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NEURO LIE DETECTION AND MENTAL PRIVACY

MADISON KILBRIDE* & JASON IULIANO†

ABSTRACT

New technologies inevitably raise novel legal questions. This is particularly true of technologies, such as neuro lie detection, that offer new ways to investigate crime. Recently, a number of scholars have asked whether neuro lie detection testing is constitutional. So far, the debate has focused on the Fifth Amendment—specifically whether evidence gathered through neuro lie detection is constitutionally admissible because it is “physical” in nature or inadmissible because it is “testimonial” in nature. Under current Supreme Court doctrine, this Fifth Amendment debate is intractable. However, the more fundamental question of whether the government can compel individuals to undergo a neuro lie detection test does have a clear answer. It just so happens that the answer lies in the Fourth Amendment, not the Fifth. In this Paper, we argue that forcing a criminal defendant, or any other person, to submit to a neuro lie detection test is a substantial invasion of mental privacy that is unconstitutional under the Fourth Amendment.

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INTRODUCTION

The success of any judicial system is predicated on the ability of judges and jurors to distinguish truths from lies. Given that humans are highly fallible in this regard, there is immense interest in developing a scientific technique that reliably detects deception. Currently, the polygraph examination is the most widely used form of scientific lie detection. However, given its lack of accuracy, few U.S. jurisdictions allow polygraph evidence to be admitted in court.¹ At present, new techniques and technologies are being developed to fill this void by providing a scientifically valid and accurate method of lie detection. Functional magnetic resonance imaging (“fMRI”) is one technology that may have the potential to help the legal system decipher truths from lies.

An fMRI is a neural imaging procedure that measures brain activity by observing changes in blood flow. More specifically, the technology detects the delivery of oxygenated blood to neurons that have just fired. In this way, fMRI helps researchers understand which parts of the brain respond to particular stimuli. In clinical settings, it has a broad range of applications. For instance, fMRI has already been used to plan neurosurgical procedures, diagnose psychiatric disorders, and examine the effects of drugs and behavioral therapy.

Given the potential uses of fMRI in legal proceedings, several commercial firms have already begun marketing this technology for its lie detection capabilities. One of the major companies in the field, No Lie MRI, boasts an accuracy rate over ninety percent.² Even though some scientists have expressed skepticism about the validity of this claim,³ it is easy to see how the technology could have widespread applications in criminal and civil cases.

With these recent advances in neuro lie detection, it is not surprising that academics have already begun to ask whether the use of such technologies in legal proceedings would be constitutionally permissible. Thus far, the debate has centered on the question of whether compelling a criminal defendant to submit to a neuro lie detection test is a violation of the Fifth

1. Nineteen states allow the admission of polygraph results when both parties consent. Only New Mexico permits the introduction of polygraph results under its regular evidentiary rules. *Legal Admissibility of Polygraph Test Results*, MATTE POLYGRAPH SERV., http://www.mattepolygraph.com/legal_admissibility.html (last visited Sept. 16, 2015).

2. See *Product Overview*, NO LIE MRI, <http://www.noliemri.com/products/Overview.htm> (last visited Sept. 15, 2015) (“Current accuracy is over 90% and is estimated to be 99% once product development is complete.”).

3. See Alexis Madrigal, *MRI Lie Detection to Get First Day in Court*, WIRED (MAR. 16, 2009), <http://www.wired.com/2009/03/noliemri/> (noting that “some scientists and lawyers . . . doubt that [fMRI lie detection] results will prove replicable outside the lab setting, and others say it just isn’t ready yet.”).

Amendment protection against self-incrimination. Although this question is an interesting one, at present, it is intractable.

The central point of contention in the Fifth Amendment debate is whether evidence gathered from neuro lie detection is “physical”—and, therefore, constitutionally admissible—or “testimonial”—and, therefore, inadmissible. Scholars on both sides of the discussion have developed persuasive arguments to support their positions.⁴ Because neuro lie detection is qualitatively different from any traditional form of evidence, existing court doctrine simply does not provide sufficient guidance to settle the Fifth Amendment issue. As things stand, the physical-testimonial debate is unresolvable.

Nonetheless, the question of whether it is constitutionally permissible to compel a criminal defendant to undergo a neuro lie detection test can be answered. In this Paper, we advance the conversation by shifting focus from the Fifth Amendment to the Fourth Amendment. That maneuver has two key benefits. First, it moves us away from the intractable physical-testimonial dispute by recasting the problem as an issue of mental privacy and human dignity. Second, it expands the scope of the debate. To date, the discussion has focused solely on criminal defendants. However, there is another group of individuals who would be likely subjects of government-compelled neuro lie detection tests. That group is witnesses.

We believe that there is something fundamentally wrong with forcing witnesses—who are often innocent bystanders and sometimes victims themselves—to submit to a procedure that invades their mental privacy to such a substantial degree. Unfortunately, the current discourse says nothing about whether the government could force a witness to submit to a neuro lie detection test. Unlike criminal defendants, witnesses are generally unable to invoke the Fifth Amendment privilege against self-incrimination. Therefore, any objection must be founded upon another constitutional provision.

In this Paper, we lay out the basis for an argument that derives its support from the Fourth Amendment. We argue that compelled neuro lie detection infringes upon a witness’s right to mental privacy and, in doing so, undermines that person’s human dignity. Our Fourth Amendment analysis also resolves the question of whether a criminal defendant can be forced to take a neuro lie detection test—something the Fifth Amendment debate is unable to do. Because the constitution grants criminal defendants the same degree of dignity and respect that is accorded to all persons, the State may not force defendants to submit to such tests either. By setting aside the Fifth Amendment issue and focusing the debate on a more fundamental constitutional principle, we are able to make progress on this formerly intractable problem.

4. *See infra* Part II.

In Part I of this Paper, we discuss recent advances in neuro lie detection. In Part II, we examine the current debate about whether forcing a defendant to undergo a neuro lie detection test violates his Fifth Amendment privilege against self-incrimination. Finally, in Part III, we refocus the debate by considering the issue as applied to witnesses. Ultimately, we argue that the State cannot force *anyone*—defendant or witness—to submit to neuro lie detection testing. To do so would be to violate a person’s Fourth Amendment right to mental privacy and the associated constitutional guarantee of human dignity.

I. RECENT ADVANCES IN NEURO LIE DETECTION

Before fMRI became the dominant technology in deception research, neuroscientists used scalp-recorded event-related potentials (“ERPs”) to study changes in electrical activity in the brain in response to external stimuli.⁵ ERPs are measured by electroencephalography (“EEG”), which detects electrical activity in the brain by attaching electrodes to the scalp. While ERPs are a direct measure of brain activity, “their source in the brain cannot be uniquely localized.”⁶ Thus, although an EEG can tell researchers whether there is more or less brain activity in response to a mental process, it is silent on which brain regions are active. fMRI solves the localization problem by enabling neuroscientists to identify and localize the brain regions involved in different mental processes, including deception. While the details are complicated, the basic idea is straightforward. fMRI is able to measure brain activity by detecting changes in cerebral blood flow.⁷ Because cerebral blood flow and neuronal activation are coupled, when a region of the brain is in use, blood flow to that region increases.

A. Experiments

In the first peer-reviewed and published report on the use of fMRI to study deception, experimenters used a modified version of what is known as the Guilty Knowledge Test (“GKT”).⁸ This test can be used during a polygraph interrogation to test the accused on elements of a crime that could only be known by the guilty party. Typically, questions are presented in multiple-choice format (as opposed to a polygraph examination which

5. For a comprehensive explanation of event-related potentials, see STEVEN J. LUCK, AN INTRODUCTION TO THE EVENT-RELATED POTENTIAL TECHNIQUE 1–48 (2005).

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

7. An in-depth discussion of the science behind fMRI is beyond the scope of this Paper. For a good introduction, see SCOTT A. HUETTEL, ALLEN W. SONG & GREGORY MCCARTHY, FUNCTIONAL MAGNETIC RESONANCE IMAGING 1–23 (2d ed. 2009).

8. Langleben et al., *supra* note 6, at 729.

traditionally employs “yes” or “no” questions). The basic principle behind the GKT is that the subject will have an elevated physiological reaction to the correct answer. Such a response suggests that the subject recognizes the correct answer and, therefore, possesses knowledge of the crime.⁹

In this early fMRI deception study, participants were asked to choose one of three sealed envelopes and memorize the card inside.¹⁰ Each envelope contained a twenty-dollar bill and a five of clubs playing card. The participants were told that they could keep the twenty dollars if they concealed the identity of the card in the envelope from the “computer.”¹¹ Participants were then placed inside the fMRI machine whereupon they were shown images of various playing cards. For each image, participants were instructed to press one of two buttons to indicate whether the card shown matched the card in the envelope.

The researchers hypothesized that they would be able to detect and localize a difference in brain activity between lies and truths. After averaging the data from eighteen participants, they found that two brain regions showed increased activation when subjects were lying.¹²

The preceding study used group analysis, which means that the data from each participant’s scan were averaged together and analyzed as a group. Accordingly, a study using group data analysis might reveal increased activation in a particular brain region even if that region was not activated in every subject.

From a legal standpoint, group studies are not especially useful. After all, the law is not interested in patterns of neural activity across subjects. Rather, judges and jurors want to know whether a particular individual is lying or telling the truth. Nevertheless, group studies may provide something like a blueprint of the pattern of neural activity associated with deception. If so, a neuroscientist could scan an individual subject and then compare his pattern of brain activity against the averaged results from a group of subjects. If the individual’s results were sufficiently similar to that of the group, one could reasonably infer whether he was lying or telling the truth.

One study that used the group analysis method also employed a modified version of the GKT. Investigators began by collecting group data. They then developed a model that could analyze individual data and indicate whether a single person was being truthful or deceitful based on the

9. See David T. Lykken, *Why (Some) Americans Believe in the Lie Detector While Others Believe in the Guilty Knowledge Test*, 26 INTEGR. PHYSIOL. BEHAV. SCI. 214 (1991).

10. Langleben et al., *supra* note 6, at 729.

11. *Id.*

12. *Id.* at 730.

patterns of activation present in the group data. Researchers found that the model was able to classify seventy-eight percent of responses accurately.¹³

B. Shortcomings of Current Research

One of the biggest challenges facing fMRI deception research is the need for experimental designs that are ecologically valid (i.e., study designs that approximate real-world scenarios). Several researchers have attempted to improve upon the ecological validity of previous work by having participants engage in mock crimes. For example, in one experiment, “subjects were taken to a specific room and instructed to ‘steal’ either a watch or a ring located in a drawer . . . and place the ‘stolen’ object in a locker along with their other belongings.”¹⁴ Participants were then scanned while responding to visually presented questions. The participants were instructed to deny taking either object but to answer neutral and control questions as honestly and accurately as possible. To motivate participants to do their best, the researchers informed them that they would receive an additional fifty dollars if the fMRI investigator could not decipher when they were lying.

An initial group of subjects was scanned and their data was used to develop analysis methods for determining when a response was a lie. These methods were then applied to a second group of participants to identify when they were lying. The investigators were quite successful in differentiating truthful responses from lies. In ninety percent of the cases, the researchers correctly identified the stolen object.¹⁵

Further attesting to the ecological validity of this experiment is the fact that, in a post-experiment survey, eighty percent of the participants stated “that they believed that they were participating in a crime.”¹⁶ Additionally, many of the participants performed countermeasures in an effort to trick the fMRI. Such actions included “pretending they did not take the object, imagining a specific place, altering breathing, or delaying response.”¹⁷ Notably, none of these countermeasures reduced the ability of the investigators to correctly determine the stolen object.¹⁸ These results suggest that fMRI

13. Daniel D. Langleben et al., *Telling Truth from Lie in Individual Subjects with Fast Event-Related fMRI*, 26 HUM. BRAIN MAPPING 262, 267 (2005).

14. F. Andrew Kozel et al., *Detecting Deception Using Functional Magnetic Resonance*, 58 BIOL. PSYCHIATRY 605, 606 (2005).

15. *Id.* at 610. Given this study’s high accuracy rate, it is worth noting that it was largely funded by Cephus, one of the leading companies in developing a commercially available fMRI test for lie detection. *Id.* at 612.

16. *Id.* at 611.

17. *Id.* at 611–12.

18. *Id.*

lie detection could be successful against even those criminal defendants who have strong incentives to fool the machine.

There have been several other attempts to develop ecologically valid deception scenarios. In one recent study, the researchers adapted the standard GKT to the “real life” scenario of lying on a resume.¹⁹ The experiment involved a single subject, JG, who was asked questions about items on his resume.²⁰ Three of the questions could be independently verified (KNOWN), and three could not be verified (UNKNOWN). The experiment was structured such that JG had an incentive to lie on all UNKNOWN items, and a post-study debriefing confirmed that he had, in fact, lied when answering questions about those items.

The research team had originally hypothesized that the pattern of brain activation during the lie responses would be similar to that observed in other studies. This hypothesis turned out to be correct for some of the questions. Specifically, JG’s responses to two of the UNKNOWN questions could be categorized as lies because they revealed patterns of brain activation normally associated with deception.²¹ However, for the third UNKNOWN question, the experimenters were not able to classify the subject’s answer as a lie because it did not follow the typical prefronto-parietal pattern.²² These results are particularly interesting because the pattern of brain activity associated with the subject’s third answer involved regions of the brain that had not previously been implicated in deception.²³

Although almost every preceding fMRI deception study has reported fronto-parietal activation, this study indicates that brain activation of that kind is not a necessary consequence of deception. Although this is only one finding in one study, it should encourage us to remain cautious when making any claims about the neural correlates of deception. It is very clear from existing studies that not all individuals have the same pattern of neural activity when engaging in deception.

Clearly, one of the biggest challenges facing fMRI deception researchers is creating experimental designs that are ecologically valid. Even though several studies have used experimental designs that better approximate real-life situations, fundamentally, all of these studies involve highly contrived scenarios.

Unfortunately, designing a truly ecologically valid study is virtually impossible. Because all studies involving human subjects must comport

19. J.G. Hakun et al., *Towards Clinical Trials of Lie Detection with fMRI*, 4 SOC. NEUROSCIENCE 518, 519 (2009).

20. *Id.* at 520–21.

21. *Id.* at 522.

22. *Id.*

23. *Id.* at 522–24.

with strict ethical standards, there are clear limitations on the extent to which experimenters can manipulate participants. In each of the fMRI studies discussed above, all of the participants were aware that their deceptive acts were sanctioned and were taking place within an experimental setting. It would be very difficult, if not impossible, to design an experiment that would address these concerns and still receive approval by a university's institutional review board.

As Nancy Kanwisher cautions, it is possible that these studies are not actually investigating the neural correlates of lying.²⁴ She points out that giving a false response when one has been instructed to do so is not really a lie *per se*. Rather, it is an “instructed falsehood.”²⁵ Therefore, existing studies can only tell us about the brain activation that occurs during an “instructed falsehood.” This is potentially a major problem. As Kanwisher observes, it is entirely possible, if not likely, that the pattern of neural activity of an individual who is genuinely lying will be significantly different than that of an individual who has been *instructed* to lie.²⁶

Another concern about the use of fMRI in the legal setting is scanning-induced stress. In experimental studies, fMRI operators aim to minimize scanning-induced stress.²⁷ In fact, in the previously mentioned Langleben study—the first peer-reviewed GKT study—the research team explicitly states that none of the participants reported symptoms of anxiety before or after the scanning session.²⁸ For obvious reasons, this is unlikely to be the case in a criminal trial where the defendant has been accused of a real crime and is facing real punishment.

A defendant who has submitted to fMRI scanning in the hopes of exoneration is likely to be extremely anxious. As Kanwisher explains, the individual will be anxious—regardless of whether he is guilty—simply because he is a suspect and faces the possibility of severe punishment.²⁹ Although experimental participants may have had a financial incentive to lie, a twenty- or fifty-dollar reward represents a very low stakes situation compared to a trial where the defendant's life may hang in the balance.

Since none of the subjects in any of these studies faced any threat of sanction if their lies were detected, anxiety likely did not affect their neural activity. Therefore, these studies cannot speak to how anxiety may affect

24. Nancy Kanwisher, *The Use of fMRI in Lie Detection: What Has Been Shown and What Has Not*, in USING IMAGING TO IDENTIFY DECEIT: SCIENTIFIC AND ETHICAL QUESTIONS 7, 12–13 (2009).

25. *Id.* at 12.

26. *Id.*

27. This minimization of harm is another requirement imposed by institutional review boards.

28. Langleben et al., *supra* note 6, at 730.

29. Kanwisher, *supra* note 24, at 12.

one's pattern of brain activity. Given the significant differences between experimental scenarios and a criminal trial, we cannot expect that the neural activation pattern of a criminal defendant, who is lying to avoid imprisonment—or possibly capital punishment—will bear a strong resemblance to the neural activation patterns of research subjects who have been instructed to lie.

Another shortcoming of existing research is that all individual-subject studies still indirectly utilize group data. For instance, in the Kozel study discussed above, the researchers began by scanning one group of participants and using their results to identify clusters of significant brain activity that could then be used to classify the responses of individual subjects as either truths or lies. Even when experimenters do not conduct their own group scans, they still rely upon the work of prior group studies. This was the case in the resume-deception study, for example.³⁰

Even though these single-subject studies boast high degrees of accuracy, their methodologies are not sufficiently advanced for use in the legal setting. This is true for two reasons. First, the number of subjects in both studies is relatively small ($n=26$ in the 2005 Langleben study and $n=31$ in the Kozel study). From a research perspective, the sample size in these studies is large enough to provide insight into which brain regions tend to be active during deception and to use those findings to predict whether another experimental subject is being truthful. However, from a legal perspective, it would be unethical to conclude that a particular defendant is lying simply because his pattern of neural activity is similar to that of a few dozen experimental subjects.

Second, the participants in each of these studies tend to be extremely homogenous. In the 2005 Langleben study, all of the participants were right-handed, healthy, male undergraduate students.³¹ The Kozel study was a bit more diverse, but not by much. That sample group consisted of healthy, unmedicated adults between the ages of eighteen and fifty.³² In addition, all of the participants were screened prior to scanning for psychiatric illness and deemed neurologically normal.³³ Given that more than half of all inmates have a mental illness,³⁴ this is an especially worrisome gap.

Taken together, existing research suggests that important progress is being made with respect to understanding the patterns of brain activation

30. Kozel et al., *supra* note 14, at 608.

31. Langleben et al., *supra* note 13, at 263.

32. Kozel et al., *supra* note 14, at 606.

33. It is likely that an individual with a psychiatric disorder such as psychopathy or schizophrenia would produce a very different pattern of neural activity when engaging in deception.

34. DORIS L. JAMES & LAUREN E. GLAZE, BUREAU OF JUSTICE STATISTICS SPECIAL REPORT: MENTAL HEALTH PROBLEMS OF PRISON AND JAIL INMATES 1 (2006), <http://www.bjs.gov/content/pub/pdf/mhppji.pdf>.

associated with deception, as well as predicting when an individual subject is lying. However, given the many weaknesses of this experimental work, it is clear that fMRI lie detection is not yet ready for use in the courtroom.

Despite these problems, we should not ignore the legal implications of neuro lie detection. The rapid progress made in recent years indicates that the legal admissibility of this technology will likely be a live issue in the near future. Indeed, neuro lie detection is already being used in other criminal justice systems. For instance, the Indian government has used the technology to investigate more than 150 suspects.³⁵ Most notably, in a 2008 case in Mumbai, a judge relied almost exclusively on neuro lie detection results when he sentenced a woman to life in prison for murdering her former fiancé.³⁶ The fact that neuro lie detection has already been used to convict people of murder indicates that we should take the constitutional issues surrounding this technology seriously.

II. THE CURRENT DEBATE: SELF-INCRIMINATION

The Fifth Amendment of the U.S. Constitution states that “[n]o person . . . shall be compelled in any criminal case to be a witness against himself.”³⁷ The Supreme Court has held that, in order for evidence to fall within the scope of the Fifth Amendment privilege, it must be (1) incriminating, (2) testimonial, and (3) compelled.³⁸ Two of these conditions (incrimination and compulsion) are quite easy to identify. In fact, with respect to the current debate, all scholars agree that forcing a criminal defendant to submit to neuro lie detection qualifies as a form of compulsion, the purpose of which is to uncover incriminating evidence. Accordingly, nearly all of the work on this topic has focused on the testimonial criterion. Although the question of whether neuro evidence is physical or testimonial has provoked an interesting debate, we believe the discussion has reached an impasse. Given the Court’s existing jurisprudence, there is no way to determine whether the results of neuro lie detection constitute testimonial evidence and would, therefore, be privileged under the Self-Incrimination Clause.

35. Angela Saini, *The Brain Police: Judging Murder with an MRI*, WIREd, (May 27, 2009) <http://www.wired.co.uk/magazine/archive/2009/06/features/guilty>.

36. Anand Giridharadas, *India’s Novel Use of Brain Scans in Courts Is Debated*, N.Y. TIMES (Sept. 15, 2008), <http://www.nytimes.com/2008/09/15/world/asia/15brainscan.html?pagewanted=all>.

37. U.S. CONST. amend. V.

38. See *Fisher v. United States*, 425 U.S. 391, 408 (1976) (“[T]he Fifth Amendment does not independently proscribe the compelled production of every sort of incriminating evidence but applies only when the accused is compelled to make a *testimonial* communication that is incriminating.”).

The Court first established the physical-testimonial distinction in the landmark decision of *Schmerber v. California*.³⁹ In *Schmerber*, the defendant, Armando Schmerber, was hospitalized after crashing his car. A police officer smelled alcohol on Schmerber's breath and observed other symptoms of drunkenness. At the hospital, the officer placed Schmerber under arrest and, despite the defendant's refusal to consent, directed a physician to take a blood sample. Chemical analysis of the blood indicated intoxication. Over Schmerber's objections, a report of the blood work was admitted into evidence at trial.

The Supreme Court held that the forcible taking of a blood sample from the accused did not violate his Fifth Amendment privilege against self-incrimination because it was not testimonial in nature:

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. Since the blood test evidence, although an incriminating product of compulsion, was neither petitioner's testimony nor evidence relating to some communicative act or writing by the petitioner, it was not inadmissible on privilege grounds.⁴⁰

The Court emphasized that the Fifth Amendment protects the accused from having to "provide the State with evidence of a testimonial or communicative nature"⁴¹ but permits the State to gather physical evidence from the accused.⁴² With this passage, the Court codified the physical-testimonial dichotomy that is still in use today. Despite articulating this distinction, the Court failed to adequately define either "physical" or "testimonial."⁴³

In fact, in the five decades since *Schmerber* was decided, the Court has never laid out a clear test for determining whether evidence is physical or testimonial. Instead, the Justices have opted to proceed in a case-by-case manner—making narrow determinations that solve the case at hand but that

39. 384 U.S. 757 (1966).

40. *Id.* at 765 (footnote omitted).

41. *Id.* at 761.

42. *Id.* "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 or accused the source of 'real or physical evidence' does not violate it." *Id.* at 764.

43. *Id.* at 764 (discussing the physical-testimonial divide, the Court observed that "both federal and state courts have usually held that it offers no protection against compulsion to submit to fingerprinting, photographing, or measurements, to write or speak for identification, to appear in court, to stand, to assume a stance, to walk, or to make a particular gesture").

provide only minimal guidance for future issues.⁴⁴ This incremental approach has left gaps in the case law that have led scholars to debate the precise meaning of the terms.

In many circumstances, it is not clear whether evidence is “testimonial” or “physical.” Neuro lie detection evidence is particularly ambiguous and may be the most difficult case yet. The nature of the technology presents novel challenges to the physical-testimonial divide, straddling the line in a way that no other type of evidence ever has. Is a device that detects blood flow within a person’s brain extracting physical or testimonial evidence from the individual? Is tracking blood flow patterns in a person’s brain meaningfully different than extracting blood from his arm? Is it relevant that the blood flow patterns reveal information that could previously be acquired only by interrogating the accused? Scholars have examined these sorts of questions at length in an effort to draw analogies between neuro lie detection and more traditional forms of evidence.⁴⁵

Unfortunately, this debate has played out to a draw. Both sides—those who believe neuro lie detection evidence is physical and those who believe it is testimonial—have advanced compelling arguments that are equally supported by existing doctrine. At this point, there is a gap in the case law that only the courts can patch. To see why, consider polygraph tests—the closest analogue to neuro lie detection.

A standard polygraph test measures and records physiological indicators of stress, including blood pressure, pulse, respiration, and skin conductivity, while an individual responds to a series of questions. The basic principle of polygraph testing is that deceptive answers will yield heightened physiological responses compared to non-deceptive answers. These physiological responses can then be used to determine whether a defendant is telling the truth or knows facts about a crime that he is unwilling to reveal.

One might be inclined to think that a person’s physiological responses are just as physical as his blood. After all, when a suspect’s blood is extracted it is analyzed and used to infer his guilt or innocence, in much the same way that his physiological responses could be used to make judgments about his involvement in a crime.

Although the Court has never ruled on whether compelling a criminal defendant to submit to a polygraph test would violate the Fifth Amendment,

44. *See, e.g.*, *United States v. Mara*, 410 U.S. 19, 22 (1973) (holding that handwriting exemplars are physical evidence); *United States v. Dionisio*, 410 U.S. 1, 5-6 (1973) (holding that voice exemplars are physical evidence); *United States v. Wade*, 388 U.S. 218, 222 (1967) (holding that it is constitutional to compel a suspect to stand in a lineup because that evidence is physical in nature).

45. *See generally* MICHAEL S. PARDO & DENNIS PATTERSON, *MINDS, BRAINS, AND LAW: THE CONCEPTUAL FOUNDATIONS OF LAW AND NEUROSCIENCE* 161-75 (2013); Nita Farahany, *Incriminating Thoughts*, 64 *STAN. L. REV.* 351, 366-400 (2012).

it has addressed the matter in dicta. Most notably, in *Schmerber*, the Court recognized that the results of polygraph testing straddle the physical-testimonial divide:

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.⁴⁶

In this passage, the Court indicates that, even though physiological responses are physical in nature, the results of polygraph testing qualify as testimonial because they are designed to “elicit[] responses which are essentially testimonial.”

At first glance, the Court seems to have solved the neuro lie detection question. After all, like polygraph tests, neuro lie detection uses physiological changes to determine an individual’s guilt or innocence. However, the analogy breaks down when one considers that the Supreme Court has held that testimonial evidence requires a communicative act on the part of the person seeking to assert the privilege. As the Court wrote in *Schmerber*:

[T]he Fifth Amendment relates only to acts on the part of the person to whom the privilege applies, and we use [the] words [testimonial and communicative] subject to the same limitations. A nod or head-shake is as much a “testimonial” or “communicative” act in this sense as are spoken words. But the terms as we use them do not apply to evidence of acts noncommunicative in nature as to the person asserting the privilege⁴⁷

This footnote shows that the Court is not concerned with whether evidence itself communicates information to the jury. Indeed, if all evidence that communicated information to jurors were barred, then no evidence would ever be admissible. Rather, only communicative “acts on the part of the person to whom the privilege applies” fall within the scope of the Fifth Amendment privilege. In other words, an individual cannot invoke the privilege against self-incrimination when a noncommunicative act produces evidence that in turn communicates facts to the jury. For example, submitting to a blood test constitutes a noncommunicative act because “[p]etitioner’s testimonial capacities were in no way implicated; indeed, his participation, except as a donor, was irrelevant to the results of the test,

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

47. *Id.* at 761 n.5 (emphasis added).

which depend on chemical analysis and on that alone.”⁴⁸ By contrast, nodding one’s head or making a verbal statement constitutes a communicative act that requires participation.

So, how does this passage from *Schmerber* inform the Court’s earlier statement regarding polygraph examinations? Well, it tells us that the results of polygraph exams are privileged because they can only be obtained through a communicative act by the defendant. Indeed, looked at in this light, it immediately becomes clear why polygraph tests must be privileged. A compelled polygraph test automatically violates a suspect’s Fifth Amendment privilege because it requires the suspect to provide verbal responses, which are then analyzed alongside his physiological responses to draw inferences about the truthfulness of his statements. The defendant’s verbal responses are communicative acts even though non-voluntary physiological evidence is being used to verify the truthfulness of the statements.

Neuro lie detection operates differently than a standard polygraph. Although some forms of neuro lie detection utilize the defendant’s responses, many others do not. Therefore, if the Court adheres to the reasoning in *Schmerber*, it will be forced to conclude that certain forms of neuro lie detection are constitutional whereas others are not. To see where the dividing line falls, consider functional magnetic resonance imaging. Each of the fMRI studies discussed earlier required the subject to perform a communicative act (normally pressing a button). Under *Schmerber*, these uses of fMRI would be testimonial and, therefore, protected. Other neuro lie detection techniques, however, do not require any communicative act on the part of the defendant. There are even some neuro lie detection designs, such as Brain Fingerprinting, where the subject never becomes consciously aware of the stimulus and, therefore, cannot possibly engage in a communicative act.

Brain Fingerprinting seeks to determine whether information about a particular event is stored in an individual’s brain.⁴⁹ This technique involves attaching electrodes to an individual’s head to record brain activity. The person is then shown a series of words or images on a computer screen. Each visual stimulus appears for only a fraction of a second. Some of the stimuli concern details of the crime that only the perpetrator (and those involved in the investigation) could know. The images or words that are relevant to the particular crime are called “probes.” The electrodes detect brainwaves known as “event-related potentials” or ERPs, which measure the electrical activity of many neurons in response to a particular stimulus.

When a word or image holds special significance to an individual, neural activity generates a blip in the ERP signal called the “P300” because it

48. *Id.* at 765.

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

occurs approximately 300 milliseconds after exposure to a stimulus. For example, if the suspect stabbed his victim to death, an image of a knife would elicit a P300, whereas an image of a baseball bat would not. Thus, a suspect's neurological response to the probes may indicate that his brain recognizes stimuli associated with the crime, even if he explicitly disavows having knowledge of what happened. Insofar as Brain Fingerprinting can be accomplished without requiring any form of communicative act on the part of the suspect, it would be constitutionally permissible under *Schmerber*.

Although supported by Court doctrine, the conclusion that some forms of neuro lie detection are permissible when others are not is nonsensical. It is this realization that has led some scholars to categorize all forms of neuro evidence as either completely physical or completely testimonial. Henry Greely and Anthony Wagner—scholars who fall in the physical camp—go so far as to say that, “[a]n fMRI scan is nothing more than a computer record of radio waves emitted by molecules in the brain. It does not seem like ‘testimony.’”⁵⁰

If one follows this analysis to its natural conclusion, then one must accept that even when the defendant is compelled to produce a response, the results of the neuro lie detection test would not be testimonial because the suspect's response is not being used for its testimonial content. Although the suspect does engage in a communicative act when he answers “yes” or “no” or presses a button in response to the examiner's questions, the evidence that is used to determine guilt or innocence—namely the computerized blood flow patterns—is spontaneous and unrelated to any sort of communicative act.

By this analysis, any evidence acquired through neuro lie detection would be permissible because it is nothing more than a digital record of brain activity.⁵¹ Although there are reasonable arguments for the view that neuro lie detection evidence is physical, these interpretations are unnecessarily reductive and miss the inherent testimonial nature of the evidence. On a technical level, it is true that investigators are only analyzing changes in blood flow patterns. However, unlike blood or DNA analysis, neuro lie

50. Henry T. Greely & Anthony D. Wagner, *Reference Guide on Neuroscience*, in FED. JUDICIAL CTR., REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 747, 791 (3d ed. 2011).

51. See Benjamin Holley, *It's All In Your Head: Neurotechnological Lie Detection and the Fourth and Fifth Amendments*, 28 DEV. MENTAL HEALTH L. 1, 15–22 (2009) (arguing that evidence acquired through neurotechnological lie detection or NTLD is physical because it “does not read thoughts, but merely manifestations of thoughts, which are recorded as electrical waves or oxygenated blood patterns” or “require a volitional act”); Aaron J. Hurd, *Reaching Past Fingertips with Forensic Neuroimaging—Non-“Testimonial” Evidence Exceeding the Fifth Amendment's Grasp*, 58 LOY. L. REV. 213, 221–47 (2012) (arguing that neuroimaging evidence is physical because the procedure used to acquire the evidence does not require a deliberate response on the part of the defendant).

detection is aimed at analyzing a suspect's mental content. Surely information that has been forcibly extracted from a person's mind is "directed to eliciting responses which are essentially testimonial."⁵² Furthermore, treating all neuro evidence as physical is untenable because it would strip too much protection from the Fifth Amendment. Indeed, categorizing neuro evidence in this manner would essentially obliterate the Self-Incrimination Clause. After all, where is the benefit in the right to refuse to take the stand if the government can simply force you to answer all of its questions via a neuro lie detection test?

So far, we have presented two solutions to the physical-testimonial conundrum. The first is a hybrid option that treats some forms of neuro evidence as physical and other forms as testimonial. The second treats all forms of neuro evidence as physical. Both solutions present reasonable arguments; however, they both lead to untenable conclusions. If neither the hybrid option nor the solely physical option is supportable, then only one possibility remains: all forms of neuro lie detection evidence are testimonial and, therefore, protected under the Fifth Amendment. In the remainder of this Section, we examine this possibility and ultimately conclude that this solution, too, suffers from serious defects.

Michael Pardo has developed the most comprehensive argument that evidence acquired through neuro lie detection is testimonial.⁵³ He maintains that testimony is "any evidence that requires reliance by the fact-finder on the epistemic authority of the defendant."⁵⁴ As Pardo explains, in providing testimony, "speakers typically assert some proposition while (1) intending the assertion to make an evidentiary contribution to the audience, and (2) believing the assertion is relevant to a matter that is in dispute for the audience or for which the audience is otherwise in need [of] evidence."⁵⁵ Towards the end of his article, Pardo addresses lie detectors. He argues that the results of polygraphs and other lie-detection tests are fundamentally testimonial because they are just "inductive evidence of the defendant's epistemic state."⁵⁶ As he explains, the evidence gleaned through

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

53. See PARDO & PATTERSON, *supra* note 45, at 161–75; Michael S. Pardo, *Neuroscience Evidence, Legal Culture, and Criminal Procedure*, 33 AM. J. CRIM. L. 301 (2006) [hereinafter Pardo, *Neuroscience Evidence*]; Michael S. Pardo, *Self-Incrimination and the Epistemology of Testimony*, 30 CARDOZO L. REV. 1023 (2008) [hereinafter Pardo, *Self-Incrimination*]; see also 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) (arguing that Brain Fingerprinting "elicits testimonial psychological responses that force a suspect to reveal the contents of his mind and involuntarily disclose incriminating information to the government in violation of the Fifth Amendment").

54. Pardo, *Self-Incrimination*, *supra* note 53, at 1025.

55. *Id.* at 1036.

56. *Id.* at 1046.

a lie-detection test tells us either “(1) that we can or cannot rely on the assertions made by the defendant and for which he has represented himself to be an authority, or (2) what propositions the defendant would assume authority for and would invite reliance upon, were he to testify truthfully.”⁵⁷ By contrast, extracted blood cannot be used to infer the mental state of the accused. Blood analysis can only provide information that is independent of the individual’s mental state, such as whether he was intoxicated or whether his DNA matches that found on the murder weapon. This information can in turn be used to determine whether the accused was driving while intoxicated or whether he committed the murder. Blood analysis does not reveal anything about the suspect’s knowledge of a crime.

In another paper, Pardo develops a theory of the scope of the Fifth Amendment privilege that specifically considers evidence acquired through neuroscience technologies. He argues that “the government may not compel for use as evidence the content of a suspect’s propositional attitudes” when these include “mental states such as beliefs, thoughts, doubts, hopes, wishes, desires, knowledge, and so on, toward propositions.”⁵⁸

Under Pardo’s definition of testimony, neuro lie detection evidence is testimonial. Even when a suspect is not required to communicate during the exam, the suspect’s neural activity would enable the fact-finder to determine which propositions the suspect would assume authority for if he were to testify truthfully. For example, if a particular image generates the telltale neurological blip, the fact-finder can infer that the suspect would assume authority for a proposition to the effect of “I recognize that individual’s face.” In this way, the fact-finder effectively relies on the suspect’s epistemic authority. Although Pardo recognizes that testimony is usually accompanied by a communicative act, he does not think that such an act is necessary for evidence to count as testimony. Rather, evidence is testimonial whenever it provides an inductive link to an individual’s epistemic state.

We believe that Pardo has mounted the best defense possible for classifying neuro evidence as testimonial. We even believe that he endorses the optimal policy conclusion—the Fifth Amendment should protect against any form of compelled neuro lie detection. The problem is that Pardo’s position is difficult to square with existing case law. The Court has long emphasized that testimony necessarily involves an act on the part of the indi-

57. *Id.*

58. Pardo, *Neuroscience Evidence*, *supra* note 53, at 330. Further elaborating on the extent of the privilege, Pardo maintains that “the privilege would not preclude compelled tests when used for any purpose other than those that rely on incriminating propositional content. For example, if the tests could be used to determine mental capacity, intent, bias, voluntariness, etc., without relying on incriminating propositional content, then the privilege would not preclude such uses.” *Id.* at 332 n.205.

vidual asserting his Fifth Amendment privilege.⁵⁹ In light of these emerging technologies, the Court may need to reconsider this condition. Until it does, Pardo's account cannot find firm support in Supreme Court precedent.

As we have already discussed, the connection between testimony and communicative action dates back to *Schmerber*. One line from that opinion bears repeating: "the Fifth Amendment relates only to acts on the part of the person to whom the privilege applies." This stipulation has played an important role in several more recent cases.

In the 1981 decision *Estelle v. Smith*,⁶⁰ the Court ordered an in-custody psychiatric examination of the defendant to determine whether he was competent to stand trial. During a capital-sentencing proceeding, the examining doctor testified that the defendant was "a very severe sociopath" who would "continue his previous behavior" and that his condition would "only get worse."⁶¹ The doctor further emphasized that the defendant had "no remorse or sorrow" for his actions.⁶² The question before the Court was whether admission of the psychiatrist's damaging testimony violated the defendant's Fifth Amendment privilege against self-incrimination because the defendant was not apprised of his *Miranda* rights prior to the exam. In delineating the scope of the Fifth Amendment privilege, the Court explained that an individual's right is not violated so long as "the evidence given by a defendant is neither related to some communicative act nor used for the testimonial content of what was said."⁶³

At first, this line seems to suggest that evidence constitutes testimony if it meets one of two distinct conditions: (1) it is related to some "communicative act" or (2) it is used for its "testimonial content." If this was the Court's holding, it would provide strong support for Pardo's account. However, the Court was not drawing a distinction between the two conditions. Rather, it was equating them. Evidence derived from the "testimonial content of what was said" is necessarily evidence that is also "related to some communicative act." In this case, the communicative act is speaking. In other words, the qualifier "testimonial" necessarily implies some sort of act on the part of an individual.

Specifically, in *Estelle*, the Court ruled that admission of the psychiatrist's testimony into evidence violated the defendant's Fifth Amendment privilege on grounds that:

Dr. Grigson's diagnosis, as detailed in his testimony, was not based simply on his observation of respondent. Rather, Dr.

59. See Farahany, *supra* note 45, at 389-90.

60. 451 U.S. 454 (1981).

61. *Id.* at 459.

62. *Id.* at 460.

63. *Id.* at 463.

Grigson drew his conclusions largely from respondent's account of the crime during their interview, and he placed particular emphasis on what he considered to be respondent's lack of remorse. Dr. Grigson's prognosis as to future dangerousness rested on statements respondent made, and remarks he omitted, in reciting the details of the crime. The Fifth Amendment privilege, therefore, is directly involved here because the State used as evidence against respondent the substance of his disclosures during the pre-trial psychiatric examination.⁶⁴

The necessary link between testimonial content and communicative action is further enforced by subsequent cases. Nine years after *Estelle*, in *Pennsylvania v. Muniz*,⁶⁵ the Court was asked to decide which, if any, of a defendant's incriminating utterances and actions were testimonial.⁶⁶ The case concerned an individual, Muniz, who was pulled over for suspected drunk driving and was asked to perform three field sobriety tests. Muniz performed these tests poorly and made incriminating remarks during the process.⁶⁷ He was arrested for driving under the influence of alcohol and taken to the police station for booking. The defendant was not apprised of his *Miranda* rights during the arrest or at the booking station. However, he was informed that he would be videotaped and audio-recorded.

Police asked the defendant a number of identifying questions, such as his name, address, height, and age. Although he answered all of the questions, he stumbled over his address and age. The questioning officer then asked the defendant "Do you know what the date was of your sixth birthday?" After the defendant gave an inaudible answer, the officer again asked, "When you turned six years old, do you remember what the date was?" The defendant responded that he did not know.⁶⁸

As the Court explained, "Muniz's answer to the sixth birthday question was incriminating, not just because of his delivery, but also because of his answer's *content*; the trier of fact could infer from Muniz's answer (i.e., that he did not *know* the proper date) that his mental state was confused."⁶⁹ While the State argued that the inference only concerned the physiological functioning of the defendant's brain, which is as much "real" or "physical" evidence as blood, the Court held that the State's interpretation of the inference "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

64. *Id.* at 464–65 (footnotes and citation omitted).

65. 496 U.S. 582 (1990).

66. *Id.* at 587.

67. *Id.* at 585.

68. *Id.* at 586.

69. *Id.* at 592.

way in which the inference is incriminating.”⁷⁰ Instead, the Court determined that the right question to be asking in this case “is whether the incriminating inference of mental confusion is drawn from a testimonial act or from physical evidence.”⁷¹

The Court’s phrase “testimonial act” clearly indicates that, for Fifth Amendment purposes, only actions can be testimonial. While an act on the part of the individual asserting his Fifth Amendment privilege may be a necessary component of testimony, it is not sufficient. Relying upon *Doe v. United States*,⁷² the Court maintained that “[u]nless some attempt is made to secure a communication—written, oral or otherwise—upon which reliance is to be placed as involving [the accused’s] consciousness of the facts and the operations of his mind in expressing it, the demand made upon him is not a testimonial one.”⁷³ In other words, “in order to be testimonial, an accused’s communication must itself, explicitly or implicitly, relate a factual assertion or disclose information.”⁷⁴

From *Muniz*, it is clear that the Court has a two-prong standard for determining when evidence is testimonial. First, the evidence must be revealed through an act, which might be verbal, written, or physical (e.g., a head nod), on the part of the individual asserting the privilege. Second, the act must be communicative, meaning it must relate a factual assertion or disclose information.

There is a line of cases, known as the Act of Production Cases, that further demonstrate that the Court considers the type of act taken by the defendant to be the defining feature of testimony. In *Fisher v. United States*,⁷⁵ the Court addressed the question of whether compelling the production of tax documents that had been prepared by taxpayers’ accountants and transferred to the taxpayers’ attorneys violated the taxpayers’ Fifth Amendment privilege.⁷⁶ The Court ruled that the Fifth Amendment privilege could not be invoked.⁷⁷ The Justices reasoned that the Fifth Amendment only protects an individual from being compelled to be a witness against himself and that the taxpayers “retained any privilege they ever had not to be compelled to testify against themselves and not to be compelled themselves to produce private papers in their possession.”⁷⁸

70. *Id.* at 593.

71. *Id.*

72. 487 U.S. 201 (1988).

73. *Muniz*, 496 U.S. at 594–95 (quoting *Doe*, 487 U.S. at 210–11).

74. *Id.* at 594 (quoting *Doe*, 487 U.S. at 210).

75. 425 U.S. 391 (1976).

76. *Id.* at 398.

77. *Id.* at 399.

78. *Id.* at 398.

The *Fisher* Court distinguished between the contents of the documents in question and the act of producing those documents. Quoting *Johnson v. United States*, the Court explained, “[a] party is privileged from producing evidence but not from its production.”⁷⁹ With respect to the contents of the documents, the Court acknowledged that while a subpoena requiring a taxpayer to produce an accountant’s documents certainly involves compulsion, “it does not compel oral testimony; nor would it ordinarily compel the taxpayer to restate, repeat, or affirm the truth of the contents of the documents sought.”⁸⁰ However, the Court acknowledged that “[t]he act of producing evidence in response to a subpoena nevertheless has communicative aspects of its own, wholly aside from the contents of the papers produced” because “[c]ompliance with the subpoena tacitly concedes the existence of the papers demanded and their possession or control by the taxpayer” and would further “indicate the taxpayer’s belief that the papers are those described in the subpoena.”⁸¹ Nevertheless, the *Fisher* Court held that the taxpayers could not invoke their Fifth Amendment privilege on the grounds that:

It is doubtful that implicitly admitting the existence and possession of the papers rises to the level of testimony within the protection of the Fifth Amendment. The papers belong to the accountant, were prepared by him, and are the kind usually prepared by an accountant working on the tax returns of his client. Surely the Government is in no way relying on the “truthtelling” of the taxpayer to prove the existence of or his access to the documents. The existence and location of the papers are a foregone conclusion and the taxpayer adds little or nothing to the sum total of the Government’s information by conceding that he in fact has the papers.⁸²

A few months after *Fisher*, the Court decided *Andresen v. Maryland*.⁸³ The central question addressed in this case was whether a person’s Fifth Amendment privilege is violated by the introduction into evidence of business records seized during a search of his offices.⁸⁴ As in *Fisher*, the Court emphasized the minimal role of the accused in furnishing and authenticating the documents desired by the State. The government’s search for, seizure of, and admission of the documents into evidence did not violate petitioner’s Fifth Amendment privilege.⁸⁵ Echoing *Fisher*, the Court reasoned

79. *Id.* at 399 (quoting *Johnson v. United States*, 228 U.S. 457, 458 (1913)).

80. *Id.* at 409.

81. *Id.* at 410.

82. *Id.* at 411 (citation omitted).

83. 427 U.S. 463 (1976).

84. *Id.* at 465.

85. *Id.* at 473.

that the evidence was not testimonial because the “petitioner was not asked to say or to do anything.”⁸⁶ As the Court explained:

The records seized contained statements that petitioner had voluntarily committed to writing. The search for and seizure of these records were conducted by law enforcement personnel. Finally, when these records were introduced at trial, they were authenticated by a handwriting expert, not by petitioner. Any compulsion of petitioner to speak, other than the inherent psychological pressure to respond at trial to unfavorable evidence, was not present.⁸⁷

*Doe v. United States*⁸⁸ similarly held that only communicative acts can be testimonial.⁸⁹ In *Doe*, the question before the Court was whether a petitioner’s Fifth Amendment privilege is violated by a court order compelling the petitioner to authorize foreign banks to disclose records of his accounts.⁹⁰ Notably, authorization did not require the petitioner to identify or acknowledge the existence of these accounts.

The petitioner, named as John Doe, was the target of a federal grand jury investigation concerning suspected fraudulent manipulation of oil cargoes and receipt of unreported income. Doe appeared before a grand jury regarding a subpoena that directed him to produce records of transactions in accounts at three named banks in the Cayman Islands and Bermuda. Doe produced some of the bank records and testified that he did not possess or control additional records responsive to the subpoena. When questioned about the existence or location of additional records, Doe invoked the Fifth Amendment privilege against self-incrimination. The Court held that the petitioner could be compelled to sign the consent directive authorizing foreign banks to disclose his records because it “is not testimonial in nature.”⁹¹ The Court explained that “in order to be testimonial, an accused’s communication must itself, explicitly or implicitly, relate a factual assertion or disclose information.”⁹² The Court concluded that signing a consent directive does not have testimonial significance because “neither the form, nor its execution, communicates any factual assertions, implicit or explicit, or conveys any information to the Government.”⁹³

There is a common theme running through the Act of Production Cases: an individual cannot assert his Fifth Amendment privilege unless the

86. *Id.*

87. *Id.*

88. 487 U.S. 201 (1988).

89. *Id.*

90. *Id.* at 202.

91. *Id.* at 219.

92. *Id.* at 210.

93. *Id.* at 215.

production of incriminating documents involves an act on the part of the accused that either (1) relates a factual assertion or (2) discloses information about the suspect's knowledge of the documents. The following two cases further illuminate the importance of these two factors in the Court's analysis. They provide examples of times the Court did rule that an act of producing documents, but not the content of the documents, had testimonial significance.

In *United States v. Doe* (not to be confused with the case *Doe v. United States* discussed earlier), the Court was asked to rule on whether the compelled production of business documents owned by, and in the possession of, the respondent was a violation of the defendant's Fifth Amendment privilege.⁹⁴ The Court held that, although the contents of the subpoenaed documents were not privileged under the Fifth Amendment, the act of producing the documents was testimonial in nature and was therefore within the scope of the Fifth Amendment privilege.⁹⁵ The Court's reasoning was that "the act of producing the documents would involve testimonial self-incrimination."⁹⁶

More recently, in *United States v. Hubbell*,⁹⁷ the Court considered whether compelling the defendant, Hubbell, to disclose the existence of incriminating documents violated his Fifth Amendment privilege when the government was unable to demonstrate with "reasonable particularity" a prior awareness either that the documents requested in the subpoena existed or that they were in the defendant's possession.⁹⁸ Echoing its ruling in *Fisher*, the Court maintained that the element of compelled testimony "is not to be found in the contents of the documents produced in response to the subpoena."⁹⁹ However, unlike in *Fisher*, the Court here determined that "the act of producing those documents" was testimonial.¹⁰⁰ The Justices emphasized the prosecutor's reliance on the "respondent's assistance both to identify potential sources of information and to produce those sources."¹⁰¹

In *Fisher*, the government "already knew that the documents were in the attorneys' possession and could independently confirm their existence and authenticity through the accountants who created them."¹⁰² By contrast, in *Hubbell*, the government was not able to demonstrate "that it had

94. *United States v. Doe*, 465 U.S. 605, 606–07 (1984).

95. *Id.* at 617.

96. *Id.* at 613.

97. 530 U.S. 27 (2000).

98. *Id.* at 29–30.

99. *Id.* at 40.

100. *Id.*

101. *Id.* at 41, 45.

102. *Id.* at 44–45.

any prior knowledge of either the existence or the whereabouts of the 13,120 pages of documents ultimately produced by respondent.”¹⁰³ Additionally, the Court emphasized the substantial mental effort that the government forced the defendant to undertake. According to the Court, forcing the defendant to produce the subpoenaed documents was equivalent to forcing him to answer a series of detailed interrogatories about those documents.¹⁰⁴ For this reason, the Court concluded that the defendant’s act of production was testimonial and, therefore, constitutionally protected.¹⁰⁵ *Hubbell* caps off a long line of cases that show that testimonial content cannot exist without a communicative act. This requirement precludes the third and final possibility regarding neuro lie detection’s place within the physical-testimonial dichotomy.

Like the hybrid option, which treats some types of neuro evidence as physical and other types as testimonial, and the physical option, which treats all forms of neuro evidence as physical, treating all types of neuro evidence as testimonial also fails. Because not all neuro lie detection tests require a communicative act on the part of the defendant, classifying all of them as testimonial would be inconsistent with Supreme Court doctrine. Given the Court’s current jurisprudence, neuro lie detection remains unclassifiable. At present, the physical-testimonial division simply cannot accommodate neuro lie detection technologies.

Although the Fifth Amendment debate is currently at an impasse, the broader question of whether it is constitutional for the government to compel a person to submit to a neuro lie detection test does have an answer. In Part III, we make progress on this issue by shifting the focus to the Fourth Amendment. Specifically, we argue that the Fourth Amendment prohibits the compelled use of neuro lie detection because it unconstitutionally violates a person’s mental privacy and the associated right to human dignity.

III. MENTAL PRIVACY AND HUMAN DIGNITY

Imagine the following scenario: The defense calls a key eyewitness to the stand. During questioning, the witness testifies that the criminal looked nothing like the defendant and, therefore, the defendant could not possibly

103. *Id.*

104. *Id.* at 41–42 (holding that asking the defendant to produce the subpoenaed documents was “tantamount to answering a series of interrogatories asking a witness to disclose the existence and location of particular documents fitting certain broad descriptions” or “the functional equivalent of the preparation of an answer to either a detailed written interrogatory or a series of oral questions at a discovery disposition”).

105. *Id.* at 43 (holding that, since “[i]t was unquestionably necessary for respondent to make extensive use of ‘the contents of his own mind’ in identifying the hundreds of documents responsive to the requests in the subpoena,” *Hubbell*’s act of production is testimonial (quoting *Curcio v. United States*, 354 U.S. 118, 128 (1957))).

have committed the crime. The prosecutor cross-examines the witness but is unable to poke holes in her testimony. After concluding the cross examination, the prosecutor moves to compel the witness to take a neuro lie detection test in order to check the truthfulness of her responses. Can the witness assert a constitutional privilege to avoid being forced to submit to the neuro lie detection test?

Unlike criminal defendants, witnesses generally cannot object on Fifth Amendment grounds.¹⁰⁶ Therefore, if they are to avoid being compelled to undergo neuro lie detection tests, they must rely on another constitutional provision for protection. Fortunately, for them, there is a very clear reason that neuro lie detection tests are constitutionally inadmissible, and the reason has nothing to do with the Fifth Amendment's protection against self-incrimination. Rather, it goes to one of the most fundamental constitutional rights: the guarantee of mental privacy and human dignity enshrined in the Fourth Amendment.¹⁰⁷

Our argument advances the debate surrounding the constitutionality of neuro lie detection tests in two key ways. First, it expands the scope of the discussion beyond criminal defendants. Specifically, we focus on witnesses, a group that has previously not been examined in the context of neuro lie detection. This lack of discussion is very peculiar insofar as witnesses play a crucial role in helping judges and jurors uncover the truth. Second, we sidestep the physical-testimonial question that has divided scholars.¹⁰⁸ If the constitutional guarantee of human dignity acts as a shield against compelled neuro lie detection tests for witnesses, then it must also protect criminal defendants who, by virtue of their humanity, also have the right of hu-

106. In the hypothetical, even if that particular witness were involved in the crime and otherwise would have been able to assert her Fifth Amendment right, she waived that right by testifying in court. *See, e.g., Mitchell v. United States*, 526 U.S. 314, 321 (1999) ("The privilege is waived for the matters to which the witness testifies . . .").

107. *See generally* William A. Parent, *Constitutional Values and Human Dignity*, in *THE CONSTITUTION OF RIGHTS: HUMAN DIGNITY AND AMERICAN VALUES* 47 (Michael J. Meyer & William A. Parent eds., 1992).

108. Other scholars have previously discussed neuroscience-based technologies in the context of the Fourth Amendment. However, these researchers have limited their investigation to those times when the technology is used outside of the courtroom and without a warrant. Because our focus is on criminal defendants who are on trial and witnesses who are subpoenaed to appear before the court, we are raising a different issue. *See, e.g., Nita A. Farahany, Searching Secrets*, 160 U. PA. L. REV. 1239, 1274–1303 (2012) (describing four categories of evidence and discussing in what circumstances a warrantless neurotechnology-based search would be constitutional); Holley, *supra* note 51, at 11–13 (arguing that the Fourth Amendment generally protects against the use of neuroscience-based technologies in the absence of a warrant but that the use of such technologies would be permissible in places where warrant requirements are relaxed, such as national borders and airport security checkpoints). *But see, Pardo, Neuroscience Evidence, supra* note 53, at 325 n.163 ("While I understand the intuitions that suggest a probable-cause-plus standard or even an absolute ban [on the extraction of one's mental content], the Supreme Court's precedents suggest that such a step would be unlikely.").

man dignity. By appealing to human dignity, we eliminate the need to categorize neuro evidence as either physical or testimonial.

The phrase “human dignity” appears nowhere in the Constitution. Nonetheless, its influence is felt throughout the entire document.¹⁰⁹ From the First Amendment’s free speech guarantee to the Eighth Amendment’s ban on cruel and unusual punishment, and even to the Fourteenth Amendment’s Equal Protection Clause, the Supreme Court has held that human dignity is a fundamental value that underlies many of the Constitution’s most important protections.¹¹⁰

[The concept of human dignity] supposes that there are ways of treating a man that are inconsistent with recognizing him as a full member of the human community, and holds that such treatment is profoundly unjust.

....

It makes sense to say that a man has a fundamental right against the Government, in the strong sense, like free speech, if that right is necessary to protect his dignity, or his standing as equally entitled to concern and respect, or some other personal value of like consequence. It does not make sense otherwise.¹¹¹

Perhaps nowhere is the manifestation of human dignity more central than in the Fourth Amendment protection against unreasonable searches and seizures.¹¹² Interestingly, *Schmerber* is one of the key Supreme Court cases on the matter. It turns out that scholars were focusing on the right case. They were simply looking at the wrong part of the opinion. The key to resolving the constitutional questions about neuro lie detection is found not in *Schmerber*’s Fifth Amendment discussion, but rather, in its Fourth Amendment analysis.¹¹³

109. See Maxine D. Goodman, *Human Dignity in Supreme Court Constitutional Jurisprudence*, 84 NEB. L. REV. 740, 744–56 (2006) (discussing how the Court has treated human dignity as a core value underlying many constitutional provisions).

110. See *Cohen v. California*, 403 U.S. 15, 24 (1971) (“[N]o other approach [than allowing freedom of expression] would comport with the premise of individual dignity and choice upon which our political system rests.”); *Heart of Atlanta Motel, Inc. v. United States*, 379 U.S. 241, 250 (1964) (relying on the Equal Protection Clause’s guarantee of “personal dignity” to uphold the Civil Rights Act of 1964); *Trop v. Dulles*, 356 U.S. 86, 100 (1958) (“The basic concept underlying the Eighth Amendment is nothing less than the dignity of man.”).

111. *Delaware v. Van Arsdall*, 475 U.S. 673, 697–98 n.9 (1986) (quoting RONALD DWORKIN, *TAKING RIGHTS SERIOUSLY* 198–99 (1977)).

112. See *Winston v. Lee*, 470 U.S. 753, 758 (1985) (“The Fourth Amendment protects ‘expectations of privacy’—the individual’s legitimate expectations that in certain places and at certain times he has ‘the right to be let alone—the most comprehensive of rights and the right most valued by civilized men.’”) (citation omitted).

113. *Schmerber v. California*, 384 U.S. 757, 767–72 (1966).

After concluding that the defendant could not object on Fifth Amendment grounds to having his blood drawn, the *Schmerber* Court took up the question of whether the Fourth Amendment prohibited such governmental action. The Court began by noting that the Fourth Amendment acts as a complement to the Self-Incrimination Clause.¹¹⁴ Even if the evidence is deemed admissible under the Fifth Amendment, the Constitution requires the Court to take the additional step of determining whether the Fourth Amendment nonetheless forbids the gathering of such evidence.¹¹⁵

To start its analysis, the Court observed that “[t]he overriding function of the Fourth Amendment is to protect personal privacy and dignity against unwarranted intrusion by the State.”¹¹⁶ Although all Fourth Amendment cases implicate these values, this is especially true when the search occurs inside a person’s body. As the Court wrote, doctrine involving the search of a person’s exterior has “little applicability with respect to searches involving intrusions beyond the body’s surface. The interests in human dignity and privacy protected by the Fourth Amendment forbid any such intrusions on the mere chance that desired evidence might be obtained.”¹¹⁷

Ultimately, the Court concluded that extracting a person’s blood to determine his blood-alcohol level does not violate his human dignity. The Court reached this decision on the basis that society does not view blood tests as an undue imposition upon a person’s privacy and bodily interests.¹¹⁸

Despite this finding, *Schmerber* reinforced the idea that human dignity concerns weigh heavily in the Fourth Amendment. As the Court concluded:

It bears repeating . . . that we reach this judgment only on the facts of the present record. The integrity of an individual’s person is a cherished value of our society. That we today hold that the Constitution does not forbid the States minor intrusions into an individual’s body under stringently limited conditions in no way indicates that it permits more substantial intrusions, or intrusions under other conditions.¹¹⁹

In *Winston v. Lee*,¹²⁰ the Court again took up this issue.¹²¹ This time, the question was whether the State could force a criminal defendant to un-

114. *Id.* at 768.

115. *See id.*

116. *Id.* at 767. This right is “basic to a free society.” *Id.* (quoting *Wolf v. Colorado*, 338 U.S. 25, 27 (1949)).

117. *Id.* at 769–70. “Because we are dealing with intrusions into the human body rather than with state interferences with property relationships or private papers—‘houses, papers, and effects’—we write on a clean slate.” *Id.* at 767–68.

118. *Id.* at 771 n.13.

119. *Id.* at 772.

120. 470 U.S. 753 (1985).

121. *Id.* at 772.

dergo surgery to remove a bullet from his collarbone.¹²² The Justices reaffirmed *Schmerber* by holding that certain types of intrusions into a person's body are prohibited even though they may produce evidentiary benefits.¹²³ In *Winston*, however, the Court went one step further and helped clarify what types of intrusions are forbidden. Specifically, the Court found that intrusions which severely violate one's "dignitary interests in personal privacy and bodily integrity" are unconstitutional.¹²⁴ Following this reasoning, the Court held that compelling the defendant to submit to the surgery is an unconstitutional intrusion on his privacy interests.¹²⁵

Importantly, the Court noted that the Fourth Amendment does not prohibit all activities that invade a person's privacy. Instead, there are two competing interests that must be weighed against each other.¹²⁶ On the one side lie the individual's dignity interests. On the other side lies society's interest in accurately determining an individual's guilt or innocence.

The Court emphasized that the potential bodily harm to the individual was not the primary basis for the decision.¹²⁷ Rather, the more fundamental harm was the fact that compelled surgery would usurp the individual's own will and substitute it with the will of the State.¹²⁸ Relying upon this balancing test, the Court determined that the evidence that could be gathered from the defendant's surgery did not outweigh the substantial harm to the defendant's human dignity.¹²⁹ Accordingly, the Fourth Amendment barred the State from compelling the defendant to undergo the surgery.

In other situations, where the intrusion is minor, the State's interests can outweigh the defendant's dignity interests. For example, in *Maryland v. King*,¹³⁰ the Court ruled that Maryland could swab a suspect's mouth upon arrest in order to gather a DNA sample that would be used to identify the

121. *Id.*

122. *Id.* at 756.

123. *Id.* at 761.

124. *Id.*

125. *Id.* at 766–67 (observing that "the operation sought will intrude substantially on respondent's protected interests").

126. *Id.* at 762.

127. *See id.* at 763–64 (discussing the uncertainty of the medical risks).

128. *See id.* at 765. When a patient elects to have surgery:

[T]he surgeon is carrying out the patient's own will concerning the patient's body and the patient's right to privacy is therefore preserved. In this case, however . . . the Commonwealth proposes to take control of respondent's body, to 'drug this citizen—not yet convicted of a criminal offense—with narcotics and barbiturates into a state of unconsciousness This kind of surgery involves a virtually total divestment of respondent's ordinary control over surgical probing beneath his skin.

Id. (citation omitted).

129. *Id.* at 766.

130. 133 S. Ct. 1958, 1980 (2013).

suspect.¹³¹ The Court emphasized that such a procedure both fails to offend a person's dignity in a meaningful way¹³² and facilitates an important police interest—namely, determining the identity of the suspect.¹³³

Likewise, in *Skinner v. Railway Labor Executives' Association*,¹³⁴ the Court held that the Federal Railroad Administration could constitutionally require breath, blood, and urine drug tests for railroad employees.¹³⁵ A majority of the Court found that the government's interest in promoting public safety outweighed the privacy intrusions of these drug tests.¹³⁶

Not all of the Justices agreed, however. In a dissent, Justices Marshall and Brennan invoked *Schmerber* to support their view that “[c]ompelling a person to submit to the piercing of his skin by a hypodermic needle so that his blood may be extracted significantly intrudes on the ‘personal privacy and dignity against unwarranted intrusion by the State’ against which the Fourth Amendment protects.”¹³⁷ Of note here is that the point of contention between the majority and the dissent was the degree to which a person's dignity is harmed by compulsory drug testing. Whereas the majority affirmed the regulation because they believed the harm to be slight, the dissent would have voided the regulation on the grounds that the intrusion was substantial.

As these cases show, the Fourth Amendment's protective power shifts according to the extent of the human dignity violation. When the violation is substantial, the Fourth Amendment concern is strong and the search is almost certain to be ruled unconstitutional. But when the violation is minimal, the Fourth Amendment concern is weak and the search is almost certain to be upheld.¹³⁸

We maintain that compelled neuro lie detection is a substantial dignity violation that triggers Fourth Amendment protection. On a purely physical level, neuro lie detection is admittedly less invasive than drawing a person's blood. In both fMRI and EEG lie detection, no physical device intrudes beyond the body's surface. Privacy, however, extends beyond the physical into the mental realm.¹³⁹

131. *Id.*

132. *Id.* at 1979 (noting that swabbing a person's mouth “does not increase the indignity already attendant to normal incidents of arrest”).

133. *Id.* at 1977.

134. 489 U.S. 602, 634 (1989).

135. *Id.*

136. *Id.* at 624 (maintaining that “the privacy interests implicated by the search are minimal”).

137. *Id.* at 644 (quoting *Schmerber v. California*, 384 U.S. 757, 767 (1966)).

138. See, e.g., *United States v. Hensley*, 469 U.S. 221, 223 (1985); *United States v. Brignoni-Ponce*, 422 U.S. 873, 876 (1975); *Terry v. Ohio*, 392 U.S. 1, 8 (1968).

139. See *Winston v. Lee*, 470 U.S. 753, 761 (1985) (dividing an individual's “dignitary interests” into “personal privacy and bodily integrity”).

As the Court observed in *Winston v. Lee*, intrusions that do no harm to the individual's physical person may nonetheless "damage the individual's sense of personal privacy and security" and will, therefore, trigger Fourth Amendment protection.¹⁴⁰ Just as searching a person's house with a thermal-imaging device or eavesdropping upon a person's phone conversations undermines that individual's privacy interests without invading his bodily space,¹⁴¹ so, too, does neuro lie detection infringe upon a person's right to privacy in a non-physical manner.¹⁴²

In neuro lie detection, a person's human dignity is violated because her thoughts and memories are forcibly extracted from her mind. If there is a reasonable expectation of privacy anywhere, then there is surely a reasonable expectation of privacy with respect to the contents of one's mind. Indeed, no place is more private. Forcing an individual to open this domain to others constitutes a much more fundamental privacy violation than any the Court has yet encountered. If we permit the State to intrude upon our thoughts, no domain will be safe from government surveillance.

In any reasonable balancing test, the weight must go in support of preserving mental privacy. Certainly, the government has a substantial interest in accurately determining guilt or innocence, but individuals have a much stronger interest in preserving a private mental sphere, free from governmental intervention. In the Kantian sense, this invasion of mental privacy violates a person's respect and status as a human being by treating him as a mere object to be used to further the State's ends. Specifically, the State is subverting the will of the individual in order to further its own interests. This subversion of will is the very action that was deemed unconstitutional in *Winston*.¹⁴³

As with any constitutional protection, there are tradeoffs. If neuro lie detection is prohibited, judges and jurors will have less information on which to base their findings and conclusions. However, to permit otherwise would be to license the government to invade our mental sphere—the place where we have the highest possible expectation of privacy. This is a concession not worth making. The guarantee of human dignity is simply too fundamental to cast aside.¹⁴⁴

140. *Id.* at 762.

141. *Kyllo v. United States*, 533 U.S. 27, 34–41 (2001); *Katz v. United States*, 389 U.S. 347, 358–59 (1967).

142. *See Payton v. New York*, 445 U.S. 573, 576 (1980); *Katz*, 389 U.S. at 349–50.

143. *See* 470 U.S. at 765.

144. *See Delaware v. Van Arsdall*, 475 U.S. 673, 697–98 n.9 (1986) ("[I]f rights make sense at all, then the invasion of a relatively important right must be a very serious matter. It means treating a man as less than a man, or as less worthy of concern than other men. The institution of rights rests on the conviction that this is a grave injustice, and that it is worth paying the incremen-

IV. CONCLUSION

The science behind neuro lie detection is rapidly advancing. Although it is not yet reliable enough for use in the courtroom, that day is not far off. When that time comes, courts will need to determine whether neuro lie detection evidence is constitutionally admissible. To date, the legal scholarship has focused on whether forcing a criminal defendant to undergo a neuro lie detection test would violate the Fifth Amendment privilege against self-incrimination. We argue that there are two key problems with this analysis.

First, the Supreme Court case law does not provide a clear answer to the question. The current understanding of the physical-testimonial divide is simply incapable of accommodating neuro lie detection. Second, even if the Court ruled that the Fifth Amendment does protect against compelled neuro lie detection, the protection would only apply to criminal defendants. It would not prevent witnesses, jurors, or any other individuals from being forced to submit to neuro lie detection tests. This is problematic because a compelled neuro lie detection test constitutes a substantial privacy violation to all citizens, not just criminal defendants.

In this Paper, we stepped back from the Fifth Amendment discourse and offered an alternative constitutional basis for prohibiting neuro lie detection tests—specifically, the constitutional guarantee of human dignity as manifested in the Fourth Amendment right to privacy. Our argument solves both of the problems endemic to the Fifth Amendment dispute. Specifically, our theory has strong precedential support in Supreme Court case law, and it is universally applicable to all persons, not just criminal defendants.

tal cost in social policy or efficiency that is necessary to prevent it.” (quoting RONALD DWORKIN, *TAKING RIGHTS SERIOUSLY* 199 (1977)).