

RADICALLY REIMAGINING FORENSIC EVIDENCE

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Since the 1990s, when DNA retesting in closed cases first began to reveal flaws in forensic evidence, considerable positive work has been done to improve forensic methods and to prevent the use of unreliable forensic evidence in criminal cases. But reform efforts have also run up against resistance and have not resolved the serious questions about the reliability of forensic evidence and the validity of forensic methods decades after flaws were first uncovered.

Against this backdrop, this Article makes a new intervention in the forensic reform movement. As scholars and activists have done in other contexts, it draws from abolitionist principles to begin constructing a new framework for reimagining forensics based on an acknowledgment that forensic methods are carceral tools that enable and support surveillance, policing, prosecution, and punishment. It considers how the application of an abolitionist framework to forensic reform might illuminate new, previously unconsidered avenues for radical transformation of the forensic system. In doing so, this Article anchors the conversation about what is needed to meaningfully improve forensic methods in the broader, modern movement for criminal justice reform and begins to radically reimagine the forensic system.

INTRODUCTION

People in the crime lab [are] saying the tire prints match, the shoe prints match, the hair matches, the bite marks match. Because of these unreliable methods, innocent people are going to prison. It's the whole profession. It's the whole system. It's the whole methodology. It's all junk.

—Peter Neufeld, co-founder of the Innocence Project.¹

* * *

Many forensic disciplines, purportedly scientific staples of police investigation and prosecution, have never been established as scientifically valid.² A plethora of literature has shown that much forensic evidence that is

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1. *The Innocence Files: The Evidence: Indeed and Without Doubt* (Netflix, Inc. 2020).

2. E.g., COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT'L RSCH. COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 107–08 (2009), <https://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf> [hereinafter "NAS REPORT"]; PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING

presented in criminal cases is faulty because (1) the underlying method itself is inherently invalid (as with bitemark analysis and several other forensic techniques);³ (2) an otherwise valid method is misapplied to produce faulty results (such as when DNA analysis is pushed beyond reliable limits);⁴ or (3) because forensic examiners exaggerate results or come to scientifically unsupported conclusions (for example, when examiners testify to “absolute certainty,” a “zero percent” error rate, or an unqualified identification).⁵ Regardless of the reason, what gets presented in court often is unreliable, invalid, unsupported, or simply not science at all. It persuades judges and juries nonetheless.⁶

SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS 87–88 (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf [hereinafter PCAST REPORT]; TEX. FORENSIC SCI. COMM’N, FORENSIC BITEMARK COMPARISON COMPLAINT FILED BY NATIONAL INNOCENCE PROJECT ON BEHALF OF STEVEN MARK CHANEY—FINAL REPORT 17 (2016), <https://www.txcourts.gov/media/1440871/finalbitemarkreport.pdf>; C. Michael Bowers, *Review of a Forensic Pseudoscience: Identification of Criminals from Bitemark Patterns*, 61 J. FORENSIC & LEGAL MED. 34, 34 (2019); Michael J. Saks et al., *Forensic Bitemark Identification: Weak Foundations, Exaggerated Claims*, 3 J.L. & BIOSCIENCES 538, 540 (2016). See generally Jonathan J. Koehler, *How Trial Judges Should Think About Forensic Science Evidence*, 102 JUDICATURE 28, 28–29 (2018); Valena E. Beety & Jennifer D. Oliva, *Evidence on Fire*, 97 N.C. L. REV. 483, 486–87 (2019) (explaining that fire science has “historically generated inaccurate expert evidence”); PCAST REPORT, *supra*, at 81–82 (noting that foundational validity is not established for some applications of DNA analysis of complex mixture samples); *id.* at 104–12 (noting that firearms analysis lacks foundational validity); *id.* at 117 (finding that attempting “to associate shoeprints with particular shoes based on specific identifying marks” is not scientifically valid); *id.* at 95–102; BRANDON L. GARRETT, *AUTOPSY OF A CRIME LAB: EXPOSING THE FLAWS IN FORENSICS 5–9* (2021) (explaining that “many forensic examiners do not use methods that are based on solid scientific research” and that the reliability of many forensic methods is “untested and unknown”).

3. See *supra* note 2 and accompanying text; see also Paul C. Giannelli, *Forensic Science: Daubert’s Failure*, 68 CASE W. RESV. L. REV. 869, 876–909 (2018) (categorizing bitemark analysis, hair comparison analysis, fire science, and comparative bullet lead analysis as discredited forensic techniques).

4. See Katherine Kwong, *The Algorithm Says You Did It: The Use of Black Box Algorithms to Analyze Complex DNA Evidence*, 31 HARV. J.L. & TECH. 275, 275–76 (2017); JOHN M. BUTLER ET AL., NAT’L INST. OF STANDARDS & TECH., DNA MIXTURE INTERPRETATION: A NIST SCIENTIFIC FOUNDATION REVIEW 5 (2021), <https://nvlpubs.nist.gov/nistpubs/ir/2021/NIST.IR.8351-draft.pdf> [hereinafter NIST DNA MIXTURE INTERPRETATION FOUNDATION REVIEW]. See generally Brief of 42 Scholars of Forensic Science as Amici Curiae in Support of Defendant-Appellee at 20, *United States v. Gissantaner*, 990 F.3d 457 (6th Cir. 2020) (No. 19-2305).

5. See NAS REPORT, *supra* note 2, at 4; PCAST REPORT, *supra* note 2, at 3 (“[A]ll . . . [forensic methods] have non-zero error rates.”); WILLIAM THOMPSON ET AL., AM. ASS’N FOR THE ADVANCEMENT OF SCI., FORENSIC SCIENCE ASSESSMENTS: A QUALITY AND GAP ANALYSIS 10, 60–67 (2017), https://www.aas.org/sites/default/files/s3fs-public/reports/Latent%2520Fingerprint%2520Report%2520FINAL%25209_14.pdf?adobe_mc=MCMID%3D28641570382635509444116438989220097469%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7CTS%3D1639853770; see also Williams v. United States, 130 A.3d 343, 352–55 (D.C. 2016) (Easterly, J., concurring) (observing that there is no “statistical basis” for asserting the certainty of a match in some forensic disciplines); Spencer S. Hsu, *FBI Admits Flaws in Hair Analysis over Decades*, WASH. POST (Apr. 18, 2015), https://www.washingtonpost.com/local/crime/fbi-overstated-forensic-hair-matches-in-nearly-all-criminal-trials-for-decades/2015/04/18/39e8d8c6-e515-11e4-b510-962fcfab310_story.html (reporting that “[o]f 28 examiners with the FBI Laboratory’s microscopic hair comparison unit, 26 overstated forensic matches in ways that favored prosecutors in more than 95 percent of the 268 trials reviewed” at the time of publication).

6. See Mark Joseph Stern, *Forensic Science Isn’t Science*, SLATE (June 11, 2014, 7:11 AM), <https://slate.com/technology/2014/06/forensic-science-is-biased-and-inaccurate-but-juries-believe-it-and-convict-the-innocent.html>; Jessica Gabel Cino, *We Can’t Trust Forensic Science*, REALCLEARSCIENCE (Dec. 8,

Ironically, the extent to which lay people without scientific training tend to trust forensic science evidence and mistakenly believe that it brings neutrality, fairness, accuracy, and certainty to the criminal process has allowed forensic evidence to do just the opposite.⁷ Forensic evidence is often not objective “science” in the way that most people perceive it to be: it can be manipulated to support unjust prosecutions,⁸ and it adds false legitimacy to illegitimate convictions even when faulty.⁹ The tactic has repeatedly proven successful: junk dressed up as scientific analysis has contributed to nearly a quarter of all documented convictions of innocent people to date.¹⁰

These issues with forensics endure even though forensic methods have been the subject of much criticism and many attempts at reform through many phases of history. In cycle after cycle, evidence of questionable integrity has been used, a reform has been introduced as a corrective measure, the reform has proven unsuccessful, and the cycle has begun again.

One of the first such cycles arguably commenced over one hundred years ago, when fingerprint evidence was first used in a 1902 burglary trial in England.¹¹ The evidence was admitted without any substantive analysis of the field despite concerns of one of the discipline’s founding fathers over the validity of the method’s fundamental premise that no two people possessed one matching fingerprint, the potential for police bias to infect judgment, and the discipline’s potential for error—concerns still at issue today.¹² Fingerprint evidence was first admitted in an American court eight years later in a similarly

2016), https://www.realclearscience.com/articles/2016/12/08/we_cant_trust_forensic_science_110121.html.

7. See Lee J. Curley, James Munro & Martin Lages, *An Inconvenient Truth: More Rigorous and Ecologically Valid Research Is Needed to Properly Understand Cognitive Bias in Forensic Decisions*, 2 FORENSIC SCI. INT’L: SYNERGY 107, 107 (2020); J. Herbie DiFonzo & Ruth C. Stern, *Devil in a White Coat: The Temptation of Forensic Evidence in the Age of CSI*, 41 NEW ENG. L. REV. 503, 505–06 (2007).

8. See, e.g., *The Innocence Files: The Evidence: Indeed and Without Doubt*, *supra* note 1; *The Innocence Files: The Evidence: The Truth Will Defend Me* (Netflix, Inc. 2020); *The Innocence Files: The Evidence: The Duty to Correct* (Netflix, Inc. 2020).

9. See Erica Beecher-Monas, *Reality Bites: The Illusion of Science in Bite-Mark Evidence*, 30 CARDOZO L. REV. 1369, 1372 (2009) (explaining that bitemark analysis is “a field replete with the trappings, if not the substance, of science” and describing how these “trappings of science” persuade nonscientist lawyers, judges, and juries).

10. *Exonerations by State*, NAT’L REGISTRY OF EXONERATIONS, <http://www.law.umich.edu/special/exoneration/Pages/Exonerations-in-the-United-States-Map.aspx> (last visited Apr. 19, 2022) (documenting 679 out of 2800, or 24.25%, of exonerations in which “[b]ad [f]orensic [e]vidence” was a contributing factor); see also *Overturning Wrongful Convictions Involving Misapplied Forensics*, INNOCENCE PROJECT, <https://innocenceproject.org/overturning-wrongful-convictions-involving-flawed-forensics/> (last visited Apr. 19, 2022) (noting that faulty forensic evidence was a contributor in 45% of the Innocence Project’s wrongful conviction cases).

11. Katherine Schwinghammer, Note, *Fingerprint Identification: How “the Gold Standard of Evidence” Could Be Worth Its Weight*, 32 AM. J. CRIM. L. 265, 278 (2005). The first ever criminal trial based on fingerprint evidence occurred in 1898 in India. SIMON A. COLE, SUSPECT IDENTITIES: A HISTORY OF FINGERPRINTING AND CRIMINAL IDENTIFICATION 88 (2002).

12. *Id.* at 277–79. See generally THOMPSON ET AL., *supra* note 5.

uncritical fashion.¹³ In the years following, courts continued to admit fingerprint evidence readily without scrutiny.¹⁴

Shortly thereafter came the reform. In 1923, amidst growing concerns over the liberal admission of scientifically questionable expert evidence, the District of Columbia Circuit considered the admissibility of an early iteration of a lie detector test.¹⁵ In *Frye v. United States*, it established a new test for the admissibility of scientific evidence that requires a method to have gained general acceptance in the relevant scientific community before it is admitted.¹⁶ But, *Frye* did little to stem the admission of scientifically unsupported evidence in courts. By the 1970s, more and more questionable forensic methods—like voiceprinting, hair analysis, and bitemark analysis—were being used in criminal prosecutions.¹⁷

Then came the next corrective. In 1993, as an apparent response to the influx of such scientifically questionable expert evidence inundating the courts,¹⁸ the Supreme Court issued *Daubert v. Merrell Dow Pharmaceuticals Inc.*, which changed the legal standard governing admissibility of scientific evidence in federal courts.¹⁹ *Frye* did not require judges to directly assess the scientific validity of expert evidence before admitting it at trial,²⁰ which *Daubert* sought to remedy.²¹ *Daubert* too, however, has done little to stem the admission of faulty forensic evidence in criminal cases.²²

At about the same time, DNA retesting in closed cases began to reveal significant flaws in forensic methods.²³ High-profile efforts to educate the scientific community, lawyers, and the public about research demonstrating the unreliability of some forensic science followed. Two groundbreaking reports, the National Academies of Sciences' *Strengthening Forensic Science in the United States: A Path Forward* (NAS Report),²⁴ published in 2009, and the President's

13. Jennifer L. Mnookin, *Fingerprint Evidence in an Age of DNA Profiling*, 67 BROOK. L. REV. 13, 17 (2001).

14. *Id.* at 21.

15. *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

16. *Id.* (finding that the lie detector in question had not gained such acceptance and upholding the trial court's exclusion of the evidence); Jim Hilbert, *The Disappointing History of Science in the Courtroom: Frye, Daubert, and the Ongoing Crisis of "Junk Science" in Criminal Trials*, 71 OKLA. L. REV. 759, 765–68 (2019).

17. See Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197, 1198 (1980).

18. See David E. Bernstein, *The Misbegotten Judicial Resistance to the Daubert Revolution*, 89 NOTRE DAME L. REV. 27, 34 (2013). *But see* Hilbert, *supra* note 16, at 779–80 (suggesting that courts may not have been so inundated with problematic scientific evidence).

19. 509 U.S. 579 (1993).

20. See *Frye*, 293 F. at 1014.

21. *Daubert*, 509 U.S. at 592–93.

22. Hilbert, *supra* note 16, at 796.

23. See NAS REPORT, *supra* note 2, at 4; Matthew Shaer, *The False Promise of DNA Testing*, THE ATLANTIC (June 2016), <https://www.theatlantic.com/magazine/archive/2016/06/a-reasonable-doubt/480747/>.

24. See generally NAS REPORT, *supra* note 2.

Council of Advisors on Science and Technology's *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (PCAST Report),²⁵ issued in 2016, made waves when they declared that a significant number of forensic disciplines routinely used to support convictions are deeply flawed and unreliable. Though these reports were critical of forensics, the blue-ribbon expert panels that authored them, each composed of elite, nationally renowned scientists,²⁶ offered comprehensive policy proposals—a roadmap for how forensic methods can be improved.²⁷ Among other proposals, the reports recommended removing forensics from law enforcement control and influence and infusing the forensic system with a culture of science that includes objectivity, independence, transparency, and continuous reexamination of methods.²⁸

Yet these reform efforts, too, have not yielded meaningful improvements.²⁹ Neither report has had a significant impact on preventing the admission of faulty forensics in courts.³⁰ While both are examples of positive developments in forensic reform, their failings are apparent to the critical observer. Inherent in these and other attempts to improve forensic methods is a recognition that, even after waves of attempted reforms, questions about the reliability and validity of forensic methods persist.³¹ Moreover, many reform efforts have been

25. PCAST REPORT, *supra* note 2, at x–xi.

26. *See, e.g.*, Koehler, *supra* note 2.

27. *See* NAS REPORT, *supra* note 2, at 14–33; PCAST REPORT, *supra* note 2, at 14–20.

28. *See, e.g.*, NAS REPORT, *supra* note 2, at 24 (recommending removal of forensic labs from administration of law enforcement); PCAST REPORT, *supra* note 2, at 14 (suggesting that evaluations of foundational validity “should be conducted by an agency which has no stake in the outcome”); *id.* at 15 (calling on research to transform subjective forensic methods into objective methods); *id.* at 18 (encouraging the FBI Laboratory to be transparent in disclosing case work errors and other quality issues).

29. *See* Adam B. Shniderman, *Prosecutors Respond to Calls for Forensic Science Reform: More Sharks in Dirty Water*, 126 YALE L.J.F. 348, 349 (2017); Giannelli, *supra* note 3, at 937; Aliza B. Kaplan & Janis C. Puracal, *It's Not a Match: Why the Law Can't Let Go of Junk Science*, 81 ALB. L. REV. 895, 926 (2018); Craig M. Cooley, *Reforming the Forensic Science Community to Avert the Ultimate Injustice*, 15 STAN. L. & POL'Y REV. 381, 397–98 (2004); Jessica D. Gabel, *Realizing Reliability in Forensic Science from the Ground up*, 104 J. CRIM. L. & CRIMINOLOGY 283, 286 (2014) (“[T]he NAS Report clearly issued a ‘call to arms’ to reform forensic science from the top down . . . Little has been done, however, to achieve reform.”); *id.* at 287, 309; Janis C. Puracal & Aliza B. Kaplan, *Science in the Courtroom: Challenging Faulty Forensics*, CHAMPION, Jan.–Feb. 2020, at 16, 17; Suzanne Bell et al., *A Call for More Science in Forensic Science*, 115 PROC. NAT'L ACAD. SCIS. 4541, 4541 (2018); Brandon L. Garrett & M. Chris Fabricant, *The Myth of the Reliability Test*, 86 FORDHAM L. REV. 1559, 1568 (2018); Jennifer L. Groscup et al., *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCH. PUB. POL'Y & L. 339, 344–46, 352, 358 (2002); *see also* Nancy Gertner, *Commentary on the Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 789, 790 (2011) (“[U]ntil courts do what [Daubert] requires that they do—there will be no meaningful change here . . .”).

30. *See, e.g.*, Jules Epstein, *The National Commission on Forensic Science: Impactful or Ineffectual?*, 48 SETON HALL L. REV. 743, 755 (2018); Hilbert, *supra* note 16, at 804.

31. *See* National Commission on Forensic Science, U.S. DEPT OF JUST. ARCHIVES, <https://www.justice.gov/archives/nfcs> (last visited Apr. 10, 2022) (stating that the purpose of the National Commission on Forensic Science, which operated from 2013 to 2017, was to make recommendations relating to forensic science to the Attorney General and “to enhance the practice and improve the reliability of forensic science”); *About OSAC*, NAT'L INST. OF STANDARDS & TECH., <https://www.nist.gov/osac> (last visited Apr. 10, 2022) (describing the purpose of the Organization of Scientific Area Committees for Forensic

stalled by resistance from both the law enforcement and forensic communities.³²

Why do these cycles repeat? Why have these and other efforts to improve forensics faltered? This Article makes a new contribution to the significant literature that seeks to answer these questions. It draws from the principles and practice of carceral abolitionism³³ to rethink forensic reform through a new lens. In doing so, it offers those interested in pursuing forensic reform the opportunity to perceive problems with forensics in new ways, to highlight flaws in reform approaches that have been made to date, and, crucially, to illuminate new pathways for meaningful change.

In recent years, outside of the forensic context, reformers have increasingly drawn from abolitionist theory and practice to consider new approaches to pervasive problems in criminal law enforcement, like police violence.³⁴ In the wake of the historic protest movement sparked by the police killings of Breonna Taylor, George Floyd, and others,³⁵ increasing numbers of people have criticized traditional approaches to police reform—like increasing police training, creating civilian police oversight agencies, improving management, or adding technological supports like body-worn cameras—for failing to prevent police violence and other abuses.³⁶

Science as aiming to “facilitat[e] the development and promot[e] the use of high-quality, technically sound standards” and to “ensure that the results of forensic analysis are reliable and reproducible”).

32. See *infra* Part II; see also NAS REPORT, *supra* note 2, at 46 (“Parts of the forensic science community have resisted the implications of the mounting criticism of the reliability of forensic analyses . . .”).

33. Throughout history, abolitionist movements have targeted many systems of social control and denial of liberty. Those aimed at the criminal legal system have focused on prisons, the penal system, the police, and the carceral state more broadly. See Justin Piché & Mike Larsen, *The Moving Targets of Penal Abolitionism: ICOPA, Past, Present and Future*, 13 CONTEMP. JUST. REV. 391, 396 (2010). In this Article, “carceral abolitionism” is a more expansive concept than prison, police, or penal abolition: “carceral” here recognizes that social control is effectuated in ways that go beyond the core criminal legal system, but that work together with and are connected to it. See Marie Gottschalk, CAUGHT: THE PRISON STATE AND THE LOCKDOWN OF AMERICAN POLITICS 1 (2015) (explaining that the “carceral state . . . has been extending its reach far beyond the prison gate . . . in the never-never land between the prison gate and full citizenship.”). Thus, in this Article, “carceral system” or “carceral state” is used to refer to a set of systems and practices that include physical prisons and the formal criminal legal establishment as well as those that work in tandem with it to effectuate social control or restrict freedom. See Piché & Larsen, *supra*, at 392 (using “carceral” to “describe the systematic and organized deprivation of liberty that takes place in prisons, other sites of confinement and in our communities, as well as the diffusion of penitentiary techniques and disciplinary norms throughout society.”); *What Is the Carceral State*, DOCUMENTING CRIMINALIZATION & CONFINEMENT (May 2020), <https://storymaps.arcgis.com/stories/7ab5f5c3fbca46c38f0b2496bcaa5ab0> (explaining that “the carceral state encompasses the formal institutions and operations and economies of the criminal justice system proper, but it also encompasses logics, ideologies, practices, and structures, that invest in tangible and sometimes intangible ways in punitive orientations to difference, to poverty, to struggles to social justice and to the crossers of constructed borders of all kinds.” (quoting Ruby Tapia)).

34. Keeanga-Yamahtta Taylor, *The Emerging Movement for Police and Prison Abolition*, NEW YORKER (May 7, 2021), <https://www.newyorker.com/news/our-columnists/the-emerging-movement-for-police-and-prison-abolition>.

35. Jelani Cobb, *An American Spring of Reckoning*, NEW YORKER (June 14, 2020), <https://www.newyorker.com/magazine/2020/06/22/an-american-spring-of-reckoning>.

36. See Mariame Kaba, Opinion, *Yes, We Mean Literally Abolish the Police*, N.Y. TIMES (June 12, 2020), <https://www.nytimes.com/2020/06/12/opinion/sunday/floyd-abolish-defund-police.html>; Todd May & George Yancy, Opinion, *Policing Is Doing What It Was Meant to Do. That’s the Problem.*, N.Y. TIMES (June 21,

In lieu of traditional reform measures, activists have increasingly proposed sweeping actions ranging from defunding or dismantling police forces to total police abolition.³⁷ Central to their argument is the idea that the functions of the carceral system, like surveillance, policing, and imprisonment, have always oppressed Black and other marginalized communities and continue to do so today.³⁸ The factors responsible for the injustice and oppression present in policing and mass criminalization, they argue, are so deeply rooted in the system itself that modest reforms at the margins cannot yield meaningful change.³⁹ Rather, by accepting the premise that policing is fundamentally a legitimate state function that needs to be improved, not abolished, such traditional approaches merely provide a veneer of reform that legitimizes the continued injustice visited upon Black, Brown, and other marginalized communities.⁴⁰ Activists and scholars, drawing from abolitionist theory to rethink criminal justice reform, encourage pursuing “non-reformist reforms,” or taking actions that shrink and delegitimize the carceral state.⁴¹

Forensics, however, has been left out of these emerging conversations. Yet, an abolition-based framework can be applied beyond policing and prisons to seemingly less obvious aspects of the criminal legal system.⁴² Forensic methods are squarely classifiable as carceral tools; they uniquely support law enforcement activity—investigation, prosecution, and punishment—and indeed, most

2020), <https://www.nytimes.com/2020/06/21/opinion/police-violence-racism-reform.html>; Steve Eder, Michael H. Keller & Blacki Migliozzi, *As New Police Reform Laws Sweep Across the U.S., Some Ask: Are They Enough?*, N.Y. TIMES (Oct. 10, 2021), <https://www.nytimes.com/2021/04/18/us/police-reform-bills.html>.

37. See Ben Kessler, *Calls to Reform, Defund, Dismantle and Abolish the Police, Explained*, NBC NEWS (June 9, 2020), <https://www.nbcnews.com/news/us-news/calls-reform-defund-dismantle-abolish-police-explained-n1227676>; Ruairi Arrieta-Kenna, *The Deep Roots—and New Offshoots—of ‘Abolish the Police’*, POLITICO (June 12, 2020), <https://www.politico.com/news/magazine/2020/06/12/abolish-defund-police-explainer-316185>; Kelsey Micklas, *Criminal Law Expert Calls for “Reimagination” and “Dismantling” of Current Policing in America*, CBS NEWS (June 18, 2020, 12:50 PM), <https://www.cbsnews.com/news/criminal-law-expert-calls-for-reimagination-and-dismantling-of-current-policing-in-america/>; #8TOABOLITION, <https://www.8toabolition.com/> (last visited Feb. 7, 2022); see, e.g., Patrisse Cullors, *‘Black Lives Matter’ Is About More than the Police*, ACLU (June 23, 2020), <https://www.aclu.org/news/criminal-law-reform/black-lives-matter-is-about-more-than-the-police/>.

38. See ALEX VITALE, *THE END OF POLICING* 27 (2017).

39. See Taylor, *supra* note 34; see also Leah Sakala & Nicole D. Porter, Opinion, *Criminal Justice Reform Doesn’t End System’s Racial Bias*, USA TODAY (Dec. 12, 2018, 8:09 PM), <https://www.usatoday.com/story/opinion/policing/politics-policing/2018/12/12/racial-injustice-criminal-justice-reform-racism-prison/2094674002/>.

40. Kaba, *supra* note 36; Allegra M. McLeod, *Envisioning Abolition Democracy*, 132 HARV. L. REV. 1613, 1617 (2019).

41. See Mark Engler & Paul Engler, *Andre Gorz’s Non-Reformist Reforms Show How We Can Transform the World Today*, JACOBIN (July 22, 2021), <https://jacobinmag.com/2021/07/andre-gorz-non-reformist-reforms-revolution-political-theory> (describing “non-reformist reforms” as “changes that are not tailored to accommodate the current system”); Anna A. Akbar, *Demands for a Democratic Political Economy*, 134 HARV. L. REV. F. 90, 101–04 (2020).

42. These principles can and have been applied outside the criminal legal context. See Akbar, *supra* note 41, at 112 (describing non-reformist reform approaches outside the criminal legal sphere including “cancel rent, give land back, abolish ICE, free them all, and make reparations”).

forensic methods were developed expressly for this purpose.⁴³ Examining forensic reform through an abolitionist lens may offer interesting—and perhaps surprising—answers for how to improve the forensic system.

Against these backdrops, this Article begins to radically reimagine the forensic system by applying an abolitionist framework to the problem of forensic reform. It draws on the literature and advocacy around carceral abolition to consider the forensic problem anew. The Article proceeds in four parts. Part I provides context for understanding why adapting an abolitionist framework for forensic reform may be useful. It briefly outlines the core principles of abolitionism and then summarizes the state of the forensic system today. It traces the carceral origins of forensics and describes the deficiencies in scientific rigor and culture that endure in many forensic disciplines. Part II then outlines forensic reform efforts to date, finding that most have had minimal success.

In order to elucidate the potential utility of applying an abolition framework to forensic reform, Part III uncovers and examines dual forces entrenched in the forensic system that serve as roadblocks to meaningful reform. First is the efforts of prosecutors. While there has been substantial study of the power prosecutors wield in the criminal legal system and their contribution to mass criminalization,⁴⁴ aspects of their contribution to criminal injustice remain overlooked.⁴⁵ In the forensic arena, individual prosecutors' efforts to secure convictions even through the presentation of problematic evidence have been well explored.⁴⁶ Less explored, however, is their record of collective, organized action to prop up suspect forensic disciplines and stifle reform efforts—actions that continue today. They have acted, largely with impunity, to undermine research efforts aimed at improving forensic science, to reject reform proposals, and even to dismantle national agencies established to enhance the scientific

43. See *infra* Part II.B; NAS REPORT, *supra* note 2, at 42; Johns Hopkins Univ. Bloomberg Sch. of Pub. Health, *Scientists Decry Lack of Science in 'Forensic Science'*, SCIEDAILY (Apr. 9, 2018), <https://www.sciencedaily.com/releases/2018/04/180409161310.htm>.

44. See, e.g., EMILY BAZELON, CHARGED: THE NEW MOVEMENT TO TRANSFORM AMERICAN PROSECUTION AND END MASS INCARCERATION (2019); ANGELA J. DAVIS, ARBITRARY JUSTICE: THE POWER OF THE AMERICAN PROSECUTOR (2007); JOHN PFAFF, LOCKED IN: THE TRUE CAUSES OF MASS INCARCERATION—AND HOW TO ACHIEVE REAL REFORM (2017).

45. For example, advocacy around the 2020 Black Lives Matter protest movement has centered predominantly around dismantling or defunding police forces. See *#DefundThePolice*, BLACK LIVES MATTER (May 30, 2020), <https://blacklivesmatter.com/defundthepolice/>; see also, Kesslen, *supra* note 37. Prosecutors, meanwhile, have managed to evade becoming a target of calls for reform, despite their significant role in contributing to criminal injustice. E.g., Rachel Cicurel, Opinion, *Don't Stop with the Police: Check Racism in the Prosecutor's Office*, WASH. POST (July 9, 2020), <https://www.washingtonpost.com/opinions/2020/07/09/dont-stop-with-police-check-racism-prosecutors-office/>.

46. See, e.g., Aviva Orenstein, *Debunked, Discredited, but Still Defended: Why Prosecutors Resist Challenges to Bad Science and Some Suggestions for Crafting Remedies for Wrongful Conviction Based on Changed Science*, 48 SETON HALL L. REV. 1139, 1148–52 (2018).

validity of forensic methods.⁴⁷ Part III thus provides an update to the literature considering the influence of prosecutors in the criminal legal system and their role in blocking forensic reform.

Part III also builds from Part II's survey of reform efforts to include a critical analysis of two reform bodies, the National Commission on Forensic Science (NCFS) and the Organization of Scientific Area Committees (OSAC). It concludes that the efforts of these bodies, though well intentioned or incrementally positive, are insufficient to resolve the pervasive problems in forensics.

Additionally, Part III contains a novel examination of the role that various segments of the forensic community have played in resisting reform. It unearths ways in which forensic practitioners have advanced methods of questionable validity while resisting efforts to reform the system. It documents how segments of the forensic community have leveraged their understanding of the evidentiary admissibility rules in ways that perpetuate a perception of forensic methods as more scientific than they are.⁴⁸

Part IV begins to radically reimagine the forensic system. It utilizes an abolitionist prism to develop a three-pronged framework for evaluating forensic reform. The first prong asks how well the reform adheres to core principles of abolitionism. The second asks how the forensic method at issue is used and requires evaluation of whether the method at issue serves a purely carceral purpose—like criminal surveillance—or whether it has a nonpunitive purpose, like identification, that supports noncarceral functions, like achieving accountability. The third prong focuses on *who* uses the method. It examines whether a reform allows carceral actors, like police and prosecutors, to use a technique, or if it is aimed at remedying harm by supporting use by those ensnared in the criminal legal system and communities.

Part IV then utilizes the framework to evaluate a sampling of forensic reform proposals and exposes potential new avenues for transformational change consistent with abolitionist principles. Finally, it addresses potential criticisms of the approach.

I. ABOLITION AND FORENSICS IN CONTEXT

This Part provides the context necessary to understand the potential utility of applying an abolition-based framework to reimagining forensics. It begins with a brief overview of basic principles underlying abolitionism and then lays out the current state of the forensic system and the forces that have contributed to its insulation from the broader scientific community and entrenchment as a carceral force.

47. See *infra* Part III.A.

48. See *infra* Part III.B.

A. The Abolition Framework

A new criminal reform dialogue has emerged in the wake of the violent police killings of Breonna Taylor and George Floyd in 2020 and the historic Black Lives Matter (BLM) protest movement that took off in response.⁴⁹ That dialogue has brought decades-old prison abolition theory and principles—long relegated to activist and scholarly circles—to mainstream consciousness.⁵⁰ Demands to defund, dismantle, and divest the police push beyond traditional calls for mere “reform” of the criminal legal system and bring to the fore a debate that has existed across academic and activist circles for years: whether conventional reforms that seek only to improve the current system as it exists can be effective in preventing the harms that flow from subjecting individuals to the carceral system or whether more transformative steps are necessary.⁵¹ On one side of the debate, legal scholars, legislators, and other traditionalist reformers have largely accepted the legitimacy of carceral institutions, believing that they serve important functions like community protection and maintenance of order or, at the very least, that such institutions are so entrenched in modern society that radical transformation is unrealistic.⁵² Those who subscribe to this view see harassment and carceral violence merely as abuses of power and, accordingly, call for modest reforms to correct what they characterize as aberrations.⁵³ Their proposals have sought corrections, including racial bias training for authorities, increased funding for resource acquisition, implementation of accountability mechanisms like civilian oversight boards, and improved technological supports, like body-worn cameras or surveillance devices.⁵⁴

On the other side, abolitionism focuses on the root causes of carceral harm.⁵⁵ Abolitionist critics of the conventional approach argue that such reforms invest in, expand, and legitimize the carceral system without grappling

49. Cobb, *supra* note 35; Larry Buchanan, Quoc Trung Bui & Jugal K. Patel, *Black Lives Matter May Be the Largest Movement in U.S. History*, N.Y. TIMES (July 3, 2020), <https://www.nytimes.com/interactive/2020/07/03/us/george-floyd-protests-crowd-size.html>.

50. See, e.g., Kessler, *supra* note 37; Akbar, *supra* note 41, at 106–07.

51. Amna A. Akbar, *An Abolitionist Horizon for (Police) Reform*, 108 CALIF. L. REV. 1781, 1814 (2020); Taylor, *supra* note 34.

52. Akbar, *supra* note 51, at 1782–83, 1802, 1814; see also Noah Berlatsky, Opinion, *Abolishing the Police and Prisons is a Lot More Practical Than Critics Claim*, NBC NEWS (Feb. 23, 2021, 5:43 PM), <https://www.nbcnews.com/think/opinion/abolishing-police-prisons-lot-more-practical-critics-claim-ncna1258659>.

53. McLeod, *supra* note 40, at 1616; Akbar, *supra* note 51, at 1802–03.

54. See McLeod, *supra* note 40, at 1616; Akbar, *supra* note 51, at 1802; CRITICAL RESISTANCE, REFORMIST REFORMS VS. ABOLITIONIST STEPS IN POLICING, https://static1.squarespace.com/static/59ead8f9692ebee25b72f17f/t/5b65cd58758d46d34254f22c/1533398363539/CR_NoCops_reform_vs_abolition_CRside.pdf.

55. Marina Bell, *Abolition: A New Paradigm for Reform*, 46 L. & SOC. INQUIRY 32, 32–34 (2021).

with systemic problems.⁵⁶ Abolitionists ground their approach in the idea that the entire carceral structure—which surveils, monitors, and inflicts violence on Black, Brown, and other marginalized communities—has white supremacist origins that date back to chattel slavery and was erected with the purpose of maintaining a racial hierarchy.⁵⁷ They question the conventional narrative that incidents of carceral violence are singular aberrations, one-off abuses, or the product of “bad apples.”⁵⁸ They emphasize that, despite generations of modest “reform,” the carceral system continues to function pursuant to its original intent to dominate Black lives and communities.⁵⁹ They argue that this is by design: the “abuses” that the mainstream may only now cognize, like harsh sentencing practices, police violence, and other punitive aspects of criminal “justice,” are not abuses at all, but the system operating as intended.⁶⁰ As a consequence, conventional reforms cannot correct the injustices frequently produced by the criminal legal system because they do not address its rotten roots. Rather, such reforms allow the system to carry on as it always has while legitimizing the process.⁶¹

Although “defund,” “dismantle,” and similar calls mean different things to different people,⁶² they have a unifying thesis. They all call for an honest examination of the illegitimate history of carceral institutions—by, for example, spotlighting that modern policing is descended from slave patrols, violent Jim Crow-era police forces, and other early policing institutions that sought to control Black people and other marginalized groups through surveillance and brutality⁶³—and implementation of changes that honestly confront and dismantle these violent and harmful origins. While the term “abolition” may suggest a primary focus on tearing down the current system, the philosophy is just as much about building. Abolitionists seek to replace existing structures

56. See Akbar, *supra* note 51, at 1802; Dorothy E. Roberts, *Abolition Constitutionalism*, 133 HARV. L. REV. 1, 43 (2019).

57. Allegra M. McLeod, *Prison Abolition and Grounded Justice*, 62 UCLA L. REV. 1156, 1162 (2015).

58. May & Yancy, *supra* note 36.

59. See McLeod, *supra* note 40, at 1621; Sam Levin, *It's Not About Bad Apples': How US Police Reforms Have Failed to Stop Brutality and Violence*, THE GUARDIAN (June 16, 2020, 6:00 PM), <https://www.theguardian.com/us-news/2020/jun/16/its-not-about-bad-apples-how-us-police-reforms-have-failed-to-stop-brutality-and-violence>.

60. See Akbar, *supra* note 51, at 1782, 1824–25.

61. Rachel Kushner, *Is Prison Necessary? Ruth Wilson Gilmore Might Change Your Mind*, N.Y. TIMES (Apr. 17, 2019), <https://www.nytimes.com/2019/04/17/magazine/prison-abolition-ruth-wilson-gilmore.html>; Cullors, *supra* note 37; Jamiles Lartey & Annaliese Griffin, *The System: The Future of Policing*, THE MARSHALL PROJECT (Oct. 23, 2020), <https://www.themarshallproject.org/2020/10/23/the-future-of-policing>; see also Roberts, *supra* note 56, at 4–5 (“Many individuals have therefore concluded that the answer to persistent injustice in criminal law enforcement is not reform; it is prison abolition.”).

62. See Josiah Bates, *How Are Activists Managing Dissension Within the 'Defund the Police' Movement?*, TIME (Feb. 23, 2021, 3:45 PM), <https://time.com/5936408/defund-the-police-definition-movement/>; Roberts, *supra* note 56, at 6–7.

63. Akbar, *supra* note 51, at 1782–83, 1813, 1817–18; Roberts, *supra* note 56, at 21, 23–24; Jill Lepore, *The Invention of the Police*, NEW YORKER (July 13, 2020), <https://www.newyorker.com/magazine/2020/07/20/the-invention-of-the-police>.

with systems that promote safety and accountability through care.⁶⁴ The idea is that meaningful change requires scaling back and divesting from carceral institutions that create harm and replacing them with institutions designed to value Black, Brown, and other marginalized lives.⁶⁵

While a singular abolitionist framework cannot be isolated,⁶⁶ scholars and leaders within the movement have extracted principles fundamental to the theory and practice.⁶⁷ Dorothy Roberts identifies three central tenets of abolitionist theory.⁶⁸ First, the modern criminal legal system originates with and is rooted in chattel slavery and the racist capitalist economy it supported.⁶⁹ Second, the carceral system does not promote safety or justice; rather, it is an institution that oppresses and controls Black, Brown, and other marginalized communities.⁷⁰ Third, a society in which the carceral institution is unnecessary can be constructed by meeting the basic needs of communities and utilizing community-based alternatives to carceral punishment to correct societal harms.⁷¹

Mariame Kaba similarly identifies obligations fundamental to abolitionist activism and practice. The first, by now likely obvious, is to eliminate policing, imprisonment, and surveillance altogether.⁷² In recognition of the fact that the current system oppresses and fails to ensure safety, wellbeing, or justice, the second obligation is to reject any expansion or legitimization of the carceral state.⁷³ The third argues that the state has engaged in systematic abandonment of and disinvestment in vulnerable communities by allowing—and sometimes promoting—the dissolution of the social safety net and its replacement with surveillance, policing, and imprisonment.⁷⁴ Critical to the abolitionist

64. See, e.g., Cullors, *supra* note 37.

65. Kushner, *supra* note 61; MARIAME KABA, WE DO THIS ‘TIL WE FREE US: ABOLITIONIST ORGANIZING AND TRANSFORMING JUSTICE 2–5, 12–13 (Tamara K. Nopper ed., 2021).

66. Roberts, *supra* note 56, at 6–7.

67. Abolitionist theory is deep and nuanced; its literature is rich, robust, and voluminous. The brief descriptions of it contained in this Article are meant to be a snapshot, rather than a comprehensive overview. For a more thorough introduction, see generally Akbar, *supra* note 51; Roberts, *supra* note 56; KABA, *supra* note 65; Patrisse Cullors, *Abolition and Reparations: Histories of Resistance, Transformative Justice, and Accountability*, 132 HARV. L. REV. 1684 (2019); McLeod, *supra* note 40; ANGELA Y. DAVIS, ARE PRISONS OBSOLETE? (Greg Ruggiero ed., 2003); McLeod, *supra* note 57, at 1156; Dorothy E. Roberts, *Constructing a Criminal Justice System Free of Racial Bias: An Abolitionist Framework*, 39 COLUM. HUM. RTS. L. REV. 261 (2008); Dylan Rodríguez, *Abolition as Praxis of Human Being: A Foreword*, 132 HARV. L. REV. 1575 (2019); RUTH WILSON GILMORE, GOLDEN GULAG: PRISONS, SURPLUS, CRISIS, AND OPPOSITION IN GLOBALIZING CALIFORNIA (2007).

68. Roberts, *supra* note 56, at 7–8.

69. *Id.* at 7, 19; Alexis Hoag, *Abolition as the Solution: Redress for Victims of Excessive Police Force*, 48 FORDHAM URB. L.J. 721, 737 (2021).

70. See Roberts, *supra* note 56, at 7.

71. *Id.* at 7–8; Lartey & Griffin, *supra* note 61.

72. KABA, *supra* note 65, at 133.

73. See *id.*

74. See *id.* at 134; Intercepted Podcast, *Ruth Wilson Gilmore Makes the Case for Abolition*, THE INTERCEPT (June 10, 2020, 5:02 AM), <https://theintercept.com/2020/06/10/ruth-wilson-gilmore-makes-the-case-for-abolition/>.

perspective is that the power to make decisions about how to promote safety and justice must be transferred directly to the communities impacted by carceral harm.⁷⁵

Abolitionists recognize that a complete and immediate end to the carceral state is unrealistic; rather, dismantling it requires dedicated deliberate steps in furtherance of that ultimate goal.⁷⁶ Accordingly, en route to total elimination of carceral institutions, non-reformist reforms, which aim to divest power from the carceral state while highlighting the harms it causes, may be implemented.⁷⁷ A non-reformist approach prioritizes contraction of the carceral institution and its power and avoids actions that validate or condone the current system.⁷⁸ Divest–invest models, which seek to reallocate funds from carceral functions like policing and prisons to investments that focus on the wellbeing of Black and other marginalized people, are one example of a non-reformist reform strategy.⁷⁹ The movement to defund the police is another.⁸⁰

B. *The Forensic System Today*

Abolitionist approaches can be adapted to call for deconstruction or transformation of institutions beyond policing and prisons. An abolitionist approach has been applied to call for abolition of criminal surveillance⁸¹ and beyond the criminal legal system entirely.⁸² Forensics is another aspect of the criminal legal system that these approaches can be applied to.

Forensic methods enable surveillance, prosecution, conviction, and punishment—the core inputs and outputs of the criminal legal system.⁸³ Black, Brown, and other marginalized groups, overrepresented in the criminal legal system, are especially impacted by these methods. Forensic techniques allow

75. See VITALE, *supra* note 38, at 224–25.

76. See KABA, *supra* note 65, at 13, 96, 137.

77. See GILMORE, *supra* note 67, at 242; see also Roberts, *supra* note 56, at 114; Akbar, *supra* note 41, at 101.

78. Akbar, *supra* note 41, at 101–02.

79. See, e.g., *Invest-Divest*, THE MOVEMENT FOR BLACK LIVES, <https://m4bl.org/policy-platforms/invest-divest/> (last visited Apr. 19, 2022).

80. See Akbar, *supra* note 41, at 112–13.

81. See Hamid Khan & Pete White, *Police Surveillance Can't Be Reformed. It Must be Abolished*, VICE (Mar. 10, 2021, 9:36 AM), <https://www.vice.com/en/article/xgzj7n/police-surveillance-cant-be-reformed-it-must-be-abolished>; Maryam Jamshidi, *The Discriminatory Executive and the Rule of Law*, 92 U. COLO. L. REV. 77, 175–76 (2021).

82. See Nicole Smith Futrell, *The Practice and Pedagogy of Carceral Abolition in a Criminal Defense Clinic*, 45 N.Y.U. REV. L. & SOC. CHANGE 159, 167 (2021) (“Abolitionist movements seek to deconstruct various systems, institutions, and practices beyond criminal punishment”); see also Ingrid Joylyn Paredes, *Why Evidence-Based Climate Justice Includes Abolition*, SISTER (Sept. 22, 2020), <https://sisterstem.org/2020/09/22/why-evidence-based-climate-justice-includes-abolition/> (calling for climate justice activism that demands disinvestment from the fossil fuel industry and investment in the communities most impacted by pollution and global warming).

83. See Jennifer L. Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725, 726 (2011).

law enforcement to surveil and monitor: DNA and fingerprint databases, in which Black and Brown people are overrepresented, house identifying information of millions of individuals, and allow police to monitor and supervise communities;⁸⁴ police use, often in secret, sophisticated location tracking devices to surveil;⁸⁵ and emerging technologies, like facial recognition systems, allow even greater mass monitoring and surveillance.⁸⁶ Databases like the FBI's Combined DNA Index System (CODIS), the Automated Fingerprint Identification System (AFIS), and even consumer DNA databases amass biometric data in seeming perpetuity, widening law enforcement's net of possible suspects.⁸⁷ Unsurprisingly, people of color, and Black people especially, are most affected by these tactics, as law enforcement monitors their communities more than those of other nonmarginalized populations.⁸⁸ Not only do forensic methods enable carceral harm, they also launder and legitimize it by cloaking carceral functions with the allegedly neutral and objective aura of science.⁸⁹

Against this backdrop, this Part briefly outlines the carceral origins of forensics and the legacy of those origins.

84. See Ava Kofman, *The FBI Wants to Exempt Massive Biometric Database from the Privacy Act*, THE INTERCEPT (June 1, 2016, 3:06 PM), <https://theintercept.com/2016/06/01/the-fbi-wants-to-exempt-massive-biometric-database-from-the-privacy-act/>; Natalie Ram, *The U.S. May Soon Have a De Facto National DNA Database*, SLATE (Mar. 19, 2019, 7:30 AM), <https://slate.com/technology/2019/03/national-dna-database-law-enforcement-genetic-genealogy.html>; *Privacy Impact Assessment Integrated Automated Fingerprint Identification System National Security Enhancements*, FBI, <https://www.fbi.gov/services/information-management/foipa/privacy-impact-assessments/iafis> (last visited Apr. 19, 2022); Erin Murphy & Jun H. Tong, *The Racial Composition of Forensic DNA Databases*, 108 CALIF. L. REV. 1847, 1851 (2020); Denise Syndercombe Court, *Protecting Against Racial Bias in DNA Databasing*, 1 NATURE COMPUTATIONAL SCI. 249 (2021).

85. TASK FORCE ON PREDICTIVE POLICING, NAT'L ASSN. OF CRIM. DEF. LAWYERS, GARBAGE IN, GOSPEL OUT: HOW DATA-DRIVEN POLICING TECHNOLOGIES ENTRENCH HISTORIC RACISM AND 'TECH-WASH' BIAS IN THE CRIMINAL LEGAL SYSTEM 30, 51 (2021), <https://www.nacdl.org/getattachment/eb6a04b2-4887-4a46-a708-dbdaade82125/garbage-in-gospel-out-how-data-driven-policing-technologies-entrench-historic-racism-and-tech-wash-bias-in-the-criminal-legal-system-09142021.pdf>.

86. Lindsey Barrett, *Ban Facial Recognition Technologies for Children and for Everyone Else*, 26 B.U. J. SCI. & TECH. 223, 240 (2020); Andrew Guthrie Ferguson, *Facial Recognition and the Fourth Amendment*, 105 MINN. L. REV. 1105, 1115 (2021).

87. Natalie Ram, Erin E. Murphy & Sonia M. Suter, *Regulating Forensic Genetic Genealogy*, 373 SCI. 1444, 1444 (2021).

88. See Murphy & Tong, *supra* note 84, at 1851.

89. See Jessica Gabel Cino, *Roadblocks: Cultural and Structural Impediments to Forensic Science Reform*, 57 HOUS. L. REV. 533, 540 (2020) (“[E]veryone can sleep better at night because ‘science’ solidified the conviction.”).

1. *The Carceral Origins of Forensic Methods*

“[M]any forensic fields (e.g., firearms analysis, latent fingerprint identification) are but handmaidens of the legal system, and they have no significant uses beyond law enforcement.”⁹⁰

* * *

The increased use of forensic techniques in criminal cases coincides neatly with the beginning of the forty-year period of mass criminalization responsible for the explosion of the prison population evident today.⁹¹ This is not a coincidence.

Most forensic methods were first developed in police departments as investigative aids meant to produce evidence that would connect suspects to crimes and secure convictions.⁹² Despite the nomenclature, other than DNA analysis, forensic disciplines did not arise out of academia, research institutions, or scientific laboratories—they do not have their origins in the sciences at all.⁹³ Their development was financed by the “War on Crime,” launched by President Lyndon Johnson in 1965, and the better-known “War on Drugs,” which

90. NAS REPORT, *supra* note 2, at 52.

91. See NAT'L RSCH. COUNCIL, *THE GROWTH OF INCARCERATION IN THE UNITED STATES: EXPLORING THE CAUSES AND CONSEQUENCES* 33 (Jeremy Travis et al. eds., 2014); Bernstein, *supra* note 18, at 34. Beginning in the late 1960s and continuing through the 1970s and 1980s, politicians, most notably Richard Nixon, latched on to white backlash to civil rights gains earned by Black Americans in the late 1960s and declared the need to establish “law and order.” MICHELLE ALEXANDER, *THE NEW JIM CROW: MASS INCARCERATION IN THE AGE OF COLORBLINDNESS* 50–56 (rev. ed. 2020). Tough-on-crime rhetoric transformed into harsh crime policy and focused on aggressive policing that targeted minority communities. See James Cullen, *The History of Mass Incarceration*, BRENNAN CTR. FOR JUST. (July 20, 2018), <https://www.brennancenter.org/our-work/analysis-opinion/history-mass-incarceration>; THE SENT'G PROJECT, *REPORT OF THE SENTENCING PROJECT TO THE UNITED NATIONS SPECIAL RAPPORTEUR ON CONTEMPORARY FORMS OF RACISM, RACIAL DISCRIMINATION, XENOPHOBIA, AND RELATED INTOLERANCE* 3 (2018), <https://www.sentencingproject.org/wp-content/uploads/2018/04/UN-Report-on-Racial-Disparities.pdf>; Benjamin Levin, *The Consensus Myth in Criminal Justice Reform*, 117 MICH. L. REV. 259, 260–61 (2018).

92. See NAS REPORT, *supra* note 2, at 42, 187; Meehan Crist & Tim Requarth, *Forensic Science Put Jimmy Genrich in Prison for 24 Years. What if It Wasn't Science?*, THE NATION (Feb. 1, 2018), <https://www.thenation.com/article/archive/the-crisis-of-american-forensics/>; Terrence F. Kiely, *The Houses of Deceits: Science, Forensic Science, and Evidence*, 35 LAND & WATER L. REV. 397, 415 (2000).

93. Eric S. Lander, *Fixing Rule 702: The PCAAST Report and Steps to Ensure the Reliability of Forensic Feature-Comparison Methods in the Criminal Courts*, 86 FORDHAM L. REV. 1661, 1668 (2018); Paul C. Giannelli, *Independent Crime Laboratories: The Problem of Motivational and Cognitive Bias*, 2010 UTAH L. REV. 247, 250; NAS REPORT, *supra* note 2, at 42; SANDRA GUERRA THOMPSON, *COPS IN LAB COATS: CURBING WRONGFUL CONVICTIONS THROUGH INDEPENDENT FORENSIC LABORATORIES* 195 (2015); Radley Balko, *Opinion, Jeff Sessions Wants to Keep Forensics in the Dark Ages*, WASH. POST (Apr. 11, 2017), <https://www.washingtonpost.com/news/the-watch/wp/2017/04/11/jeff-sessions-wants-to-keep-forensics-in-the-dark-ages/>.

brought federal funding to local police departments to effectuate national crime policy.⁹⁴

In the mid-1960s, partially in response to unrest in urban cities related to discriminatory policing, mass fear around rising crime took hold across America and in national politics.⁹⁵ As part of a federal response to the perceived threat of crime and disorder, in 1965, President Lyndon Johnson launched the War on Crime—the less famous precursor to Presidents Nixon and Reagan’s War on Drugs—and sent Congress the Law Enforcement Assistance Act.⁹⁶ The passage of the Law Enforcement Assistance Act was a watershed moment in American law enforcement; it marked the beginning of the modern era of criminal justice in which the federal government plays a direct role in local law enforcement.⁹⁷

The Law Enforcement Assistance Act paved the way not only for mass criminalization but also for the widespread use of forensic methods in law enforcement seen today.⁹⁸ In the leadup to the passage of the Law Enforcement Assistance Act, President Johnson established a national commission to study the perceived crime problem and develop a national law enforcement program.⁹⁹ The commission focused its efforts on urban Black communities, which it believed to be at the center of the crime problem, without consultation with members of those communities.¹⁰⁰

The commission’s sweeping final report, issued in 1967, made hundreds of wide-ranging recommendations.¹⁰¹ Among these were recommendations to improve police ability to utilize technological advancements like fingerprint and voiceprint analyses and other forensic techniques by establishing additional crime labs and conducting research to facilitate the use of such techniques to aid in law enforcement efforts.¹⁰² The commission also suggested that future crime-solving would require the collection and forensic analysis of physical crime scene evidence, including fingerprints, weapons, shoeprints, and trace

94. See ELIZABETH HINTON, FROM THE WAR ON POVERTY TO THE WAR ON CRIME: THE MAKING OF MASS INCARCERATION IN AMERICA 2 (2016).

95. See *id.* at 55–56. In reality, and contrary to popular belief, reported rising crime rates corresponded to newly implemented crime statistics measures and reporting policies that coincided with new federal crime control funding tied to reported crime rates. *Id.*

96. *Id.* at 1–2.

97. *Id.*

98. *Id.* at 5; Joseph L. Peterson & Anna S. Leggett, *The Evolution of Forensic Science: Progress Amid the Pitfalls*, 36 STETSON L. REV. 621, 623–25 (2007).

99. PRESIDENT’S COMM’N ON L. ENF’T AND ADMIN. OF JUST., THE CHALLENGE OF CRIME IN A FREE SOCIETY, Foreword (1967) [hereinafter CRIME COMMISSION REPORT], <https://www.ojp.gov/sites/g/files/xyckuh241/files/archives/ncjrs/42.pdf>; HINTON, *supra* note 94, at 80–81.

100. HINTON, *supra* note 94, at 83–84.

101. CRIME COMMISSION REPORT, *supra* note 99, at 293–301.

102. *Id.* at 245–46, 255.

evidence, and encouraged investment in lab services and the establishment of a central fingerprint database.¹⁰³

These recommendations were a significant factor in paving the way for increased attention to the development and utilization of forensic methods.¹⁰⁴ The commission's recommendations became the basis for legislation that provided unprecedented funding to local law enforcement agencies to facilitate these new initiatives.¹⁰⁵ Billions of dollars were ultimately sent to local law enforcement, which allowed for the development of methods to collect and analyze physical crime scene evidence and resulted in the proliferation of police crime labs.¹⁰⁶ Notably, War on Crime dollars also funded surveillance technologies focusing on Black communities that included helicopter systems, crime prediction programs, and mobile surveillance units.¹⁰⁷

Federal crime policy eventually transitioned to having a near-singular focus on drugs.¹⁰⁸ Grant funding was tied to drug enforcement, driving up arrests and prosecutions relating to drug crimes.¹⁰⁹ The new pace of policing in this period required tools to serve the needs of expanded law enforcement.¹¹⁰ Forensics served as one such tool.¹¹¹ These policies resulted in the development of police crime labs centered initially around drug testing.¹¹² These labs went beyond drug testing, however, to develop or further the use of forensic techniques in criminal prosecutions.¹¹³ The result was increased use in criminal prosecutions of then-new forensic methods, including voiceprinting, bitemark analysis, and hair-comparison analysis.¹¹⁴

As a result of its law enforcement origins, forensic disciplines have a natural alignment with one side of the adversarial process: the prosecution.¹¹⁵ That alignment runs deep.¹¹⁶ Forensic practitioners both work for and communicate

103. PRESIDENT'S COMM'N ON L. ENF'T AND ADMIN. OF JUST., TASK FORCE ON THE POLICE, TASK FORCE REPORT: THE POLICE 51, 57, 92 (1967), <https://www.ojp.gov/pdffiles1/Digitization/147374NCJRS.pdf>.

104. *See id.* at 92.

105. *See* HINTON, *supra* note 94, at 2, 104; Peterson & Leggett, *supra* note 98, at 623.

106. Peterson & Leggett, *supra* note 98, at 625.

107. HINTON, *supra* note 94, at 87, 90–92.

108. *See id.* at 317.

109. *See id.* at 318.

110. *See* Matthew Nesvet, *Anatomy of a Crime Lab: Winning Convictions 'on the Cheap'*, THE CRIME REP. (Dec. 15, 2020), <https://thecrimereport.org/2020/12/15/anatomy-of-a-crime-lab-winning-convictions-on-the-cheap/>.

111. *See* Giannelli, *supra* note 17, at 1199.

112. *See* Peterson & Leggett, *supra* note 98, at 624; NAT'L INST. OF JUST., NCJ 248572, THE IMPACT OF FORENSIC SCIENCE RESEARCH AND DEVELOPMENT 4–6 (2015); NAT'L INST. OF JUST., NCJ 146878, LEAA 1970 *passim* (1970); Giannelli, *supra* note 17, at 1199–1200.

113. *See* Giannelli, *supra* note 17, at 1199–200.

114. Bernstein, *supra* note 18; Giannelli, *supra* note 17.

115. Michael J. Saks, *Merlin and Solomon: Lessons from the Law's Formative Encounters with Forensic Identification Science*, 49 HASTINGS L.J. 1069, 1092 (1998).

116. *See id.*

heavily with prosecutors and rarely work collaboratively with defense lawyers without prosecutors listening in.¹¹⁷ As a result, forensic practitioners often see themselves as part of the prosecution team, exhibiting pro-prosecution bias and willingness to provide testimony that supports the prosecution's case, even when unwarranted.¹¹⁸ Even those who do not view themselves as an arm of law enforcement may be pressured to return the result sought by the prosecution.¹¹⁹

Though most forensic methods were developed outside the scientific process without integrating the fundamentals of the scientific method, law enforcement co-opted the term *science* as part of a strategy to professionalize police departments by connecting them to science to give weight and credibility to forensic techniques.¹²⁰ Practitioners described themselves as forensic “scientists,” when they were often more aptly characterized as technicians focusing on the application of methods rather than research or theory.¹²¹ Police departments created crime laboratories not for testing theories and hypotheses but, at least in part, for public relations.¹²²

Because forensics inherited law enforcement's concern for securing convictions, the scientific method and process were often left by the wayside in the development of forensic methods.¹²³ Given that those targeted for prosecution and conviction are disproportionately Black, Brown, or otherwise of color,¹²⁴ it comes as no surprise that those convicted by unreliable forensic evidence are also members of marginalized communities. The overlap between the increased use of forensic techniques and the mass expansion of the criminal legal system makes clear that those who have been hit hardest by nearly five decades of expanded criminalization, Black and Brown communities,¹²⁵ are also the most likely to bear the brunt of flawed forensics in their cases. It is difficult to quantify the effects of flawed forensics, but the available data bear this out. The National Registry of Exonerations reports that problematic forensic

117. See Nicole Bremner Cásarez & Sandra Guerra Thompson, *Three Transformative Ideals to Build a Better Crime Lab*, 34 GA. ST. U. L. REV. 1007, 1008 (2018). Of course, the accused use forensic evidence too but with far less frequency and typically in response to prosecution evidence. *Id.*

118. See, e.g., Paul C. Giannelli, *The Abuse of Scientific Evidence in Criminal Cases: The Need for Independent Crime Laboratories*, 4 VA. J. SOC. POL'Y & L. 439, 441 (1997).

119. See NAS REPORT, *supra* note 2, at 23–24.

120. See Crist & Requarth, *supra* note 92; Radley Balko, *A Brief History of Forensics*, WASH. POST (Apr. 21, 2015), <https://www.washingtonpost.com/news/the-watch/wp/2015/04/21/a-brief-history-of-forensics/>; Mnookin et al., *supra* note 83, at 766.

121. Michael J. Saks & David L. Faigman, *Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It*, 4 ANN. REV. L. & SOC. SCI. 149, 153 (2008); Mnookin et al., *supra* note 83, at 766; see also Paul C. Giannelli, *Forensic Science: Why No Research?*, 38 FORDHAM URB. L.J. 503, 508–09 (2010).

122. Saks, *supra* note 115; see also Crist & Requarth, *supra* note 92.

123. See Saks & Faigman, *supra* note 121, at 157–58.

124. See *Race and Ethnicity*, PRISON POLY INITIATIVE, https://www.prisonpolicy.org/research/race_and_ethnicity/ (last updated Mar. 4, 2022) (consolidating data on, *inter alia*, overrepresentation of people of color in the criminal legal system).

125. *Criminal Justice Facts*, THE SENT'G PROJECT, <https://www.sentencingproject.org/criminal-justice-facts/> (last visited Apr. 19, 2022); Levin, *supra* note 91.

evidence has contributed to twenty-four percent of wrongful convictions.¹²⁶ Of that group, fifty-four percent of those convicted are Black or Latine.¹²⁷

2. *Carceral Culture in Forensics*

A consequence of these law enforcement origins is that forensic methods developed insulation from traditional scientific checks and balances like independent review, critique, and repeated testing, and in turn, a scientific culture designed to promote these features did not emerge.¹²⁸ This lack of scientific culture remains entrenched today and has evolved into a significant hurdle for reform efforts.¹²⁹

Because it is both outcome-oriented and influenced by adversarial interests, forensic science is distinct from the broader scientific community.¹³⁰ Whereas the scientific process aims to generate knowledge via the scientific method by promoting continuous research and reevaluation of ideas and methods as opposed to the achievement of a specific outcome,¹³¹ forensic methods focus on processing cases and obtaining convictions.¹³²

While counter influences, like profit motives, do exist in science, the broader scientific community utilizes incentive and feedback structures designed to guard against straying from scientific methodology and generating false results in pursuit of predetermined outcomes.¹³³ It embraces a group-driven process for generating knowledge that involves multiple levels of evaluation of scientific work;¹³⁴ researchers present findings to each other, and feedback is either approving or critical, potentially resulting in disapproval of the presented work.¹³⁵ Scientific accomplishment and professional recognition may

126. See % *Exonerations by Contributing Factor*, NAT'L REGISTRY OF EXONERATIONS, <http://www.law.umich.edu/special/exoneration/Pages/ExonerationsContribFactorsByCrime.aspx> (last updated Mar. 19, 2022).

127. The National Registry of Exonerations lists 715 wrongful convictions as involving faulty forensic evidence as a contributing factor. Detailed View of Cases, NAT'L REGISTRY OF EXONERATIONS, <http://www.law.umich.edu/special/exoneration/Pages/detail.aspx?View={FAF6EDDB-5A68-4F8F-8A52-2C61F5BF9EA7}&FilterField1=F%5Fx002F%5FMFE&FilterValue1=8%5FF%2FMFE> (last visited Mar. 19 2022). Of those, it lists 332 as Black and 52 as "Hispanic." *Id.*

128. See D. Michael Risinger & Michael J. Saks, *A House with No Foundation*, ISSUES IN SCI. & TECH., Fall 2003, <https://issues.org/risinger/>; Lander, *supra* note 93; Paul C. Giannelli, *Daubert and Forensic Science: The Pitfalls of Law Enforcement Control of Scientific Research*, 2011 U. ILL. L. REV. 53, 88.

129. Lander, *supra* note 93; see also Giannelli, *supra* note 121, at 517–18 ("Instead of taking the lead in ensuring that the needed research was conducted, many forensic practitioners adopted a 'circle the wagons' mentality and attacked the critics.")

130. See Cino, *supra* note 89, at 534; Mnookin et al., *supra* note 83, at 731; see also Balko, *supra* note 93.

131. See Lander, *supra* note 93, at 1662; Cino, *supra* note 89, at 534.

132. Cino, *supra* note 89, at 534–35, 537.

133. Risinger & Saks, *supra* note 128.

134. See *id.*

135. See Cino, *supra* note 89, at 539.

be valued over profit or outcome.¹³⁶ The threat of losing professional recognition by generating false information or techniques promotes adherence to the scientific method and serves as an additional deterrent to shortcuts to thorough research.¹³⁷

Another check is peer review, which, while imperfect,¹³⁸ serves several functions for increasing the reliability and accuracy of science. As a threshold matter, before publication, research is reviewed to ensure that it meets scientific standards.¹³⁹ Additionally, in the broader scientific community, scientific journals are listed in widely available indices and are available through libraries.¹⁴⁰ Publication in widely disseminated journals encourages scrutiny, transparency, and continued reevaluation, particularly if underlying data are made available.¹⁴¹ Additionally, some databases maintain listings of journals that meet certain quality criteria and impact ratings, which measure the scholarly impact of a journal based on citation rate.¹⁴²

Peer review can take several forms. Review can be “double blind,” traditionally considered to be best practice, where the identity of the author is not disclosed to the reviewer and that of the reviewer is not disclosed to the author.¹⁴³ The aim of double-blind peer review is to prevent bias from infecting the review process and to encourage honest review of work.¹⁴⁴ Review can also be “single blind,” in which the reviewer knows the identity of the author, but the reverse is not true.¹⁴⁵ Least tailored to ensure neutrality is open review, in which both parties know each other’s identities and can communicate about a draft.¹⁴⁶

Many peer-reviewed journals also encourage neutrality by requiring authors to disclose potential sources of bias, including grant sources, competing

136. *Id.* at 536–37.

137. *Id.* at 536–37, 39.

138. See DAVID H. KAYE, DAVID E. BERNSTEIN & JENNIFER L. MNOOKIN, *THE NEW WIGMORE: A TREATISE ON EVIDENCE: EXPERT EVIDENCE* § 7.3.2(b) (Richard D. Friedman ed., 2011); Effie J. Chan, *The “Brave New World” of Daubert: True Peer Review, Editorial Peer Review, and Scientific Validity*, 70 N.Y.U. L. REV. 100, 117–18 (1995); Kwong, *supra* note 4, at 289; 1 DAVID L. FAIGMAN ET AL., *MODERN SCIENTIFIC EVIDENCE* § 1:23 (2019).

139. Jacalyn Kelly, Tara Sadeghieh & Khosrow Adeli, *Peer Review in Scientific Publications: Benefits, Critiques, & a Survival Guide*, J. INT’L FED’N CLINICAL CHEMISTRY LAB’Y MED. 227, 228 (2014).

140. See Mnookin et al., *supra* note 83, at 754–55.

141. *Id.* at 755–58.

142. See, e.g., *Web of Science Core Collection Editorial Selection Process*, CLARIVATE, <https://clarivate.com/webofsciencegroup/journal-evaluation-process-and-selection-criteria/> (last visited Apr. 19, 2022); Mnookin et al., *supra* note 83, at 756 n.90; Alan Wayne Jones, *The Distribution of Forensic Journals, Reflections on Authorship Practices, Peer-Review and Role of the Impact Factor*, 165 FORENSIC SCI. INT’L 115, 115–16 (2007).

143. William L. Anderson, Barry M. Parsons & Drummond Rennie, *Daubert’s Backwash: Litigation-Generated Science*, 34 U. MICH. J.L. REFORM 619, 640 (2001).

144. Mnookin et al., *supra* note 83, at 771.

145. Anderson, Parsons & Rennie, *supra* note 143.

146. See *id.*

interests, and other affiliations.¹⁴⁷ Some also disallow editors from having an interest in technologies or companies that may produce research that they may be required to review.¹⁴⁸ For example, all but one of the 117 journals designated as “Core Clinical Journals” by the National Library of Medicine¹⁴⁹ have a conflict policy requiring, at a minimum, authors to disclose financial conflicts of interest.¹⁵⁰ A majority requires one or more additional conflict disclosures.¹⁵¹

While forensic disciplines claim to have similar journals, many forensic journals lack the quality, rigor, transparency, and accessibility of mainstream scientific journals.¹⁵² They are not nearly as accessible or widely disseminated as mainstream scientific journals, shielding forensic work from scrutiny.¹⁵³ Moreover, many do not utilize rigorous peer review, limiting the quality of checks on published work as well as insulation from bias.¹⁵⁴ Many journals do not employ double-blind—or even single-blind—review.¹⁵⁵ They also lack the transparency of peer-reviewed journals: many forensic journals are not widely accessible through major indexing services or libraries,¹⁵⁶ and very few are listed among journal database listings as quality, high-impact journals.¹⁵⁷

On top of this, forensic researchers have purposefully failed to gather data and have been reluctant to release research data, limiting retesting and further research.¹⁵⁸ Likewise, some forensic science journals have no conflict-of-interest policy whatsoever, while others employ watered-down versions of those of mainstream journals.¹⁵⁹

147. E.g., *Science Journals: Editorial Policies*, SCIENCE, <https://www.sciencemag.org/authors/science-journals-editorial-policies> (last visited Apr. 19, 2022); *Editorial Policies*, NATURE, <https://www.nature.com/nature-research/editorial-policies> (last visited Apr. 19, 2022).

148. *Science Journals: Editorial Policies*, *supra* note 147.

149. *Abridged Index Medicus (AIM or “Core Clinical”) Journal Titles*, NAT’L LIBR. MED., <https://www.nlm.nih.gov/bsd/aim.html> (last updated July 27, 2020).

150. Khaled Shawwa et al., *Requirements of Clinical Journals for Authors’ Disclosure of Financial and Non-Financial Conflicts of Interest: A Cross Sectional Study*, PLOS ONE (Mar. 31, 2016), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0152301>.

151. *Id.*

152. See Jason M. Chin, Gianni Ribeiro & Alicia Rairden, *Open Forensic Science*, 6 J.L. & BIOSCIENCES 255, 268–71, 275 (2019).

153. Mnookin et al., *supra* note 83, at 754.

154. *Id.* at 754–57.

155. See *id.*

156. *Id.*

157. See *id.* at 756; Sarfaraz Alam, *List of Science Citation Index (SCI) Journals*, RESEARCHGATE (Mar. 2019), https://www.researchgate.net/publication/331546716_List_of_Science_Citation_Index_SCI_journals; Chin, Ribeiro & Rairden, *supra* note 152, at 271.

158. Cino, *supra* note 89, at 538; see also, NIST DNA MIXTURE INTERPRETATION FOUNDATION REVIEW, *supra* note 4, at 75, 87.

159. *Compare AFTE Peer Review Process*, ASS’N OF FIREARM & TOOL MARK EXAM’RS, <https://afte.org/afte-journal/afte-journal-peer-review-process> (last visited Apr. 19, 2022), with *Author Guidelines*, JUNIPER PUBLISHERS (last visited Apr. 19, 2022), <https://juniperpublishers.com/author-guidelines.php>; and *Author Guidelines*, J. FORENSIC SCIS., <https://onlinelibrary.wiley.com/page/journal/15564029/homepage/forauthors.html> (last visited Apr. 19, 2022).

Other safeguards, cues, and indicators exist to ensure that ideas, techniques, or products are valid. Basic market forces, like competition and consumer reviews, help give end-users confidence in the efficacy of products, devices, or treatments. Competition, for example, encourages innovation and the production of ideas.¹⁶⁰ But competition in the traditional sense does not exist in forensics because forensic methods are predominantly practiced outside of traditional markets. Once a conviction is obtained, there is little incentive for prosecutors to encourage further research that might result in findings that undermine the forensic evidence that has proven persuasive to judges and juries.¹⁶¹ Instead, forensic practitioners often receive positive feedback, regardless of the accuracy of their findings.¹⁶²

For-profit carceral technologies further demonstrate this point. Take ShotSpotter as an example. Essentially, ShotSpotter purports to be a gunshot detection system that uses a network of microphones installed in various locations to detect and locate gunfire.¹⁶³ The system uses an algorithm to approximate the location of alleged gunshots.¹⁶⁴ Investigations have shown that ShotSpotter microphones are installed mostly, if not exclusively, in predominantly Black and Latinx neighborhoods.¹⁶⁵

ShotSpotter is sold and marketed exclusively to police departments and is incentivized to satisfy those customers.¹⁶⁶ Independent investigations have revealed that ShotSpotter analysts sometimes reclassify sounds the system originally characterizes as non-gunfire as gunshots and alter other data,

160. See, e.g., *N. Pac. Ry. Co. v. United States*, 356 U.S. 1, 4 (1958) (“[T]he unrestrained interaction of competitive forces will yield the best allocation of our economic resources, the lowest prices, the highest quality and the greatest material progress”); Daniel P. Gross, *Creativity Under Fire: The Effects of Competition on Creative Production* 24, (Harv. Bus. Sch. Working Paper No. 16-109, 2016), https://www.hbs.edu/ris/Publication%20Files/16-109_bd402d7e-f9d1-465f-837e-7e36a3a3ae3e.pdf.

161. Risinger & Saks, *supra* note 128.

162. See THOMPSON, *supra* note 93, at 127–28 (describing this process as a “kudos” effect).

163. JOSEPH M. FERGUSON & DEBORAH WITZBURG, CITY OF CHI. OFF. INSPECTOR GEN., THE CHICAGO POLICE DEPARTMENT’S USE OF SHOTSPOTTER TECHNOLOGY 4 (2021), <https://igchicago.org/wp-content/uploads/2021/08/Chicago-Police-Departments-Use-of-ShotSpotter-Technology.pdf>.

164. *Id.*

165. Todd Feathers, *Gunshot-Detecting Tech Is Summoning Armed Police to Black Neighborhoods*, VICE (July 19, 2021, 9:17 AM), <https://www.vice.com/en/article/88nd3z/gunshot-detecting-tech-is-summoning-armed-police-to-black-neighborhoods>.

166. See SHOTSPOTTER, <https://www.shotspotter.com/> (last visited Apr. 19, 2022); Jay Stanley, *Four Problems with the ShotSpotter Gunshot Detection System*, ACLU (Aug. 24, 2021), <https://www.aclu.org/news/privacy-technology/four-problems-with-the-shotspotter-gunshot-detection-system/>; MacArthur Just. Ctr., *ShotSpotter Creates Thousands of Dead-End Police Deployments that Find No Evidence of Actual Gunfire*, END POLICE SURVEILLANCE., <https://endpolicesurveillance.com/> (last visited Feb. 10, 2022).

including the location of the sounds.¹⁶⁷ Frequently, these alterations are requested by ShotSpotter's police customers.¹⁶⁸

Because of its law enforcement alignment, ShotSpotter has evaded scrutiny. According to reports, ShotSpotter itself has not conducted any scientific studies to assess its ability to distinguish between gunfire and other loud noises, nor has it allowed outside testing of its system.¹⁶⁹ Recent investigations have exposed ShotSpotter as unreliable in unearthing crime and in impacting arrest rates.¹⁷⁰

Regulatory structures, though imperfect, also serve as a check on reliability. Approval of drugs by the U.S. Food and Drug Administration (FDA), for example, means that research and testing on a drug have been conducted pursuant to FDA regulations and have been reviewed by trained FDA regulators.¹⁷¹ If a drug does not work as intended, say a vaccine does not prevent contraction of a disease, it is less likely to earn FDA approval, and governments, hospitals, or pharmacies will instead turn to competitors.¹⁷²

Checks like these are largely absent in the forensic science system.¹⁷³ Forensic practitioners operate largely independently without receiving critical—or any—feedback on their results from peers or end-users.¹⁷⁴ The majority of forensic work is conducted in crime labs, and examiners are not encouraged to test and refine forensic techniques or conduct research to ensure sound scientific underpinnings or accuracy of methods.¹⁷⁵ Instead, outcome-based, nonscientific markers—like whether a technique is admitted at trial, whether techniques can stand up to cross-examination, and whether they secure convictions—are sometimes substituted for evidence of validity.¹⁷⁶

Unlike general consumers in the marketplace, the “end-users” of forensic science, judges and juries,¹⁷⁷ are typically not well-versed in science¹⁷⁸ and are

167. Stanley, *supra* note 166; Todd Feathers, *Police Are Telling ShotSpotter to Alter Evidence from Gunshot-Detecting AI*, VICE (July 26, 2021, 8:00 AM), <https://www.vice.com/en/article/qj8xbq/police-are-telling-shotspotter-to-alter-evidence-from-gunshot-detecting-ai>.

168. Stanley, *supra* note 166. ShotSpotter disputes these claims. *ShotSpotter Files Defamation Lawsuit Against Vice Media*, SHOTSPOTTER, <https://www.shotspotter.com/press-releases/shotspotter-files-defamation-lawsuit-against-vice-media/> (last visited Apr. 12, 2022).

169. Feathers, *supra* note 167; MacArthur Just. Ctr., *supra* note 166.

170. MacArthur Just. Ctr., *supra* note 166; Mitchell L. Doucette et al., *Impact of ShotSpotter Technology on Firearm Homicides and Arrests Among Large Metropolitan Counties: A Longitudinal Analysis, 1999–2016*, 98 J. URB. HEALTH 609, 609 (2021) (“Results suggest that implementing ShotSpotter technology has no significant impact on firearm-related homicides or arrest outcomes.”).

171. Risinger & Saks, *supra* note 128.

172. *Id.*

173. Mnookin et al., *supra* note 83, at 745.

174. Cino, *supra* note 89, at 541; *see also* Balko, *supra* note 120.

175. *See* Lander, *supra* note 93, at 1668.

176. *See* NAS REPORT, *supra* note 2, at 42; Saks & Faigman, *supra* note 121, at 150.

177. *See* Risinger & Saks, *supra* note 128; Mnookin et al., *supra* note 83, at 758.

178. Risinger & Saks, *supra* note 128.

easily taken in by the aura of science around forensic evidence.¹⁷⁹ They do not have the equivalent of Consumer Reports or the FDA to filter out bad products from good. Instead, judges and juries receive forensic evidence filtered predominantly through one party, the prosecutor, whom they may perceive as motivated to seek fairness and justice rather than convictions and whom they effectively have no choice but to trust.¹⁸⁰ Many judges are also former prosecutors who, consciously or not, hold pro-prosecution biases that make them inclined to believe in the reliability of prosecutorial evidence.¹⁸¹ Moreover, judges and juries rarely, if ever, receive feedback on the true performance of forensic evidence.¹⁸² One result of all of this is that judges have allowed admission of forensic evidence over and over again regardless of validity.¹⁸³

Another major component of scientific culture is its connection to academic institutions. Doctoral programs, in particular, are significant engines of research within the broader scientific community.¹⁸⁴ These programs train scientists in proper research methodology and instill an ethics geared towards testing hypotheses against scientific evidence, not achievement of predetermined outcomes.¹⁸⁵ Thus, academic institutions serve both as another layer of insulation from partisan and profit-driven biases as well as a part of the larger group-driven scientific process.

The forensic system, however, lacks the same strong connection to academics that mainstream sciences maintain.¹⁸⁶ Relatively few academic programs in forensic science disciplines are offered in the United States.¹⁸⁷ The

179. Saks & Faigman, *supra* note 121, at 153; Jane Campbell Moriarty, *Deceptively Simple: Framing, Intuition, and Judicial Gatekeeping of Forensic Feature-Comparison Methods Evidence*, 86 *FORDHAM L. REV.* 1687, 1695 (2018); *see also* NAS REPORT, *supra* note 2, at 85.

180. *See* Balko, *supra* note 93.

181. Katie Kronick, *Forensic Science and the Judicial Conformity Problem*, 51 *SETON HALL L. REV.* 589, 622 (2021); Stephanie L. Damon-Moore, Note, *Trial Judges and the Forensic Science Problem*, 92 *N.Y.U. L. REV.* 1532, 1561 (2017).

182. Mnookin et al., *supra* note 83, at 745.

183. *See, e.g.*, Denise Lavoie, *Fallen Forensics: Judges Routinely Allow Disavowed Science*, AP NEWS, (Aug. 20, 2017), <https://apnews.com/article/north-america-us-news-ap-top-news-pa-state-wire-crime-42540ea68fab40a8b26a767ed9e5f802>.

184. NAT'L RSCH. COUNCIL, *BEST PRACTICES IN STATE AND REGIONAL INNOVATION INITIATIVES: COMPETING IN THE 21ST CENTURY* ch. 3 (Charles W. Wessner ed., 2013), <https://www.ncbi.nlm.nih.gov/books/NBK143000/?report=reader>; *see also* Mnookin et al., *supra* note 83, at 764.

185. *See* David L. Faigman, *Anecdotal Forensics, Phrenology, and Other Abject Lessons from the History of Science*, 59 *HASTINGS L.J.* 979, 986–87 (2008); Michael J. Saks & Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 *SCI. MAG.* 892, 893 (2005).

186. *See* sources cited *supra* note 185. *See also* Chin, Ribeiro & Rairden, *supra* note 152, at 284.

187. Of the nearly four thousand degree-granting post-secondary schools in the country, fewer than 270 colleges or universities offer degrees in forensic science or related fields. Josh Moody, *A Guide to the Changing Number of U.S. Universities*, U.S. NEWS (Apr. 27, 2021), <https://www.usnews.com/education/best-colleges/articles/how-many-universities-are-in-the-us-and-why-that-number-is-changing>; *Forensic Science Schools by State*, FORENSICS COLLS., <https://www.forensicscolleges.com/usa> (last visited Apr. 19, 2022). Only twenty-six colleges or universities offer forensic science bachelor's degrees accredited by the Forensic Science Education Programs Accreditation Commission (FEPAC) and only twenty-one offer accredited master's

forensic science programs that do exist focus more on training practitioners than on research training.¹⁸⁸ Importantly, few forensic science Ph.D. programs exist.¹⁸⁹

On top of this, many forensic practitioners are not trained at academic institutions that promote scientific rigor.¹⁹⁰ Because labs have traditionally not required practitioners to be college educated, some have no college degree at all and are trained exclusively or primarily by law enforcement laboratories.¹⁹¹ Thus, while many are competent technicians, they may have none of the expertise associated with the scientific method nor an understanding of what it means to practice science.

II. FORENSIC SCIENCE REFORM EFFORTS

Researchers, legal experts, legislators, and others have proposed a range of reforms aimed either at improving the forensic system itself or at addressing how forensic evidence is handled once it enters the legal system. This Part surveys a sampling of reform proposals and evaluates their relative success at reforming forensic science. It includes a critical examination of two institutions created with the goal of improving the forensic system: the National Commission on Forensic Science and the Organization of Scientific Area Committees.

A. Policy Reforms

The NAS Report was the first comprehensive analysis of forensic disciplines and the first call for major reforms by independent research scientists.¹⁹² In light of growing evidence of the failings of the forensic system, the committee that produced the report (NAS Committee), composed of distinguished scientists and legal experts,¹⁹³ conducted a two-year study of the

degrees in forensic science. *Forensic Science Education Programs Accreditation Commission*, AM. ACAD. FORENSIC SCIS., <https://aafs.org/FEPAC> (last visited Apr. 19, 2022). Some schools do offer graduate programs that are not accredited by FEPAC. *PhD Programs in Forensic Science—Accredited Doctoral Programs*, FORENSICS COLLS., <https://www.forensicscolleges.com/programs/forensic-science/phd-in-forensic-science> (last visited Apr. 19, 2022). By way of comparison, over 1200 colleges offer a degree in biology. *Colleges Offering a Biology Major*, U.S. NEWS, <https://www.usnews.com/best-colleges/biology-major-2601> (last visited Apr. 19, 2022).

188. Mnookin et al., *supra* note 83, at 765.

189. *Id.* at 764–67; *see also Find a School*, AM. ACAD. FORENSIC SCIS., https://www.aafs.org/careers-forensic-science/find-school?_page=1&keywords=&_limit=18°ree=25&specialty=83 (last visited Mar. 16, 2022).

190. Mnookin et al., *supra* note 83, at 765–66.

191. *See, e.g.,* Beety & Oliva, *supra* note 2, at 487 n.12 (citing JOHN J. LENTINI, SCIENTIFIC PROTOCOLS FOR FIRE INVESTIGATION at xv (Keith Inman & Norah Rudin eds., 2d ed. 2013)).

192. *See generally* NAS REPORT, *supra* note 2, at 1–2.

193. *Id.* at v–ix; Koehler, *supra* note 2, at 33 (describing the NAS Committee as being comprised of “some of the most accomplished scientists of our era”).

state of forensics.¹⁹⁴ Its ultimate criticisms were scathing. The NAS Report declared that “[m]uch forensic evidence . . . is introduced in criminal trials without any meaningful scientific validation.”¹⁹⁵

The NAS Committee proposed a series of comprehensive reforms centered around the need for scientific culture in forensic science and for improving independence, objectivity, and transparency.¹⁹⁶ Some recommendations were fairly modest. These included establishing best practices and industry-wide standards, encouraging mandatory accreditation of forensic labs, and developing a national code of ethics.¹⁹⁷ Others were more robust, including recommendations to improve forensic science education for practitioners, to create mechanisms for critical and competitive research, and to obtain research funding.¹⁹⁸ Many of the NAS recommendations received broad support from legislators or were echoed by academics and researchers.¹⁹⁹

Underlying the NAS Report’s reform proposals was an emphasis on removing and insulating forensics from law enforcement control and influence at both the federal and local levels.²⁰⁰ The NAS Committee emphasized the need to avoid bias and conflicts of interest in forensic labs by removing them from police departments.²⁰¹ Scholars have made the same call,²⁰² some well before the NAS Report was issued.²⁰³

The Committee’s central and most sweeping recommendation was to create an independent “National Institute of Forensic Science” (NIFS) outside of law enforcement control that would influence, incentivize, and guide the implementation of the recommendations laid out above.²⁰⁴

Though the NAS Report initially rocked the legal and forensic science communities,²⁰⁵ its recommendations have either remained unimplemented or have fallen flat. The most significant recommendations were never

194. NAS REPORT, *supra* note 2, at xix, 1–2.

195. *Id.* at 107–08.

196. *Id.* at 18–19.

197. *Id.* at 24–26.

198. *Id.* at 19–20, 22–23, 26–28.

199. *See, e.g.*, Press Release, Off. of Sen. Patrick Leahy, The Crim. Just. & Forensic Sci. Reform Act, <https://www.leahy.senate.gov/imo/media/doc/CJFSRA%20One-Pager%20outside.pdf> (last visited Apr. 19, 2022); NAT’L COMM’N ON FORENSIC SCI., RECOMMENDATION TO THE ATTORNEY GENERAL: UNIVERSAL ACCREDITATION 2 (Apr. 30, 2015), <https://www.justice.gov/archives/ncfs/file/477851/download>; Saks & Faigman, *supra* note 121, at 166; Gabel, *supra* note 29, at 289; Craig M. Cooley, *Nurturing Forensic Science: How Appropriate Funding and Government Oversight Can Further Strengthen the Forensic Science Community*, 17 TEX. WESLEYAN L. REV. 441, 479 (2011); Cino, *supra* note 89, at 544; PCAST REPORT, *supra* note 2, at 14.

200. NAS REPORT, *supra* note 2, at 16–17, 24, 80.

201. *Id.*

202. *See, e.g.*, Cásarez & Thompson, *supra* note 117, at 1013.

203. Giannelli, *supra* note 118, at 441.

204. NAS REPORT, *supra* note 2, at 16–20.

205. *See* Innocence Staff, *Ten Years Later: The Lasting Impact of the 2009 NAS Report*, INNOCENCE PROJECT (Feb. 19, 2019), <https://innocenceproject.org/lasting-impact-of-2009-nas-report/>.

implemented. Though some labs have become independent since the NAS Report was issued, the vast majority are still embedded in police departments.²⁰⁶ As described in Part III, law enforcement interests successfully prevented the establishment of a centralized forensic governing body.²⁰⁷

Research efforts have improved the validity of some forensic methods, like fingerprint analysis,²⁰⁸ and some more recommendations have been implemented. For example, most forensic labs are now accredited.²⁰⁹ Accreditation, however, is a safeguard with limited effectiveness; it does not guarantee competence of examiners or validity of methods. Because accrediting bodies are not independent of the forensic science community, they assess labs presuming that the forensic methods are generally valid, skipping over the crucial question of whether the techniques are sound and reliable in the first place.²¹⁰ And, though prosecutors, forensic examiners, and labs frequently point to accreditation as an indicator of quality, accreditation has proven inadequate in ensuring the validity of methods or preventing errors.²¹¹

Two watered-down entities did grow out of the NAS recommendations. One was the National Commission on Forensic Science (NCFS), discussed in detail in Part III.A, established by the Department of Justice (DOJ) in conjunction with the National Institute of Standards and Technology (NIST).²¹² The NCFS, which was only in operation from 2013 to 2017, had a modest mission: it accepted that forensic methods would be embedded in and connected to law enforcement and sought only to advise the DOJ and make

206. Cásarez & Thompson, *supra* note 117, at 1007; Karen Kafadar, *Statistics and the Impact of the 2009 NAS Report*, 69 DUKE L.J. ONLINE 6, 8 (2019). Even private forensic labs still serve law enforcement as their primary clientele. See, e.g., *What We Do*, SIGNATURE SCI., <http://www.signaturescience.com/what-we-do> (last visited Feb. 2, 2022) (describing its DNA operations as “support[ing] law enforcement with cost-effective, casework solutions”); BODE TECH., <https://www.bodetech.com/> (last visited Feb. 2, 2022) (listing work for several separate law enforcement agencies on front page).

207. See Gabel, *supra* note 29, at 286–87; Epstein, *supra* note 30, at 748. In response to this opposition, some have begun to express concern that establishing a centralized forensic science institution is no longer viable and that instead reform efforts should involve grassroots, ground-up change rather than a top-down approach. Gabel, *supra* note 29, at 288–89.

208. Cásarez & Thompson, *supra* note 117, at 1054–56.

209. ANDREA M. BURCH ET AL., BUREAU OF JUST. STAT., NJC 250152, PUBLICLY FUNDED FORENSIC CRIME LABORATORIES: QUALITY ASSURANCE PRACTICES, 2014 at 2 (2016), <https://www.bjs.gov/index.cfm?ty=pbdetail&iid=5828>.

210. See Radley Balko, Opinion, *Two FBI Officials Say the State of Forensics Is Fine. Here’s Why They’re Wrong*, WASH. POST (June 6, 2018), <https://www.washingtonpost.com/news/the-watch/wp/2018/06/06/two-fbi-officials-say-the-state-of-forensics-is-fine-heres-why-theyre-wrong/>.

211. See Brief of 42 Scholars of Forensic Science as Amici Curiae in Support of Defendant-Appellee at 20, *United States v. Gissantaner*, 990 F.3d 457 (6th Cir. 2021) (No. 19-2305); Jack Moore & Megan Cloherty, *DC Forensic Lab Under Scrutiny After Evidence Errors Discovered in Murder Cases*, WTOP NEWS (Nov. 2, 2020, 4:25 AM), <https://wtop.com/dc/2020/11/dc-forensic-lab-under-scrutiny-after-evidence-errors-discovered-in-murder-cases/> (describing errors in firearms case work at the District of Columbia Department of Forensic Sciences while it was accredited); see also Balko, *supra* note 210.

212. NAT’L COMM’N ON FORENSIC SCI., REFLECTING BACK—LOOKING TOWARD THE FUTURE 1 (Apr. 11, 2017), <https://www.justice.gov/archives/ncfs/page/file/959356/download> [hereinafter REFLECTING BACK]; Lander, *supra* note 93, at 1674.

recommendations on how to improve forensic methods.²¹³ While its outputs were not insignificant, the NCFS recommendations did not result in the lack of scientific underpinning of forensic disciplines being addressed, nor did they change the way forensic evidence is used against the accused.²¹⁴

Second, in response to calls by the NAS and others to improve standards governing forensic science work,²¹⁵ the Organization of Scientific Area Committees for Forensic Science (OSAC) was established in 2014.²¹⁶ The OSAC, still in operation today, aims to produce “technically sound standards and guidelines” for use by the forensic community.²¹⁷ As described in detail in Part III.B, the standards produced through the OSAC process vary in quality and effectiveness.

The OSAC is an understandable and natural outgrowth of the NAS recommendations. But an unintended consequence of its work is to add a sheen of legitimacy to the forensic system without confronting more systemic concerns. A lack of standards has never been the primary problem with forensic methods. Although standards are necessary to ensure a baseline level of quality and consistency in forensic practice, standards themselves do not establish scientific validity.²¹⁸ Moreover, despite the patina of legitimacy the OSAC adds, as a result of structure, composition, and red tape, standards are produced slowly and are often superficial rather than substantive.²¹⁹ And OSAC lacks enforcement power and thus cannot mandate adherence to standards at the lab level.²²⁰

Seven years after the issuance of the NAS Report, a working group of the PCAST, another body of the country’s leading independent scientists and engineers,²²¹ assembled to advise the President on matters relating to science and technology (PCAST Working Group),²²² undertook a follow-up study to

213. REFLECTING BACK, *supra* note 212, at 4; U.S. DEP’T OF JUST., RENEWED CHARTER NATIONAL COMMISSION ON FORENSIC SCIENCE (Apr. 23, 2015), <https://www.justice.gov/archives/ncfs/file/624216/download> [hereinafter NCFS CHARTER].

214. See Epstein, *supra* note 30, at 754 (“At the most rudimentary level of analysis, from a data-driven perspective, the Commission’s work and indeed its existence can be seen as having had no relevance to the judiciary.”).

215. NAS REPORT, *supra* note 2, at 23–25; see also Press Release, Off. of Sen. Patrick Leahy, *supra* note 199.

216. Matthew F. Redle & Christopher J. Plourd, *A Path Forward: The Value of Forensic Science Standards Development and Use to the American Legal System*, 35 CRIM. JUST. 58, 58 (2020).

217. *The Organization of Scientific Area Committees for Forensic Science*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/osac> (last visited Apr. 19, 2022).

218. Simon A. Cole, *Who Will Regulate American Forensic Science?*, 48 SETON HALL L. REV. 563, 566–68 (2018); Jonathan J. Koehler, *Forensics or Fauxsrenics? Ascertaining Accuracy in Forensic Sciences*, 49 ARIZ. ST. L.J. 1369, 1388 (2017).

219. See Cole, *supra* note 218, at 577–78.

220. *Id.* at 580.

221. Koehler, *supra* note 2.

222. PCAST REPORT, *supra* note 2, at iv–vii.

determine what progress had been made since the issuance of the NAS Report in 2009 and to outline what reforms were still necessary.²²³

The report evaluated the scientific validity of a subset of forensic disciplines studied by the NAS Commission.²²⁴ The PCAST Working Group found minimal progress in addressing the scientific validity of forensic methods and concluded that several commonly used forensic science disciplines were not foundationally valid or that they were not even reliable *in principle*.²²⁵ Ultimately, it found deficiencies in every single discipline it examined.²²⁶

As with the NAS Report, the PCAST Report also provided a roadmap for improving the forensic system. Its recommendations centered around the need for additional research and other mechanisms for ensuring the validity of forensic evidence as well as development of new, objective forensic techniques.²²⁷

Some of these reform attempts have led to incremental or isolated successes including additional research in several disciplines. But despite high hopes, none have resulted in consistently greater reliability of the forensic evidence routinely used against criminal defendants.²²⁸

B. *Legal Reforms*

Attempts have also been made to regulate how forensic evidence can be used in the legal system. Although some recommended changes have been implemented, the same inherent structural problems within the forensic system remain, and the criminally accused remain vulnerable to convictions based on evidence of questionable validity.

1. *The Change in Standards Governing Admissibility of Forensic Evidence*

Judges are the gatekeepers of scientific evidence in criminal cases and are tasked with admitting only reliable, or trustworthy, evidence.²²⁹ The scientific

223. *Id.* at x–xi.

224. *Id.* at 7. These are DNA analysis, bitemark analysis, fingerprint analysis, firearms and toolmark examination, footwear analysis, and hair comparison analysis. *Id.* The report is careful to note that the evaluation of hair comparison analysis is not as exhaustive as those of the other disciplines. *Id.*

225. *Id.* at 4–5 (defining foundational validity), 5–13 (summarizing findings with respect to the forensic methods that were evaluated), 39. Even those techniques that the PCAST Working Group did find to be foundationally valid were not completely in the clear; the report outlines significant concerns with respect to even those disciplines, like fingerprint examination, that were found to be reliable in theory. *Id.* at 7–13.

226. *Id.* at 7–14.

227. *Id.* at 14–20.

228. Kaplan & Puracal, *supra* note 29, at 926; Cooley, *supra* note 29, at 397–98; Gabel, *supra* note 29, at 286, 309; Puracal & Kaplan, *supra* note 29, at 17.

229. *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579, 589 (1993); *see also* 1 MODERN SCIENTIFIC EVIDENCE, *supra* note 138, § 4:10 (describing legal reliability as a consolidation of both scientific reliability

corollary of “reliability” is “validity,” or the idea that a technique or method must fulfill the function that it aims to fulfill—that it *does* what it *aims to do*.²³⁰ A comparison of two fingerprints should reveal whether they were produced by the same source, a comparison of two shell casings should reveal whether they were fired from the same weapon, and a comparison of two DNA profiles should tell the analyst if both came from the same person or from different people.

Admissibility rules guide judges’ determinations of what may be admitted in and what must be excluded from trials.²³¹ For decades, the governing admissibility standard was a permissive one, established in 1923 in *Frye v. United States*.²³² The *Frye* standard does not require judges to conduct an independent assessment of a method’s reliability and allows judges to outsource the decision of whether forensic science evidence is admissible to those who are motivated to find it so. Under *Frye*, if a method is “generally accepted” as reliable by what a judge deems to be the “relevant” community of scientists, evidence deriving from it is admissible.²³³ In practice, then, the admissibility decision turns not on whether a method is reliable or accurate, but on whether it is commonly used and accepted by forensic practitioners.²³⁴

Courts have typically deemed the relevant scientific community to be composed of forensic practitioners themselves, notwithstanding the insular nature of forensics and its natural alignment with prosecutors.²³⁵ As a result, shoddy forensic evidence was and is frequently admitted under the *Frye* standard.²³⁶

In federal jurisdictions, the *Frye* standard was supplanted in 1993 by a new admissibility test laid out in *Daubert v. Merrell Dow Pharmaceuticals*.²³⁷ In *Daubert*, the Supreme Court decided that judges must directly assess whether a method is scientifically valid before scientific evidence may be presented in court—they were no longer, in theory, permitted to outsource that job via “general

and validity); 4 JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN’S FEDERAL EVIDENCE §§ 702.01, 702.02 (Mark S. Brodin ed., Matthew Bender 2d ed. 2019).

230. *Daubert*, 509 U.S. at 590, n.9 (“In a case involving scientific evidence, *evidentiary reliability* will be based upon *scientific validity*.”); *see also id.* at 589, 594–95. Importantly, legal or evidentiary reliability is distinct from scientific reliability, which is a measure of a method’s consistency, or the extent to which it produces the same result each time it is applied. *Id.*; *see also* 1 MODERN SCIENTIFIC EVIDENCE, *supra* note 138, § 4:10 (reliability and validity); Hillel J. Bavli & John Kenneth Felter, *The Admissibility of Sampling Evidence to Prove Individual Damages in Class Actions*, 59 B.C. L. REV. 655, 705 (2018); PCAST REPORT, *supra* note 2, at 75–76.

231. *Daubert*, 509 U.S. at 589; FED. R. EVID. 702.

232. 293 F. 1013, 1014 (D.C. Cir. 1923).

233. *Id.* at 1014; *see also* Roselle L. Wissler, Keelah E.G. Williams & Michael J. Saks, *Dual-Processing Models of Admissibility: How Legal Tests for the Admissibility of Scientific Evidence Resemble Cognitive Science’s System 1 and System 2*, 17 VA. J.L. & TECH. 354, 357 (2013).

234. *See* Wissler, Williams & Saks, *supra* note 233, at 357.

235. Simon A. Cole, *Out of the Daubert Fire and into the Fryeing Pan? Self-Validation, Meta-Expertise and the Admissibility of Latent Print Evidence in Frye Jurisdictions*, 9 MINN. J.L. SCI. & TECH. 453, 472–73, 483 (2008).

236. *See id.*

237. 509 U.S. at 592–93.

acceptance.”²³⁸ The Court suggested several non-exhaustive factors to consider in evaluating scientific validity. These are: (1) whether the method at issue can and has been tested, (2) whether the method has been subjected to peer review and publication, (3) the known or potential error rate of the technique, (4) whether standards exist that control the field, and (5) the old *Frye* test, whether the method is generally accepted by the relevant scientific community.²³⁹ Since *Daubert* was decided, a majority of states have abandoned the *Frye* test in favor of *Daubert*'s,²⁴⁰ and in 2000, the *Daubert* standard was codified in Federal Rule of Evidence 702.²⁴¹

Many believed adoption of the *Daubert* standard would halt the flow of junk science in courts.²⁴² But while it is a theoretical improvement over the *Frye* standard, it is not a perfect solution. Each of the *Daubert* factors can be manipulated to create an appearance of reliability, even when actual scientific validity has not been established.²⁴³ This is because most of the *Daubert* factors are not direct measures of validity.

The only factor that is directly relevant to scientific validity is the testing factor, but even that factor can be manipulated.²⁴⁴ Though testing a method to ensure its validity is an essential component of good science,²⁴⁵ not all testing is equal: the extent to which testing actually establishes validity necessarily depends on the quality and design of the test itself. Take breathalyzers, which are used to aid in determining if someone has been driving while intoxicated,²⁴⁶ as an example. Breathalyzers do not directly measure a person's blood alcohol level (BAC); rather, they attempt to estimate BAC by determining the amount

238. *Id.*

239. *Id.* at 593–94. Because in *Daubert* “error rate and the existence and maintenance of standards controlling its operation” are described as a single factor, *id.* at 594, *Daubert* is frequently described as setting out four, not five, factors. Compare 1 MODERN SCIENTIFIC EVIDENCE, *supra* note 138, § 1:15 (identifying four *Daubert* factors), with 1 SCIENTIFIC EVIDENCE § 1.09 (Paul C. Giannelli et al. eds., 6th ed. 2019) (identifying five). Because error rate and standards are distinct measures of reliability, this Article describes *Daubert* as establishing five factors, not four.

240. *Rochkind v. Stevenson*, 236 A.3d 630, 633 (Md. 2020) (explaining that “[a] supermajority of states followed the Supreme Court’s lead and replaced their respective . . . standards with *Daubert*” in formally adopting the *Daubert* standard in Maryland); *Motorola Inc. v. Murray*, 147 A.3d 751, 752 (D.C. 2016) (adopting the *Daubert* admissibility standard in the District of Columbia). Of those few that retain *Frye* as their admissibility standard in name, many have adopted elements of *Daubert*'s reliability test. See, e.g., *Sargon Enters., Inc. v. Univ. of S. Cal.*, 288 P.3d 1237, 1252 (Cal. 2012) (explaining that trial judges have a “gatekeeping” function that involves assessing whether an “expert opinion is founded on sound logic”).

241. FED. R. EVID. 702 advisory committee’s note to 2000 amendment.

242. See, e.g., Peter J. Neufeld, *The (Near) Irrelevance of Daubert to Criminal Justice and Some Suggestions for Reform*, 95 AM. J. PUB. HEALTH S107, S109 (2005).

243. Thomas Lyons, *Frye Daubert and Where Do We Go from Here?*, STRAUSS, FACTOR, LAING & LYONS BLOG (July 4, 2019), <https://www.sfandllaw.com/articles/frye-daubert-and-where-do-we-go-from-here/>.

244. See *id.*

245. 1 MODERN SCIENTIFIC EVIDENCE, *supra* note 138, § 1:16.

246. Nat’l Inst. on Drug Abuse, *The Science of Drug Testing: How Alcohol Breath Tests Work*, NIDA BLOG (Apr. 4, 2016), <https://archives.drugabuse.gov/blog/post/science-drug-testing-how-alcohol-breath-tests-work>.

of alcohol present in an individual's breath.²⁴⁷ This is neither easy to measure, nor is it a straightforward determinant of the amount of alcohol in a person's system; breathalyzers vary in accuracy.²⁴⁸ Assume that a particular commercial breathalyzer is highly accurate in estimating BAC in those who are extremely intoxicated, but equally inaccurate in estimating BAC when used on those who are only mildly or moderately intoxicated. Assume also that the makers of the breathalyzer, who work for a for-profit company, are well aware of the variable accuracy of their technique and test it only on people who are extremely intoxicated. The results of such skewed testing would suggest that the breathalyzer was valid, when in fact, that is only true for a subset of applications. Such testing might well be seen as satisfying *Daubert's* testing factor, notwithstanding the fact that it reveals nothing about the breathalyzer's accuracy in a large set of applications, because judges typically do not engage in a deep assessment of the strength of testing.²⁴⁹

Because error rates are determined through testing, satisfaction of this factor is subject to the same manipulability as the testing factor. Error rates are valuable because they suggest that a method has been tested and, in theory, give an indication of how well it was tested.²⁵⁰ The error rate produced by the breathalyzer testing just described, however, would be misleadingly low for the same reason that the validity would appear misleadingly high: the testing was deliberately skewed to avoid scenarios that would produce a high error rate. The *Daubert* analysis does not usually prevent admissibility of evidence produced by such a method as judges tend not to investigate application-specific testing or error rates.²⁵¹

The remaining factors are less useful as markers of validity because they do not actually measure validity; they are proxies for it, making them especially subject to manipulation. Whether standards exist that control the field would, in theory, allow for confidence that a method can be reliably applied if such standards are followed, but the standards are not themselves measures of validity. As with testing, the degree to which standards are useful in this context depends on the quality of the standards. Standards in the breathalyzer context may help end-users of the machine, like police officers, employ the test properly, but they do not reveal anything about validity, or reliability, of the breathalyzers themselves. *Daubert* does not safeguard against the admission of evidence produced by such techniques because the standards factor is often

247. Paul A. Clark, *The Right to Challenge the Accuracy of Breath Test Results Under Alaska Law*, 30 ALASKA L. REV. 1, 6 (2013).

248. Stacey Cowly & Jessica Silver-Greenberg, *These Machines Can Put You in Jail. Don't Trust Them.*, N.Y. TIMES (Nov. 3, 2019), <https://www.nytimes.com/2019/11/03/business/drunk-driving-breathalyzer.html>.

249. See, e.g., *United States v. Gissantaner*, 990 F.3d 457, 463–64 (6th Cir. 2021).

250. See Giannelli, *supra* note 128, at 60.

251. See *Gissantaner*, 990 F.3d at 468–70.

treated as a superficial one that does not require analysis of the quality of standards.²⁵²

The “peer review and publication” factor is meant to uncover whether a methodology has been subjected to the degree of scrutiny necessary to reveal—and ultimately correct—flaws.²⁵³ The prong is not meant to be satisfied merely if peer-reviewed publications exist; the body of literature should establish that the technique held up to unbiased, rigorous examination.²⁵⁴ All too often, however, the peer review factor is treated as a box to check off; courts deem it satisfied if they can point to a number or quantity of publications, without deeper analysis of whether the publications indicate that the method in question has held up to rigorous scientific scrutiny.²⁵⁵

As with the others, this factor is only as good as the journals are. *Daubert* does nothing to ensure that the peer-review process is doing what it is meant to in any given case. To extend the breathalyzer hypothetical, the makers of the device might publish several articles in journals with lax or non-existent standards. That quantity of publications might seem to satisfy the peer-review factor and also create an appearance of general acceptance in the scientific community, but, of course, would say little, if anything, about the breathalyzers’ overall validity.

“General acceptance” overlaps with peer review; publication in peer-reviewed journals can result in general acceptance, and reciprocally, general acceptance is often judged by the degree of publication and peer review of a method.²⁵⁶ General acceptance, though, turns on who constitutes the “relevant scientific community,” a subject of much debate.²⁵⁷ In the context of forensics, prosecutors and forensic practitioners have argued that the relevant scientific community consists only of forensic practitioners.²⁵⁸ Makers and administrators of the breathalyzer considered above might argue that their community deems their method of BAC measurement to be reliable. Critics, on the other hand, have argued that this definition is self-serving—of course forensic practitioners

252. *Id.*

253. *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579, 593 (1993); *see also* Randolph N. Jonakait, *The Meaning of Daubert and What That Means for Forensic Science*, 15 CARDOZO L. REV. 2103, 2105 (1994).

254. *See* Jonakait, *supra* note 253, at 2105.

255. *See, e.g.*, Oral Argument, *United States v. Gissantaner*, 990 F.3d 457 (6th Cir. 2021) (No. 19-2305), https://www.opn.ca6.uscourts.gov/internet/court_audio/aud2.php?link=audio/01-29-2021%20-%20Friday/19-2305%20USA%20v%20Daniel%20Gissantaner.mp3&name=19-2305%20USA%20v%20Daniel%20Gissantaner (In response to counsel for Gissantaner’s argument that the DNA testing method at issue had not “been adequately peer reviewed because most of the literature and the studies that have been performed are coming from the law enforcement community or from the developer[.]” a Sixth Circuit judge suggested that “it’s the fact of publication is the important component, not the author. That is my understanding of what peer review is. . . . That was traditionally my understanding of peer review, but am I mistaken on that?”) (cleaned up).

256. *See* Giannelli, *supra* note 128, at 60; Anderson, Parsons & Rennie, *supra* note 143, at 649.

257. *See* Cole, *supra* note 235, at 472–73.

258. *Id.* at 483.

believe the discipline they have dedicated their careers to is reliable.²⁵⁹ Critics maintain that the relevant scientific community is much broader and necessarily includes independent scientists willing to critically evaluate forensic methods.²⁶⁰ Judges, however, have frequently been reluctant to define the relevant scientific community this broadly.²⁶¹

Empirical data demonstrates that adoption of the *Daubert* standard has not stemmed the admission of problematic forensic evidence in trials.²⁶² As the breathalyzer hypothetical demonstrates, *Daubert* factors can be manipulated to create an appearance of validity. Judges, however, are not well equipped to identify such manipulation.²⁶³ More importantly, judges often do not apply the test critically.²⁶⁴ Instead, they frequently rely on precedent to continue to admit flawed forensic evidence merely because it has been admitted previously.²⁶⁵ The result is that *Daubert* is now blamed for too liberal admission of junk science in criminal cases.²⁶⁶

2. Other Efforts to Regulate the Use of Forensic Evidence in Criminal Cases

Other front-end efforts have been made to improve judges' ability to filter unreliable expert evidence out of trials. These include proposals to amend or modify Rule 702 to clarify the rule or to expand its scope.²⁶⁷ Some recommend that judges rely more frequently on court-appointed experts, not affiliated with either party, for testimony or advice regarding the reliability of a given method.²⁶⁸

Others suggest that admissibility decisions should be taken entirely out of courts' hands and advocate for special masters to be employed to resolve complex scientific issues.²⁶⁹ Michael Saks, among others, has suggested that a national scientific panel should be in charge of determining which forensic techniques have sufficient scientific support to be deemed admissible.²⁷⁰ Finally,

259. *Id.* at 472–73.

260. KAYE, BERNSTEIN & MNOOKIN, *supra* note 138, at 157.

261. *See, e.g.*, United States v. Gissantaner, 990 F.3d 457, 464–65 (6th Cir. 2021).

262. *See* Giannelli, *supra* note 3, at 937.

263. *Id.*

264. *Id.*

265. Hilbert, *supra* note 16, at 804.

266. *See* Beety & Oliva, *supra* note 2, at 503 n.110; Giannelli, *supra* note 3, at 873.

267. *See, e.g.*, David E. Bernstein & Eric G. Lasker, *Defending Daubert: It's Time to Amend Federal Rule of Evidence 702*, 57 WM. & MARY L. REV. 1, 43–47 (2015); Daniel J. Capra, *Foreword: Symposium on Forensic Expert Testimony, Daubert, and Rule 702*, 86 FORDHAM L. REV. 1459, 1460 (2018); Brandon L. Garret & Chris Fabricant, *The Myth of the Reliability Test*, 86 FORDHAM L. REV. 1559, 1580 (2018); Maneka Sinha, *Junk Science at Sentencing*, 89 GEO. WASH. L. REV. 52 (2021) (proposing modified application of Rule 702 or analogous state rules at sentencing).

268. Daniel L. Rubinfeld & Joe S. Cecil, *Scientists as Experts Serving the Court*, 147 DAEDALUS 152 (2018).

269. *Id.*

270. Balko, *supra* note 120 (describing proposal of Michael J. Saks); *see also* Giannelli, *supra* note 17, at 1231–32.

some suggest that judges just need to do better—that they should be more critical of purportedly scientific evidence and educate themselves on scientific issues.²⁷¹

Despite such recommendations, no major modifications to Rule 702 have yet been made.²⁷² Although amendments to the rule were proposed in 2021 and are set to take effect in 2023, they serve to clarify existing elements of the admissibility framework rather than to make substantive modifications.²⁷³ DOJ objected to more substantive changes, including the addition of a new subsection to the rule that would regulate overstatement of expert testimony and the addition of an Advisory Committee note specifically addressing forensic evidence.²⁷⁴

No expert panel to resolve thorny admissibility questions has been convened. While on rare occasions courts do appoint their own experts for testimony and advisement, this is the exception, rather than a rule that has seen widespread implementation.²⁷⁵

In addition to recommendations regarding the courts' gatekeeping function, some have proposed that discovery rules be modified to require more comprehensive disclosures to defendants relating to forensic analyses.²⁷⁶ In 2021, the Advisory Committee on Criminal Rules recommended amendments to the federal criminal discovery rule that expand and clarify the scope of expert

271. See, e.g., Saks & Faigman, *supra* note 121, at 166; Radley Balko, Opinion, *We Need to Fix Forensics. But How?*, WASH. POST (June 20, 2019), <https://www.washingtonpost.com/opinions/2019/06/20/we-need-fix-forensics-how/>; Damon-Moore, *supra* note 181.

272. Stylistic amendments were added to the Rule in 2011. See FED. R. EVID. 702 advisory committee's note to 2011 Amendment. See generally Capra, *supra* note 267, at 1463; *No Amendment to Federal Rule of Evidence 702, At Least for Now*, NAT'L L. REV. (Aug. 17, 2020), <https://www.natlawreview.com/article/no-amendment-to-federal-rule-evidence-702-least-now>.

273. COMM. ON RULES OF PRAC. AND PROC., JUD. CONF. OF THE U.S., PRELIMINARY DRAFT OF PROPOSED AMENDMENTS TO THE FEDERAL RULES OF APPELLATE, BANKRUPTCY, CIVIL, AND CRIMINAL PROCEDURE, AND THE FEDERAL RULES OF EVIDENCE 3, 308–12 (2021), https://www.uscourts.gov/sites/default/files/preliminary_draft_of_proposed_amendments_2021_0.pdf (proposing amendments to Rule 702 clarifying the burden and standard of proof and emphasizing judges' gatekeeping function).

274. Advisory Comm. on Evidence Rules, Minutes of the Meeting of May 3, 2019 18–19, https://www.uscourts.gov/sites/default/files/final_-_minutes_of_the_spring_2019_meeting_of_the_evidence_rules_committee_0.pdf; Advisory Comm. on Evidence Rules, Minutes of the Meeting of November 13, 2020 5, 6–7, 9, https://www.uscourts.gov/sites/default/files/ev_minutes_fall_2020_0.pdf; see also Advisory Comm. on Evidence Rules, Minutes of the Meeting of April 30, 2021 3, https://www.uscourts.gov/sites/default/files/ev_minutes_spring_2021_0.pdf (describing DOJ objection to proposed language “limiting” an expert’s opinion to one based on reliable application of principles and methods).

275. See, e.g., *United States v. Gissantaner*, 417 F. Supp. 3d 857 (W.D. Mich. 2019), *rev'd*, 990 F.3d 457 (6th Cir. 2021).

276. See Marjorie Anne McDiarmid, *Mandating Meaningful Forensic Discovery: A Proposal to Fuel the Engine of Truthfulness*, 51 IND. L. REV. 641, 659 (2018); NAT'L COMM'N ON FORENSIC SCI., RECOMMENDATIONS TO THE ATTORNEY GENERAL: PRETRIAL DISCOVERY (2017), <https://www.justice.gov/archives/ncfs/page/file/880241/download> [hereinafter NCFPS RECOMMENDATION ON PRETRIAL DISCOVERY].

disclosure requirements.²⁷⁷ Though the changes are moderate, they are likely to have a positive effect in allowing the parties to understand and evaluate the reliability of proposed testimony and better prepare for litigation.

Others have proposed back-end reforms to detect and remedy errors, like wrongful convictions, after they occur. The American Bar Association proposed that states enact legislation to create a substantive right to challenge convictions by showing that forensic evidence used to convict has been “undermined or discredited by reliable scientific research or technological advances.”²⁷⁸ Others have recommended the establishment of “innocence commissions,” independent bodies to investigate causes of wrongful convictions and recommend policies to reduce the contribution of flawed forensic evidence to unjust outcomes.²⁷⁹

Some of these postconviction proposals have been implemented. A few jurisdictions have passed laws allowing challenges to convictions based on flawed forensic evidence.²⁸⁰ North Carolina established the North Carolina Innocence Inquiry Commission (NCIIC) with the specific focus of correcting errors that occurred in actual cases.²⁸¹ Since 2006, the NCIIC has reviewed nearly three thousand claims, yielding fifteen exonerations to date.²⁸²

While back-end solutions like these do call attention to forensic errors and get some out of prison, they are not designed to—and have not—fundamentally changed forensic practice. They are not systemic reforms. As Jessica Gabel put it, “[r]elying on the postconviction process to correct the problem simply puts a Band-Aid on a gaping wound.”²⁸³

Aside from specific legal rules and procedures, many have also identified a need to provide more resources and forensic education to defense attorneys, particularly those charged with the representation of indigent clients.²⁸⁴ Many

277. COMM. ON RULES OF PRAC. AND PROC., JUD. CONF. OF THE U.S., PRELIMINARY DRAFT OF PROPOSED AMENDMENTS TO THE FEDERAL RULES OF APPELLATE, BANKRUPTCY, CIVIL, AND CRIMINAL PROCEDURE 244–261 (2020),

https://www.uscourts.gov/sites/default/files/preliminary_draft_of_proposed_amendments_to_federal_rules_august_2020_final_0.pdf. The proposed amendments, set to take effect in December 2022, require, *inter alia*, greater specificity on what expert opinions must be disclosed, disclosure of proposed experts’ publications, and that, under most circumstances, expert notice be approved by the proposed expert. *Id.*

278. AM. BAR ASS’N, RESOLUTION 108B & REPORT (2018), https://www.americanbar.org/content/dam/aba/administrative/death_penalty_representation/dp-policy/2018-my-108b.pdf [hereinafter RESOLUTION 108B & REPORT].

279. See *State Commissions Seek to Prevent Wrongful Convictions*, INNOCENCE PROJECT (July 20, 2009), <https://innocenceproject.org/state-commissions-seek-to-prevent-wrongful-convictions/>.

280. RESOLUTION 108B & REPORT, *supra* note 278, at 6; *Overturning Wrongful Convictions Involving Misapplied Forensics*, *supra* note 10.

281. Jessica A. Roth, *The Institutions of Innocence Review: A Comparative Sociological Perspective*, 70 RUTGERS U. L. REV. 1143, 1155–56 (2019).

282. N.C. INNOCENCE INQUIRY COMM’N, <https://innocencecommission-nc.gov/> (last visited Apr. 19, 2022).

283. Gabel, *supra* note 29, at 288.

284. See Kronick, *supra* note 181, at 624.

argue that flawed forensic evidence continues to be relied upon in criminal trials because poor defendants are often unable to put on a full-throated challenge to the admissibility of forensic evidence or to respond with authoritative experts of their own.²⁸⁵ But this state of affairs has remained largely unchanged for decades.

Though the need for forensic reform is frequently discussed and some recommendations have been implemented, the system as a whole has not substantially been altered. Reform efforts have not prevented admission of unreliable forensic evidence against the accused.²⁸⁶ Why the forensic system is so resistant to change is discussed next.

III. STRATEGIC AVOIDANCE, STIFLED REFORM

The resistance of the forensic science system to reform has arisen as a result of two powerful forces. First, prosecutors have acted collectively as a powerful body to fend off efforts to improve forensic disciplines and disentangle them from law enforcement. At the same time, actors within the forensic community have attempted to protect and grow their industry by manufacturing a perception that forensic methods are more scientific than they really are.

A. Collective Prosecutorial Action Against Reform

Prosecutors have tremendous control over what forensic evidence is collected and produced, which evidence is used in court, and even how that evidence is presented.²⁸⁷ Prosecutors' influence is not just limited to their roles as individual actors, however. As organized bodies seeking to influence policy, prosecutors have played a major role in halting forensic reform in order to retain forensics as a tool, under their control, that can be used to secure criminal convictions.

285. See, e.g., Mark Loudon-Brown, *Garbage In, Garbage Out: Revising Strickland as Applied to Forensic Science Evidence*, 34 GA. ST. U. L. REV. 893, 894 (2018).

286. Moriarty, *supra* note 179, at 1695; Kaplan & Puracal, *supra* note 29, at 926, 932; Puracal & Kaplan, *supra* note 29, at 19. There are exceptions. Particularly in the wake of the PCAST Report, some courts have begun to restrict the use of some types of forensic evidence. See, e.g., *United States v. Gissantaner*, 417 F. Supp. 3d 857 (W.D. Mich. 2019), *rev'd*, 990 F.3d 457 (6th Cir. 2021); see also Maneka Sinha, *The Trump DOJ Snuck in One Last Effort to Push Junk Science in Court*, SLATE (Feb. 4, 2021, 12:15 P.M.), <https://slate.com/news-and-politics/2021/02/trump-doj-forensic-science-pcast.html>.

287. See Jane Campbell Moriarty, "Miscorrections," *Science, and the Ministers of Justice*, 86 NEB. L. REV. 1, 27 (2007).

1. *Muffling the Alarms*

Over and over again, attempts to improve the forensic system have been answered with attacks by prosecutorial bodies aimed at stifling reform. The response to the NAS Committee's findings is an early example of such efforts.

The Committee faced prosecutorial opposition from the start. The DOJ was alarmed by the assembly of a body of notable, independent nonforensic scientists with superlative credentials tasked with scrutinizing forensic methods—a staple of prosecutions—and actively sought to undermine the Committee's work.²⁸⁸ The National Institute of Justice (NIJ), the DOJ's research and development arm,²⁸⁹ attempted to withhold funding for the NAS study and even control its output, demanding permission to review the results and recommendations before release of the report.²⁹⁰ It was not until Congress stepped in to fund and insulate the study that the NAS Committee's work began.²⁹¹

Members of NIJ, along with former DOJ employees-turned-lobbyists, participated in additional efforts to undermine the report.²⁹² Their efforts included conducting counter-studies aimed not at unearthing the truth, but at undercutting the report's conclusions.²⁹³

If the DOJ cared about the pursuit of truth and the reliability of criminal convictions, it should not have been so threatened by the NAS's report—while it was critical of most forensic methods,²⁹⁴ its aim was not to dismantle the forensic system, but, rather, to bolster it by suggesting pathways for improvement.²⁹⁵ In service of that goal, the NAS Committee made detailed recommendations for reform,²⁹⁶ chief among them the recommendation to develop an independent NIFS.²⁹⁷

But prosecutorial bodies including the DOJ and the National District Attorneys' Association (NDAA), the largest organization of prosecutors in the United States,²⁹⁸ opposed the recommendation, instead seeking to retain

288. See Giannelli, *supra* note 128, at 88.

289. *About NIJ*, NAT'L INST. OF JUST., <https://nij.ojp.gov/about-nij> (last visited Feb. 3, 2022).

290. Solomon Moore, *Science Found Wanting in Nation's Crime Labs*, N.Y. TIMES (Feb. 4, 2009), <https://www.nytimes.com/2009/02/05/us/05forensics.html>.

291. *Id.*

292. *Id.*

293. Giannelli, *supra* note 128, at 88 & n.240; *Commerce, Justice, Science, and Related Agencies Appropriations for Fiscal Year 2009: Hearing Before the Subcomm. On Com., Just., and Sci. of the S. Comm. on Appropriations*, 110th Cong. 4 (2008) (statement of Sen. Richard Shelby of Ala.), <https://www.govinfo.gov/content/pkg/CHRG-110shrg69104303/pdf/CHRG-110shrg69104303.pdf>.

294. See generally NAS REPORT, *supra* note 2.

295. Kafadar, *supra* note 206, at 7.

296. NAS REPORT, *supra* note 2, at 14–33; *supra* Part II.A.

297. See *supra* notes 178–190 and accompanying text.

298. Letter from Michael A. Ramos, Pres. of the Nat'l Dist. Att'ys Ass'n, to Pres. Obama (Nov. 16, 2016), <http://www.ciclt.net/ul/ndaajustice/PCAST/NDAA%20PCAST%20Response%20FINAL.pdf>.

control over the generation of forensic evidence despite widespread agreement that any national forensic body must remain outside the control of prosecutors and other law enforcement to avoid bias or conflicts of interest.²⁹⁹

The extent to which they were able to influence reception of the 2016 PCAST Report further illustrates the power of prosecutors as a lobbying entity. Despite its praiseworthy origins and the fact that the report's conclusions came only after exhaustive study of published literature, consultation with expert advisors, and input from members of the forensic and laboratory communities, in many ways, the report was dead on arrival.³⁰⁰ As soon as the report's findings began trickling out of the PCAST Working Group, prosecutorial bodies took immediate steps to limit its influence. As soon as PCAST voted to release the report, the NDAA issued a press release denouncing and undermining the report and its findings.³⁰¹

The DOJ worried the report's conclusions would threaten prosecutors' ability to present forensic evidence against the accused and could undermine convictions that had already been secured, and the agency acted to prevent its release.³⁰² As the PCAST Working Group came close to releasing its findings, it met with DOJ representatives.³⁰³ According to Eric Lander, Chair of the PCAST Working Group and co-chair of the entire PCAST,³⁰⁴ upon learning of the group's findings, DOJ officials pressed to prevent or delay release of the report³⁰⁵ and argued that the report's conclusions should not be applied to closed cases.³⁰⁶ The Working Group declined to delay release, concluding that such a move would be inconsistent with its role as an independent scientific research panel, and declined to limit its findings to future cases, as there was no scientific justification to distinguish between closed and open cases.³⁰⁷ The DOJ nevertheless continued its efforts to block publication, going so far as to (unsuccessfully) lobby the White House to prevent its release.³⁰⁸

On the day the PCAST report was published, the country's top prosecutor, then-Attorney General Loretta Lynch, swiftly denounced it.³⁰⁹ Instead of

299. NAS REPORT, *supra* note 2, at 17; Giannelli, *supra* note 93, at 249.

300. PCAST REPORT, *supra* note 2, at 2.

301. Press Release, Nat'l Dist. Att'ys Ass'n, National District Attorneys Association Slams President's Council of Advisors on Science and Technology Report (Sept. 2, 2016), http://www.thewai.org/resources/Pictures/NDAA%20Press%20Release%20on%20PCAST%20Report_1.pdf.

302. See Capra, *supra* note 267, at 1522 (testimony of Eric Lander).

303. See Lander, *supra* note 93, at 1674.

304. PCAST REPORT, *supra* note 2, at v, vii.

305. *Id.*; see also Lander, *supra* note 93, at 1674.

306. Lander, *supra* note 93, at 1674.

307. *Id.*

308. *Id.* at 1675.

309. Gary Fields, *White House Advisory Council Report Is Critical of Forensics Used in Criminal Trials: U.S. Attorney General Says Justice Department Won't Adopt Recommendations*, WALL STREET J. (Sept. 20, 2016, 4:25 PM),

vowing to put the weight of the DOJ behind efforts to strengthen the forensic sciences, Lynch released a statement asserting that the DOJ would not adopt or implement a single one of the report's recommendations.³¹⁰ She instead claimed that "when used properly, forensic science evidence helps juries identify the guilty and clear the innocent, and the department believes that the current legal standards regarding the admissibility of forensic evidence are based on sound science and sound legal reasoning."³¹¹

Not only did the statement ignore the mounting evidence that forensic evidence is all too frequently *not* "used properly,"³¹² it also failed to recognize that unvalidated science *cannot* be used properly³¹³ and absolved the forensic community from having to improve its methods. Lynch's lauding of admissibility standards shifted attention away from the core issue tackled by the PCAST Report: judicial gatekeeping does not obviate the need for improvement of forensic methods. While a necessary check, gatekeeping is not a perfect filter—it cannot prevent faulty scientific evidence from being produced or being offered against the accused. In light of the DOJ's wholesale rejection of the PCAST Report's recommendations and consistent attempts to derail both the NAS and PCAST findings, Lynch's additional claim that reforms were unnecessary because "the Justice Department had taken unprecedented steps to strengthen forensic science,"³¹⁴ was more than a little ironic.

Other attempts to discredit the PCAST Report bordered on transparently disingenuous. NDAA president Michael Ramos followed the organization's press release up with a nine-page letter to then-President Barack Obama making a number of new accusations, including that the report's authors were biased.³¹⁵ The sole evidence offered to support the accusation was Lander's service on the board of the Innocence Project.³¹⁶ The letter attacked additional unnamed PCAST members as having a "stake in the outcome" of the report without any elaboration.³¹⁷ Ramos also made the bold assertion, undermined by

<https://www.wsj.com/articles/white-house-advisory-council-releases-report-critical-of-forensics-used-in-criminal-trials-1474394743>.

310. *Id.*

311. *Id.*

312. *See supra* notes 10, 127.

313. Adam B. Shnideman, *Prosecutors Respond to Calls for Forensic Science Reform: More Sharks in Dirty Water*, 126 *YALE L.J.F.* 348, 351 (2017).

314. Fields, *supra* note 309.

315. Letter from Michael A. Ramos, *supra* note 298, at 1, 7.

316. *See id.* at 1. The Innocence Project has done much to expose the extent to which many wrongful convictions have been based on junk science. *See, e.g., Eric Lander Calls for Officials to Uphold Best Forensic Practices*, INNOCENCE PROJECT (Apr. 21, 2015), <https://www.innocenceproject.org/eric-lander-calls-for-officials-to-uphold-best-forensic-practices/>.

317. *See* Letter from Michael A. Ramos, *supra* note 298, at 1.

considerable research,³¹⁸ that “[t]here is no evidence the scientific basis for forensic feature comparisons are [sic] responsible for wrongful convictions.”³¹⁹

Others accused the PCAST Working Group of failing to consider relevant literature establishing the validity of forensic disciplines. The NDAA claimed that the Working Group ignored large bodies of research without indicating what research it believed the PCAST missed.³²⁰

The Federal Bureau of Investigation (FBI), the DOJ’s investigatory arm, claimed the report failed to assess “numerous published research studies which seem to meet PCAST’s criteria for appropriately designed studies providing support for foundational validity,” arguing that this “omission discredits the PCAST report as a thorough evaluation of scientific validity.”³²¹ The Working Group responded by soliciting additional material that interested parties felt it had failed to consider.³²² Instead of providing the PCAST with additional studies, the NDAA responded by claiming that the PCAST’s solicitation of further literature was a “fool’s errand” and speculated that the PCAST would disregard any such materials.³²³ The DOJ, meanwhile, indicated that it could find no further studies to provide.³²⁴

Although the Working Group’s criteria for establishing the validity of forensic methods is not controversial among scientists or academics,³²⁵

318. See, e.g., Brandon L. Garrett, *Judging Innocence*, 108 COLUM. L. REV. 55, 82 (2008); Brandon Garrett & Peter Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 1 (2009); Cino, *supra* note 89, at 543.

319. Letter from Michael A. Ramos, *supra* note 298, at 1. *Contra* Vanessa Meterko, *Strengths and Limitations of Forensic Science: What DNA Exonerations Have Taught Us and Where to Go from Here*, 119 W. VA. L. REV. 639, 639 (2016).

320. See Letter from Michael A. Ramos, *supra* note 298, at 1, 7–8.

321. Fed. Bureau of Investigation, Comments on: President’s Council of Advisors on Science and Technology Report to the President Forensic Science in Federal Criminal Courts: Ensuring Scientific Validity of Pattern Comparison Methods (Sept. 20, 2016), <https://www.fbi.gov/file-repository/fbi-pcast-response.pdf>.

322. PRESIDENT’S COUNCIL OF ADVISORS ON SCIENCE & TECHNOLOGY, AN ADDENDUM TO THE PCAST REPORT ON FORENSIC SCIENCE IN CRIMINAL COURTS 2–3 (2017), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensics_addendum_finalv2.pdf [hereinafter ADDENDUM TO THE PCAST REPORT].

323. Letter from the National District Attorney’s Association to PCAST (Dec. 14, 2016), *in* ADDITIONAL INFORMATION PROVIDED BY STAKEHOLDERS 48, 48 (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensics_2016_additional_responses_0.pdf.

324. ADDENDUM TO THE PCAST REPORT, *supra* note 322.

325. See, e.g., William C. Thompson, *AAAS, PCAST, and Validation: Questions and Answers*, AM. ASS’N FOR THE ADVANCEMENT OF SCI., <https://www.aaas.org/sites/default/files/QA%20AAAS%20and%20PCAST%20Reports.pdf#vYqKK65CN0k0FKrAiDtUE64PdZuw5YT> (last visited Apr. 19, 2022); J.H. Pate Skene, *Up to the Courts: Managing Forensic Testimony with Limited Scientific Validity*, 102 JUDICATURE 39, 44–45 (2018); Harry T. Edwards & Jennifer L. Mnookin, Opinion, *A Wake-Up Call on the Junk Science Infesting Our Courtrooms*, WASH. POST (Sept. 20, 2016), https://www.washingtonpost.com/opinions/a-wake-up-call-on-the-junk-science-infesting-our-courtrooms/2016/09/19/85b6eb22-7e90-11e6-8d13-d7c704ef9fd9_story.html; Thomas D. Albricht, *The US Department of Justice Stumbles on Visual Perception*, PROC. NAT’L ACAD. SCI. U.S., June 15, 2021, at 1, <https://www.pnas.org/content/pnas/118/24/e2102702118.full.pdf>.

prosecutors and law enforcement bodies, including the NDAA and the DOJ, took issue with them.³²⁶ The PCAST Working Group emphasized that before forensic methods can be considered reliable, multiple empirical studies reflecting real-world casework that provide estimates of a method's accuracy must be conducted.³²⁷ Despite their complaints, none of these bodies immediately suggested alternative criteria for establishing the validity of forensic methods.³²⁸ Notably, despite its public denunciation of the report, the DOJ acknowledged in closed-door meetings with the PCAST that there were insufficient empirical studies to establish the validity of some forensic methods.³²⁹ Its concern, then, was not the method, process, or criteria the PCAST Working Group employed in its analysis, but that the report's findings might jeopardize convictions.³³⁰

In 2021, five years after its publication, the DOJ made a brand-new attempt to undermine the PCAST Report.³³¹ That effort, an unsigned statement riddled with scientific inaccuracies and mischaracterizations, appeared as a last-ditch effort to discredit the PCAST Report before judges gave it greater consideration in admissibility determinations.³³²

These attempts to undermine the PCAST and NAS Reports are among the most prominent collective efforts by prosecutors to exert influence over the forensic landscape but are by no means the only ones. As Paul Giannelli has thoroughly documented, prosecutors have lobbied at the highest levels of government to prevent forensic reform.³³³ A National Academies project to study forensic examination that predated the NAS Report never got off the

326. See ADDENDUM TO THE PCAST REPORT, *supra* note 322, at 2; Capra, *supra* note 267, at 1519 (comments of Ted Hunt, DOJ Senior Advisor on Forensic Science) (“[T]he Department [of Justice] . . . reject[s] PCAST’s premise that there exists a singular and exclusive means by which to establish the foundational validity of these methods.”). See generally Letter from the National District Attorney’s Association to PCAST, *supra* note 323.

327. PCAST REPORT, *supra* note 2, at 5–6.

328. No one who responded to PCAST’s call for additional studies that might establish validity of the studied methods “identified any alternative approach that could establish the validity and reliability of a subjective forensic feature-comparison method.” ADDENDUM TO THE PCAST REPORT, *supra* note 322, at 3 (emphasis omitted). But see Ted Robert Hunt, *Scientific Validity and Error Rates: A Short Response to the PCAST Report*, 86 FORDHAM L. REV. ONLINE 24, 31–38 (2018) (criticizing the PCAST Report’s criteria for establishing validity).

329. Lander, *supra* note 93, at 1674.

330. *Id.*

331. See Press Release, U.S. Dep’t of Just., Justice Department Publishes Statement on 2016 President’s Council of Advisors on Science and Technology Report (Jan. 13, 2021), <https://www.justice.gov/opa/pr/justice-department-publishes-statement-2016-presidents-council-advisors-science-and>.

332. See Albright, *supra* note 325; Sinha, *supra* note 286; Innocence Staff, *Innocence Project Calls on Department of Justice to Retract Statement on PCAST Report*, INNOCENCE PROJECT (Feb. 19, 2021), <https://innocenceproject.org/innocence-project-calls-on-doj-to-retract-statement-on-pcast-report/>; Jordan Smith, *Advocates Challenge Mysterious Justice Department Statement That Undercuts Forensic Science Reform*, THE INTERCEPT (Aug. 8, 2021, 6:00 AM), <https://theintercept.com/2021/08/08/forensic-science-reform-justice-department/>.

333. See generally Giannelli, *supra* note 128.

ground because the DOJ conditioned its sponsorship of the project on a right to review the findings.³³⁴ Through NIJ, the DOJ has opposed presentation of rigorous analyses of the scientific underpinnings of forensic methods at government conferences.³³⁵ Prosecutors have also made direct attempts to control research by funding interested parties willing to pursue research agendas aligned with its strategic avoidance of reform efforts.³³⁶

The NAS and PCAST Reports' ultimate aim was to make forensic disciplines more scientific and more reliable. Efforts by prosecutorial bodies to undermine those aims and block forensic reform, however, have borne fruit. Such strategies have trickled down to the trial level, where they have been successfully adopted by individual prosecutors.³³⁷ After the PCAST Report was released, to assist prosecutors in combatting the recommendations of the report in litigation, various attorney general associations published advice to help prosecutors respond to attacks on forensic evidence based on the report.³³⁸

While the DOJ failed to block the PCAST Report entirely, it has succeeded in getting courts to reject the report in practice.³³⁹ The few reported decisions on the matter reveal that strategies by prosecutorial bodies to undercut the report have trickled into judges' admissibility rulings.³⁴⁰ Rather than scrutinize these methods in light of growing research underscoring how little "science" underlies many forensic methods, judges have instead reverted to reliance on

334. Donald Kennedy, *Forensic Science: Oxymoron?*, 302 SCIENCE 1625, 1625 (2003); Giannelli, *supra* note 128, at 64, 80.

335. Giannelli, *supra* note 128, at 80–81; Kennedy, *supra* note 334.

336. See Giannelli, *supra* note 128, at 65.

337. Within just weeks of issuance, the DOJ's statement attempting to discredit the PCAST Report was relied on by line prosecutors to persuade judges not to rely on the PCAST Report. Letter from Democracy Forward Foundation to U.S. Department of Justice 16–17 (June 24, 2021), <https://democracyforward.org/wp-content/uploads/2021/06/UCS-IQA-Request-re-PCAST-Statement-6.24.21.pdf>.

338. See, e.g., Memorandum from Amie Ely, Director of NAGTRI Center for Ethics & Public Integrity, Nat'l Ass'n of Attorneys General (Sept. 23, 2016), in *NAAG Memo Concerning 2016 PCAST Report*, VT. CRIM. L. MONTHLY, Aug.–Sept. 2016, at 9–10, <https://ago.vermont.gov/wp-content/uploads/2019/04/criminal-law-monthly-August-September-2016.pdf> (including an NAAG memo labeled "Attorney Work Product" even though it is readily available via an internet search); Benjamin I. Kaminar, *Responding to PCAST-Based Attacks on Forensic Science*, TEX. DIST. & CNTY. ATT'YS ASS'N (Jan.–Feb. 2018), <https://www.tdcaa.com/journal/responding-to-pcast-based-attacks-on-forensic-science/>.

339. See, e.g., *United States v. Johnson*, No. 16 Cr. 281, 2019 U.S. Dist. LEXIS 39590, at *34–35, *67–68 (S.D.N.Y. Mar. 11, 2019) (acknowledging PCAST Report's finding that firearms analysis is not foundationally valid but admitting evidence), *aff'd*, 861 F. App'x 483 (2d Cir. 2021); *United States v. Pitts*, No. 16-CR-550, 2018 U.S. Dist. LEXIS 30589, at *9–10, *12–14 (E.D.N.Y. Feb. 26, 2018) (acknowledging PCAST Report's questioning of the reliability of fingerprint evidence, but relying predominantly on precedent to admit such evidence); *State v. Patel*, No. LLICR130143598S, 2016 Conn. Super. LEXIS 3440, at *26, *29–30 (Conn. Super. Ct. Dec. 28, 2016) (admitting footwear comparison analysis after contending that the PCAST Report does not constitute the scientific community).

340. See, e.g., *United States v. Romero-Lobato*, 379 F. Supp. 3d 1111, 1118 (D. Nev. 2019) ("The PCAST Report refused to consider any study that did not meet its strict criteria . . . [T]he PCAST Report was criticized by a number of entities, including the DOJ, FBI, ATF, and AFTE.").

prosecutors' rhetoric about the report and precedent that predates the criticisms.³⁴¹

2. *Controlling Forensic Institutions*

To avoid the establishment of a national forensic body that would be entirely outside of its influence, the DOJ did exactly what the NAS Committee warned against: it took over efforts to govern the forensic system even though “[t]he potential for conflicts of interest between the needs of law enforcement and the broader needs of forensic science [is] great.”³⁴² The DOJ successfully pressed for a far more constrained body that it could maintain substantial control over;³⁴³ the result was the NCFS.³⁴⁴ The NCFS was designed in a way that limited its contributions to forensic reform. Although the NCFS was composed of roughly thirty voting commissioners of diverse backgrounds within the forensic, broader scientific, and legal communities,³⁴⁵ the DOJ control was embedded throughout. The NCFS charter established that senior DOJ officials would direct the NCFS's work and set its agenda, including determining what issues it would consider and prioritize.³⁴⁶

Most importantly, like the OSAC, NCFS had no enforcement power. Its recommendations to the Attorney General were advisory only; the DOJ was not bound to adopt any recommendations made, giving the DOJ total freedom to ignore or implement reforms as it deemed fit.³⁴⁷

The DOJ also determined who was selected to serve on the commission.³⁴⁸ At the time the NCFS charter expired in 2017, the DOJ's influence was reflected in the makeup of its commissioners. While a significant proportion were independent scientists or academics (eleven), more were affiliated with law enforcement (twelve), including four active or former prosecutors.³⁴⁹ Only two commissioners were affiliated with the defense.³⁵⁰

341. See, e.g., *State v. DeJesus*, 436 P.3d 834, 842 (Wash. Ct. App. 2019) (rejecting defense challenge to the admissibility of firearms evidence based on the NAS and PCAST Reports in part because “[c]ourts from around the country have universally held that toolmark analysis is generally accepted”); *Patel*, 2016 Conn. Super. LEXIS 3440, at *18-26, *30 (relying on pre-NAS and PCAST Report precedent to admit footwear comparison testimony).

342. NAS REPORT, *supra* note 2, at 17.

343. See *id.*; Lander, *supra* note 93, at 1674–75.

344. Lander, *supra* note 93, at 1674.

345. REFLECTING BACK, *supra* note 212, at app. A. The commission also had up to ten “ex officio” nonvoting members. NAT'L COMM'N ON FORENSIC SCI., BYLAWS AS AMENDED, MARCH 21, 2016, at 2 (2016), <https://www.justice.gov/archives/ncfs/file/47386/download> [hereinafter NCFS BYLAWS].

346. NCFS BYLAWS, *supra* note 345, at 1; *NCFS Charter*, *supra* note 213, at 1–2.

347. Lander, *supra* note 93, at 1674.

348. NCFS BYLAWS, *supra* note 345, at 2.

349. REFLECTING BACK, *supra* note 212, at app. A.

350. Of the twelve commissioners affiliated with law enforcement, six served at law enforcement laboratories including the Drug Enforcement Agency (DEA), Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), Federal Bureau of Investigation (FBI), and county crime labs. REFLECTING BACK, *supra*

Because recommendations to the Attorney General required a two-thirds vote to pass,³⁵¹ law enforcement members of the NCFS could prevent recommendations from passing.³⁵² The result was that, although the NCFS was able to pass many recommendations, others were diluted in order to gain sufficient votes for passage.³⁵³ Consequently, most NCFS recommendations were moderate by design. Two examples include a recommendation that forensic examiners and prosecutors abandon the scientifically meaningless term “reasonable scientific certainty,” and that judges refrain from declaring forensic examiners as “experts” in front of a jury to avoid putting a thumb on the scale for the proponent of the witness.³⁵⁴ While these recommendations do have value, more meaningful recommendations were never made or were not implemented. One such recommendation, that research be conducted into the technical merit of forensic disciplines, was abandoned by the FBI after the NCFS was disbanded.³⁵⁵

The DOJ also worked to undermine proposals made by the NCFS outside of the formal process. When the NCFS decided to recommend that expanded discovery relating to forensic evidence be provided to the defense, Deputy Attorney General Sally Yates called the head of the subcommittee working on the discovery proposal, Judge Jed Rakoff of the Southern District of New York, to block its work.³⁵⁶ Although forensic reformers have emphasized the

note 212, at app. A. Two additional members were high-level police officials. *Id.* Three judges also served as commissioners: Barbara Hervey, Pam King, and Bridget Mary McCormack. *Id.* Two of the judges were former defense attorneys and one a former prosecutor. *Id.* But see Epstein, *supra* note 30, at 743 (describing the NCFS as “dominated by the defense community”).

351. NCFS BYLAWS, *supra* note 345, at 4; see also Jed Rakoff, *Keynote Address*, 57 HOUS. L. REV. 475, 479 (2020).

352. For example, a document recommending what information should be included in a forensic case report and case record was voted down by eleven members. NAT’L COMM’N ON FORENSIC SCIENCE, MEETING #13: APR. 10–11, 2017, at 11 (2017), <https://www.justice.gov/ncfs/page/file/976566/download>. Of the eleven negative votes, nine were affiliated with either law enforcement or crime labs. *Id.*; REFLECTING BACK, *supra* note 212, at app. A.

353. REFLECTING BACK, *supra* note 212, at 5.

354. NAT’L COMM’N ON FORENSIC SCI., RECOMMENDATION TO THE ATTORNEY GENERAL: USE OF THE TERM “REASONABLE SCIENTIFIC CERTAINTY” (2016), <https://www.justice.gov/archives/ncfs/page/file/1079121/download>; NAT’L COMM’N ON FORENSIC SCI., VIEWS OF THE COMMISSION: JUDICIAL VOUCHING (2016), <https://www.justice.gov/archives/ncfs/file/880246/download>.

355. NAT’L COMM’N ON FORENSIC SCI., RECOMMENDATION TO THE ATTORNEY GENERAL: TECHNICAL MERIT EVALUATION OF FORENSIC SCIENCE METHODS AND PRACTICES 1 (2016), <https://www.justice.gov/archives/ncfs/page/file/905541/download>; Spencer S. Hsu, *Sessions Orders Justice Dept. to End Forensic Science Commission, Suspend Review Policy*, WASH. POST (Apr. 10, 2017), https://www.washingtonpost.com/local/public-safety/sessions-orders-justice-dept-to-end-forensic-science-commission-suspend-review-policy/2017/04/10/2dada0ca-1c96-11e7-9887-1a5314b56a08_story.html.

356. Jed S. Rakoff, *Full Text: Judge’s Protest Resignation Letter*, WASH. POST (Jan. 28, 2015), https://www.washingtonpost.com/local/full-text-judges-protest-resignation-letter/2015/01/29/41659da6-a7e1-11e4-a2b2-776095f393b2_story.html?tid=a_inl_manual. The subcommittee planned to recommend that prosecutors in criminal cases be required to provide to the defense the same detailed discovery as in civil

importance of improved discovery to ensure accuracy of information presented to juries,³⁵⁷ Yates claimed that discovery was outside the scope of the NCFS's mission even though a stated purpose of the NCFS was to “develop proposed guidance concerning the intersection of forensic science and the courtroom,” which, as Rakoff noted, could hardly be interpreted as omitting discovery.³⁵⁸ Rakoff resigned in protest and issued a scathing public letter charging the DOJ with “plac[ing] strategic advantage over a search for the truth” and attempting to “preserve a courtroom advantage.”³⁵⁹

Amidst the media storm over Rakoff's open call-out and resignation, Yates backed down and asked Rakoff to return, which he did.³⁶⁰ The public reconciliation, however, should not have suggested that the DOJ intended to accept Rakoff's subcommittee's suggestions to expand forensic discovery practice. Indeed, the subcommittee made a number of important recommendations that were passed overwhelmingly by the NCFS,³⁶¹ including several not already provided for in discovery rules.³⁶² But, in January of 2017, the DOJ issued supplemental discovery guidance for forensic evidence³⁶³ that largely mirrored existing discovery requirements or practice and did not address or adopt the majority of the Commission's recommendations.³⁶⁴

cases. NAT'L COMM'N ON FORENSIC SCI., MEETING #9: MAR. 21–22, 2016, at 11 (2016), <https://www.justice.gov/archives/ncfs/page/file/866111/download>.

357. McDiarmid, *supra* note 276, at 1.

358. Rakoff, *supra* note 356 (quoting *NCFS Charter*, *supra* note 213).

359. *Id.*

360. Spencer S. Hsu, *Judge Rakoff Returns to Forensic Panel After Justice Department Backs Off of Decision*, WASH. POST (Jan. 30, 2015), https://www.washingtonpost.com/local/crime/in-reversal-doj-lets-forensic-panel-suggest-trial-rule-changes-after-us-judge-protests/2015/01/30/2f031d9e-a89c-11e4-a2b2-776095f393b2_story.html.

361. The NCFS's discovery recommendations were approved by 78% of Commissioners. NCFS RECOMMENDATION ON PRETRIAL DISCOVERY, *supra* note 276, at 1.

362. These included that prosecutors provide to the defense all exhibits that will be used to support an expert's opinions, a list of all publications authored by the expert in the previous ten years; a list of all cases in which the expert testified in the previous four years; and a summary of how the expert is compensated. *Compare id.* at 2–3, *with* FED. R. CRIM. P. 16.

363. See generally Memorandum from Sally Q. Yates, Deputy Att'y Gen., to Dep't Prosecutors, *Supplemental Guidance for Prosecutors Regarding Criminal Discovery 2* (Jan. 5, 2019), <https://www.justice.gov/archives/ncfs/page/file/930411/download>.

364. Federal Rule of Criminal Procedure 16 requires, *inter alia*, that the defense generally be provided with documents and objects, results, and reports of “scientific tests” as well as a written summary of expert testimony the government intends to offer at trial, along with the expert's opinions, the bases and reasons for those opinions, and the expert's qualifications. FED. R. CRIM. P. 16(a)(1)(E) to (G). The supplemental guidance requires little, if any, additional discovery be provided. For example, it requires the prosecutor to “obtain the forensic expert's laboratory report,” “disclose . . . a written summary,” of expert testimony, and “provide to the defense information on the expert's qualifications.” Memorandum from Sally Q. Yates, *supra* note 363, at 2–3. Each of these disclosures is already required by Rule 16. FED. R. CRIM. P. 16. It does instruct prosecutors to provide the defense with the relevant “case file,” which can include bench notes, photographs taken during analysis, the raw data on which conclusions are based, chain of custody information, communication logs, proficiency test results for the examiner who conducted the analysis in question, documentation of the review process for forensic examinations, among other documentation of the particular forensic analysis process at issue. *Id.* at 2; e.g., Houston Forensic Science Ctr., Crime Scene Unit: Crime Scene Case Records: Evidence Collection Division (Dec. 7, 2015),

As described, improvements have since been made with respect to forensic discovery despite the stalemate at the NCFS.³⁶⁵

Notwithstanding the significant output of the NCFS, few of its recommendations were adopted by the Attorney General.³⁶⁶ Nevertheless, it made some incremental progress. It made over forty recommendations to improve and strengthen the nation's forensic science system³⁶⁷ and most were approved by a strong majority of commissioners, even if not adopted by the DOJ.³⁶⁸ Aside from its official outputs, the NCFS created unprecedented dialogue between forensic stakeholders and added a layer of transparency to a system usually hidden behind the curtain of law enforcement.³⁶⁹

This success, however, contributed to the commission's demise. As its term progressed, the NCFS began working on thornier issues that had the potential to have wider impact on the forensic system.³⁷⁰ But in April 2017, its term was set to expire³⁷¹ as many of its recommendations were still in progress.³⁷² To complete its work, the NCFS sought an extension of its term.³⁷³ The request was rejected; Jeff Sessions disbanded the body after he was appointed as Attorney General.³⁷⁴ Peter Neufeld was blunt about the import of the NCFS's disbanding: "[T]he [D]epartment [of Justice] has literally decided to suspend the search for the truth . . . As a consequence innocent people will languish in prison or, God forbid, could be executed."³⁷⁵

Sessions announced that the DOJ would take the task of improving forensics in-house.³⁷⁶ Rather than choosing an independent scientist, or a panel of leaders with broad interests to lead the effort, Sessions chose a career prosecutor, Ted Hunt, to helm the program.³⁷⁷ Hunt lacked scientific training and was accused of employing questionable tactics in his practice, including

<https://houstonforensicscience.org/sop/57729903RhZ06-21-16.pdf>. Case files are routinely provided in discovery. Some of the subcommittee's proposals are included in the proposed amendments to Federal Rule of Criminal Procedure 16. *See supra* note 277 and accompanying text.

365. *See supra* note 277 and accompanying text.

366. Lander, *supra* note 93, at 1674.

367. REFLECTING BACK, *supra* note 212, at 5.

368. Rakoff, *supra* note 351, at 479.

369. *See* Toni Feder, *US Government Ends Forensic Science Commission*, PHYSICS TODAY (Apr. 18, 2017), <https://physicstoday.scitation.org/doi/10.1063/pt.5.1116/full/>.

370. Rakoff, *supra* note 351, at 480.

371. NCFS Charter, *supra* note 213, at 2, 3.

372. Hsu, *supra* note 355.

373. *Id.*

374. *Id.*

375. *Id.*

376. *Id.*

377. Off. of Pub. Affs., *Justice Department Announces Plans to Advance Forensic Science*, U.S. DEP'T OF JUST. (Aug. 7, 2017), <https://www.justice.gov/opa/pr/justice-department-announces-plans-advance-forensic-science>.

mischaracterizations of scientific statements.³⁷⁸ His anti-reform track record³⁷⁹ earned him the nickname, the “Mike Pence of forensics.”³⁸⁰ To this day, no similarly transparent and broad-based body of experts has yet been established to replace the NCFS.

B. *Manufactured Reliability*

While prosecutors resist reform efforts, segments of the forensic community have worked to facilitate the admission of unsound forensic evidence in criminal cases. They understand admissibility standards and leverage that knowledge, following the roadmaps provided by courts, to increase the likelihood of admission of forensic methods, even those lacking meaningful scientific underpinnings.³⁸¹

The breathalyzer hypothetical highlights the unpleasant reality that commonly used forensic techniques can be made to appear admissible by wrapping them in the trappings of science—as laid out by relevant admissibility standards—even when what lies beneath has hardly been established as reliable science. Studies are manipulated to achieve desired outcomes.³⁸² Results that are contrary to the position of the sponsor are sometimes suppressed.³⁸³ Research is frequently funded or commissioned either by parties themselves or others, like drug manufacturers, who have an interest in the outcome of litigation or the admissibility of certain evidence.³⁸⁴

The hypothetical is not merely a warning; examples of manipulation of admissibility factors to manufacture a perception of reliability are well known in civil litigation.³⁸⁵ What is less known is that many of the same strategies are being employed in forensic communities on the criminal side—and going unnoticed.

An examination of firearms analysis serves as a useful case study for understanding how segments of the forensic community, aligned with law enforcement and insulated from the broader scientific community, have leveraged an understanding of the *Daubert* factors to manufacture a perception

378. Lander, *supra* note 93, at 1675.

379. Pema Levy, *Sessions' New Forensic Science Adviser Has a History of Opposing Pro-Science Reforms*, MOTHER JONES (Aug. 10, 2017), <https://www.motherjones.com/crime-justice/2017/08/sessions-new-forensic-science-adviser-has-a-history-of-opposing-pro-science-reforms/>.

380. Liliana Segura & Jordan Smith, *Bad Evidence: Ten Years After a Landmark Study Blew the Whistle on Junk Science, the Fight over Forensics Rages On*, INTERCEPT (May 5, 2019, 7:00 AM), <https://theintercept.com/2019/05/05/forensic-evidence-aafs-junk-science/>.

381. See NAS REPORT, *supra* note 2, at 46-47.

382. See Anderson, Parsons & Rennie, *supra* note 143, at 666.

383. Mark R. Patterson, *Conflicts of Interest in Scientific Expert Testimony*, 40 WM. & MARY L. REV. 1313, 1346-47 (1999).

384. Anderson, Parsons & Rennie, *supra* note 143, at 623-26, 655; Patterson, *supra* note 383, at 1346-47.

385. Anderson, Parsons & Rennie, *supra* note 143, at 620-21.

that their method is reliable—thereby winning it widespread admissibility—despite significant data to the contrary.

Firearms and toolmark examination is one of the most widely used forensic methods today.³⁸⁶ The fundamental theory behind firearms examination is that the hard tools used in the weapons manufacturing process impart markings or patterns on the softer metal of the guns being manufactured.³⁸⁷ These manufacturing irregularities, along with changes to a weapon's surfaces caused by wear and tear, the theory goes, leave small, even microscopic, features on the surfaces of the interior of a gun that are imparted on the surface of ammunition after it is fired and travels through the weapon.³⁸⁸ Firearms examiners believe that these features are unique to a specific weapon and that, as a result, each weapon leaves a distinct set of markings on ammunition fired from it.³⁸⁹ According to firearms examiners, the markings on two bullets or shell casings can be compared to determine whether they were fired from the same weapon.³⁹⁰

The method has come under sharp criticism because there is little evidence that the discipline's foundational premises—that weapons pass on a unique set of markings to fired ammunition, repeated from firing to firing—is true.³⁹¹ Worse, there is also little evidence that, even if weapons do pass on distinct patterns to ammunition, examiners are capable of discerning those differences with a high level of accuracy.³⁹²

Despite this lack of scientific grounding, the firearms analysis community has utilized its knowledge of the *Daubert* factors to regularly secure admission of firearms evidence at trial, creating a perception of reliability when the discipline may not be valid.³⁹³ As one court has noted, without deeper scrutiny, each factor can be made into a box to easily check off:

[I]t is possible, at a superficial level, to conclude that his methodology satisfies the *Daubert* requirements. Replicability? Check. . . . Other forensic examiners trained in ballistics comparisons can perform an examination using the same basic methodology. In fact, double check: a forensic examiner in this very case did a second comparison and came to the same conclusion. Error rate? Check.

386. *Forensic Evidence Types: Common Types of Evidence*, MICH. STATE POLICE, https://www.michigan.gov/documents/msp/Forensic_Evidence_Types_390544_7.htm (last visited Feb. 8, 2022); Jacob Sims, *7 Most Common Types of Forensic Evidence*, OUTLOOK MAG. (Mar. 29, 2019), <http://www.outlookmagazine.ca/science/7-most-common-types-of-forensic-evidence/>.

387. NAS REPORT, *supra* note 2, at 150.

388. *What is Firearm and Toolmark Identification?*, ASS'N OF FIREARM & TOOL MARK EXAM'RS, <https://afte.org/about-us/what-is-afte/what-is-firearm-and-tool-mark-identification> (last visited Feb. 8, 2022).

389. NAS REPORT, *supra* note 2, at 150.

390. *Id.* at 150–51; *What is Firearm and Toolmark Identification?*, *supra* note 388.

391. PCAST REPORT, *supra* note 2, at 105.

392. *Id.*

393. See, e.g., *SWGUN Admissibility Resource Kit (ARK): Review of Admissibility Elements*, ASS'N OF FIREARM & TOOL MARK EXAM'RS, <https://afte.org/resources/swgun-ark>.

Testing seems to indicate an error rate hovering around two percent. Testing and standards? Check[.] Publication? Check. Journals put out by associations of forensic examiners have published hundreds of relevant articles. Acceptance? Check. All reputable forensic examiners accept the ballistics comparison method used in this case as valid.

It is only when you look beneath the surface that the problems with [firearms and toolmark examination] methodology begin to emerge.³⁹⁴

1. *Flawed Testing*

Daubert's testing factor purports to establish a validity-based requirement for admissibility: without sufficient empirical testing establishing validity, the testing factor cannot be met, and a method cannot be deemed admissible.³⁹⁵ Superficial satisfaction of the testing factor does not necessarily indicate validity, however, as a number of design flaws plague the majority of the studies that purport to establish the validity of forensic methods.

In order for testing to reliably reflect the accuracy of a forensic method, it must test the method as it is actually used in the real world. Problematically, however, judges often find the factor satisfied even when testing says little about reliability.³⁹⁶ In firearms analysis, many studies employ “testing” that is both unrealistically easy and divorced from actual casework.³⁹⁷ The result is that these studies have little value in establishing whether firearms analysis is actually valid.³⁹⁸

The majority of, though not all, published studies relating to firearms examination accuracy do not mirror the types of cases encountered in actual case work and are, in fact, far easier problems than those encountered in typical cases.³⁹⁹ For example, many employ what the PCAST Report describes as a “closed-set” design, in which examiners can deduce the correct answers.⁴⁰⁰ In actual case work, however, the universe of conclusions is not a closed one with a limited number of possible choices, one of which is definitively right.⁴⁰¹

Moreover, many, if not most, studies that attempt to determine the accuracy of firearms examiners through empirical testing are designed by

394. United States v. Adams, 444 F. Supp. 3d 1248, 1258 (D. Or. 2020).

395. Daubert v. Merrell Dow Pharms., 509 U.S. 579, 592 (1993); PCAST REPORT, *supra* note 2.

396. See David H. Kaye, *How Daubert and Its Progeny Have Failed Criminalistics Evidence and a Few Things the Judiciary Could Do About It*, 86 FORDHAM L. REV. 1639, 1643–44 (2018).

397. See PCAST REPORT, *supra* note 2, at 111–12.

398. *Id.*

399. See *id.* at 106; Adams, 444 F. Supp. at 1266.

400. PCAST REPORT, *supra* note 2, at 106. The PCAST Report offers a detailed overview of what the Working Group perceived to be the design flaws in the majority of firearms studies. *Id.* at 106–08.

401. Some critics have argued that closed-set studies do resemble certain types of case work, particularly cases involving police shootings in which the source weapon is known. *Id.* at 107–09. Though closed-set studies do more closely resemble such cases, these cases are the exception, not the rule. *Id.*

firearms practitioners whose expertise is not in research science or study design.⁴⁰² The result is that these studies often fail to account for test-taking bias or to control for variation in test-takers' approaches to study problems.⁴⁰³ These issues make results difficult to interpret and assess, limiting their utility for establishing validity.⁴⁰⁴

The sum total of these design flaws is that forensic testing often provides a veneer of reliability, specifically designed to satisfy a "testing" requirement for admissibility, rather than a meaningful check of validity. This aura of reliability has apparently been sufficient to convince judges to admit potentially problematic firearms evidence with regularity. Judges have not only largely found firearms and toolmarks testimony admissible, but they have also gone so far as to declare that the discipline has been thoroughly vetted.⁴⁰⁵

2. *Meaningless Peer Review*

Peer review is potentially the most manipulable of the *Daubert* factors. Judges often treat this factor as satisfied by the mere existence of peer-reviewed publications relating to a discipline—a box to check—rather than by assessing whether those publications reflect meaningful scrutiny verifying a method's reliability.⁴⁰⁶ They also readily accept publications in professional journals that are not, or are only minimally, peer-reviewed.⁴⁰⁷ Within the firearms discipline, for example, the majority of literature is published in the journal of the Association of Firearms and Tool Mark Examiners (AFTE), a professional organization for firearm and toolmark examiners.⁴⁰⁸ Though the firearms community disputes this, the AFTE Journal has been described as a trade journal rather than a peer-reviewed scientific publication, written for firearms practitioners rather than for the scientific community at large to test or evaluate research and theories underlying the discipline.⁴⁰⁹ Publications submitted to the journal are reviewed by other firearms practitioners who, like the author(s), "have a vested, career-based interest in publishing studies that validate their own field and methodologies."⁴¹⁰

402. *United States v. Tibbs*, No. 2016 CF1 19431, 2019 D.C. Super. LEXIS 9, at *41 (D.C. Super. Ct. Sep. 5, 2019).

403. *Id.* at *41–42, *44–45. *See also* Itiel E. Dror & Nicholas Scurich, *(Mis)use of Scientific Measurements in Forensic Science*, 2 FORENSIC SCI. INT'L.: SYNERGY 333, 336 (2020).

404. *Id.* at *41–42.

405. *Id.* at *24 ([V]irtually every court that has evaluated the admissibility of firearms and toolmark identification has found the . . . method to be testable and that the method has been repeatedly tested.).

406. *See* KAYE, BERNSTEIN & MNOOKIN, *supra* note 138, § 7.6.3; *see also Tibbs*, 2019 D.C. Super. LEXIS 9, at *28–29.

407. KAYE, BERNSTEIN & MNOOKIN, *supra* note 138, § 7.6.3.

408. *Tibbs*, 2019 D.C. Super. LEXIS 9, at *28–32. *See also* Chin, Ribeiro & Rairden, *supra* note 152, at 287 (describing the AFTE Journal as a "guild journal").

409. *E.g.*, *United States v. Adams*, 444 F. Supp. 3d 1248, 1265 (D. Or. 2020).

410. *Tibbs*, 2019 D.C. Super. LEXIS 9, at *33.

Moreover, the AFTE Journal's insulation from the outside scientific community protects the work it publishes from independent scientific scrutiny: the journal is not freely available to the scientific community or to the public, and it cannot be obtained through most university libraries or research engines.⁴¹¹

At every level of review, the AFTE Journal publication process is permeable to bias. In contrast to double-blind and single-blind procedures meant to limit bias in the peer-review process, the AFTE Journal's peer-review process, until just 2020, was totally open,⁴¹² meaning that authors and reviewers could discuss draft publications together. Because authors and reviewers are often known to each other, this type of review dampens the likelihood of any submission receiving critical feedback.⁴¹³ Though AFTE has since moved to a double-blind review process, submissions are still reviewed by an editorial board that consists entirely of AFTE members⁴¹⁴ who have no less an interest in the field being deemed valid than article authors and other practitioners.

Importantly, these issues are not limited to firearms analysis. Handwriting and bitemark analysis have also been credibly accused of publishing studies in self-serving journals.⁴¹⁵

Even journals relating to DNA analysis, still considered the most reliable among forensic disciplines,⁴¹⁶ have been similarly criticized. Today, DNA analysis is typically conducted using sophisticated probabilistic genotyping software (PGS) systems that utilize algorithms to interpret complex DNA

411. See *Journal Subscriptions*, ASS'N OF FIREARMS & TOOL MARK EXAM'RS, <https://afte.org/afte-journal/journal-subscriptions> (last visited Apr. 10, 2022); *AFTE Store Journals*, ASS'N OF FIREARMS & TOOL MARK EXAM'RS, <https://afte.org/store/category/journals> (last visited Apr. 10, 2022); KAYE, BERNSTEIN & MNOOKIN, *supra* note 138, § 7.6.3. *Contra* NAT'L COMM'N ON FORENSIC SCI., VIEWS OF THE COMMISSION: SCIENTIFIC LITERATURE IN SUPPORT OF FORENSIC SCIENCE AND PRACTICE 3 (2015), <https://www.justice.gov/archives/ncfs/file/786591/download> (recommending that foundational forensic science literature be published in journals “searchable using free, publicly available search engines . . . that search major databases of scientific literature” and “that are available through academic libraries and other services”).

412. Compare *Tibbs*, 2019 D.C. Super. LEXIS 9, at *29, with *Peer Review Process*, ASS'N OF FIREARMS & TOOL MARK EXAM'RS, <https://afte.org/afte-journal/afte-journal-peer-review-process> (last visited Apr. 10, 2022).

413. See KAYE, BERNSTEIN & MNOOKIN, *supra* note 138, § 7.32(b).

414. See *Tibbs*, 2019 D.C. Super. LEXIS 9, at *32; *Peer Review Process*, *supra* note 412.

415. See *Almeciga v. Ctr. for Investigative Reporting, Inc.*, 185 F. Supp. 3d 401, 420 (S.D.N.Y. 2016) (“[T]he key question here is what constitutes a ‘peer,’ because just as astrologers will attest to the reliability of astrology, defining ‘peer’ in terms of those who make their living through handwriting analysis would render this *Daubert* factor a charade. While some journals exist to serve the community of those who make their living through forensic document examination, numerous courts have found that ‘[t]he field of handwriting comparison . . . suffers from a lack of meaningful peer review’ by anyone remotely disinterested.”); *Beecher-Monas*, *supra* note 9, at 1389; *Orenstein*, *supra* note 46, at 1143.

416. Lauren Kirchner, *Where Traditional DNA Testing Fails, Algorithms Take Over*, PROPUBLICA (Nov. 4, 2016, 8:00 AM), <https://www.propublica.org/article/where-traditional-dna-testing-fails-algorithms-take-over>.

mixtures.⁴¹⁷ A number of studies have been conducted to attempt to establish the validity of these methods, but most of these have been conducted by the primary creators of the software.⁴¹⁸ The authors' relationship with the software they are attempting to validate represents a conflict of interest; they stand to gain financially and professionally from having their work found to be valid.⁴¹⁹

While the authors' conflicts certainly do not invalidate their work, they demonstrate a need for greater independent scrutiny of the fields.⁴²⁰ The whole point of "peer review" is that one's work is reviewed by their peers who will scrutinize it and identify shortcomings; "self-review," while helpful, is not an adequate substitute.⁴²¹

3. *Miscalculated Error Rates*

The reason *Daubert* includes error rates as a reliability factor is simple: judges need to know the likelihood of an expert getting it wrong before allowing expert evidence that might result in a conviction to be heard by a jury.⁴²² Despite the importance of understanding the real chance of error, courts have routinely accepted low reported error rates as true without scrutinizing the studies reporting those rates.⁴²³ This is problematic for several reasons. Take the reported low error rates in firearms examinations, for example. As described, many of the studies purporting to validate the firearms discipline involve test problems that are easier than real-life case work problems.⁴²⁴ Easy problems

417. See Simon Ford & Dan Krane, *The Dawning of a New Era in DNA Profiling*, CHAMPION, May 2018, at 40 (2018); NIST DNA MIXTURE INTERPRETATION REVIEW, *supra* note 4, at 2.

418. PCAST REPORT, *supra* note 2, at 80; Kwong, *supra* note 4, at 289; see also *Peer Reviewed Publications for STRmix IV*, JOHN BUCKLETON (last updated Apr. 21, 2021), <https://johnbuckleton.files.wordpress.com/2020/06/peer-reviewed-publications-for-strmix-iv.pdf> (listing publications relating to STRmix, the most prevalent PGS system used today and indicating that a majority are authored entirely or in part by one or more of STRmix's three developers: Jo-Anne Bright, John Buckleton, and Duncan Taylor); *STRmix*, JOHN BUCKLETON (last updated Apr. 21, 2021), <https://johnbuckleton.wordpress.com/strmix/>; *Scientific Validation Studies, Magazine Articles, Book Chapters and More*, CYBERGENETICS, <https://www.cybgen.com/information/publication/page.shtml> (last visited Apr. 19, 2022) (listing a majority of publications related to TrueAllele, another PGS software, as authored entirely or in part by Mark Perlin, its primary developer).

419. See Kwong, *supra* note 4, at 289; *Tibbs*, 2019 D.C. Super. LEXIS 9, at *33.

420. PCAST REPORT, *supra* note 2, at 79 (recommending additional "studies by multiple groups, not associated with the [PGS] software developers"); see also *id.* at 81 (encouraging PGS studies by researchers with no stake in the system being studied).

421. Kwong, *supra* note 4, at 289 ("Peer review of validation studies conducted by interested parties is not the equivalent of rigorous third-party evaluation studies for the purposes of general acceptance in the scientific community.").

422. Koehler, *supra* note 218, at 1372–74.

423. See, e.g., *United States v. Adams*, 444 F. Supp. 3d 1248, 1264 (D. Or. 2020) (describing reported error rates as ranging from 0.9 to 2.2 percent); *Tibbs*, 2019 D.C. Super. LEXIS 9, at *38, *40.

424. PCAST REPORT, *supra* note 2, at 12, 150.

artificially drive the false positive error rate down,⁴²⁵ meaning that the reported error rates relied upon by courts likely do not reflect reality.⁴²⁶ This is further evidenced by the fact that calculated error rates in firearms analysis and other disciplines increase with the difficulty of the test.⁴²⁷

Additionally, in most forensic disciplines, including firearms examination, an examiner can come to one of three conclusions: (1) an elimination, meaning two items can be eliminated as having been fired by the same weapon; (2) identification, meaning two items can be identified as having the same source; or (3) inconclusive, meaning no conclusion can be reached about whether or not two items have the same source.⁴²⁸ In firearms studies, test takers often choose inconclusive when, in fact, two items could have been identified or eliminated as having been fired from the same source.⁴²⁹ But inconclusive findings are not included in the false-positive error rate calculation, creating another way in which error rates calculated from studies are driven below real-world error rates.⁴³⁰

Only recently has inconclusive reporting in forensics begun to be studied.⁴³¹ There is a debate as to whether inconclusive should be tallied as an “incorrect” answer in calculating false positives, but there is a growing recognition that, particularly in simulated study scenarios in which there is sufficient data to render a conclusion, inconclusive findings represent some form of error.⁴³² This is concerning because these studies do not incorporate inconclusive results in error rate calculations, meaning reported error rates are likely significantly lower than the actual error rates in case work.⁴³³

425. See *id.* at 12. In firearms examination, the false positive error is the rate at which examiners incorrectly conclude that two items were fired from the same weapon when they were in fact fired from different weapons. See *id.* at 151.

426. See *Adams*, 444 F. Supp. 3d at 1265.

427. *Id.* at 1264–65; Jonathan J. Koehler & Shiquan Liu, *Fingerprint Error Rate on Close Non-Matches*, 66 J. FORENSIC SCIS. 129, 129 (2020) (reporting high false positive error rates where fingerprint analysts were asked to compare two prints from different sources with many common features).

428. See e.g., *AFTE Range of Conclusions*, ASS'N OF FIREARM AND TOOL MARK EXAM'RS, <https://afte.org/about-us/what-is-afte/afte-range-of-conclusions> (last visited Apr. 10, 2022). The inconclusive category is sometimes broken down further to reflect scenarios in which some, but not sufficient, evidence supports either an identification or elimination. *Id.*

429. Dror & Scurich, *supra* note 403, at 336. This is true even though the study designers take pains to ensure that test samples are of high enough quality such that a definite conclusion can be rendered. See *United States v. Tibbs*, No. 2016 CFI 19431, 2019 D.C. Super. LEXIS 9, at *58–60 (D.C. Super. Ct. Sept. 5, 2019) for a more fulsome summary of how this is accomplished.

430. Dror & Scurich, *supra* note 403, at 336. Why test takers report so many inconclusives is the subject of speculation. One reason is that because only false positives and false negatives are considered errors, there is an incentive for test takers to make an inconclusive call rather than risk an error. *Id.*; *Adams*, 444 F. Supp. 3d at 1265.

431. Itiel E. Dror & Glenn Langenburg, “Cannot Decide”: *The Fine Line Between Appropriate Inconclusive Determinations Versus Unjustifiably Deciding Not to Decide*, 64 J. FORENSIC SCIS. 10, 11 (2018).

432. *Id.*; Dror & Scurich, *supra* note 403, at 334; see also *Tibbs*, 2019 D.C. Super. LEXIS 9, at *62.

433. On top of all this, error rates cannot even be calculated from many of firearms studies. Calculating the false positive error rate requires, in simple terms, dividing the number of false positive conclusions by the total number of comparisons conducted in which the two items were fired from different weapons. PCAST

Though these examples are taken from firearms and toolmark examination, these are not issues isolated to that field. A prominent statistician, Karen Kafadar, recently discovered significant undercalculation of error rates in forensic glass analysis using inferential techniques that she asserts “you would never see in the statistics literature.”⁴³⁴ Likewise, undercalculation of error rates has been found in studies relating to additional forensic disciplines including bitemark and fingerprint analysis.⁴³⁵

4. “Vacuous” Standards

The aim of standards development is to promote use of best practices and consistency in applying the forensic methods across labs and analysts.⁴³⁶ That can only happen, however, when standards offer specific, tailored guidance for practitioners. Frequently, so-called standards developed for forensic science fields do not meet this metric.

For example, the governing standard in conducting firearms and toolmark identification centers around the “AFTE theory.”⁴³⁷ The AFTE theory provides that an examiner can conclude that two items were fired by the same weapon:

when the unique surface contours of two toolmarks are in “sufficient agreement.” . . . Agreement is significant when the agreement in individual characteristics exceeds the best agreement demonstrated between toolmarks known to have been produced by different tools and is consistent with agreement demonstrated by toolmarks known to have been produced by the same tool. The statement that “sufficient agreement” exists between two toolmarks means that the agreement of individual characteristics is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility.⁴³⁸

REPORT, *supra* note 2, at 151–152. In set-based studies, the number of actual comparisons an examiner makes is unknown. The examiner may compare each item in the set to each other item in the set or may just compare a few items to each other and reach conclusions based on inferences made from the set. *Id.* at 107–108. This means that a false positive error rate cannot be calculated. While set-based studies allow the number of false positive errors, or misidentifications, to be tallied, they do not allow one to know the total number of comparisons. *Id.* at 106–08. For a more fulsome overview of statistical issues relating to error rate calculation, see *id.* at 151–54.

434. Kafadar, *supra* note 206, at 10. Forensic glass analysis involves comparing element concentrations of glass samples found at a crime scene to glass samples associated with a suspect to determine if the samples originated from the same source. See *id.* at 9–10.

435. See PCAST REPORT, *supra* note 2, at 86, 97.

436. See *The Organization of Scientific Area Committees for Forensic Science*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science> (last visited Apr. 19, 2022).

437. *The Foundations of Firearm and Toolmark Identification*, SCI. WORKING GRP. OF FIREARMS AND TOOLMARKS 1, 4 (May 1, 2013), https://www.nist.gov/system/files/documents/2016/11/28/swgun_foundational_report.pdf.

438. *AFTE Theory of Identification as It Relates to Toolmarks*, ASS’N OF FIREARMS & TOOLMARK EXAM’RS, <https://afte.org/about-us/what-is-afte/afte-theory-of-identification> [hereinafter *AFTE Theory of Identification as It Relates to Toolmarks*] (last visited Apr. 19, 2022) (emphasis added).

The AFTE theory *sounds* scientific,⁴³⁹ but, as several courts have noted, the theory is entirely circular.⁴⁴⁰ As one court put it recently, “the AFTE ‘sufficient agreement’ standard is a tautology that doesn’t *mean* anything.”⁴⁴¹ “Significant” or “sufficient” agreement is defined subjectively by the examiner in relationship to their own personal experience.⁴⁴²

Despite this, courts routinely point to the AFTE theory as evidence that the *Daubert* “standards” factor is satisfied.⁴⁴³ The discipline, here too, has leveraged a *Daubert* factor to create an air of reliability when in fact the core principle underlying the discipline is subjective and undefined, precisely what a standards requirement ought to protect against.

Again, firearms and toolmark examination provides a useful case study, but these problems are not limited to the firearms field. Examination of the OSAC standards development process reveals deficiencies in standards development across forensic disciplines.

The OSAC structure embeds several layers of what should serve as checks on the quality of standards. Standards development usually starts at the subcommittee level.⁴⁴⁴ After a proposed standard is drafted by a subcommittee, stakeholders—human factors, legal resource, quality, statistics, and terminology task groups—and, in some cases, a technical review panel, can provide comments, advice, and guidance to subcommittees on draft standards.⁴⁴⁵ After comments are received, the subcommittee may revise the proposed standard

439. United States v. Tibbs, No. 2016 CFI 19431, 2019 D.C. Super. LEXIS 9, at *69 (D.C. Super. Ct. Sept. 5, 2019) (explaining that terms like “sufficient agreement” in the AFTE theory gives the theory an air of being scientific).

440. See, e.g., United States v. Adams, 444 F. Supp. 3d 1248, 1261 (D. Or. 2020) (quoting United States v. Shipp, 422 F. Supp. 3d 762, 779 (E.D.N.Y. 2019)).

441. *Id.* at 1262.

442. See *id.* at 1262–63 (quoting *Shipp*, 422 F. Supp. 3d at 779); *AFTE Theory of Identification as It Relates to Toolmarks*, *supra* note 438.

443. See, e.g., State v. Phillips, No. 1210013272, 2015 Del. Super. LEXIS 439, at *23–24 (Del. Super. Ct. Sept. 2, 2015) (finding that “the AFTE theory satisfies the existence and maintenance of standards controlling the technique’s operation factor under *Daubert*”); United States v. Otero, 849 F. Supp. 2d 425, 434 (D.N.J. 2012) (determining that “the AFTE standard of ‘sufficient agreement’ is the established standard controlling firearms and toolmark identification”); United States v. Johnson, No. 14-cr-00412, 2015 U.S. Dist. LEXIS 111921, at *10 (N.D. Cal. Aug. 24, 2015) (finding that “[t]he AFTE methodology is subject to standards controlling the technique’s operation” and, thus, satisfies the *Daubert* standards prong).

444. *Registry Approval Process*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/osac/registry-approval-process#Registry> (last visited April 12, 2022).

445. *Id.*; *Resource Task Groups*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science/resource-task-groups> (last visited Apr. 10, 2022); *Scientific & Technical Review Panels*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/osac/scientific-technical-review-panels> (last visited April 12, 2022). The Author is currently an appointed member to the OSAC Legal Resources Task Group and the OSAC Firearms and Toolmarks Subcommittee. *Legal Task Group*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science/legal-task-group> (last visited Apr. 10, 2022); *Firearms & Toolmarks Subcommittee*, NAT’L INST. OF STANDARDS & TECH., <https://www.nist.gov/topics/organization-scientific-area-committees-forensic-science/firearms-toolmarks-subcommittee> (last visited Apr. 10, 2022).

and then vote to send it to the Forensic Science Standards Board (FSSB), OSAC's governing body, for review and potential placement on the OSAC Registry.⁴⁴⁶ Once a proposed standard is approved for placement on the OSAC Registry, it is sent to an external standards developing organization (SDO) for additional development, another open comment period, and publication.⁴⁴⁷ Next, the subcommittee votes again to replace the proposed standard with the published standard on the OSAC Registry.⁴⁴⁸ If approved by the subcommittee, the FSSB may petition for review and vote to approve the standard for placement on the OSAC registry.⁴⁴⁹ If the FSSB does not seek review, the published standard will automatically replace the proposed standard on the OSAC Registry.⁴⁵⁰ At all levels, approval for a standard to move on to the next phase of development requires a two-thirds vote.⁴⁵¹

The OSAC's process for developing standards appears quite rigorous and may well have been intended to be so. Review is required at multiple levels, public comments are considered, and a supermajority is required to approve a draft standard at any phase of the process. To a judge, in particular, the OSAC's standards development process may appear more than enough to satisfy *Daubert's* standards prong.

But a look beneath the surface reveals shortcomings. First, of the OSAC's nearly 500 members, over fifty percent are forensic practitioners.⁴⁵² The subcommittees also have significant law enforcement membership.⁴⁵³ Consequently, standards, whether or not they promote scientific validity, can be pushed through the process despite well-founded concerns and dissenting votes from nonforensic scientists, legal experts, or others.

446. *Registry Approval Process*, *supra* note 444; *Forensic Science Standards Board*, NAT'L INST. OF STANDARDS & TECH., <https://www.nist.gov/osac/forensic-science-standards-board> (last visited April 12, 2022).

447. *Registry Approval Process*, *supra* note 444.

448. *Id.*

449. *Id.*

450. *Id.*

451. *Terms of Reference for the Subcommittees*, NAT'L INST. OF SCI. & TECH. 1, 4 (Jan. 6, 2021), https://www.nist.gov/system/files/documents/2021/01/07/FSSB_OSAC_ToR%20Subcommittee_V2.1_CURRENT.pdf; *OSAC: Terms of Reference for Scientific Area Committees*, NAT'L INST. OF SCI. & TECH. 1, 3 (Jan. 6, 2021), https://www.nist.gov/system/files/document/s/2020/09/15/5.FSSB_OSAC%20ToR%20TG_V1.0%20%281%29.pdf; *OSAC: Terms of Reference for the Forensic Science Standards Board*, NAT'L INST. OF SCI. & TECH. 1, 4 (Jan. 6, 2021), https://www.nist.gov/system/files/documents/2021/03/16/OSAC%20ToR%20FSSB_V2.1%20Final%202-2021.pdf.

452. *OSAC: A Year in Review*, OSAC NEWSLETTER (Nat'l. Inst. of Sci. & Tech.), Fall 2021, at 12, <https://www.nist.gov/magazine/osac-newsletter/fall-2021-annual-report>.

453. See e.g., *Facial Identification Subcommittee*, NAT'L INST. OF SCI. & TECH. (February 2, 2022), <https://www.nist.gov/osac/facial-identification-subcommittee>; *Seized Drugs Subcommittee*, NAT'L INST. OF SCI. & TECH. (February 2, 2022), <https://www.nist.gov/osac/seized-drugs-subcommittee>; *Forensic Document Examination Subcommittee*, NAT'L INST. OF SCI. & TECH. (February 2, 2022), <https://www.nist.gov/osac/forensic-document-examination-subcommittee>; *Firearms & Toolmarks Subcommittee*, NAT'L INST. OF SCI. & TECH. (February 2, 2022), <https://www.nist.gov/osac/firearms-toolmarks-subcommittee>.

Second, despite the tiered standards approval process, research scientists have recently brought to light the fact that standards lacking meaningful substance have been published.⁴⁵⁴ These “vacuous” standards, as they call them, have minimal requirements, are vague, easy to satisfy, or otherwise do not promote scientific validity.⁴⁵⁵ In one example, a bloodstain pattern analysis standard calls for forensic providers to “have a series of written procedures” without indicating what the content of any such procedures should be.⁴⁵⁶ Another standard, purporting to provide guidance on how to test a method to ensure its scientific validity or fitness for its intended purpose, says merely that “[m]ethods shall be evaluated to determine whether they work as intended and are fit for purpose.”⁴⁵⁷ These “standards” are meaningless: the OSAC’s stated goal of promoting consistency cannot be served by standards that offer absolutely no guidance on *how* labs should validate bloodstain pattern analysis methods.⁴⁵⁸

The troubling statistical techniques that Kafadar discovered were set to go into three separate OSAC standards on forensic glass analysis methods when she reported her findings to the FSSB.⁴⁵⁹ Even still, the FSSB overwhelmingly approved the standards; glass analysts can readily claim that their field is controlled by the existence of standards even though the standards codify questionable techniques.⁴⁶⁰

Standards like these create a perception that forensic disciplines are progressing when, in fact, they maintain and reinforce the unscientific status quo.⁴⁶¹ This creates the “danger . . . that a court may not look further than the fact that a standard exists, and be misled into believing that conformity to a vacuous standard is indicative of scientific validity, even though it is not.”⁴⁶² As the researchers note, standards that allow faulty forensic techniques to be used do not strengthen scientific validity.⁴⁶³

454. Geoffrey Stewart Morrison et al., *Vacuous Standards—Subversion of the OSAC Standards-Development Process*, 2 FORENSIC SCI. INT’L 206, 206 (2020).

455. *Id.* at 206.

456. *Id.* at 207.

457. *Id.* (internal quotations omitted).

458. *Id.*

459. Kafadar, *supra* note 206, at 10.

460. *See id.*

461. Morrison et al., *supra* note 454, at 206–07.

462. *Id.* at 207.

463. *Id.* General acceptance is the final *Daubert* factor. *Daubert v. Merrell Dow Pharms.*, 509 U.S. 579, 594 (1993). Its manipulability has been discussed in detail previously in Part II.B. In the firearms context, prosecutors and forensic scientists have successfully persuaded courts to, with near unanimity, treat the relevant scientific community as limited to the community of firearms and toolmark examiners despite the fact that the “scientific community at large disavows” the firearms examination method. *United States v. Tibbs*, No. 2016 CFI 19431, 2019 D.C. Super. LEXIS 9, at *73 (D.C. Super. Ct. Sept. 5, 2019) (collecting cases); *People v. Ross*, 129 N.Y.S.3d 629, 639 (Sup. Ct. 2020); *United States v. Adams*, 444 F. Supp. 3d 1248, 1266 (D. Or. 2020).

IV. RADICALLY REIMAGINING THE FORENSIC SYSTEM

Understanding the degree to which these two sets of interested actors have stood in the way of reform is important in its own right, but what does it reveal about how to overcome the resistance and propel positive change in the forensic context? Recently, activists and scholars have drawn from abolitionist theory in developing strategies for change.⁴⁶⁴ This Part now begins to build an abolition-based framework for reimagining the forensic system. Application of the framework may reveal new strategies and offer new explanations for why the forensic system has remained insulated from reform efforts.

A. An Abolitionist Framework for Reimagining Forensics

What processes could be applied to construct a forensic system that satisfies the goals and obligations of abolitionism? For forensic reformers who acknowledge the carceral applications of forensics and who desire to pursue a non-reformist agenda, abolitionist tenets and principles can be adapted to formulate a framework for forensic reform. This approach, which acknowledges structural racism built into the modern carceral system, is not the only perspective from which the forensic system can be reimagined; this Article does not suggest that the framework it proposes is the sole way of approaching forensic reform.⁴⁶⁵ Rather, it encourages an acknowledgement that the forensic system is part of the carceral system, cannot be extracted from it, and enables carceral harm. And it aims to enable a new conceptualization of the forensic system based on that acknowledgment.

It is worth emphasizing that there is no single model for reimagining forensics that draws on abolitionism.⁴⁶⁶ Instead of focusing on the construction of a singular roadmap, a broad approach can be derived from core abolitionist principles and an understanding of ways in which forensic techniques are used in the criminal legal system. From there, a framework for reimagining forensics in a manner consistent with the broader abolitionist vision can be developed.

This Part uses an abolitionist lens to propose a three-pronged framework for reimagining forensics. The first prong examines how well a proposal

464. See *supra* notes 34–37 and accompanying text.

465. See DERECKA PURNELL, *BECOMING ABOLITIONISTS* 9 (2021) (“I write about prison and police abolition . . . as one way to think about and experiment with problems and solutions. Abolition is important to me, but not abolition alone. I try my best to study abolition alongside other paradigms, such as feminism, decolonization, and internationalism . . .”). Other frameworks may be the subject of future scholarship but are outside the scope of this Article. See, e.g., BERNARD HARCOURT, *THE ILLUSION OF FREE MARKETS: PUNISHMENT AND THE MYTH OF NATURAL ORDER* (2011) (arguing that conventional belief in the legitimacy and necessity of both free markets and a governmental role in carceral punishment are myths and that, instead, free markets and carceral punishment operate in concert to entrench societal inequities.).

466. See e.g., SHANA AGID ET AL., *CRITICAL RESISTANCE, THE CR ABOLITION ORGANIZING TOOLKIT* 49 (2012), <http://criticalresistance.org/wp-content/uploads/2012/06/CR-Abolitionist-Toolkit-online.pdf> (“There are many different kinds of abolitionist steps.”).

adheres to core principles of abolitionism. The second considers how the forensic method at issue is used; it requires evaluation of whether the method at issue serves a purely carceral purpose (like criminal surveillance) or if it has a nonpunitive purpose (such as identification) that supports noncarceral functions (like achieving accountability). The third prong focuses on *who* uses the method. It examines whether a proposal allows use of a technique by carceral actors, like police and prosecutors, or if it is aimed at remedying harm by supporting use by communities and those ensnared in the criminal legal system.

1. *Constructing the Framework*

To conduct the evaluation under prong one, this Article identifies five core principles of abolitionism that relate to the use of forensics. As described previously, abolitionism is not easily captured in a single definition or set of principles. The principles laid out below, however, facilitate development of a framework for non-reformist forensic reform in two ways: (1) they encapsulate the central elements of the core theory and (2) they are pragmatic; they enable a straightforward approach for applying abolitionist theory to reimagining forensics, particularly for those considering such an approach for the first time.

The first such principle is that non-reformist forensic reform efforts should seek the elimination or, at minimum, alleviation of the harms caused by the use of forensics to facilitate carceral functions. Because forensic methods are used to power carceral function, these are the same harms caused by the carceral system, which, as previously described, include ensnarement in the punitive criminal legal system generally, violence, harassment, surveillance, monitoring, and criminal punishment more specifically. An abolition-based model for non-reformist forensic reform must acknowledge these harms in the first instance and work to remedy them in the second. As a baseline then, an abolition-based model does not permit the use of scientifically invalid methods.⁴⁶⁷ Under any model for reimagining forensics, scientific validity and reliability are threshold requirements necessary to prevent unjust outcomes—harms well-known to be caused by forensic evidence.⁴⁶⁸

The second principle is to acknowledge the carceral origins of forensics and, accordingly, eschew expansion or further legitimization of the carceral system overall in pursuing non-reformist forensic reform. Third, forensic reform efforts must acknowledge the historical exclusion of communities from decision-making about accountability and punishment and seek to avoid the continuation of that trend.⁴⁶⁹ Fourth, the model should incorporate the value

467. To be clear, use of forensic methods that are not scientifically valid is inconsistent with even a reformist vision for forensic reform.

468. See *supra* note 10.

469. See Jocelyn Simonson, *Police Reform Through a Power Lens*, 130 YALE L.J. 778, 791 (2021).

of investing in new systems that obviate the need for carceral punishment—systems that build up communities by investing in health, education, wellbeing, and other basic needs.⁴⁷⁰ Finally, a forensic reform model that relies on abolitionist principles must avoid describing and treating the carceral system as broken or in need of fixing. Abolitionists argue that such rhetoric works against the core abolitionist mission of eliminating the carceral state by constraining people's ability to conceptualize a world without a carceral institution and allows that mission to be portrayed as unrealistic, impossible, or naïve.⁴⁷¹

Practically speaking, what can non-reformist forensic reform look like? As described previously, forensics is intimately entwined with carceral function. Most obviously then, it would be consistent with these principles to abandon all use of forensics for criminal legal purposes entirely. But the project of reenvisioning forensic reform is not meant to be naïve. As abolitionists who recognize the unlikelihood of immediate eradication of current carceral structure encourage, lesser, deliberate steps that incorporate non-reformist principles should be taken.⁴⁷²

The second prong, then, requires categorizing forensic methods by purpose. Not all forensic methods serve the same function in general or in a given case. The forensic system is vast; it encompasses a variety of methods used for a variety of purposes depending on the case or task at hand. What follows is that, whether abolition-based or otherwise, no forensic reform strategy can be one-size-fits-all. On the contrary, understanding the function or range of functions of a particular method opens up a way in which to evaluate that method or proposed reforms according to the above principles. Thus, as a starting point, reformers need to ask: which forensic functions may be desirable in a post-abolition world? Which are inextricably intertwined with carceralism and thus contrary to a reimagined forensic system?

Forensics methods can be categorized along two dimensions: the degree to which a method serves a sweeping data-amassing or surveillance purpose and the degree to which a method serves a narrow identification purpose. Take DNA as an example. In an individual case in which a person is charged with a sex offense, DNA analysis of intimate swabs from a sex kit might, where a suspect is known, allow confirmation of the suspect as the person of interest. Of course, the identification then enables that suspect's prosecution, but its primary purpose was to identify someone.

Where the suspect is unknown, however, entry of a DNA profile developed from testing of the swab into a database serves more than an identification function. Forensic databases, including law enforcement DNA databases, fingerprint databases, photo databases that enable facial recognition searches,

470. See PURNELL, *supra* note 465, at 9 (“Abolition . . . includes eliminating the reasons people think they need cops and prisons in the first place.”); KABA, *supra* note 65, at 2.

471. See KABA, *supra* note 65, at 13.

472. See *supra* notes 76–80 and accompanying text.

and even commercial DNA databases that are increasingly used for law enforcement purposes,⁴⁷³ support more insidious carceral purposes: surveillance and monitoring. They maintain and store highly personal biometric information, often in perpetuity,⁴⁷⁴ creating an ever-growing and expanding net from which the carceral system can draw suspects. The database search draws on the surveillance function of the vast DNA databanks that house biometric data, disproportionately those of members of marginalized communities.⁴⁷⁵ It also encourages expansion of such databases to increase the pool of suspects available to law enforcement. This concern is not theoretical: apart from legislatively created databases like CODIS, law enforcement entities are actively creating unregulated, secret DNA databases built by applying pressure to people to give up their DNA to avoid harsh punishments.⁴⁷⁶

This identification-surveillance categorization helps clarify ways in which non-reformist forensic reforms might be pursued. Because abolitionism is not inconsistent with a desire for accountability, it does not necessarily require total abandonment of forensic methods. One strategy may permit the use of forensic methods strictly for identification purposes. Abolition of the carceral system would mean that forensic methods would cease to serve a purpose in the criminal context. However, forensic methods might continue to play a role in accountability and harm reduction. Indeed, abolitionists do not propose that those who cause harm not be held accountable. Rather, they propose noncarceral consequences⁴⁷⁷—meaning, forensics might still be used to identify those who cause harm, so long as such methods are not used to funnel people into the carceral system and so long as communities are empowered to determine how, and for what purposes, forensic methods may be used in achieving accountability.

Even if forensic identification methods continued to be used for individual identification purposes, an approach consistent with the above five principles might focus on elimination of or placement of a moratorium on use of forensic technologies (1) to collect and amass biometric data that can be used later for surveillance, policing, and prosecution; (2) that widens the pool of people who can be ensnared in the criminal legal system; and which thus (3) allow people to be swept into the carceral process without specific ties or suspicion of

473. Natalie Ram, *Genetic Privacy After Carpenter*, 105 VA. L. REV. 1357, 1360–61 (2019).

474. See, e.g., *GEDmatch.com Terms of Service and Privacy Policy*, GEDMATCH, <https://www.gedmatch.com/terms-of-service-privacy-policy> (last visited Feb. 8, 2022) (stating a general policy of indefinitely retaining DNA data until receipt of a request to delete the data or discovery that the data was uploaded in violation of the privacy policy).

475. Murphy & Tong, *supra* note 84, at 1851.

476. See Jordan Smith, *Orange County Prosecutors Operate “Vast, Secretive” Genetic Surveillance Program*, THE INTERCEPT (July 3, 2021, 5:00 AM), <https://theintercept.com/2021/07/03/orange-county-prosecutors-dna-surveillance/>.

477. These can include isolation from people or places, required restitution or labor, public apology, ineligibility for community leadership, among other consequences. KABA, *supra* note 65, at 136–37.

involvement in a crime. Such an approach reckons with the historically racialized application of surveillance technologies, acknowledges and seeks to redress the harms of surveillance, and attempts to limit the use of forensic methods for carceral purposes. Any moratorium could only be ended after meaningful community-driven consensus on how, if at all, to resume use of such techniques.⁴⁷⁸ What such a community-based consensus might look like is beyond the scope of this Article, but what is clear is that different communities will have different needs and priorities. Consensus in one community may look different than in others.⁴⁷⁹ And indeed, it is possible that community-led decisions about surveillance may not eliminate punitive uses of surveillance technologies.⁴⁸⁰

Undoubtedly, some forensic disciplines evade easy categorization along axes of identification and surveillance. For example, forensic psychology and psychiatry techniques used to evaluate mental state, predict risk, or determine competency or intellectual disability, among myriad other purposes, do not serve either an identification function or surveillance function.⁴⁸¹ But a direct application of the above-identified five principles can still be used to approach reform that applies to these disciplines as well. Where a forensic technique can be classified this way, the identification–surveillance classification is a means of identifying uses that raise red flags because of acutely carceral functions.

The third prong requires examination of who may use the method at issue. A non-reformist approach to forensic reform might seek to ban the use of forensic methods by carceral actors, whose role it is to police, prosecute, and punish, and who have proven not to be honest brokers when it comes to the use of forensics and any others who have a stake in the continuation of the current system. It is important to recognize that private organizations that

478. Criminal surveillance functions as we recognize them today likely have no place in a post-abolition society. See McLeod, *supra* note 40, at 1617 (quoting Miriam Kaba) (“Prison abolition is . . . the complete and utter dismantling of prisons, policing, and surveillance as they currently exist within our culture.”). But this may not mean that a total abandonment of data collection and analysis is required. See Erin Collins, *Abolishing the Evidence-Based Paradigm* (manuscript at 61) (forthcoming 2022) (draft on file with author) (“[Abolitionism] does not mean we should or must abandon data collection and analysis altogether. But we must redefine what evidence means—what ‘counts’ as data.”); *About Us*, DATA FOR BLACK LIVES, <https://d4bl.org/about.html> (last accessed Dec. 6, 2021) (“[N]ew data systems have tremendous potential to empower communities of color. Tools like statistical modeling, data visualization, and crowd-sourcing, in the right hands, are powerful instruments for fighting bias, building progressive movements, and promoting civic engagement.”).

479. Simonson, *supra* note 469, at 789 (“Communities, however defined, are not monolithic, a reality that has become especially salient as communities of color have disagreed internally over the summer of 2020 about calls to defund the police.” (footnote omitted)).

480. *Id.*; Trevor G. Gardner, *By Any Means: A Philosophical Frame for Rulemaking Reform in Criminal Law*, 130 YALE L.J.F. 798, 806–807 (explaining that “crime policymaking at the level of community” may “produce[] inequitable crime policy and inequitable crime-policy outcomes” where “punitive crime politics . . . permeate marginal communities”).

481. Howard Kaplan, *The Forensic Psychology Report*, AM. BAR ASS'N (Nov. 27, 2018), https://www.americanbar.org/groups/public_education/publications/teaching-legal-docs/the-forensic-psychology-report/.

produce forensic technologies for their own use or use by law enforcement are carceral actors too,⁴⁸² and thus, should be scrutinized in the same ways that traditional carceral actors—police and prosecutors—are. Use of forensic methods by carceral actors entrenches carceral harms and treats miscarriages of justice as remediable aberrations of the system. A strategy that restricts or eliminates use of forensics by carceral actors acknowledges that forensics enables carceral harm and seeks to redress those harms by eliminating the use of forensic evidence by those who pursue carceral functions.

Reciprocally, such an approach might permit interim use of forensics for exculpatory purposes by individuals suspected of, charged with, or convicted of crimes. By eliminating the ability of the carceral institution to inflict harm using forensic methods, allowing exculpatory use of forensic evidence both acknowledges and operates to redress those very harms at the individual level.

It is imperative to be precise about the meaning of “exculpatory” here. To be consistent with the identified principles, exculpatory use of forensics must mean the exclusive use of evidence to negate guilt or mitigate punishment, without implicating alternative suspects for prosecution. This is in contrast to contemporary strategies for exonerating the innocent, in which the availability of an alternative suspect is often central to a determination of innocence.⁴⁸³ But any action that leads to the infliction of additional harm by the carceral system, like pointing the finger at an alternative suspect, is inconsistent with the principles of abolition identified previously.

2. *Looking Forward*

The framework outlined above can be used to evaluate contemporary proposals for reform to determine whether they meet the goals of abolitionism. This Subpart evaluates three such proposals: (1) calls for forensic lab independence; (2) demands for increased research to shore up the scientific underpinnings of forensic methods; and (3) proposals for progressive prosecutors to eliminate or limit use of forensics in prosecutions in their jurisdictions.

A common call for reform is to remove labs from law enforcement control and establish them as independent agencies.⁴⁸⁴ While moving forensic labs out

482. See *Why*, CARCERAL TECH RESISTANCE NETWORK (Mar. 30, 2020), <https://static1.squarespace.com/static/5d7edafed15c7f734412daf2/t/5e842016a28b9416638fd698/1585717282776/documentation+%2F+2020-03-30+%2F+why> (“carceral tech industries exploit the visibility and exposure our communities face for financial gain, and do so under the guise of innovation, security, and academic knowledge production.”).

483. See, e.g., Robert P. Mosteller, *N.C. Innocence Inquiry Commission's First Decade: Impressive Successes and Lessons Learned*, 94 N.C. L. REV. 1725, 1736–37, 1760–61 (2016) (explaining that, by design, the North Carolina Innocence Inquiry Commission is charged with providing law enforcement agencies evidence of guilt of alternative suspects and highlighting the importance of investigating an alternate suspect in one of its investigations).

484. See, e.g., NAS REPORT, *supra* note 2, at 184, 190–91.

of police departments may be a starting point for decoupling forensic science from law enforcement, perhaps surprisingly, application of an abolitionist framework suggests that even this proposal will not always be classifiable as non-reformist.⁴⁸⁵ First, even independent labs serve law enforcement's crime-solving needs and, thus, operate in service of the carceral state.⁴⁸⁶ Second, unless specifically designed to place limits on what methods can be used, what can be tested, or under what circumstances law enforcement can seek testing, there is little reason to believe that establishment of independent labs would contract the carceral establishment or alleviate harm. And while taking law enforcement personnel from a police lab and moving them to another, theoretically independent agency, as some independent labs do,⁴⁸⁷ might appear to divest power from and to contract the carceral institution, it cannot ensure meaningful insulation from law enforcement influence because of the inherited cultural alignment between law enforcement and the forensic system. Examiners and analysts carry over their education, training, experience, and alignments.⁴⁸⁸

Not only that, but because forensic methods are used with far greater frequency in prosecuting than by the accused,⁴⁸⁹ examiners will remain targets of defense requests to uncover errors, mistakes, and other failures and will continue to be subjected to aggressive cross-examinations aimed at undermining qualifications, accuracy of results, and the validity of entire disciplines. These tactics, though ethical, lawful, and necessary to adequately defend the accused within the adversarial process, may further entrench existing alignments.

Even independent labs, though not under direct law enforcement control, continue to serve law enforcement needs as their primary function. They are also typically state-funded and controlled, with little community involvement or oversight.⁴⁹⁰

485. Some forensic reformers have begun hinting at this. See Sarah Chu (@SarahPChu), TWITTER (Dec. 15, 2021, 7:57 AM), <https://twitter.com/SarahPChu/status/1471117123930017792> (“True independence is not about putting walls up—it’s about tearing walls down. Independence requires transparency, putting science first, and owning the past . . .”).

486. See e.g., Jacquelyn Powell, *Austin’s New, Independent Forensic Science Department Nearing Deadline to Open*, KXAN (June 30, 2021, 10:00 AM), <https://www.kxan.com/news/local/austin/austins-new-independent-forensic-science-department-nearing-deadline-to-open/> (noting that a proposed independent forensic lab in Austin will process police evidence).

487. See, e.g., *id.* (explaining that the lab head hired to run Austin’s police lab will continue to run the lab after it is moved out of the police department); SNA INT’L, DC DEPARTMENT OF FORENSIC SCIENCES LABORATORY ASSESSMENT REPORT 11 (2021) (“[M]any MPD [Metropolitan Police Department] staff were ‘grandfathered’ into the DFS without formally vetting their prior training, competency, or proficiency.”).

488. SNA INT’L, *supra* note 487.

489. DAVID L. FAIGMAN ET AL., *MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY* § 1:35 (2021–2022 ed.).

490. St. John Barned-Smith, *Houston Crime Lab’s Move Into New Space Will Speed Up Testing, Ensure Independence, Officials Say*, HOUS. CHRON. (Oct. 22, 2019, 7:05 PM), <https://www.houstonchronicle.com/news/houston-texas/houston/article/Houston-crime-lab-s-move-into-new-space-will-14554705.php>; *History of the Alabama Department of Forensic Science*, ALA. DEP’T OF FORENSIC SCIS., <https://www.adfs.alabama.gov/about/history> (last visited Apr. 11, 2022); *Division History*,

Independence might nevertheless fit within a non-reformist vision of “gradual application of a coherent program of reforms” that may lead to transformative change if implemented in tandem with other transformative strategies.⁴⁹¹ As an interim strategy, lab independence has the potential to benefit the criminally accused languishing in the existing criminal legal system. Independence could aid in avoiding battles for discovery and prevent suppression of documents; it could help arm the accused with materials needed to mount a defense or admissibility challenge.⁴⁹² But as recent lab scandals have demonstrated, independence does not always prevent error, mishandling of evidence, or other fundamental lab failures.⁴⁹³ Moreover, independence does not change forensics’ enablement of carceral functions. True independence and transparency would require a radically new vision for forensic labs separate and insulated from carceral influence that begins to incorporate principles of neutrality and adherence to the scientific method long before the lab does any work.

Privatization of labs is no better tailored to solve these problems. With the bulk of forensic service demand coming from law enforcement, for-profit labs cannot eliminate the use of forensics for carceral purposes. Indeed, for-profit DNA analysis software companies are already criticized for pursuing analyses beyond the reliable limits of the software system and for lack of transparency around how their systems operate.⁴⁹⁴ Privatization may serve only to place an unearned gloss of neutrality on labs that continue to be beholden to law enforcement needs.

These examples reveal that even seemingly transformative reform can be implemented in ways that serve to further entrench the forces they are meant to dismantle. Recently, Valena Beety, recognizing the need for and supportive of calls to defund the police, has called not just for independence of labs, but for crime scene investigators to be moved out of police departments entirely, to civilian agencies.⁴⁹⁵ Her proposal might be classified appropriately as a non-reformist reform because it seeks to divest from the carceral institution and because it reflects an inherent recognition that, even if labs are made

CONN. STATE DEP’T OF EMERGENCY SERVS. & PUB. PROT., <https://portal.ct.gov/DESPP/Division-of-Scientific-Services/Division-History> (last visited Apr. 11, 2022).

491. See Engler & Engler, *supra* note 41 (quoting Andre Gorz, *Reform and Revolution*, in *THE SOCIALIST REGISTER* 111-12 (Ralph Miliband & John Saville eds., 1968)); see also Akbar, *supra* note 41, at 106.

492. NAS REPORT, *supra* note 2, at 82.

493. See e.g., Jack Moore, *DC Attorney General Demands Release of Report Probing DC Crime Lab*, WTOPNEWS (Dec. 10, 2021, 9:30 AM), <https://wtop.com/dc/2021/12/dc-attorney-general-demands-release-of-report-probing-dc-crime-lab/>.

494. Kwong, *supra* note 4, at 276; Allen Slater, *Policing Project Five-Minute Primers: Rapid DNA*, POLICING PROJECT, <https://www.policingproject.org/news-main/2020/1/23/policing-project-five-minute-primers-rapid-dna> (last visited Apr. 19, 2022); Brief of 42 Scholars of Forensic Science as Amici Curiae in Support of Defendant-Appellee at 20, *United States v. Gissantaner*, 990 F.3d 457 (6th Cir. 2021).

495. Valena E. Beety, *Forensic Evidence in Arizona: Reforms for Victims and Defendants*, 52 ARIZ. ST. L.J. 709, 710, 740 (2020).

independent, forensic investigation can be weaponized in the same ways it has been historically if law enforcement agents remain in charge of investigation. Put another way, traditional attempts to make labs independent may not sufficiently divest the state of carceral power or transfer control and oversight of labs to the community; proposals to remove forensic labs from police departments that do not confront forensics' role within the prosecutorial system fail to satisfy the obligations of an abolitionist agenda.

Calls are frequently made for research to shore up the scientific underpinnings of forensic disciplines,⁴⁹⁶ but would such research be consistent with an abolition-based reform agenda? Because forensic techniques may be used consistently with an abolitionist agenda to identify those who cause harm to others, the reliability and accuracy of forensic methods remain important precisely because accountability cannot be achieved if forensic methods cannot be relied on to produce accurate results.

It is important, however, to focus on *how* research is conducted. The scientific underpinnings must be shored up, and the limitations of methods must be determined through research that pulls forensics away from the carceral intuition. Thus, any research model must be separate and insulated from carceral influences. Identifying the specific contours of such a model is left for future scholarship, but a non-profit- or university-based research structure might be appropriate. Various research models—some that meet an anti-carceral agenda and some that do not—have already been proposed.⁴⁹⁷

It is additionally important to push for research not to be funded by for-profit entities or to support for-profit products. So long as a carceral state exists, the biggest customers of private companies that produce forensic technologies will remain law enforcement clients. Thus, profit-driven research will have the potential to be influenced by incentives that seek to maintain the status quo.

Finally, there is an ongoing “progressive prosecutor” movement to leverage the power that prosecutors wield in the criminal legal system towards a decarceral agenda.⁴⁹⁸ The precise contours of what constitutes a progressive prosecutor have been debated,⁴⁹⁹ but the central idea behind the movement is that prosecutors have great power within the criminal legal system that can be leveraged to decarcerate.⁵⁰⁰ Applied to forensics, a policy for progressive

496. See e.g., PCAST REPORT, *supra* note 2, at 124–25 (encouraging research to establish the validity of forensic science disciplines and routine evaluation of methods' validity).

497. *Id.* at 125 (proposing a variety of organizations to conduct validation research including law enforcement agencies like the FBI); NAS REPORT, *supra* note 2, at 190.

498. Darcy Covert, *Transforming the Progressive Prosecutor Movement*, 2021 WIS. L. REV. 187, 188.

499. See Benjamin Levin, *Imagining the Progressive Prosecutor*, 105 MINN. L. REV. 1415, 1418 (2021) (arguing that there are multiple ways in which prosecutors might be fairly characterized as “progressive”); Rachel Foran, Mariame Kaba & Katy Naples-Mitchell, *Abolitionist Principles for Prosecutor Organizing: Origins and Next Steps*, 16 STAN. J.C.R. & C.L. 496, 500 (2021) (noting that there is “no generally accepted definition of a ‘progressive prosecutor’”).

500. Covert, *supra* note 498, at 187, 202.

prosecution would require that prosecutors (1) decline to use unvalidated forensic evidence and ensure that forensic evidence that is used to prosecute is valid in principle and also as applied in any given case, (2) commit to continuous evaluation of new scientific literature even if it undermines old methods, and (3) prevent overstatement of forensic conclusions.⁵⁰¹ Simply, a progressive prosecution approach to forensics would require prosecutors to limit use of forensics to reliable methods and applications.

At first blush, such an approach may appear consistent with an abolition-based framework. Limiting the use of forensics in prosecutions might redress *some* harm. Moreover, the progressive prosecutor movement is premised on the idea that progressive prosecutors derive their authority from those who elect them and, as a result, will institute progressive policies supported by their constituents.⁵⁰² So, according to that premise, putting progressive prosecutors in charge of how and when to use forensics may feel like democratization of forensic policy.

But upon closer scrutiny, the progressive prosecutor model does not satisfy the agenda for several reasons. Fundamentally, abolitionism seeks to end prosecution because it constitutes a core function of the criminal legal system;⁵⁰³ prosecutors cannot eliminate the carceral state.⁵⁰⁴ Moreover, abolitionists argue that progressive prosecution cannot serve as a meaningful democratizing force because of the insurmountable power imbalance between prosecutors and communities.⁵⁰⁵

Even setting these fundamental barriers aside, there are additional pragmatic issues specifically related to use of forensics that make putting progressive prosecutors in charge of forensic policy contrary to abolitionist principles. First, any policy attempting to define the circumstances under which forensics may be used will necessarily be murky because what methods and applications are reliable is under debate. The murkiness, then, is destined to allow continued enablement of traditional prosecutorial use of forensics, including use of unreliable methods.

Second, it is unlikely that the elected progressive prosecutor could limit *police's* use of forensic evidence before charging. This is particularly true in light of heated tension between police and progressive prosecutors over law

501. See FAIR & JUST PROSECUTION, 21 PRINCIPLES FOR THE 21ST CENTURY PROSECUTOR 22 (2018), https://www.brennancenter.org/sites/default/files/2019-08/Report_21st_century_prosecutor.pdf.

502. Jeffrey Bellin, *Theories of Prosecution*, 108 CALIF. L. REV. 1203, 1218 (2020).

503. Foran, Kaba, & Naples-Mitchell, *supra* note 499, at 519.

504. Jeffrey Bellin, *Expanding the Reach of Progressive Prosecution*, 110 J. CRIM. L. & CRIMINOLOGY 707, 713 (2020) (listing abolition on a “nonviable list [of normative theories of prosecution] because prosecutors cannot be the source of abolition”); Foran, Kaba, & Naples-Mitchell, *supra* note 499, at 498–500 (arguing that because prosecution is an essential criminal legal function, it cannot be progressive). For a comprehensive abolitionist critique of progressive prosecution, see generally Foran, Kaba, & Naples-Mitchell, *supra* note 499.

505. Foran, Kaba, & Naples-Mitchell, *supra* note 499, at 520.

enforcement policy in many jurisdictions.⁵⁰⁶ A progressive prosecutor policy for limiting use of forensics in prosecution does not stop individuals from being swept into the carceral system by policing that uses forensic methods.

Third, setting aside the murkiness of any such policy, decision-making authority on whether and how to use forensics under the progressive prosecutor model is still centered in the carceral actor, not the party likely to suffer some harm from its use, the accused. Moreover, community members would not have an influence on day-to-day decisions on whether and how to use forensic evidence; prosecutors would retain complete control over such decisions. It seems unreasonable, if not naïve, to believe that prosecutors would consistently adhere closely to such a policy in the face of pressures.⁵⁰⁷

The primary reason a progressive prosecutor model for forensic reform is inconsistent with a non-reformist agenda is that, beneath the surface-level fix, such a model fails to register a forceful critique of the way in which the criminal legal system, and the use of forensics within it, operates today.⁵⁰⁸ Rather, it seeks to place limits on the current system while tolerating the overall structure. The model would do nothing to contract or delegitimize the system overall. Rather, it would create the appearance of meaningful reform by suggesting that progressive prosecutors can be entrusted to use forensics as part of a decarceration strategy without reducing funding to or the scale of prosecution, challenging the conventional idea that policing and prosecution promote public safety, or transferring meaningful decision-making authority to the community.

3. *Looking Backward*

Evaluating past reform efforts through the abolition frame also yields interesting and often surprising results. First, application of the framework suggests that most reform efforts to date have largely aligned with conventional criminal justice reform efforts and, accordingly, can squarely be classified as reformist reforms. Reformers have assumed the intrinsic utility and legitimacy

506. Covert, *supra* note 498, at 191; Marco della Cava, *New, More Progressive Prosecutors Are Angering Police, Who Warn Approach Will Lead to Chaos*, USA TODAY (Feb. 8, 2020, 11:26 AM), <https://www.usatoday.com/story/news/nation/2020/02/08/criminal-justice-police-progressive-prosecutors-battle-over-reform/4660796002/>; Alice Speri, *A Progressive Prosecutor Faces Off With Portland's Aggressive Police*, THE INTERCEPT (Sept. 16, 2020, 11:04 AM), <https://theintercept.com/2020/09/16/portland-protests-prosecutor-police/>.

507. Tyler Yeargain, *Prosecutorial Disassociation*, 47 AM. J. CRIM. L. 85, 118 (2020) (describing failures of some progressive prosecutors to keep promises).

508. See McLeod, *supra* note 57, at 1207–08 (arguing that one distinguishing feature between abolition and reform models is that abolitionism is “oriented toward displacing criminal law as a primary regulatory framework and replacing it with other social regulatory forms, rather than only or primarily moderating criminal punishment or limiting its scope or focus”).

of the use of forensic evidence in criminal prosecutions, attempting to improve it by tweaking at the margins without serious confrontation of systemic flaws.⁵⁰⁹

The NAS Report's recommendations exemplify this. While the report is ultimately critical of some applications of the forensic system, it assumes the intrinsic value of both the carceral establishment and of forensic techniques to support it, largely accepting forensics as legitimate science that need only be cleaned up.⁵¹⁰ Its recommendations, for example, creation of a national forensic governing body and infusion of funding for forensic research and education, would result in expansion of the forensic system and, thus, might well result in greater use of forensic methods for carceral purposes. Other recommendations—for instance, accreditation of labs, development of guiding standards, and adoption of a forensic code of ethics—are analogs of conventional policing reform. They are meant to fine-tune and would aid in legitimizing the role of forensics in carceral functions.

The NAS Report's outgrowths, the NCFS and OSAC, have, perhaps unintentionally, already enlarged the forensic system and enabled even more forensics-aided law enforcement while adding a gloss of scientific legitimacy to forensic practice even if their work products have not significantly improved forensic methods or operations.

Application of the framework reveals additional examples of forensic reform proposals that correspond with conventional reform efforts in the broader criminal legal context and, thus, do not fit within an abolitionist agenda. Take for example forensic science commissions or advisory boards that aim to serve as accountability mechanisms by conducting oversight of forensic labs.⁵¹¹ Like civilian oversight boards in the policing context, however, such commissions add a veil of legitimacy without either confronting the root causes of harm caused by the forensic system or providing a meaningful check on forensic work. Rather, such commissions expand the forensic system while reinforcing the perception that forensic methods need only minor corrections; they presume that miscarriages of justice are aberrations rather than expected outcomes of the use of carceral technologies.⁵¹² In reality, of the minority of

509. NAS REPORT, *supra* note 2, at xix (describing a need for greater resources, policies and support in the forensic system); PCAST REPORT, *supra* note 2, at 1 (describing the report's aim as to "close gaps" in particular forensic methods); see also Kafadar, *supra* note 206, at 7 ("Our [the NAS Committee's] goal was supportive—to strengthen the value of forensic evidence . . ."); see also, e.g., Jessica Gabel Cino, *Bad Science Begets Bad Convictions: The Need for Postconviction Relief in the Wake of Discredited Forensics*, 7 U. DENV. CRIM. L. REV. 1, 2 (2017) ("Undoubtedly, forensic science is a vital component of the criminal justice system."). This Author, too, has suggested reforms that do not grapple with the systemic fissures in the forensic science system. See generally Sinha, *supra* note 267.

510. NAS REPORT, *supra* note 2, at xix ("[T]he work of forensic science practitioners is so obviously wide-reaching and important . . ."); *id.* at 4 ("For decades, the forensic science disciplines have produced valuable evidence that has contributed to the successful prosecution and conviction of criminals as well as to the exoneration of innocent people.")

511. Brandon L. Garrett, *The Costs and Benefits of Forensics*, 57 HOUS. L. REV. 593, 615–16 (2020).

512. See *Reformist Reforms vs. Abolitionist Steps in Policing*, *supra* note 54.

jurisdictions that even have such commissions, few actually oversee forensic operations.⁵¹³

Application of the abolitionist framework suggests that even the national, centralized forensic governing body proposed by the NAS Committee—the most sweeping reform recommendation made to date—may not fit within a non-reformist agenda. Fundamentally, the proposed version of such a body accepts the role of forensic methods in support of carceral function as legitimate. Indeed, the very aim of that recommendation is to further develop forensic fields and ultimately divert more resources to the continued use of forensics in order to enable policing and prosecution.⁵¹⁴ In other words, such a body would—by design—take the legitimacy of the forensic system for granted without confronting its origins and abet an institution that has historically caused harm.⁵¹⁵ And, granting a national forensics governing body governance authority, control over disbursement of funding, and other regulatory authority might well equate to a transfer of power *to* the carceral establishment rather than divestment from it.⁵¹⁶

Consideration of legal efforts to reform the forensic system through this lens yields equally interesting results. Proposals for improved forensic discovery echo reformist calls for greater transparency in policing (e.g., for mandatory use of body-worn cameras). Calls to increase scrutiny of forensic evidence, like those for more stringent rules governing admissibility or for assistance to judges making admissibility determinations, assume that forensic methods play a valid role in carceral functions that need only be improved. Like police accountability boards, back-end reforms, including statutes creating avenues for challenging wrongful convictions, postconviction commissions, and even innocence projects, create the impression that errors are being corrected but do not grapple with fundamental concerns stemming from the forensic system's origins and natural allegiance to police and prosecutors. Needless to say, each of these proposals *can* alleviate the significant harms suffered by those being churned through the criminal legal system. Thus, if tailored carefully to a non-reformist agenda, some of these proposals may be appropriately taken as

513. Garrett, *supra* note 511, at 615 (“[T]hirteen states and Washington D.C. have created forensic science commissions . . . [f]ew of these groups, however, actually conduct oversight of forensic methods and work.”).

514. See NAS REPORT, *supra* note 2, at 19–20.

515. *Id.* at 14–18.

516. It may nevertheless be possible to design a forensic regulatory body consistent with a non-reformist agenda. Cf. KABA, *supra* note 65, at 97 (explaining that some abolitionists believe that police regulatory structures “could be an interim way to begin to erode the power of the police” as “part of the long evolution on your way to abolition” by “taking away power from the institution of policing.”). For example, a body designed for purposes identified by and with the input of communities and individuals harmed by the carceral system that is committed to transparency and seeks to ensure the validity of forensic methods exclusively for noncarceral purposes by noncarceral actors might satisfy abolitionist obligations. For the reasons identified, proposals for a national forensic governing body made to-date, however, do not satisfy these criteria. Whether a such a body can be designed consistently with a non-reformist agenda and the contours of such a body are left for future scholarship.

intermediate harm-reduction steps alongside more transformative actions.⁵¹⁷ Still, it is important to recognize that such proposals seek to remedy the problems caused by bad science at the margins while allowing the bulk to be admitted, as it always has been. They may also serve to entrench existing perceptions of the carceral system as legitimate or create new harms;⁵¹⁸ indeed, the NCIIC funnels evidence uncovered in innocence inquiries back to law enforcement for the potential prosecution of new suspects.⁵¹⁹

Ironically, the forensic system is *itself* borne of an attempt to reform policing by nibbling at its edges. Like calls for increased training, funding, standards, technology, accountability measures, and other traditional reforms, forensic techniques are themselves reforms to policing that help legitimize a system of law enforcement that decimates Black and Brown lives and communities.⁵²⁰

B. *Is an Abolitionist Approach to Reimagining Forensics Realistic?*

This Article represents the first scholarly attempt to connect forensic reform efforts to the burgeoning movement for carceral abolition. It invites an uncomfortable confrontation with the fundamental carceralism of forensics. The ideas it explores are novel; further development of them is necessary and encouraged. Thus, critiques of the approach outlined here, which distinctly diverges from the models for reform currently being considered or attempted, are inevitable. Valid initial questions that may arise, related to common concerns surrounding abolitionism, include (1) what precise structures might replace the forensic system as it exists today and (2) whether there can be agreement on the answers to that question.⁵²¹ Another critique may be that, if the central thesis of abolitionism is that the carceral system must be replaced, abolitionist goals are more likely to be achieved if reformers focus their efforts on core carceral functions like surveillance, policing, prosecution, and imprisonment rather than on forensics. This may be true; this Article does not seek to resolve that question. Rather, its approach merely acknowledges that many people currently focus their attentions on forensic reform and will continue to do so. With that backdrop, it attempts to include forensic reform in the larger, ongoing conversation on criminal legal reform that draws on abolitionist principles and offers a framework for doing so.

517. See Daniel Harawa, *Lemonade: A Racial Justice Reframing of The Roberts Court's Criminal Jurisprudence*, 110 CALIF. L. REV. (forthcoming 2022) (arguing that while “big picture” radical reimagination of the criminal legal system is necessary, “the millions of Black and Brown people who are arrested each year need some solutions *now*.”).

518. See KABA, *supra* note 65, at 96 (warning of the danger of pursuing reforms that “end up reproducing the system in another form.”).

519. Mosteller, *supra* note 483, at 1736–37.

520. See *supra* note 125 and accompanying text.

521. See, e.g., Mirko Bagaric, Dan Hunter & Jennifer Svilar, *Prison Abolition: From Naïve Idealism to Technological Pragmatism*, 111 J. CRIM. L. & CRIMINOLOGY 351, 395–96 (2021); Akbar, *supra* note 51, at 1844.

This Article leaves these questions open for exploration in future scholarship. Recognizing that the answers to these questions may affect what avenues reformers choose to pursue, this Part briefly addresses two anticipated critiques that have not been examined earlier.

1. *The Relationship Between the Forensic and Carceral Systems*

As a threshold matter, critics may question how well the abolitionist framework maps on to forensics. Indeed, the forensic system is not limited to the criminal legal sphere; it intersects with the greater scientific institution, and forensic methods are also utilized in noncriminal contexts.⁵²² Some may further argue that forensics is distinct from other punitive aspects of the carceral system because, in their view, forensics does not take sides; it merely searches for the truth. And indeed, forensic methods are employed by the accused and convicted, not only by carceral actors.⁵²³

It is equally true, however, that forensic methods are enmeshed with—and cannot be disaggregated from—the carceral system as a whole. Forensic methods enable policing and prosecution, the core functions of the carceral system.⁵²⁴ As a result of insulation from competitive and scientific checks, forensic evidence often *does* take sides. As this Article has reminded, forensic methods originated as criminal legal tools and the original carceral DNA is embedded in the modern forensic system.⁵²⁵ Context-less statements about the purportedly truth-seeking function of forensics purposely obscure this history and the reality that most forensic evidence is produced to prosecute.

The more global defect with this argument is that by attempting to extract forensics from the overall criminal legal system, it inherently accepts the punitive outcomes and damage to communities the system imposes.⁵²⁶ To seek the “true” perpetrator *is* to enable the existing criminal legal system. Identification of a person within the confines of a criminal prosecution suggests that what happens next in the criminal process is justified. It allows the system to exert its punitive power over that person, and the next, and the next, and so on, all under the guise of uncontaminated, scientific justice.

522. See James M. Anderson et al., *The Unrealized Promise of Forensic Science—A Study of Its Production and Use*, 26 BERKELEY J. CRIM. L. 121, 123 (2021) (arguing that “[t]he forensic science process is, at least potentially, also independent of much of the rest of the criminal process”).

523. Forensic Science, NAT’L ASS’N OF CRIM. DEF. LAWS., <https://www.nacdl.org/Landing/ForensicResources> (last visited Apr. 19, 2022) (“Evidence is the crux of every criminal case, making forensic science one of the most (if not the most) critical elements of an investigation and defense.”).

524. See *supra* notes 110–114 and accompanying text.

525. See *supra* notes 92, 115–116 and accompanying text.

526. See McLeod, *supra* note 57, at 1207 (“[A]n abolitionist ethic more accurately identifies the wrong entailed in holding people in cages or policing them with the threat of imprisonment, as well as more fully recognizes the transformative work that would be required to meaningfully alter these dynamics and practices.”).

2. *The Practicality of Abolitionism*

Another critique may be that, to some observers, the defund the police movement, and the carceral abolition movement more broadly, appear to have been unsuccessful. According to this reasoning, abandoning what are currently believed to be sound reform efforts may be misguided.

Critics who take this view will find support in media narratives and among politicians and others.⁵²⁷ In the immediate wake of George Floyd's murder, demands to defund and dismantle appeared to influence policy across the country. At least sixteen cities proposed or promised some version of defunding the police.⁵²⁸ These proposals ranged from reducing police budgets and rerouting funding to community resources to shrinking police forces.⁵²⁹ As one prominent example, in the initial aftermath of BLM protests, the Minneapolis City Council committed to disbanding its police force.⁵³⁰

Many of those cities did make at least minimal early progress on fulfilling such promises by reducing police budgets or manpower.⁵³¹ Austin drastically cut its police budget and reallocated that money into non-law enforcement agencies that address health and housing issues.⁵³² Its city council voted to reallocate millions from its police budget to remove its crime lab from the police department.⁵³³ Los Angeles reduced school police and used the windfall to fund education initiatives for Black students.⁵³⁴

527. E.g., Erroll G. Southers, Opinion, *Black Ex-Cop: I Understand the Anger but Don't Defund Police. It Could Make Things Worse.*, USA TODAY (June 11, 2020, 3:15 AM), <https://www.usatoday.com/story/opinion/voices/2020/06/11/defunding-police-could-backfire-black-former-detective-column/5331008002/>; Jason C. Johnson & James A. Gagliano, Opinion, *Defunding the Police Isn't the Answer*, CNN (June 9, 2020, 7:27 PM), <https://edition.cnn.com/2020/06/09/opinions/defunding-police-is-not-the-answer-johnson-gagliano/index.html>; Jacquelin B. Helfgott, Opinion, *The Movement To Defund the Police Is Wrong, and Here's Why*, SEATTLE TIMES (June 9, 2020), <https://www.seattletimes.com/opinion/the-movement-to-defund-the-police-is-wrong-and-heres-why/>; Paul H. Robinson, Opinion, *Don't Abolish the Police. It Didn't Work for 1960s Communes and It Won't Work for Us.*, USA TODAY (June 21, 2020, 8:30 AM), <https://www.usatoday.com/story/opinion/2020/06/21/abolishing-police-unworkable-1960s-communes-2020-cities-column/3216029001/>.

528. Sarah Holder, *The Cities Taking Up Calls to Defund the Police*, BLOOMBERG CITYLAB (June 9, 2020, 12:40 PM), <https://www.bloomberg.com/news/articles/2020-06-09/the-cities-taking-up-calls-to-defund-the-police>.

529. *Id.*

530. Bates, *supra* note 62.

531. Jemima McEvoy, *At Least 13 Cities Are Defunding Their Police Departments*, FORBES (Aug. 20, 2021, 3:04 PM), <https://www.forbes.com/sites/jemimamcevoy/2020/08/13/at-least-13-cities-are-defunding-their-police-departments/?sh=af22ab529e3f>.

532. Ailsa Chang, *Inside One City's Attempt to Defund the Police*, NPR (Feb. 15, 2021, 4:05 PM), <https://www.npr.org/2021/02/15/967079446/inside-one-citys-attempt-to-defund-the-police>.

533. Powell, *supra* note 486.

534. Melissa Gomez, *L.A. School Board Cuts Its Police Force and Diverts Funds for Black Student Achievement*, L.A. TIMES (Feb. 16, 2021, 10:04 PM), <https://www.latimes.com/california/story/2021-02-16/laus-diverting-school-police-funds-support-black-students>.

After making early inroads, however, activists faced challenges in securing more than promises. Stated commitments to defunding did not always translate to community control or oversight of how diverted funds would be redistributed.⁵³⁵

Setbacks like these brought into focus larger concerns about the long-term viability of abolitionism and how much popular support movements could maintain. Less than two years after demands to defund took hold, political backlash and rhetoric attributing rising crime rates to defunding of police forces emerged and earned support.⁵³⁶ Not long after the Minneapolis City Council promised to disband the police department, several council members walked back their positions.⁵³⁷ Voters ultimately rejected a ballot measure to replace the police department with a Department of Public Safety.⁵³⁸ By the end of 2021, New York City, Los Angeles, Austin, and other cities raised police budgets, and nationwide polling indicated a loss of support for police budget cuts.⁵³⁹

Scholars have explained that a non-reformist approach may be undermined even when abolitionist calls do garner widespread support. Amna Akbar noted that some liberal reformers who did not previously advocate defunding accepted variations of such calls in response to protests and grassroots organizing.⁵⁴⁰ She warned that these reformers' efforts, which simultaneously advocate for conventional reforms alongside defunding, might end up simply relegitimizing status quo policing.⁵⁴¹

Critiques based on such challenges are well founded. They serve as a warning about the limits of non-reformist approaches. Yet, others have countered that there are historical examples of efforts to reduce reliance on

535. See Fola Akinnibi, Sarah Holder & Christopher Cannon, *Cities Say They Want to Defund the Police. Their Budgets Say Otherwise.*, BLOOMBERG CITYLAB (Jan. 12, 2021), <https://www.bloomberg.com/graphics/2021-city-budget-police-funding/> (describing challenges faced by activists in influencing how funds diverted from the Los Angeles Police Department are used).

536. *Id.*; Zak Cheney-Rice, *What Eric Adams's Success Reveals About 'Defund the Police'*, INTELLIGENCER (June 25, 2021), <https://nymag.com/intelligencer/2021/06/what-eric-adams-success-reveals-about-defund-the-police.html>; Richard Luscombe, *James Clyburn: 'Defund the Police' Slogan May Have Hurt Democrats at Polls*, THE GUARDIAN (Nov. 8 2020, 3:01 PM), <https://www.theguardian.com/us-news/2020/nov/08/james-clyburn-defund-police-slogan-democrats-polls>.

537. Bates, *supra* note 62.

538. Holly Bailey, *Minneapolis Rejects Measure to Replace Police Department in First Major Electoral Test of Reform Movement After George Floyd's Murder*, WASH. POST (Nov. 3, 2021, 12:01 AM), <https://www.washingtonpost.com/nation/2021/11/02/minneapolis-mayor-police-vote/>.

539. J. David Goodman, *A Year After 'Defund,' Police Departments Get Their Money Back*, N.Y. TIMES (Oct. 1, 2021), <https://www.nytimes.com/2021/10/10/us/dallas-police-defund.html>; Jeffery C. Mays & Emma G. Fitzsimmons, *They Supported 'Defund the Police.' Then the Mayoral Campaign Began.*, N.Y. TIMES (June 29, 2021), <https://www.nytimes.com/2021/02/03/nyregion/defund-police-new-york-mayor.html>; Kim Parker & Kiley Hurst, *Growing Share of Americans Say They Want More Spending on Police in Their Area*, PEW RSCH. CTR. (Oct. 26, 2021), <https://www.pewresearch.org/fact-tank/2021/10/26/growing-share-of-americans-say-they-want-more-spending-on-police-in-their-area/>.

540. Akbar, *supra* note 41, at 111–12.

541. *Id.* at 112.

policing that demonstrate the feasibility of abolitionist models.⁵⁴² And, both movement leaders and scholars have framed challenges positively. Leaders of the campaign to replace the police department in Minneapolis noted that a sizeable portion of the population supported the move; with record voter turnout, forty-four percent of voters voted for the measure.⁵⁴³ They argued that their efforts reframed the public conversation around the relationship between policing and public safety, possibly signifying larger changes in how people think about policing in the future.⁵⁴⁴ Akbar described the “interest convergence” between abolitionist organizers and liberal reformers not just as a challenge, but also as an opportunity for transformative change.⁵⁴⁵

The challenges do not necessarily lead to the conclusion that an abolition-based approach to reform cannot work. Rather, they suggest that attention to how reforms are approached and implemented is critical. Care must be taken to ensure that even seemingly transformative approaches are not executed in ways that re-root the established system.⁵⁴⁶

An additional overarching response to objections to adapting an abolition-based framework to reimagine forensics is simply that, over many years, many varied conventional reform efforts have failed or faltered in improving the forensic system or its enablement of carceral harm. It is not clear that adherence to existing models will succeed any more in the future than they have in the past. Instead, allegiance to existing approaches to reform, though well-intentioned, may reflect an inability to break the mold of dominant thinking.⁵⁴⁷ Innocently entrenched thinking, however, may also be affirmatively harmful. Failing to acknowledge the dominance the current system exerts may contribute to further embedding of carceral power.⁵⁴⁸ But recognizing this may pave the way for more open-mindedness towards abolitionist approaches to reform. As abolitionists have argued, thinking beyond the system as it exists is intensely

542. E.g., Tiffany Yang, “Send Freedom House!”: *A Study in Police Abolition*, 96 WASH. L. REV. 1067, 1072–1073, 1100–01 (2021).

543. See Steve Karnowski & Mohamed Ibrahim, *Minneapolis Voters Reject Replacing Police with New Agency*, AP NEWS (Nov. 2, 2021), <https://apnews.com/article/2021-election-minneapolis-cc108d1707d9cb8cbaa6135bb60e7fbd>; Char Adams, *Minneapolis Organizers Say Rejected Police Proposal Isn't a Failure*, NBC NEWS (Nov. 6, 2021, 5:00 AM), <https://www.nbcnews.com/news/nbcblk/minneapolis-organizers-say-rejected-police-proposal-isn-t-failure-n1283379>.

544. See Adams, *supra* note 543.

545. Akbar, *supra* note 41, at 112 (citing Derrick A. Bell, Jr., *Brown v. Board of Education and the Interest-Convergence Dilemma*, 93 HARV. L. REV. 518, 523–28 (1980) to explain Bell’s theory that alignment of interests between White and Black Americans was a prerequisite to a positive outcome in *Brown v. Board of Education*, 347 U.S. 483 (1954)).

546. See *id.*

547. See KABA, *supra* note 65, at 4 (“[W]hen we set about trying to transform society, we must remember that we ourselves will also need to transform. Our imagination of what a different world can be is limited. We are deeply entangled in the very systems we are organizing to change.”).

548. See e.g., Roberts, *supra* note 56, at 43; Rodríguez, *supra* note 67, at 1597.

difficult. It requires consistent effort, but it can be achieved through diligent practice.⁵⁴⁹

CONCLUSION

The label of science has frequently been used as a fig leaf to legitimize prosecutions rather than advance justice. Recognition that forensics have been used as an engine for control and criminalization of marginalized communities demonstrates the need for a reimagining of the forensic system. This Article reframes the conversation around forensic reform and invites scholars, researchers, and reformers to consider the benefits of scaling back the forensic system and disentangling it from law enforcement rather than implementing “reforms” that fail to bring about change and, instead, expand and legitimize the use of forensics to abet mass criminalization. It offers a new framework for considering reform through this lens. What precise approaches will fit the framework is a subject for future scholarship, but the conversation on how to unveil new pathways for structural, systemic, radical forensic reform must begin now.

549. Yang, *supra* note 542, at 1081 (describing abolition as a “discipline”); Foran, Kaba, & Naples-Mitchell, *supra* note 499, at 521 (explaining that “abolition is a practice.”).