THE NATIONAL RESEARCH COUNCIL’S PLAN TO STRENGTHEN FORENSIC SCIENCE: DOES THE PATH FORWARD RUN THROUGH THE COURTS?

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ABSTRACT: According to the National Research Council’s (NRC) report on forensic science, courts have been “utterly ineffective” in screening problematic forensic testimony from criminal juries. This article discusses the NRC’s implicit critique of the courts and assesses future prospects for judicial gatekeeping in the area of forensic science. It argues that the NRC report may itself help turn the tide of judicial opinion against the admissibility of individualization testimony by practitioners of pattern-matching disciplines and that this development, if it occurs, will help generate political support for the NRC’s ambitious agenda of legislative and regulatory reforms.


The National Research Council’s (NRC) February 2009 report, Strengthening Forensic Science in the United States: A Path Forward,1 is a scathing critique. It finds that entire disciplines of forensic science rest on deficient scientific foundations, that procedures routinely used for interpretation are lacking in rigor, that analysts routinely take inadequate measures to avoid error and bias, and that they testify with unwarranted certainty. It finds that these problems are systemic—rooted in the institutional structure of forensic science—and therefore calls for a revolutionary transformation of the field. Among its recommendations are: (1) the creation of a National Institute of Forensic Science (NIFS) to establish best practice standards, promote research and education, and generally oversee the field; (2) removal of public forensic laboratories from the administrative control of police agencies and prosecutors’ offices; and (3) development of new graduate education programs to link forensic science more closely to the academic community and expand the number of qualified scientists entering the field.

When analyzing the report, it is useful to separate its assessment of the problems in forensic science from its recommended solutions. The assessment of problems, while broad and helpful, is nothing new. Virtually every aspect of the NRC’s critique echoes points that have been made previously in academic

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commentary on forensic science. Nevertheless, I expect that the NRC report will have a powerful influence on the way courts and the public view many forensic science disciplines, particularly the pattern-matching disciplines such as latent-print analysis, toolmark analysis, and bite-mark analysis.

As commentators have noted, there currently are two opposing “literatures” on these disciplines. One literature, consisting of court opinions and the writings of forensic practitioners, holds that these disciplines are valid, well-grounded in science, and easily meet the Daubert and Frye standards for admissibility of scientific testimony. The other literature, consisting of commentary by academics (most of whom are not forensic practitioners), holds that these disciplines rest on shaky scientific foundations and produce evidence of questionable quality. By adding the considerable weight of the

2. See generally Michael J. Saks & Jonathan J. Koehler, The Coming Paradigm Shift in Forensic Identification Science, 309 SCIENCE 892 (2005) (arguing that many disciplines of forensic science have been “undervalidated and oversold”); Jane Campbell Moriarty & Michael J. Saks, Forensic Science: Grand Goals, Tragic Flaws, and Judicial Gatekeeping, 44 JUDGES’ J. 16 (2005) (arguing that courts have failed to prevent weak and problematic forensic science from being used as evidence); Daivd Faigman et al., Modern Scientific Evidence: The Law & Science of Expert Testimony (2007) (an important treatise with many sections on forensic science; notable for candid and comprehensive discussion of problems and limitations of forensic evidence). The NRC report generally acknowledged these scholarly antecedents, but there were some curios omissions, most notably the report’s failure to acknowledge that many of its key points regarding latent-print analysis had previously been made by other scholars, perhaps most cogently by Professor Simon Cole. E.g., Simon A. Cole, Grandfathering Evidence: Fingerprint Admissibility Rulings from Jennings to Llera Plaza and Back Again, 41 AM. CRIM. L. REV. 1189 (2004) [hereinafter Cole, Grandfathering Evidence] (discussing weaknesses of courts’ analysis of latent print admissibility under Daubert); Simon A. Cole, More than Zero: Accounting for Error in Latent Print Identification, 95 J. CRIM. L. & CRIMINOLOGY 985 (2005) [hereinafter Cole, More Than Zero] (critiquing the claim that the error rate for latent print analysis is zero).

3. See 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, 457 (2008) [hereinafter Cole, Out of the Daubert Fire]; Jennifer L. Mnookin, The Validity of Latent Fingerprint Identification: Confessions of a Fingerprinting Moderate, 7 LAW, PROBABILITY & RISK 127, 127 (2008). Cole and Mnookin focus on the literature on latent print examination, but the same point could be made about other pattern matching disciplines in forensic science, such as toolmark and firearms examination, see generally Adina Schwartz, A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification, 6 COLUMN. SCI. & TECH. L. REV. 1 (2005), and handwriting analysis, see generally D. Michael Risinger, Goodbye to All That, or A Fool’s Errand, by One of the Fools: How I Stopped Worrying about Court Responses to Handwriting Identification (and “Forensic Science” in General) and Learned to Love Misinterpretations of Kumho Tire v. Carmichael, 43 TULSA L. REV. 447 (2007).

4. The Daubert standard, set forth in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), requires federal courts to act as “gatekeepers” for expert testimony, allowing it to reach the jury only if the judge determines that it is legally reliable (that is, valid). Id. at 592–97. Daubert mentioned several factors that courts may consider when assessing expert evidence, including whether the underlying method has been tested, whether the error rate is known, whether testing has been carried out according to established standards, whether the method has been subject to peer review, and whether the method is generally accepted in the relevant scientific community. Id.

5. The Frye standard, first articulated in Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), states that evidence derived from a novel scientific technique may be presented to a jury only if the court first determines that the technique has “gained general acceptance in the particular field in which it belongs.” Id. at 1014.
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NRC’s authority to the “critical” literature on forensic identification science, the NRC report will make it much harder for courts to continue siding with forensic practitioners and ignoring the academic critics. I will discuss this point further below.

The NRC’s proposed solutions are novel and extremely ambitious. The call for such sweeping reforms is an indication that the panel perceived the problems in the field to be both serious and deeply engrained. What I found most impressive about the proposals was the effort to create systemic solutions for systemic problems. The report largely avoids the usual rhetoric that blames all problems on individual intellectual and moral failures and seeks to solve those problems by identifying and replacing the “bad apples.” Instead, the report proposes a series of changes that have the potential to alter the fundamental institutional structure of forensic sciences. To address the systemic problems, the report recommends important changes in the context in which forensic science is done.

Agreeing as I do with the NRC’s assessment of the problems in forensic science, I found the proposed solutions both appropriate and promising. My main concern is whether they will be politically viable. The agenda for reform, as outlined in the report, relies entirely on legislative and regulatory mechanisms. It calls for Congress to create and fund an entirely new federal agency and proposes that the agency take a series of steps to reshape the cultural, intellectual, and administrative foundations of the field. Will we have the political will for such an ambitious undertaking?

This brings me to the main issue I would like to discuss in this article. What role, if any, might the judiciary play in strengthening forensic science? The report itself seems to write off courts as a possible mechanism of reform, saying, “Judicial review, by itself, will not cure the infirmities of the forensic science community.” This conclusion is understandable given the failure of the courts to police forensic science in the past. As the report correctly explains: “‘[T]he undeniable reality is that the community of forensic science professionals has not done nearly as much as it reasonably could have done to establish either the validity of its approach or the accuracy of its practitioners’ conclusions,’ and the courts have been ‘utterly ineffective’ in addressing this problem.” But I think the NRC panel gave up on the judiciary too easily. I will argue that the report itself may help turn the tide of judicial opinion against the admissibility of certain important forms of forensic testimony until they have a more adequate scientific foundation and that this development, if it occurs, will have salutary effects on the field of forensic science. In particular,

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7. NRC REPORT, supra note 1, at 12, 110.

8. Id. at 108–09 (quoting Mnookin, supra note 3, at 134; Peter J. Neufeld, The (Near) Irrelevance of Daubert to Criminal Justice and Some Suggestions for Reform, 95 Am. J. Pub. Health S107, S109 (2005)).
it will help generate political support for the legislative and regulatory reforms that the NRC report proposes and may well be a necessary step toward achieving those reforms. Accordingly, I think more attention is warranted to the role courts may play in helping or hindering reform of the forensic sciences. Let us consider whether the “path forward” mentioned in the title of the NRC report might run through the courts.

I. IS JUDICIAL GATEKEEPING HOPELESS?

The NRC report is not just a critique of forensic science; it also can be read as a severe criticism of the judiciary for being too lenient in evaluating the admissibility of forensic evidence. According to the report, judges have been negligent gatekeepers—they have applied the Frye and Daubert standards in an excessively permissive manner that has allowed a broad range of questionable forensic science to reach juries.

Review of reported judicial opinions reveals that, at least in criminal cases, forensic science evidence is not routinely scrutinized pursuant to the standards of reliability enunciated in Daubert. . . . The standard is admittedly “flexible,” but that does not render it meaningless. Any reasonable reading of Daubert strongly suggests that, when faced with forensic evidence, “trial judge[s] must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.” As the reported cases suggest, however, Daubert has done little to improve the use of forensic science evidence in criminal cases.

Why has judicial review failed? The NRC report offered several explanations. Ignorance of science has been part of the problem. According to the report, lawyers and judges “generally lack the scientific expertise necessary to comprehend and evaluate forensic evidence . . . .” A second explanation, which I will call the codependency hypothesis, is that judges are reluctant to exclude forensic science because the judicial system needs it.

“There is no evident reason why [‘rigorous systematic’] research would be infeasible.” However, some courts appear to be loath to insist on such research as a condition of admitting forensic science evidence in criminal cases, perhaps because to do so would likely “demand more by way of validation than the disciplines can presently offer.”

Like parents who are afraid to discipline a wayward teenager for fear of losing his love and support, judges, by this account, are afraid to hold forensic sci-

9. See supra text accompanying note 5.
10. See supra text accompanying note 4.
11. NRC REPORT, supra note 1, at 106 (quoting Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 589 (1993)).
12. Id. at 110.
13. Id. at 109 (quoting Joan Griffin & David J. LaMagna, Daubert Challenges to Forensic Evidence: Ballistics Next on the Firing Line, 26 CHAMPION 20, 21 (Sept.–Oct. 2002)).
ence to strict admissibility standards for fear of losing forensic evidence. A third explanation is that judges are reluctant to upset established practices: “‘The principal difficulty, it appears, is that many [forensic science] techniques have been relied on for so long that courts might be reluctant to rethink their role in the trial process.’”

To summarize, the NRC report portrays judges as ignorant, codependent, and hidebound. No wonder the panel saw little hope that judges will help with reform of forensic science. But did the NRC panel write off the judiciary too easily? Is it really hopeless to expect that judges will be able to follow the law in this area?

Clearly there are holes in the NRC argument. For example, the NRC analysis fails to explain why the same courts that appear so inept at detecting and excluding problematic forensic testimony in criminal cases are able to enforce the Daubert standard far more rigorously in civil cases. It might be that civil litigators are generally better funded and more skillful than the criminal defense lawyers who challenge the admissibility of forensic science. In at least a few cases, however, criminal defense lawyers have mounted extensive, well-funded challenges with what appears to be a reasonable level of skill but have lost anyway. The challenges to latent-print examination in

14. In 2001, I attended a conference on forensic science sponsored by the National Institute of Justice that took place at a Miami hotel. The hotel was also hosting a second conference on “tough love” for troubled teens. After listening to a speaker in one session say that, if forensic science failed to meet the Daubert standard, the Daubert standard needed to be changed, I wandered into another room in which the speaker seemed to be taking a harder line. We must always maintain our high standards, he said. To reduce our standards out of fear that others cannot meet them is to give in to their pathology, to become part of it, to be an enabler—a condition he labeled codependency. I gradually realized, alas, that the speaker was talking about parental supervision of drug-abusing teenagers rather than judicial review of forensic science evidence. But I nevertheless agree with the conclusion. When reviewing forensic science evidence I think courts need to exercise a little “tough love” and not continue to tolerate (and thus enable) the deficiencies identified in the NRC report. Otherwise, as the speaker in Miami succinctly put it, “you’ll be co-dependent forever.”

15. NRC REPORT, supra note 1, at 110 (quoting David L. Faigman ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 1:30, at 85 (2007)).

16. That Daubert is applied more leniently in criminal cases than civil cases has been widely noted. See generally D. Michael Risinger, Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?, 64 ALB. L. REV. 99 (2000) (finding that civil defendants almost always win their Daubert challenges to plaintiff’s expert evidence, while criminal defendants almost never win their challenges to prosecution expert evidence); Neufeld, supra note 8 (noting more stringent standards of review of expert evidence in civil than criminal cases).

17. The NRC report quoted Innocence Project cofounder Peter Neufeld to this effect:

“Their’re the extremely well-litigated civil challenges, the criminal defendant’s challenge is usually perfunctory. Even when the most vulnerable forensic sciences—hair microscopy, bite marks, and handwriting—are attacked, the courts routinely affirm admissibility citing earlier decisions rather than facts established at a hearing. Defense lawyers generally fail to build a challenge with appropriate witnesses and new data. Thus, even if inclined to mount a Daubert challenge, they lack the requisite knowledge and skills, as well as the funds, to succeed.”

NRC REPORT, supra note 1, at 107 (quoting Neufeld, supra note 8, at S110)
United States v. Mitchell, United States v. Llera Plaza, and Commonwealth v. Patterson are good examples. To explain the outcome in these cases one must look for something more than the limited skill and resources of defense lawyers.

Of course, legal scholars of a critical bent can offer explanations that involve the political and ideological inclinations of judges. From their perspective, these cases offer evidence that, to paraphrase Justice Holmes, the life of the law lies not in a logical application of rules but in judges’ policy preferences. Perhaps what judges prefer is that prosecutors win and civil plaintiffs lose, and those tacit inclinations have shaped legal rulings on the admissibility of scientific evidence more profoundly than the formal standards articulated in Daubert or Frye.

But this “realist” explanation also has a few holes. For example, it has difficulty accounting for instances in which admissibility challenges mounted by criminal defense lawyers have succeeded. The most notable example was the period in the early 1990s when a number of appellate courts reversed convictions based on forensic deoxyribonucleic acid (DNA) evidence on grounds that the methods, employed at the time to compute the statistical frequency of matching DNA profiles had not been adequately validated and were not generally accepted. There are more recent examples as well. Although the event received little attention, a trial judge in Los Angeles recently excluded evidence from a relatively novel form of DNA testing known as Low-copy number (LCN) analysis.

If judicial rulings merely sway with the political winds, how can we explain these cases?

18. 365 F.3d 215 (3d Cir. 2004). This case is discussed extensively in Cole, Grandfathering Evidence, supra note 2, at 1225–32.
20. 840 N.E.2d 12 (Mass. 2005). In Patterson, the Massachusetts Supreme Court excluded an unusual technique known as simultaneous impressions but rejected a more general challenge to latent print identification despite receiving an amici curiae brief, signed by fifteen prominent scholars, that reviewed deficiencies in the scientific foundation for such testimony. Id. at 32–33. The brief stated that, apart from latent print practitioners, the great majority of the scientists who had commented on the issue believe that the reliability of latent print individualization has not been established. Brief for David M. Siegel et al. as Amici Curiae at 32–35, Commonwealth v. Patterson, 840 N.E.2d 12 (Mass. 2005) (No. 09478), available at http://onin.com/fp/patterson_appeal_defense_amicus_brief_sep05.pdf
21. “The life of the law has not been logic; it has been experience.” Holmes expanded on this perspective as follows: “The very considerations which judges most rarely mention, and always with an apology, are the secret root from which the law draws all the juices of life. I mean, of course, considerations of what is expedient for the community concerned.” Oliver Wendell Holmes, Jr., The Common Law 1, at 35 (1881).
22. See supra text accompanying note 4.
23. See supra text accompanying note 5.
In my view, several factors can explain the rulings that excluded DNA evidence. In the late 1980s and early 1990s, DNA testing was a relatively new technology without a lengthy history of use in the courts. Also, it was a relatively immature technology in a field where technology was evolving and progressing rapidly. Judges looking at early restriction fragment length polymorphism (RFLP) tests may have been willing to exclude the evidence in part because they were confident of better things to come. They knew that proponents of the evidence would be back later with more support for their claims. Judges looking at LCN technology today may view it the same way.26

The skill of the litigators also may have been a factor. As Jay Aronson discussed in his excellent historical account,27 the early challenges to DNA evidence did not really gain traction until they attracted the talents of a group of lawyers who did not routinely try criminal cases. A watershed was the case of People v. Castro,28 in which a pair of extremely skillful lawyers, Barry Scheck and Peter Neufeld, recruited an all-star team of scientific experts to assist in a successful admissibility challenge. Lawyers who later brought other successful challenges generally modeled their efforts on the pioneering work of Scheck, Neufeld, and a handful of other lawyers with special expertise in the area.29

Another important factor was the existence of a number of prominent scientific critics who publicly questioned the scientific basis for the statistical conclusions of forensic DNA laboratories.30 The critics were academic scientists with strong credentials in population genetics and statistics. Proponents of DNA testing made strenuous efforts to marginalize the critics,31 but courts eventually began to take them seriously.

The key event that tipped the balance in favor of those challenging DNA evidence, at least for a while, was the release of a 1992 NRC report on DNA evidence.32 The 1992 NRC report endorsed and supported a core element of the critical position—the claim that there was inadequate scientific support for the statistical estimates that made DNA evidence so impressive. According to the 1992 NRC report, the methods then being used to compute the frequency of DNA profiles, and thus the probability of a coincidental match between

26. Defenders of the codependency hypothesis might argue that because of the novelty of DNA evidence, judges had not yet come to depend on it in the way they depended on such disciplines as latent print analysis and toolmark analysis, but this argument seems a little strained.


29. See ARONSON, supra note 27, 56–88.

30. Id.

31. See Thompson, supra note 24, at 100–02; ARONSON, supra note 27, at 141–43.

32. COMM., ON DNA TECH. IN FORENSIC SCI., NAT’L RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE (1992) [hereinafter DNA TECHNOLOGY].
DNA profiles, rested on assumptions that had not been adequately verified about human mating patterns and the genetic structure of human populations. The NRC’s endorsement of this critique effectively torpedoed proponents’ efforts to marginalize the critics. It is difficult to claim that critics do not know what they are talking about, or should not be considered part of the relevant scientific community, when an NRC report commissioned to examine the issue takes their criticisms seriously and agrees with them. The NRC report had a profound and immediate effect on litigation; a number of appellate courts reversed convictions based on DNA evidence where the statistics accompanying the evidence had been computed using the conventional method.

Although these rulings caused an atmosphere of crisis in the law enforcement community and were characterized by some as a judicial rejection of science, the rulings did not actually prevent lawyers from making use of DNA evidence. In some jurisdictions, DNA laboratories began using a more conservative method for computing the frequency of DNA profiles that the 1992 NRC report had recommended. This method, called the ceiling principle, generally produced more modest numbers than the conventional method, but the ceiling frequencies were often still low enough to be impressive. In the period immediately after the release of the 1992 NRC report, many courts allowed prosecutors to present DNA evidence accompanied by the ceiling.

33. *Id.* at 10–13. See also Thompson, *supra* note 24, at 68–79; Aronson, *supra* note 27, at 56–88.


35. The second NRC report on DNA evidence was prompted, in part, by a letter from then FBI Director William Sessions, who declared that the scientific controversy over DNA statistics had “created a climate of confusion in the courts.” Sessions noted that, since the release of the first NRC report on DNA evidence, 11 of 30 appellate decisions on the admissibility of DNA evidence had resulted in exclusions. Calling the situation “a crisis,” Sessions urged the Academy to act quickly to resolve the controversy. Letter from William Sessions, Director of the FBI, to Dr. Frank Press, President of the National Academy of Sciences (Apr. 16, 1993) (on file with author).

36. See generally, e.g., Peter Aldhous, *Geneticists Attack NRC Report as Scientifically Flawed*, 259 *Science* 755 (1993) (reporting that scientists were surprised and dismayed that the 1992 NRC report had been cited as a basis for rejecting scientific evidence). The critics misunderstood the significance of the appellate rulings. What the courts were rejecting was not Science (with a capital S) but testimony based on a technique that had not been adequately validated. By exercising the gatekeeping function diligently, courts assured that the DNA evidence that reached juries rested on a firmer scientific foundation.

37. *DNA Technology*, *supra* note 32, at 82–85. The ceiling principle addressed uncertainty about the distribution of genetic characteristics in the human population by assuming, rather arbitrarily, that the frequency of each characteristic of a DNA profile was at least as high as its observed frequency in any sub-population. If a given characteristic was more common among Caucasians then other races, for example, the ceiling principle gave the defendant the benefit of the doubt by using the higher Caucasian frequency, even if the defendant and perpetrator were of another race. Thompson, *supra* note 24, at 79–82.

frequencies.\textsuperscript{39} It may well be that the availability of an alternative statistical method, and the assurance that DNA evidence could still be used, albeit with more modest numbers, helped ease the codependency fears of appellate courts. They could be tough in enforcing standards for the admissibility of DNA evidence because they knew they would not lose it entirely.

As it turned out, courts did not insist on the use of the ceiling principle for long. Successful early challenges to the admissibility of DNA evidence, such as the Castro case, prompted a rapid flurry of research to address concerns raised by scientific critics.\textsuperscript{40} Perceiving an urgent need to get the research done, funding agencies such as the National Institute of Justice (NIJ) solicited research proposals and supported conferences on the topic.\textsuperscript{41} In relatively short order, a number of studies were published that tested the population genetic assumptions underlying DNA statistical models and identified areas of strength and weakness.\textsuperscript{42} Some of the key studies were published shortly after the 1992 NRC report. In light of the new research and improvements in methods, academic support for the ceiling principle faded, and within a relatively short time, prosecutors found little difficulty in reintroducing conventional DNA statistics in court.\textsuperscript{43} In 1996, the NRC issued a second report on forensic DNA evidence that effectively placed its imprimatur on the conventional method.\textsuperscript{44} By 1995, courts in some jurisdictions that had reversed convictions based on conventional DNA statistics had already begun admitting such statistics again.\textsuperscript{45} The 1996 NRC report accelerated this trend and effectively ended admissibility challenges to standard DNA testing methods.

This history of DNA litigation holds important lessons for the present. Those challenging forensic science evidence may be more likely to succeed if

\textsuperscript{39} DNA TECHNOLOGY, supra note 32, at 82–85.
\textsuperscript{40} ARONSON, supra note 27, 87–88. See generally Kaye, supra note 24; Kaye, supra note 38.
\textsuperscript{41} ARONSON, supra note 27, 111–13.
\textsuperscript{42} For a review of the studies, see William C. Thompson, Guide to Forensic DNA Evidence, in EXPERT EVIDENCE: A PRACTITIONER’S GUIDE TO LAW, SCIENCE AND THE FJC MANUAL, 227 (Bert Black & Patrick W. Lee eds., 1997) (“Empirical studies on the extent of structure in human populations (with regard to VNTR alleles) began to appear in the early 1990s, but some of the key findings appeared only after the 1992 publication of [the first National Research Council report on DNA evidence].”). See generally Kaye, supra note 24 (discussing the studies).
\textsuperscript{43} ARONSON, supra note 27, at 177.
\textsuperscript{44} COMM. ON DNA FORENSIC SCI: AN UPDATE, NAT’L RESEARCH COUNCIL, THE EVALUATION OF FORENSIC DNA EVIDENCE (1996). The report recommended a computational procedure that incorporated a correction factor, called Theta, to take account of the potential for a limited degree of population structure, but the correction typically had only a small effect on the ultimate numbers. Id. at 104–06. Forensic laboratories that ignored Theta and used the simple product rule had no trouble presenting their results in court after 1996.
\textsuperscript{45} David H. Kaye & George F. Sensabaugh, Jr., Reference Guide on DNA Evidence in FEDERAL JUDICIAL CENTER, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 529 n.195 (2d ed., 2000) (“By 1995 . . . . courts that only a short while ago had held basic product rule estimates to be too controversial to be admissible decided that there was sufficient agreement about the basic product rule for it to be used.”); See also 4 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY § 31:3, at 153 (2009).
they ease judges’ fears of entirely losing forensic evidence by seeking to limit what experts can say about it, rather than asking for outright exclusion of whole disciplines. The NRC report seems to support this approach. It explicitly noted that forensic evidence may be valid for answering some questions and not others.

In evaluating the accuracy of a forensic analysis, it is crucial to clarify the type of question the analysis is called on to address. Thus, although some techniques may be too imprecise to permit accurate identification of a specific individual, they may still provide useful and accurate information about questions of classification. For example, microscopic hair analysis may provide reliable evidence on some characteristics of the individual from which the specimen was taken, but it may not be able to reliably match the specimen with a specific individual.

Challenges to forensic science testimony seem most likely to succeed if they are carefully targeted and specify which specific conclusion analysts should and should not be allowed to present based on a given type of evidence. As discussed in the next section, I believe the most obvious target for such challenges is the individualization claims of pattern-matching practitioners.

A second lesson is that successful challenges to the admissibility of forensic evidence are helpful in achieving improvements in forensic science, especially when the exclusion of evidence is perceived as a “crisis.” The successful early challenges to DNA evidence had very positive effects on research funding and attention to validation. Although these rulings did little to impede criminal prosecutions, they created the perception of a crisis and that, in turn, assured that steps were taken to improve the scientific foundations of the field. In my opinion, we would benefit from having a few more crises of this sort. Indeed, I wonder whether we will have the political will to pursue the ambitious agenda for change, outlined in the recent NRC report, in the absence of such a crisis.

In sum, I think it is too early to write off judicial review as a means for reform. The NRC report was correct in concluding that judicial review has, in the past, been “utterly ineffective” in screening out problematic forensic evidence. It does not necessarily follow, however, that courts will continue to perform ineffectively in the future. Indeed, the NRC report may itself play a pivotal role in educating courts regarding the problems in forensic science and in helping courts apply admissibility standards more rigorously. By underestimating their own ability to influence the courts, the NRC panel may have failed to see the important role that judicial review can play in charting the path forward.


47. NRC REPORT, supra note 1, at 8.
II. WILL THE NRC REPORT BRING THE END OF INDIVIDUALIZATION?

For decades, practitioners of the pattern-matching disciplines of forensic science have claimed to be able to make unique identifications (some prefer the term individualizations) based solely on subjective judgment. Analysts in these disciplines claim that they can tell, based on their knowledge, training, and experience, whether a particular latent print, toolmark, or bite mark contains sufficient detail to allow meaningful comparison with exemplars. When they judge sufficient detail to be present, analysts claim they can also tell whether the questioned mark and exemplar could have a common source. And when analysts identify a sufficient number of common features, they claim they can determine with certainty that the mark and exemplar do, in fact, have a common source. There are no formal standards for determining whether a mark contains “sufficient” detail to support such judgments—these determinations are entirely subjective. Often the basis for the expert judgment (that is, which features were compared and found to match) is not even recorded. The expert simply presents the conclusion of identification or exclusion as an ipse dixit—yet often does so with great certainty. Latent-print examiners often claim, for example, to have determined that a latent print was made by a particular finger “to the exclusion of all other fingers in the world.”

As noted above, there is a growing body of critical literature that challenges the scientific foundations of the pattern-matching disciplines and questions individualization claims. Nevertheless, courts generally have upheld the admissibility of these claims. When evaluating whether the claims are “generally accepted” per the Daubert and Frye standards, courts typically define the “relevant scientific community” narrowly in a manner that includes forensic practitioners but excludes most critics. Furthermore, courts have accepted

48. Pattern-matching disciplines include latent-print analysis, toolmaker analysis, and bite-mark analysis.
51. IMMAN & RUdIN, supra note 50, at 53–54, 141; see also Lyn Haber & Ralph Norman Haber, Scientific Validation of Fingerprint Evidence Under Daubert, 7 LAW, PROBABILITY & RISK 87, 90 (2008); Schwartz, supra note 3, at 14–15.
52. Haber & Haber, supra note 51, at 103.
53. Cole, Grandfathering Evidence, supra note 2, at 1198. See generally Mnookin, supra note 3.
54. Mnookin, supra note 3, at 128.
55. See supra text accompanying note 4.
56. See supra text accompanying note 5.
the claims of practitioners that individualization testimony is based on an established method, known as ACE-V, that has been validated and proved reliable by many years of practical experience and that the error rate of this method is effectively zero.\footnote{Mnookin, supra note 3, at 128; Cole, Grandfathering Evidence, supra note 2, at 1236 n.201. See generally Cole, More Than Zero, supra note 2 (discussing and evaluating the ACE-V fingerprinting method and its error rate).}

A central tenant of the practitioners’ position is an argument that Professor Simon Cole has called “the fingerprint examiner’s fallacy.”\footnote{Cole, Grandfathering Evidence, supra note 2, at 1197–1203; Simon A. Cole, Is Fingerprint Identification Valid? Rhetorics of Reliability in Fingerprint Proponents’ Discourse, 28 LAW & POL’Y 109, 116–23 (2006). This same argument is also advanced by toolmark and bite-mark analysts, among others. Schwartz, supra note 3, at 4; INMAN & RUDIN, supra note 50, 52–54.} According to this argument, trained analysts can tell, based on their experience, whether particular marks (such as latent prints, toolmarks, bite marks, etc.) are “unique,” and therefore, can determine with absolute certainty whether two such marks had a common origin. Academic commentators have argued that there is no proof that any such marks are unique, and that even if some such marks are unique, there is no proof that analysts can accurately distinguish those that are unique from those that are not. Hence, there is no reason to believe that what an analyst decides to call a “match” between two marks is proof that the marks have a common origin.\footnote{See Cole, Grandfathering Evidence, supra note 2, at 1197–1203; Mnookin, supra note 3, at 129; Schwartz, supra note 3, at 2–8.} Nevertheless, forensic practitioners have argued that because the marks they identify are unique, their claims of individualization must be infallible—and courts have, so far, accepted this argument.\footnote{Mnookin, supra note 3, at 141.}

The NRC report cuts the legs from under the practitioners’ arguments. It declares outright that “[w]ith the exception of nuclear DNA analysis . . . no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source.”\footnote{NRC REPORT, supra note 1, at 7.} Moreover, the report considers, and explicitly refutes, all major arguments supporting individualization claims.

Consider, for example, the claim that ACE-V is a valid and accurate method. According to the NRC report:

[ACE-V] is not specific enough to qualify as a validated method for [friction ridge analysis]. ACE-V does not guard against bias; is too broad to ensure repeatability and transparency; and does not guarantee that two analysts following it will obtain the same results. For these reasons, merely following the

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steps of ACE-V does not imply that one is proceeding in a scientific manner or producing reliable results.\textsuperscript{63} The NRC report explicitly rejects as “not scientifically plausible” the claim that latent-print examination has a “zero error rate.”\textsuperscript{64} The report also considers and explicitly rejects the “fingerprint examiner’s fallacy.”

Uniqueness and persistence are necessary conditions for friction ridge identification to be feasible, but those conditions do not imply that anyone can reliably discern whether or not two friction ridge impressions were made by the same person. Uniqueness does not guarantee that prints from two different people are always sufficiently different that they cannot be confused, or that two impressions made by the same finger will also be sufficiently similar to be discerned as coming from the same source.\textsuperscript{65}

According to the report, the individualization claims of all of the pattern-matching disciplines rest on shaky or deficient scientific foundations. “Toolmark and firearms analysis suffers from the same limitations” as latent-print analysis.\textsuperscript{66} “The scientific basis for handwriting comparisons needs to be strengthened.”\textsuperscript{67} There is “no scientific support for the use of hair comparisons for individualization in the absence of nuclear DNA.”\textsuperscript{68} Finally, “there is considerable dispute about the value and reliability of [bite-mark] interpretation.”\textsuperscript{69}

In light of those damning assessments, it strains credibility to believe that individualization claims arising from these disciplines meet the standards of either \textit{Frye} or \textit{Daubert}. Of course, as Simon Cole observed, courts have ignored the very same assessments in the past when they were made by academic commentators\textsuperscript{70} — a circumstance that raises fundamental questions about the degree to which courts are responsive to rational argument. Nevertheless, I believe courts will pay attention to the NRC report—not because it is more rationally persuasive than previous scholarly commentary, but because it is more authoritative. Consequently, I predict that courts will soon begin excluding individualization testimony.

The report drastically undermines efforts to marginalize academic critics of individualization because it adopts and endorses their arguments—effectively bringing the critical perspective into the scientific mainstream. Forensic scientists will look silly if they try to argue that the NRC is not part of the relevant scientific community for purposes of \textit{Frye} or \textit{Daubert}. The panel that prepared the report was appointed by the National Research Council, which is the research arm of the National Academy of Sciences (NAS), our nation’s

\textsuperscript{63} \textit{Id.} at 142.
\textsuperscript{64} \textit{Id.} at 143.
\textsuperscript{65} \textit{Id.} at 144.
\textsuperscript{66} \textit{Id.} at 154.
\textsuperscript{67} \textit{Id.} at 166.
\textsuperscript{68} \textit{Id.} at 161.
\textsuperscript{69} \textit{Id.} at 176.
most distinguished scientific body. The panel was appointed for the purpose of examining the scientific basis of forensic science. It included an array of distinguished scientists and scholars, including two forensic scientists. It conducted an exhaustive study in which representatives of the various forensic disciplines were invited to make presentations and submit evidence. The panel set forth its conclusions in an extensive report. In my view, any judge who concludes that the NRC report does not speak for the “relevant scientific community” deserves to be impeached. If courts accept the NRC report as authoritative, as I believe that they must, then individualization testimony is in deep trouble.

In the wake of the NRC report, judges will need to look closely at proffered testimony and make an assessment of whether the specific conclusions offered have an adequate scientific foundation. In the past, courts seemed to decide admissibility on a blanket basis for entire disciplines. For instance, if latent-print analysis was admissible then almost anything an examiner wanted to say about latent prints was deemed admissible; any concerns about validity were said to go to the weight, rather than the admissibility, of the expert’s conclusions. In the future, I expect to see a finer-grained analysis of admissibility, with courts allowing some conclusions and not others from a particular expert. For example, latent-print examiners might be able to tell the jury that two prints could have a common source, but might not be allowed to conclude that they were definitely made by the same finger to the exclusion of all other fingers in the universe.

**III. WHY THE PATH FORWARD MUST RUN THROUGH THE COURTS**

If courts persist in upholding the admissibility of all forms of forensic testimony, as they have in the past, then “the path forward” is likely to go nowhere. In the absence of a crisis that threatens the status quo, it is unlikely that law enforcement groups will support the NRC’s reform agenda. Nor does it appear that forensic scientists themselves will support it. Without their support, I think it is unlikely that Congress will be willing to create a new federal agency, fund an ambitious agenda of research, support development of gradu-

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71. “The Academy . . . is composed of approximately 2,100 members and 380 foreign associates, of whom nearly 200 have won Nobel Prizes. Members and foreign associates of the Academy are elected in recognition of their distinguished and continuing achievements in original research; election to the Academy is considered one of the highest honors that can be accorded a scientist or engineer.” Nat’l Acad. of Scis, About the NAS, http://www.nasonline.org/site/PageServer?pagename=ABOUT_main_page (last visited December 19, 2009).

72. For information about the membership of the panel, see NRC REPORT, supra note 1, at v, 2.

73. See supra note 47 and accompanying text. See generally Cole, Where the Rubber Meets the Road, supra note 46 (explaining in doctrinal and conceptual terms how a finer-grained analysis of admissibility might work).

74. See Cole, Where the Rubber Meets the Road, supra note 46, at 818–19.
ate education programs, and encourage institutional separation of forensic laboratories from police and prosecutorial agencies.

The major professional societies in forensic science have responded to the report by acknowledging that problems may exist in the field, but denying that the problems are systemic. They also deny that there are fundamental deficiencies in the scientific foundations of forensic disciplines. The American Society of Crime Laboratory Directors (ASCLD) issued a statement declaring that “the complexity of the [NRC] report distills down to two fundamental issues: the need for both standardization and resources in the forensic community.”\(^\text{75}\) The statement asserts that crime laboratories generally “have robust, validated methods, and are confident of the science behind the work they do,” acknowledging only that “documentation may not be readily available in some laboratories or the published literature, leading to a perception that the science behind some types of disciplines is lacking.”\(^\text{76}\)

The International Association of Identification (IAI), which represents latent-print examiners, has also claimed that the questions about the validity of forensic science are merely matters of (mis)perception rather than reality. In a letter to Senator Patrick Leahy, the IAI president insisted, notwithstanding the NRC report’s analysis, that latent-print individualizations are valid and reliable “when conducted by individuals, trained to competency, using scientific and professionally accepted practices and procedures.”\(^\text{77}\)

The FBI’s Scientific Working Group for Firearms and Toolmarks (SWGGUN) has taken a similar position. It issued a statement declaring, notwithstanding the NRC conclusions to the contrary, that its discipline rests on a solid scientific foundation.

The reliability of the science has been demonstrated and supported through proficiency tests and validity studies over many decades. The calculated error rates indicate that the conclusions reached are accurate when appropriate methods are followed by a competent examiner. Methods and standards have been established by the Association of Firearm and Tool Mark Examiners (AFTE), the Scientific Working Group for Firearms and Toolmarks (SWGGUN) and the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB).\(^\text{78}\)

According to SWGGUN, the main problem in the field is merely that “many of these standards and guidelines are presently recommendations and have not


\(^{76}\) Id. (emphasis added).


been mandated or universally applied across the United States.”

The problems that have occurred in the field are attributed not to systemic causes, but to “examiners with poor ethical standards, inadequate training, scientifically unsound protocols and/or working under undue pressure to produce results.”

It appears, then, that these forensic science organizations hope to use the NRC report to leverage additional funding and strengthen the hand of existing professional associations, while essentially maintaining the status quo. Review of their public statements suggests that these organizations oppose creation of NIFS, oppose separating forensic science from law enforcement, and oppose any type of external oversight other than accreditation and certification systems that are controlled by their private professional associations.

Accreditation and certification are positive steps to be sure, but they do virtually nothing to address the two main problems in the field—that entire disciplines of forensic science rest on a deficient scientific foundation and that inadequate measures have been taken to avoid bias and error. ASCLD-LAB, which is the major organization responsible for laboratory accreditation, has never acknowledged that there is any problem with the scientific foundations or procedures of disciplines such as bite-mark, toolmark or latent-print analysis. It has been perfectly willing to accredit laboratories that provide services in these disciplines without making any demands that they do the type of validation research that the NRC report deems essential. Similarly, the American Board of Criminalistics (ABC), which is the major body that certifies individual forensic scientists, has been perfectly willing to certify analysts in problematic disciplines without demanding that they limit their testimony to avoid conclusions that, according to the NRC report, go beyond what the science can support. Accreditation and certification may be good ways to make sure that individual laboratories and individual analysts rise to the standards of the field. They are not, however, good ways to address systemic problems of the field as a whole. According to the NRC report, the scientific foundations and procedures for entire disciplines are deficient. Accrediting laboratories and certifying analysts in these deficient disciplines does nothing to address the underlying deficiency.

Accreditation and certification are appealing “solutions,” however, because they require no governmental involvement and no taxpayer money. In the absence of a crisis that compels a more effective response, Congress may well be persuaded to postpone or forgo the creation of NIFS and let forensic science address its own problems. In that case, the deficiencies identified in the NRC report might never be addressed.

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79. Id. at 2.
80. Id. This statement appears to be an example of the “bad apples” analysis discussed previously. See supra note 6 and accompanying text. The NRC report declined to blame the problem on individual deficiencies in training or ethics, viewing the problem as more systemic. See generally NRC REPORT, supra note 1.
81. See the American Board of Criminalistics Web Site, http://www.criminalistics.com/ (last visited Dec. 15, 2009), for information about this organization.
I must confess that I am hoping for a “crisis.” I believe that judicial opinions excluding individualization testimony by pattern-matching experts will send shock waves through the legal and forensic science communities. As with the early judicial rejection of forensic DNA evidence, such opinions will elicit cries of anguish from prosecutors and claims that courts are rejecting “science.” In the long run, however, and perhaps even in the short run, rulings of this type will have beneficial effects on the field of forensic science, and in turn, on the legal system as a whole. They will spur long-neglected research on the fundamental issues that the NRC report identified. They might even prompt Congress to take a serious look at the bold agenda of reform outlined in the NRC report—and that would indeed put us on a path forward.