responses and this possibility raises interesting Fifth Amendment issues.⁵⁸ For the first time,

⁵² U.S. CONST. amend. V.

⁵³ JOHN B. TAYLOR, *THE RIGHT TO COUNSEL AND PRIVILEGE AGAINST SELF-INCRIMINATION* 16-17 (ABC-CLIO, Inc. 2004).

⁵⁴ *Murphy v. Waterfront Commission*, 378 U.S. 52, 55 (1964) (stating that our fundamental values include an unwillingness to subject those accused of crime to the cruel trilemma of self accusation, perjury, or contempt).

⁵⁵ TAYLOR, *supra* note 53, at 16-19. Ronald J. Allen & M. Kristin Mace, *The Self-Incrimination Clause Explained and Its Future Predicted*, 94 J. CRIM. L. & CRIMINOLOGY 243, 245 (2004).

⁵⁶ Allen & Mace, *supra* note 55, at 245. For a discussion of the proposed rationales and their shortfalls, see TAYLOR, *supra* note 53, at 16-19.

⁵⁷ See, e.g., *Schmerber v. California*, 384 U.S. 757, 764 (1966) ("The distinction which has emerged, often expressed in different ways, is that the privilege is a bar against compelling 'communications or testimony,' but that compulsion which makes a suspect the source of 'real or physical evidence' does not violate it.").

⁵⁸ For example, during Brain Fingerprinting, instead of presenting the suspect with target stimuli to which he has been told to pay attention, the targets might consist of previously collected images that the test-givers know the suspect will find salient, such as a photograph of his apartment building. The suspect, hooked up to EEG sensors, would then be

"testimonial-like" evidence, suggesting whether a person recognizes an object or is engaging in deceit, would be available in the form of a physical object (a brainwave or the flow of blood) without an accompanying verbal response. Whether the self-incrimination clause covers such evidence will turn on the judicial definition of "testimony," and the rationale behind the self-incrimination clause.

Although none of the commonly cited rationales for the self-incrimination clause can fully explain its scope, the two that are most relevant to NTLD are: (1) preventing coerced and therefore unreliable testimony, and (2) protecting citizens' privacy. The first rationale originated in response to the abusive practices of Medieval English courts. In the Star Chamber, an English Court of Law in the 15th and 16th centuries, the Crown forced suspects to take an oath (or be "whipped and pilloried") and answer questions designed to uncover uncharged offenses.⁵⁹ Clearly, this practice calls into question the reliability of the testimony. Even without the use of torture, suspects faced with the cruel "trilemma" of whether to self-accuse, perjure themselves, or be found in contempt of court, may feel an irresistible urge to perjure themselves. Because false testimony is so debilitating to the justice system, it is important to protect a suspect's right not to testify.

Additionally, many scholars and justices have focused on mental privacy as a historically important value behind the self-incrimination clause that reflects "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.'"⁶⁰ Georgetown University Law Professor Louis Michael Seidman suggests that Fifth Amendment protection is said to "mark off a boundary of private, individual right beyond which the state may not legitimately go even when going beyond it would maximize the good."⁶¹ In other words, while the state may require a defendant to cooperate in an investigation to a certain extent, it may not demand access to a person's mental life and thus "violate" the "human personality."

Of course, these two rationales will yield different interpretations of what the privilege is supposed to protect. As explored below, courts have never been particularly consistent in their interpretation of the self-incrimination clause's purpose or scope.⁶² The introduction of NTLD may force the judicial system to untangle these inconsistencies. It will force us to think not only

asked to look at the computer screen without having to press a button indicating whether or not he found the stimulus salient. His brainwaves would be recorded, and, presumably, one could determine whether the brainwaves in response to the probes more closely resembled those in response to the irrelevant or the targets. If they more closely resembled the brainwaves in response to the targets, the implication would be that he found the probes salient.

⁵⁹ Erwin N. Griswold, *THE 5TH AMENDMENT TODAY: THREE SPEECHES* 3 (Harvard University Press 1955). See also *Pennsylvania v. Muniz*, 496 U.S. 582, 596 (1990) (stating that the Star Chamber operated by forcing suspects to choose between revealing incriminating private thoughts and forsaking their oath by committing perjury).

⁶⁰ Allen & Mace, *supra* note 56, at 261; *Murphy*, 378 U.S. at 55.

⁶¹ Louis M. Seidman, *Points of Intersection: Discontinuities at the Junction of Criminal Law and the Regulatory State*, 7 J. CONTEMP. LEGAL ISSUES 69, 130-131 (1996).

⁶² See generally Michael Edmund O'Neill, *Undoing Miranda*, 2000 B.Y.U. L. REV. 185, 185 (2000) (discussing variations in the Supreme Court's application of the self-incrimination doctrine). See also TAYLOR, *supra* note 53, at 16.

about the meaning of the privilege, but also about our conceptions of ourselves.

B. THE ACT OF COMMUNICATING AND CONCERNS ABOUT RELIABILITY

Although courts have generally interpreted the self-incrimination clause as protecting against the use of "testimonial" or "communicative" evidence, it is not entirely clear whether the defining quality of "communicative" is the *act* of communicating or the *product* of the communication. When courts speak of the clause as prohibiting the forced "disclos[ure of] the contents of [one's] own mind," they refer both to the act of communicating (the disclosing) and the product of the communication (the contents of one's mind).⁶³ Until now of course, the two have been inextricably linked; in order for the contents of a person's mind to be exposed, he had to communicate that content actively, whether by speaking, writing, gesticulating, or some other deliberate means. Although courts often discuss the act and the product of communication without noting a distinction, at times they tend to emphasize the communicative act over the product. For example, in *Pennsylvania v. Muniz*,⁶⁴ the Supreme Court addressed the question of whether the self-incrimination clause prevented the state from drawing an inference that the defendant was intoxicated based on his inability to answer a simple question. The Court wrote:

The Commonwealth . . . argue[s] that this incriminating inference does not trigger the protections of the Fifth Amendment privilege because the inference concerns "the physiological functioning of [Muniz's] brain," . . . which is asserted to be every bit as "real or physical" as the physiological makeup of his blood and the timbre of his voice. But this characterization addresses the wrong question; that the "fact" to be inferred might be said to concern the physical status of Muniz's brain merely describes the way in which the inference is incriminating. The correct question for present purposes is whether the incriminating inference of mental confusion is drawn from a *testimonial act* or from physical evidence.⁶⁵

Here, the Court found that it is the testimonial (or communicative) aspect of the evidentiary *act* that garners Fifth Amendment protection. What the act conveys (the level of Muniz's intoxication or the physiological status of his brain), is irrelevant.

If this is the rule, courts will need to determine whether NTLD involves an "act" of communication. For the first time in human history, the state may be able to obtain information directly from the brain against a suspect's will. Whether this unprecedented involuntary transmission of information could be considered an "act" of communication is not immediately clear. The language that courts use in their discussions of communicative acts may be instructive in this regard.

⁶³ See *Muniz*, 496 U.S. at 594.

⁶⁴ *Id.* at 582.

⁶⁵ *Id.* at 593 (emphasis added).

When the Supreme Court has elaborated on the concept of communication, it has suggested that the mere transmission or disclosure of information alone does not qualify as an act that triggers Fifth Amendment protection. Instead, it is the active role that the defendant or witness must play in the disclosure that triggers protection. In *Schmerber v. California*,⁶⁶ the Court ruled that the police could compel a suspect to provide a blood sample for analysis in order to determine whether he was intoxicated. The Court explained:

Not even a shadow of testimonial compulsion upon or enforced communication by the accused was involved either in the extraction or in the chemical analysis. Petitioner's testimonial capacities were in no way implicated; indeed, his participation, except as a donor, was irrelevant to the results of the test, which depend on chemical analysis and on that alone.⁶⁷

Interestingly, as later noted in *Muniz*, the Court made its determination in *Schmerber* "not simply because the evidence concerned the suspect's physical body," but rather because of the nature of the suspect's act in providing the evidence.⁶⁸ In the above quote, the Court emphasizes not the suspect's mere transmission of information, but the suspect's "participation" in that transmission, suggesting that a suspect must play an active role in order to engage in a testimonial act. The Court's use of the phrase "testimonial capacities" may suggest that the suspect must have some sort of control over the transmission of information in order to implicate the privilege against self-incrimination; the word "capacity" generally implies an ability to do something and not a passive willingness to submit to something done by the state. The proposition that a suspect must have some sort of control over the transmission of information in order to qualify for Fifth Amendment protection is in line with the "reliability of the testimony" rationale for the privilege, as a defendant can only manipulate testimony over which he has control.

If we adopt the proposition that the privilege against self-incrimination applies only to situations in which the suspect can exert control over testimonial actions, it seems that compelled NTLD would not violate the privilege. At first, it might seem that a mental event roughly translated into the thought "I recognize that crime scene" is of course a testimonial capacity; if there is any one capacity that truly makes us human, it is the capacity to think. The recognition of an image can be considered a "thought" that translates to: "I recognize that crime scene." However, the act in question in the case of brain fingerprinting is not the "thought" as the subject experiences it, but rather the spike in the P300 brainwave, and under *Schmerber*, it would seem that this is not a testimonial act. In *Schmerber*, the Court found that the defendant did not commit a testimonial act when police extracted and tested his blood. The only action the defendant took was to submit to extraction. Assuming that brain fingerprinting were 100% accurate, the subject would have no more control over the firing of neurons than *Schmerber* had in the

⁶⁶ 384 U.S. 757 (1966).

⁶⁷ *Id.* at 765.

⁶⁸ *Muniz*, 496 U.S. at 593.

way his blood responded to the test. In both cases, the suspect's only choice is whether to submit to the test. Other than looking at the computer screen, any active participation on the part of the subject would be, like Schmerber's participation in the blood extraction and analysis, irrelevant to the results of the test. Thus, if control over results is a defining element of a testimonial act, brain fingerprinting would not qualify as such.

The idea that we have no more control over our thoughts than we do over the breaking of our blood vessels when pricked with a needle may run counter to our conceptions of ourselves. In our culture there is a tension between the belief that consciousness is something non-physical, and the idea that our minds (like everything else) are composed of mere matter reacting to other matter according to the laws of physics. On a certain intellectual level, we may accept that our "thoughts" are no more than physical reactions in the brain and that our recognition of an object is just a physical change in the brain caused by the firing of particular neurons. Yet, our everyday conception of humanity still reflects dualistic notions of body and non-physical mind or soul. When we say things like "my brain," we implicate a metaphysical being exerting influence over the workings of the brain, which we consider to be the organ of the mind and consciousness, but not synonymous with them. Even neuroscientists and their studies often "seem to leave room for the homunculus, the little ghost in the machine, which does all the directing of brain traffic."⁶⁹

The dualistic view of mind and body seems to be less at issue when considering relatively simple cognitive functions like the recognition of a stimulus as salient. However, it might still be difficult to view that recognition as involving no more participation or control on the part of the subject than does the withdrawal of blood. Still, as we have seen, this would be the case if NTLD did in fact prove 100% accurate. If reliability is the core rationale for the self-incrimination clause and the test for whether an act is testimonial is simply whether the suspect can manipulate the information transmitted, then compelled NTLD should not trigger Fifth Amendment protection any more than a blood test.

Nevertheless, the concern about reliability of testimony cannot fully explain the scope of the self-incrimination clause. The most glaring pitfall of the reliability theory is that it fails to explain the judicial practice of excluding reliable physical evidence discovered as a result of compelled statements.⁷⁰ Indeed, some legal scholars believe that the privacy rationale is more important than the reliability rationale to the Supreme Court.⁷¹

C. THE PRODUCT OF COMMUNICATION AND CONCERNS ABOUT PRIVACY

Despite the Supreme Court's assertion that it is the nature of the evidentiary *act* that qualifies evidence as testimonial and therefore covered by the self-incrimination clause, some have proposed that the evidentiary *product* may be the real determining factor. Ronald J. Allen and M. Kristin

⁶⁹ BRENT GARLAND, *NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE* 66 (2004).

⁷⁰ TAYLOR, *supra* note 53, at 18-19.

⁷¹ *Id.* at 19.

Mace cogently argue that, although the Supreme Court has never explicitly acknowledged it, the Court defines "testimony" as the "substantive content of cognition," or more simply, the "contents of one's mind" or "thoughts" with truth-value.⁷² They argue that in preventing the compulsion of "testimony," the Court is really forbidding the government from compelling the disclosure of incriminating "thoughts" that were the result of state-action (as opposed to, say, documents written voluntarily, without government interference).⁷³ Indeed, the Court often explicitly discusses the product of cognition, noting, for example, that "[t]he expression of the contents of the individual's mind is testimonial for the purposes of the Fifth Amendment."⁷⁴

As discussed above, the rationale for emphasizing the *act* of communicating concerned issues of reliability; by contrast, the rationale for emphasizing the *product* of communication (the contents of one's mind) concerns mental privacy. In *Couch v. United States*,⁷⁵ for example, the Court wrote: "By its very nature, the privilege is an intimate and personal one. It respects a private inner sanctum of individual feeling and thought . . ."⁷⁶ The *Schmerber* Court took this perspective as well. There, Justice Brennan made it a point to note that the Court did not find the evidence to be non-testimonial solely because blood is physical evidence. He offered the following example to illustrate:

Some tests seemingly directed to obtain "physical evidence," for example, lie detector tests measuring changes in body function during interrogation, may actually be directed to eliciting responses which are essentially testimonial. To compel a person to submit to testing in which an effort will be made to determine his guilt or innocence on the basis of physiological responses, whether willed or not, is to evoke the spirit and history of the Fifth Amendment.⁷⁷

Thus, Brennan suggests that the self-incrimination clause may be implicated even where the defendant does not actively participate in the evidentiary act and where the "contents of his cognition" are compelled and exposed only through the vehicle of physical evidence. Justice Brennan's allusion to the "spirit" of the Fifth Amendment most likely refers to his belief, articulated in other cases, that the self-incrimination clause safeguards "the cherished valued of privacy."⁷⁸ With his lie detector example, then, it is presumably the intrusion into the mental privacy and the contents of the accused's mind that triggers Fifth Amendment protection. Justice Brennan's musings on this have led some to conclude that compelled NTLD would clearly be prohibited by the self-incrimination clause.⁷⁹ Importantly though, these reflections were beyond the scope of *Schmerber's* facts and were thus dicta. The example does

⁷² Allen & Mace, *supra* note 56, at 246-47.

⁷³ *Id.* at 266-67.

⁷⁴ *Doe v. United States*, 487 U.S. 201, 210 n.9 (1988) (stating that they do not disagree with the dissent on this point).

⁷⁵ 409 U.S. 322 (1973).

⁷⁶ *Id.* at 327.

⁷⁷ *Schmerber*, 384 U.S. at 764.

⁷⁸ *Fisher v. United States*, 425 U.S. 391, 417 (1976).

⁷⁹ George M. Dery, *Lying Eyes: Constitutional Implications of New Thermal Imaging Lie Detection Technology*, 31 AM. J. CRIM. L. 217, 248 (2004).

not necessarily establish precedent for future decisions.⁸⁰

Nevertheless, if the Court does choose to apply a rule against the disclosure of the substantive products of cognition because of mental privacy concerns, NTLD would fall squarely within the scope of the self-incrimination clause. Brainwaves and blood flow (although physical objects) suggest particular mental states, and are likely to qualify as products of cognition that privacy concerns are meant to protect. Indeed, the direct and unwanted government access to our mental life is a chilling concept. There is a general belief that such access would be more intrusive on our privacy than access to any other aspect of ourselves, including, perhaps, our genome, despite the fact that a person's genome may reveal more about him than a split second peek into his mind. As neuroscientist Donald Kennedy, editor of the journal *Science*, remarked, "I already don't want my employer or my insurance company to know my genome. As to my brainome, I don't want *anyone* to know it for any purpose."⁸¹

What is it about the "brainome" that makes it so sacred? The answer seems to lie in its relation to our sense of self. However one defines the term "self," it incorporates the idea of consciousness. In western cultures in particular, the brain is considered to be "the organ of mind and consciousness . . . the locus of selfhood."⁸² Some believe that "neuroscientific essentialism," the idea that the locus of selfhood and personal essence is the brain, is "less erroneous" than "genetic essentialism," the argument that "we are our genes."⁸³ Bioethicist Hank Greely explains:

I am more than my genes. The genes are an important part of me, but I can be certain that they are not my essence; they are not my soul. When we shift that notion to the neuroscience area, though, I am not so confident. Is my consciousness—is my brain—me? I am tempted to think it is . . .⁸⁴

The connection that we feel to our brain is unlike the connection that we feel to any other aspect of ourselves. Even if the firing of our neurons is just a chemical reaction in response to a stimulus as is our bleeding in response to the touch of a needle, we still feel a more intimate connection to the activity in our brains than to the activity in our blood vessels. The firing of the neuron itself, or some unknown but related action milliseconds afterwards, enables the consciousness that that we perceive as constituting the "self" or "I." In contrast, bleeding is something that "I" can watch or take note of, but it itself is not, and, does not, enable "me." Unlike any other personal aspect, such as

⁸⁰ It might also be noted that Justice Brennan is sometimes out of line with the majority in terms of his views on the proper scope of the Fifth Amendment. See, e.g., *Fisher v. United States*, 425 U.S. 391, 420 (1976).

⁸¹ New York City Bar Association, The Committee on Science and Law, *Are Your Thoughts Your Own? 'Neuroprivacy' and the Legal Implications of Brain Imaging* (2005) (citing *Harrington v. Iowa*, 659 N.W.2d 509 (Iowa 2003)), <http://www.abenry.org/pdf/report/Neuroprivacy-revisions.pdf>.

⁸² Linda F. Hogle, *Enhancement Technologies and the Body*, 34 ANN. REV. ANTHROPOLOGY 695, 709 (2005).

⁸³ GARLAND, *supra* note 69, at 34.

⁸⁴ HENRY T. GREELY, *NEUROETHICS AND ELSI: SOME COMPARISONS AND CONSIDERATIONS* (2004), <http://perpich.com/neuroed/archive/139.pdf> (last visited June 18, 2007).

our blood or genes, we know by definition what our thoughts say about us without the help of scientists. It is the stuff of the brain, our real-time thoughts, feelings, reflections, and memories that constitute selfhood.

If we view our minds as our "selves" and our brains as enabling our minds, then technologies capable of uncovering cognitive information from the brain threaten to violate our sense of privacy in a new and profound way. For the first time, the invasion of privacy would concern not the revelation of information *about* the "self," information that might be obtained by reading a person's diary, for example (a classic intrusion on privacy), but rather the revelation of the *actual* "self." Indeed, Donald Kennedy concludes that the reason he wishes to keep his 'brainome' private is that "[i]t is way too close to who I am."⁸⁵ If, as the Supreme Court has asserted, the self-incrimination clause reflects "our respect for the inviolability of the human personality," then direct access to a person's "self" seems a clear invasion of that inviolability.⁸⁶

However, even if direct access to our thoughts is the ultimate intrusion into our privacy, the privacy rationale may still not be a sufficient basis for finding that the self-incrimination clause prohibits compelled NTLD. Perhaps most fatal to the privacy theory is the fact that the privilege only applies to incriminating testimony. If the government grants immunity to an individual, it can then compel even the most private disclosures as long as it does not subsequently prosecute the individual for offenses related to the testimony. As Professor William Stuntz points out:

This is irrational, in privacy terms, for there is no apparent connection between privacy intrusion on the one hand and the threat of criminal punishment on the other. If the privilege were sensibly designed to protect privacy, or even only "mental privacy," its application would turn on the *nature* of the disclosure the government wished to require, and yet settled Fifth Amendment law focuses on the criminal *consequences* of disclosure.⁸⁷

Indeed, direct access to one's thoughts is just as much of a personal invasion for one with immunity as it is for one without immunity. Furthermore, the government can compel testimony from witnesses unsuspected of a crime, a practice that is at odds with the privacy rationale.⁸⁸ For these reasons, the Court may not be able to rely on the privacy rationale alone to defend Fifth Amendment protection of NTLD.

D. THE INTERPRETATION OF THE ACT AND PSYCHOLOGICAL CRUELTY

There is an interesting variation on the privacy rationale that may defeat the conceptual challenges posed by the admissibility of private documents and

⁸⁵ *Major Talks on Addiction, Neuroethics, and Depression Highlight Neuroscience* 2003, NEUROSCIENCE Q. (Winter 2004), http://web.sfn.org/index.cfm?pagename=neuroscienceQuarterly_04winter_neuroscience.

⁸⁶ *Murphy v. Waterfront Commission*, 378 U.S. 52, 55 (1964).

⁸⁷ William J. Stuntz, *Self-Incrimination and Exemption*, 88 COLUM. L. REV. 1227, 1234 (1988).

⁸⁸ *Id.* at 1236.

of immunized testimony. Professor Louis Michael Seidman outlines (but does not subscribe to) the following theory:

Fifth Amendment protection marks off a boundary of private, individual rights beyond which the state may not legitimately go Although a defendant who commits a crime may justly be punished and used by the state to deter others, he does not thereby become a creature of the state. The state may control him physically, for example, by limiting his physical freedom, but his mental life remains private and immune from public coercion. It follows that although he may be physically punished, he may not be legitimately forced to consent to his own punishment. Consent is a purely mental event that lies beyond the state's legitimate authority. Compelled self-incrimination rests on a kind of consent.⁸⁹

Seidman goes on to explain that this theory might protect verbal testimony, but not physical evidence, such as blood samples.⁹⁰ He explains that while Schmerber's blood may "testify" to something, "it does so in a purely physical fashion without implicating his interior, mental life."⁹¹ Seidman suggests that since his blood does not "belong" to him in the way that his mind does, the provision of the blood is less of a "voluntary act" or an act of "consent" on his part than would be his provision of testimonial evidence.⁹² Professor Michael Dann further articulates this view, arguing that "psychologically intrusive compulsion has occurred . . . if the 'accused' can . . . reasonably believe that he can affect the results' of the disclosure."⁹³

This theory evokes the goal of preventing the "cruel trilemma" (the state compelling a defendant to choose among perjury, being held in contempt of court, and self-incrimination). In their explanations of the theory, both Seidman and Dann call attention to the role of "voluntariness" and "control" over one's thoughts. The rationale implicated here is not ensuring the reliability of testimony, but preventing psychological cruelty. Just as is true of a "Sophie's choice" situation (where Nazis forced a woman to decide which of her two children would die),⁹⁴ the cruelty lies in the ability to control the outcome of the decision. In cases where the defendant decides to provide blood or walk in a line-up (to avoid being held in contempt of court), the result of his decision is out of his hands once he decides to submit; he cannot control his blood alcohol level or whether the accusing party will recognize him. According to the theory, this is less cruel than forcing a defendant to provide testimony. There, the defendant can control the outcome of the testimony, and by choosing to incriminate himself, consents to his own punishment. The theory asserts that the purpose of the self-incrimination

⁸⁹ Seidman, *supra* note 61, at 131.

⁹⁰ *Id.*

⁹¹ *Id.* at 132.

⁹² *Id.*

⁹³ Allen & Mace, *supra* note 56 at 263 (quoting 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)).

⁹⁴ See generally Lois Shepherd, *Sophie's Choices: Medical and Legal Responses to Suffering*, 72 NOTRE DAME L. REV. 103, 103 (1996) (explaining the story behind the phrase "Sophie's Choice").

clause is preventing this kind of cruelty.

NTLD adds an interesting twist to this analysis. In reality, a suspect submitting to NTLD would have no more control over the test results than Schmerber had over the results of his blood test. Yet, it might be harder for the suspect to accept the idea that his thoughts are beyond his control. In Seidman's words, because he feels that his thoughts "belong" to him in a way that his blood does not, he might consider their use against him to be a kind of personal and "mental consent" to his own punishment. Dann suggests that the determining factor as to whether psychologically intrusive compulsion has occurred is whether the suspect has reason to believe that he could affect the outcome of the results.⁹⁵ Regardless of whether a suspect undergoing NTLD has good reason to believe that he has this control, however, he might nonetheless believe that he does, and might accordingly suffer the psychological cruelty that the privilege is meant to prevent.

Still, regardless of how the psychological cruelty rationale applies to NTLD, the theory itself may be fatally flawed. First, an innocent person faces no trilemma, and it is unlikely that the self-incrimination clause was meant only to protect the guilty. Even if it were meant to protect the guilty, the cruelty of a life in prison (a consequence regularly inflicted on the guilty) is clearly worse than the psychological cruelty in having control over one's incriminating testimony. Preventing only the psychological cruelty of mentally consenting to one's own punishment therefore seems inconsistent at best, hypocritical at worst.⁹⁶ For these reasons, scholars have generally rejected the psychological cruelty theory, and it is unlikely that the courts would use it to justify Fifth Amendment protection of NTLD.⁹⁷

III. CONCLUSION

Past judicial decisions and legal commentaries do not present a clear answer as to whether NTLD would be covered by the Fifth Amendment's protection. If the courts focus on the communicative act involved in garnering the evidence, the control the suspect has over the results, and concerns about reliability of the testimony, they would likely find that NTLD falls outside of the Fifth Amendment's scope. If, however, they focus on the communicative product and the violative nature of entering the suspect's mind, they would likely find NTLD to fall within the Amendment's bounds. Whether the underlying rationale for the decision—if there is an underlying rationale at all—is concerns about reliability or concerns about privacy, it will, to some extent, be at odds with other applications of the Fifth Amendment. Although the judiciary is unlikely to sort out centuries of a somewhat inconsistent rationale, the introduction of NTLD may at least demonstrate that it ought to abandon its distinction between testimonial and physical evidence.

The advent of technologies that can directly access brain processes that have historically been closed to outside scrutiny poses many challenges to conceptions of privacy that have previously been taken for granted. As these

⁹⁵ Allen & Mace, *supra* note 56, at 263.

⁹⁶ Stuntz, *supra* note 87, at 1239.

⁹⁷ Allen & Mace, *supra* note 56, at 261.

technologies become more powerful and their validity and reliability are established, numerous questions concerning their proper use will arise in the courts. A major issue will be the challenge that NTLD brings to Fifth Amendment protections. However, there are also several other areas in which the courts will have to grapple with these developments, including the general admissibility of a variety of deception-detecting technologies, the acceptability of brain imaging evidence to determine subjective states of mind, and the use of brain imaging to determine levels of competence or capacity.

Of course, the public may remove many of these decisions from the courts by successfully demanding legislation. Just as public pressure drove a number of states to pass genetic anti-discrimination laws, the public may demand that their minds be off-limits to compelled outside scrutiny under any circumstances, once it understands the implications of these new technologies. As NTLD moves from the laboratory to the public sphere, the legislatures and courts will be forced to grapple with the issue of whether and to what extent our minds should remain protected from state intrusion.