

BLACK BOXES: fMRI LIE DETECTION AND THE ROLE OF THE JURY*

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I. Introduction	931
II. The Neuroscience of deception	933
III. The Role of the Jury – Finding Facts and Finding Law	934
IV. The Potential Impact of a Foolproof Lie Detector	936
V. Directions for Further Thought.....	938

I. INTRODUCTION

I would like to begin by thanking Professor Jane Moriarty for inviting me to participate in this wonderful program. Both the human mind and the jury room have often been described as “black boxes.” As the metaphor suggests, for each of these decision-making organs (the brain and the jury) we can measure the input and we can view the output, but the process that takes place inside the box – the process that transforms the inputted data into the outputted decision – is inscrutable, perhaps even magical. Yet the recent advances in neuroscience, including those in the area of lie detection and deception, offer the prospect of a peek inside the black box of the mind. And that peek inside the black box of the mind may in turn offer a peek inside the black box of the jury room. Thus the question: Would opening the black box of the jury room be akin to opening a Pandora’s box?

Before I offer some thoughts on that question, let me mention three real-life cases in which cutting-edge neuroscientific evidence either did – or conceivably might in a not-so-distant future – influence the outcome of a criminal prosecution. In the first case, reported last week in the New York Times, EEG brain-fingerprinting-type evidence was admitted

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against a woman on trial in India for murdering her husband.¹ She was convicted.²

In the second case, in England recently, neuroscientists performed an fMRI lie-detection scan on a woman who had previously been convicted of poisoning a child in her care.³ She claimed that she was innocent, but the jury believed the prosecutor's allegation that the caretaker had poisoned the child, presumably because she was suffering from Munchausen's syndrome by proxy.⁴ According to the researchers, the fMRI data was consistent with the woman's claim of innocence.⁵

And finally, in the third case, just three days ago and two hours before he was scheduled to die by lethal injection, the Supreme Court granted a stay of execution in the case of Troy Anthony Davis.⁶ Mr. Davis has been on death row for the last eighteen years for murdering a police officer in Savannah, Georgia.⁷ He was convicted solely based on eyewitness testimony – there was no physical evidence tying him to the murder.⁸ Seven of the nine eyewitnesses have now recanted (one of the other two is the person who, if Troy Davis did not shoot the officer, is no doubt the real killer).⁹ Two of the witnesses said they lied at the trial because they were pressured by police to name Davis as the killer.¹⁰ The Georgia Supreme Court refused to order a hearing in the case.¹¹ The majority asserted that the trial testimony of the witnesses was more likely true than the recantations.¹² On Monday, the U.S. Supreme Court will decide whether to hear the case. If it declines, the stay will automatically terminate and Troy Davis will be executed.¹³

1. See Anand Giridharadas, *India's Novel Use of Brain Scans in Courts is Debated*, N.Y. TIMES, Sept. 15, 2008, at A10.

2. See *id.*

3. See Sean A. Spence et al., 'Munchausen's Syndrome by Proxy' or a 'Miscarriage of Justice?': An Initial Application of Functional Neuroimaging to the Question of Guilt Versus Innocence, 23 EUROPEAN PSYCHIATRY 309, 309-10 (2007).

4. See *id.* at 310-11.

5. *Id.* at 312-13.

6. Davis v. Georgia, 129 S. Ct. 28 (2008).

7. See Davis v. State, 660 S.E.2d 354, 357 (Ga. 2008).

8. See *id.*

9. See *id.* at 358-60.

10. *Id.* at 359.

11. *Id.* at 357.

12. See *id.* at 363.

13. Davis v. Georgia, 129 S. Ct. 397 (2008). On October 14, 2008, the Supreme Court issued a one-line decision declining to hear Troy Davis' petition. *Id.* Davis' execution date was scheduled for October 27, 2008. Rhonda Cook, *Davis' Execution Rescheduled for Oct. 27*, ATL. JOURNAL-CONSTITUTION, Oct. 16, 2008, at A1. On October 22, 2008, Davis' attorneys filed a second habeas petition based on new exculpatory affidavits, requesting an emergency stay of the pending

In case one, the Indian murder case, neuroscience evidence that appears patently unreliable – in the sense that there is virtually no assurance that it can do what its proponent claimed – was admitted against the defendant and contributed to her being convicted.¹⁴ In case two, the English case, neuroscience evidence that is arguably reliable suggested that a conviction might have been wrongful, but the test was done after the defendant had finished serving her sentence and was not offered in any court proceeding.¹⁵ And in case three, that of Troy Davis, no neuroscience evidence is involved; however, this is precisely the kind of case in which such evidence – if reliable – would be (according to one's point of view) either extremely useful or extremely dangerous.¹⁶

II. THE NEUROSCIENCE OF DECEPTION

We heard this morning about some of the exciting recent advances in brain imaging and lie detection. Prof. Langleben's work, for example, has been on the cutting edge of theory and experimental design and his research paradigms have been adopted by others in the field. Dr. Laken's company, Cephos, is also at the forefront in developing techniques that could someday be used in various legal contexts. As Professor Greely noted last night, the trajectory of advancement in this – and related – “mind-reading” research has been truly remarkable and continues at a rapid pace.¹⁷

Though the state of the science certainly is not anywhere near meeting the *Daubert* standard (or any other conceivable standard of scientific reliability, notwithstanding the Indian case), my assumption for purposes of this talk is that the science of lie detection probably will, in the foreseeable future, reach a point of courtroom viability. At the very least, the prospect is sufficiently likely that it behooves us to consider the implications of such a development sooner rather than later. Therefore, in the nature of a thought experiment, I would like to explore

execution. See Bill Rankin, *Execution of Troy Davis: Lawyers Launch New Appeal Effort*, ATL. JOURNAL-CONSTITUTION, Oct. 23, 2008, at D6. On October 24, 2008, the 11th Circuit Court of Appeals issued a stay of execution to consider the newly filed habeas petition. Bill Rankin & Rhonda Cook, *Court Issues Stay, Lets Davis Make His Case*, ATL. JOURNAL-CONSTITUTION, Oct. 25, 2008, at A1. Oral arguments took place on December 9 in Atlanta. Bill Rankin, *Judges Differ as Davis Seeks New Trial*, ATL. JOURNAL-CONSTITUTION, Dec. 10, 2008, at C1.

14. See *supra* notes 1-2 and accompanying text.

15. See *supra* notes 3-5 and accompanying text.

16. See *supra* notes 6-13 and accompanying text.

17. Henry T. Greely, *Law and the Revolution in Neuroscience: An Early Look at the Field*, 42 AKRON L. REV. 687 (2009).

what the legal system would or should do when faced with a non-invasive, safe, portable, contemporaneous, and foolproof neuro-imaging lie detector.

Therefore I will leave to other more qualified presenters the question whether, and when, such a development might actually occur. Should it occur, it will have rather profound implications for our system of jury decision-making. I am going to focus here on the criminal jury, though parts of the analysis will also apply to civil juries.

III. THE ROLE OF THE JURY – FINDING FACTS AND FINDING LAW

The paradigmatic function of the jury is to find facts – to decide the historical questions of what happened and why (i.e. with what intent, motive, etc.). Given its findings of historical fact, the conventional wisdom holds that the jury is then bound to apply the law, as instructed by the court, to those facts and to render its verdict accordingly.

Yet the jury also undoubtedly performs another function, more hidden and less accepted than its fact-finding role. That is what can be called, roughly speaking, its legislative function. At the extreme, a jury acting in its legislative role would engage in what is commonly known as jury nullification – that is, it would reject the law as enacted by the legislature and as charged to it by the court, and would enter a verdict contrary to the law based on the facts as it found them.

Jury nullification is a funny animal, at once idealized and reviled. In this sense, it perfectly captures our society's more general ambivalence toward the jury. Instances of nullification (or at least what is widely believed to be nullification, because – as I will discuss – we can never be quite certain that a particular verdict is nullificatory) are held up as the best of what the jury system represents, and as the worst. In the former category, think of the famous acquittal of John Peter Zenger for seditious libel and the refusals of antebellum Northern juries to convict defendants under the Fugitive Slave laws.¹⁸ For examples of the latter, think of Southern juries' acquittals of White defendants charged with lynchings and other crimes against Blacks following Reconstruction and well into the 20th century.¹⁹ Juries are capable of

18. See NEIL VIDMAR & VALERIE P. HANS, *AMERICAN JURIES: THE VERDICT* 225 (2007).

19. See *id.* (“If Northern juries of the 1850s acquitted the courageous people who harbored slaves in defiance of the Fugitive Slave Act, Southern juries a hundred years later acquitted people who had beaten and killed the descendants of those slaves as they attempted to assert their legal rights.”); *cf.* *United States v. Navarro-Vargas*, 408 F.3d 1184, 1199 (9th Cir. 2005) (en banc). The court notes that in the context of the grand jury's power to nullify that:

While we celebrate grand jury independence in defense of the First Amendment in the

acting as a check against state power, against executive or legislative or judicial overreaching; they are capable of dispensing mercy to sympathetic defendants. Yet they are also capable of being driven or influenced by prejudice, bias, and vindictiveness. If we wish to preserve their power to do the “good” nullification, it entails the danger that they may do the “bad” nullification. In judicial and scholarly discussions of nullification, one hears words such as “heroic,” “independent,” “bulwark,” “conscience,” and “democratic” juxtaposed with such words as “anarchy,” “lawless,” “chaotic,” and “undemocratic.”

As far as the doctrine of jury nullification, the Supreme Court settled the question more than 100 years ago by holding that a criminal jury has the power, but not the right, to acquit against the law.²⁰ This power is a byproduct of other features of the criminal justice system: the general verdict; the constitutional protection against double jeopardy; and the secrecy of jury deliberations. Indeed, it is this secrecy plus the general verdict that create the black box quality of the jury process.

Because of this well-settled paradox – that juries retain the power to nullify even though they are not supposed to exercise it – the scholarly debate over jury nullification has largely revolved around the issue whether juries should be informed of this power. Scholars are divided on the question, partly on normative grounds and partly on empirical grounds. The normative issue is whether juries should have the power to decide the law if we could make them stop; the empirical issue is whether, were juries told of their power to nullify, this would result in more of the “bad” nullification.

Judges are not divided. Virtually every court that has addressed the issue has held that defendants do not have a right to have the jury told of its power to nullify, whether through argument or judicial instruction.²¹ Indeed, several courts have excused jurors who admitted on voir dire to being aware of the power to nullify, and the Second Circuit has held that a juror’s unwillingness to follow the court’s instructions on the law is an

case of Peter Zenger and those accused of violating the Alien and Sedition Acts, and we praise grand jury resistance to the morally-obnoxious fugitive slave laws, we must acknowledge as well that grand juries have also refused to enforce lawful and wise legislation, including some of the most important legislation in American history: the Reconstruction laws implementing the Thirteenth, Fourteenth, and Fifteenth Amendments. Grand jury independence, evidently, has historically served causes both good and ill.

Id.

20. *Sparf v. United States*, 156 U.S. 51 (1895).

21. See Lawrence W. Crispo et al., *Jury Nullification: Law Versus Anarchy*, 31 LOY. L.A. L. REV. 1 (1997).

appropriate ground for disqualifying the juror in the midst of the deliberation.²² Many standard jury instructions inform jurors that it is their duty to follow the law as charged by the court.

Yet in their opinions, courts often extol the “good” instances of nullification. Judge Leventhal’s opinion for the D.C. Circuit in the 1972 *Dougherty* case exemplifies the position: “An equilibrium has evolved – an often marvelous balance – with the jury acting as a ‘safety valve’ for exceptional cases, without being a wildcat or runaway institution.”²³ He goes on to say that articulating to the jury its discretion to disregard the court’s instruction would create a danger “that the breach will be more often and casually invoked.”²⁴

IV. THE POTENTIAL IMPACT OF A FOOLPROOF LIE DETECTOR

The development of my imagined, very accurate lie detector would threaten to disrupt the “marvelous balance” described by Judge Leventhal in *Dougherty*. That is because, if the facts are clear and everyone can see that the facts are clear, then it becomes quite apparent that the jury must have the power to nullify (else what is it doing there?). And whereas now we can (and do) argue over whether a particular jury has acquitted despite the facts or because of them, if our imaginary future jury issues a verdict contrary to the clear facts, it will be apparent to the public that nullification has occurred.

Furthermore, such a development would force us to confront head-on our ambivalence about the legislative role of the jury. To the extent that we believe that the jury’s only legitimate role is to find the facts, which in large part consists of judging the credibility of witnesses, then technological advances – including a highly accurate lie detector – would largely displace the jury and might eventually cause it to go the way of trial by ordeal and trial by battle. After all, if the jury is the lie detector and technology gives us a much better lie detector, why would

22. *United States v. Thomas*, 116 F.3d 606 (2d Cir. 1997). In *Thomas*, the trial court dismissed the sole black juror in a drug prosecution trial in which all of the defendants were black. *Id.* at 609, 612. Though the Second Circuit held that a juror’s intent to disregard the court’s instructions on the law was “just cause” for dismissal under Federal Rule of Criminal Procedure 23(b), the court further held that “the need to safeguard the secrecy of jury deliberations requires the use of a high evidentiary standard for the dismissal of a *deliberating* juror” for such a reason, and that this high standard had not been met in the case where the juror’s stated reasons for his position were ambiguous and permitted an interpretation inconsistent with nullificatory intent. *Id.* at 618 (emphasis in original).

23. *United States v. Dougherty*, 473 F.2d 1113, 1134 (D.C. Cir. 1972).

24. *Id.* at 1135.

we need – or want – the jury? Much research tells us that people, of which juries are composed, are not very good at detecting deception;²⁵ many innocent people are undoubtedly convicted because juries cannot very accurately tell truth from lies. That the system has been around for a long time surely is not a sufficient reason to retain it if we had a better way of doing the very thing it is meant to do.

I think the better argument is that history, theory, and precedent (including recent Supreme Court decisions on the right to a jury trial)²⁶ strongly support the argument that the jury is much more than a lie detector, and that the Constitutional right to a jury trial in criminal cases (and in some civil cases) is grounded not primarily in the value of an accurate determination of facts but in the need to check governmental power (I've argued elsewhere that the right to a jury finding of certain facts rests largely on this protective role.).²⁷

If the jury does (or should) serve this political, institutional role, the next question is how my imaginary foolproof lie detector would impact the jury's performance of this role – would removing some of the secret, black box quality of the jury threaten to destroy it? And if it might, should we prevent these new technologies from entering the courtroom in order to preserve the jury system?

Even now, the system goes to some lengths to preserve the black box quality of the jury room. Along with the general verdict, rules of evidence and appellate review preserve “plausible deniability” about the reasons for a jury verdict, such that we can always say that the jury might have decided the case rationally, based on its assessment of the credibility of the witnesses. I would predict that the system will continue to resist forensic use of neuro-imaging lie detectors. At some point, however, the interests of truth would – and should – trump the value of preserving the jury for its own sake.

25. See Timothy R. Levine et al., *Deception Detection Accuracy is a Predictable Linear Function of Message Veracity Base-Rate: A Formal Test of Park and Levine's Probability Model*, 73 COMM. MONOGRAPHS 243, 244-45 (2006) (summarizing the results of more than 200 studies investigating people's ability to detect deception and stating that the most recent meta-analysis found an across-study average of 54% accuracy).

26. See, e.g., *Gonzalez v. United States*, 128 S.Ct. 1765 (2008) (holding that a federal criminal defendant may demand that an Article III judge preside over the selection of the jury); *Cunningham v. California*, 549 U.S. 270 (2007) (holding that California's determinate sentencing law, which authorized the judge, not the jury, to find facts making the defendant subject to an elevated upper term sentence violated the defendant's right to trial by jury); *United States v. Booker*, 543 U.S. 220 (2005) (holding that federal sentencing guidelines are subject to the jury trial requirements of the Sixth Amendment).

27. See Julie A. Seaman, *Triangulating Testimonial Hearsay: The Constitutional Boundaries of Expert Opinion Testimony*, 96 GEO. L.J. 827, 865-69 (2008).

There has been some empirical study of the question whether the jury's knowledge of its nullification power causes it to exercise the power more often, or less desirably.²⁸ The results are mixed. Earlier studies (using mock jurors) largely showed that a nullification instruction did not significantly affect results.²⁹ However, more recent studies, which employed emotionally salient facts, did reveal an effect of nullification instructions on verdicts.³⁰ For example, in a murder for hire scenario, the nullification instruction had no effect.³¹ But in a euthanasia scenario, the instruction (along with biasing facts about the victim) did affect the jury's verdict.³²

V. DIRECTIONS FOR FURTHER THOUGHT

Though a very reliable lie detector today is still science fiction, based on what we've heard during this Symposium it is certainly conceivable that tomorrow (figuratively speaking), it might become a reality. Thus it is crucial that scholars continue to explore the implications – ethical, doctrinal, constitutional, and systemic – of this and other emerging technologies. And, as we have also heard over the past two days, brain-imaging impacts the public and private imagination in myriad ways and carries much baggage whether it promises more than

28. See, e.g., Norbert L. Kerr et al., *Jury Nullification Instructions as Amplifiers of Bias*, 6 INT'L COMMENT. EVID., Apr. 2008, <http://www.bepress.com/ice/vol6/iss1/art2/> (finding that nullification instructions might amplify emotional biases in cases in which the fairness of the law is in question, but that the direction and complexity of the effect requires further study); Irwin A. Horowitz et al., *Jury Nullification: Legal and Psychological Perspectives*, 66 BROOK. L. REV. 1207 (2001) (reviewing empirical research on nullification).

29. See Irwin A. Horowitz et al., *Chaos in the Courtroom Reconsidered: Emotional Bias and Juror Nullification*, 30 LAW & HUM. BEHAV. 163, 165-66 (2006) (summarizing existing studies, and stating that "although there are some hints that nullification instructions might increase jurors' susceptibility to biasing information, there is little strong or direct evidence" that it does so); *Id.* at 176 ("The empirical nullification literature is, at best, agnostic on" the issue of the effect of juror awareness of the power to nullify upon the rate and circumstances of "improper" nullificatory verdicts.).

30. See *id.*; Kerr et al., *supra* note 28.

31. See Horowitz et al., *supra* note 29, at 176; Kerr et al., *supra* note 28, at 15 (difference was not statistically significant).

32. In Horowitz, et al., *supra* note 29, jurors in receipt of the nullification addendum to the standard jury instruction were less likely to convict the defendant in a euthanasia case involving an unsympathetic victim. In Kerr et al., *supra* note 28, which was a follow-up study that included a further jury instruction cautioning jurors not to allow their emotions toward the parties to bias their verdicts, the researchers found that this additional instruction had no effect. While the later study replicated the earlier finding that emotional response to the victim biased jury verdicts in the euthanasia scenario, in the second study "the opposite [directional effect] occurred – recipients of nullification instructions were *more* likely to convict when the victim was relatively unsympathetic." *Id.* at 17.

it can deliver or whether it delivers all it promises. Given the complexities, both of the technology and of the issues it raises, I offer here only some very tentative thoughts in conclusion.

First, it is unacceptable to sacrifice truth – to convict a factually innocent defendant, say – in order to preserve some notion of legitimacy or protection of jury fact-finding – if we are certain that we have a better mousetrap, we should use it. Second, the more that science removes fact-finding from the jury (e.g., DNA, lie detection, other “second generation” forensic techniques), the more the now hidden legislative role of the jury will become apparent.

Given this, and given a commitment to the institution of the jury as a check on the power of the state, it will be crucial to figure out how to bolster the “good” nullification and suppress the “bad” nullification. At this point, it is not clear whether, or how, that can be done, but it should be an area of focus. We cannot hold the black box shut, nor should we try. But having peeked at the process inside, we can do our best to educate and expect juries to act on their highest instincts and not on their basest. All we really do now is to hide both within the black box.

