

***The National Academy of Sciences Report on Forensic Sciences:
What it Means for the Bench and Bar***

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On February 18, 2009, after more than two years of work, the Committee on Identifying the Needs of the Forensic Science Community at the National Academy of Sciences issued a report entitled, “Strengthening Forensic Science in the United States: A Path Forward.”¹ The Committee was composed of a diverse and accomplished group of professionals. Seven of the 17 Committee members are prominent professionals in the forensic science community, with extensive experience in forensic analysis and practice; 11 members of the Committee are trained scientists (with expertise in physics, chemistry, biology, engineering, biostatistics, statistics, and medicine); 10 members of the Committee have Ph.Ds, 2 have MDs, 5 have JDs, and one has an M.S. in chemistry.

The Committee’s project involved an extraordinary amount of time, because of the extensive research and countless interviews that we undertook. In addition, there were many hours of Committee meetings – which involved deliberations between forensic analysts and practitioners, experts in the physical and life sciences, a former federal prosecutor, a defense attorney, a crime lab director, a medical examiner, an engineer, statisticians, educators, and a judge. Our interactions were challenging and fruitful. And, in the end, despite our differing professional perspectives, the Committee was unanimous in its findings and recommendations.

With the benefit of hindsight, I can now say that the substance of the Committee’s Report really was not hard to write. The problems that plague the forensic science community have been well understood for quite some time by thoughtful and skilled forensic professionals, and their views and concerns were well known to us. For example, in 2003, when he was President of the American Academy of Forensic Sciences (AAFS), Kenneth Melson, a former prosecutor and now Director of the Bureau of Alcohol, Tobacco, Firearms and Explosives, wrote:

[M]ore research is needed in the techniques and science already in use. With the importance of forensic science to truth and justice, the science employed and relied upon by judges and juries must be valid. It does not matter how well forensic scientists abide by testing protocols or how reliable the techniques are, if the underlying science does not actually reveal what the expert says it does. Method validation studies and new research must be ongoing even in the areas of traditional forensic science disciplines. Justice demands good science and we have an obligation to provide it. We can no longer expect the courts or public to accept the truth of our science merely because we say it is good. In order to maintain the integrity of both the science and the justice system, we must prove that it is so. Moreover, we cannot overlook the fact that scientific evidence was presented at many of the trials where innocent people were convicted and later exonerated by DNA. The evidence in many of the trials showed associations between the defendants and the victims or crime scenes. While modern day science is exonerating the innocent, it is also showing us that some inferences drawn from scientific associations in the past were wrong. The use of DNA to exonerate wrongly convicted persons has certainly taught us lessons about forensic science in general and underscores the importance of continuing research.²

Thomas Bohan, the most recent Past President of the American Academy of Forensic Sciences, published a similar statement earlier this year.³

When Congress passed legislation in 2005 directing the National Academy of Sciences to create an independent committee to study the forensic science community, it did so at the urging of the Consortium of Forensic Science Organizations. The legislation establishing our Committee was, in effect, a response to a *call for help* from forensic science professionals.

The Committee spent an enormous amount of time listening to testimony from and reviewing materials published by numerous experts, including forensic practitioners, heads of public and private laboratories, directors of medical examiner and coroner offices, scientists, scholars, educators, government officials, members of the legal profession, and law enforcement officials. Not only did we examine how the forensic disciplines operate, we also carefully considered any peer-reviewed, scientific research purporting to support the validity and reliability of existing forensic disciplines. Additionally, we invited experts in each discipline to refer us to any pertinent research. Committee members and staff spent countless hours reviewing these materials. And before the Report was released, it was peer-reviewed by outside experts in the fields of science, law, and forensic practice.

I started the NAS project with no skepticism regarding the forensic science community. Rather, I assumed, as I suspect many of my judicial colleagues do, that the forensic disciplines are well grounded in scientific methodology and that crime laboratories and forensic practitioners follow proven practices that ensure the validity and reliability of forensic evidence offered in court. I was surprisingly mistaken in what I assumed.

What our Committee found is that, although there are many dedicated and skilled forensic professionals, the quality of practice in the forensic disciplines varies widely and the conclusions reached by forensic practitioners are not always reliable. The reasons for this include:

- the paucity of scientific research to confirm the validity and reliability of forensic disciplines and establish quantifiable measures of uncertainty in the conclusions of forensic analyses;
- the paucity of research programs on human observer bias and sources of human error in forensic examinations;
- the absence of scientific and applied research focused on new technology and innovation;
- the lack of autonomy of crime laboratories;
- the absence of rigorous, *mandatory* certification requirements for practitioners;
- the absence of uniform, *mandatory* accreditation programs for laboratories;
- the failure to adhere to robust performance standards;

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- the failure of forensic experts to use standard terminology in reporting on and testifying about the results of forensic science investigations;
 - the lack of effective oversight; and
 - a gross shortage of adequate training and continuing education of practitioners.

These findings⁴ and the Committee's accompanying recommendations⁵ have been taken very seriously by those with an understanding and interest in forensic science. Just after our Report issued, Carol Henderson, who preceded Dr. Bohan as President of the American Academy of Forensic Sciences, said:

The report identified shortcomings in research, education, and standards of practice in the nation's crime labs. In-depth research and analysis of options leading to strategic policy and implementation plans is needed. . . . We have been presented with an opportunity to make forensic science serve justice even more reliably and effectively. This is the time to build better "forensic science."⁶

The overall reaction to the Report really has been extraordinary. And interest in the Report's findings and recommendations has not waned during the 14 months since the date of issuance. Why is that? Perhaps it is because no one has meaningfully refuted the Committee's finding that, "with 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."⁷

The good news is that important developments are now underway to help the forensic science community get its house in order.

- The Senate Judiciary Committee is pursuing hearings aimed at corrective legislation.
- The White House National Science and Technology Council has chartered a Subcommittee on Forensic Science to address problems identified in the Report.
- The National Institute of Justice, the research arm of the Department of Justice, has launched an effort to promote new research on forensic sciences, including a recent grant of \$866,764 to UCLA to conduct a comprehensive study of error rates in latent fingerprint evidence.⁸
- Last September, the American Academy of Forensic Sciences issued a press release saying: "after extensive consideration, discussion, and drafting, the Board [of AAFS] unanimously voted to support the recommendations of the NAS Report."⁹

- In March of this year, *Nature*, the prestigious international journal of science, endorsed the Committee's Report.¹⁰
- The Board of Directors of the American Statistical Association recently voted to endorse the recommendations of the Report, "recogniz[ing] the pivotal role of forensic science in our judicial system and cit[ing] the value of statistical methods and research to improve forensic methods."¹¹
- And there also have been countless media reports, articles, and conferences describing the problems that plague the forensic science community.

These developments are encouraging.

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From my vantage point, the response to the Report has been very positive and I have seen a ground swell of support in favor of major reforms to correct the ills of the forensic science community. I have encountered a few pockets of resistance, however, to what I believe are the rather obvious implications of the Committee's findings. I recently had an opportunity to read several briefs filed by various U.S. Attorneys' offices in which my name has been invoked in support of the Government's assertion that the Committee's findings should not be taken into account in judicial assessments of the admissibility of certain forensic evidence. One brief, for example, asserts:

[T]he NRC Forensic Science Report does not support the conclusion that fingerprint evidence is inadmissible under the *Frye* calculus. In fact, the Honorable Harry T. Edwards, Co-Chair for the NRC Forensic Science Report, has stated on the public record that the report is not intended to affect the admissibility of any forensic evidence.¹²

This is a blatant misstatement of the truth. I have never said that the Committee's Report is "not intended to affect the admissibility of forensic evidence," and I have never publicly addressed the "*Frye* calculus." To the degree that I have commented on the effect of the Report on admissibility determinations, I have said something quite close to the opposite of what these briefs assert.

What is true is that, in February 2009, when the Committee Report was released, I said that judges would continue to follow established law. The Committee's charge was not law reform and, to be circumspect, I did not offer my own views on that subject. But there is a critical difference between saying that judges will continue to apply existing legal standards, like the *Frye*¹³ analysis, and saying that the Report should have no effect on how judges apply those standards. I most certainly never said, or even suggested, that judges should not take into account the new information provided by the Report in assessing the validity and reliability of forensic evidence while making admissibility determinations. Claims to the contrary are without basis in fact and utterly absurd.

In the public statement that I made when the Report was issued, I said,

[T]he committee’s report does not mean to offer any judgments on any cases in the judicial system. The report does not assess past criminal convictions, nor does it speculate about pending or future cases. And the report offers no proposals for law reform. That was beyond our charge. Each case in the criminal justice system must be decided on the record before the court pursuant to the applicable law, controlling precedent, and governing rules of evidence. The question whether forensic evidence in a particular case is admissible under applicable law is not coterminous with the question whether there are studies confirming the scientific validity and reliability of a forensic science discipline.¹⁴

During the question and answer session that followed, I clarified that law reform was not part of the Committee’s charge, saying:

I think judges will continue to follow the law as it is. We’re not proposing law reform. Will there be law reform? We don’t know. Might some people propose it. I don’t know. Maybe. But there is no law reform proposal here; so judges will continue to do what they have been doing.¹⁵

In my testimony before the Senate Judiciary Committee in March 2009, I suggested – contrary to the mischaracterization of my position in the Government’s briefs – that “courts [would] take the findings of the committee regarding the scientific foundation of particular types of forensic science evidence into account when considering the admissibility of such evidence in a particular case.”¹⁶ As I explained to the Senate Committee, because the Report presents “findings about the current status of the scientific foundation of particular areas of forensic science,” it would be “no surprise if the report is cited authoritatively” by the courts in their assessment of particular cases.¹⁷

Why was that my prediction? Because it seemed quite obvious, at least to me, that if a particular forensic methodology or practice, once thought to be scientifically valid, has been revealed to lack validation or reliability, no prosecutor would offer evidence derived from that discipline without taking the new information into account and no judge would continue to admit such evidence without considering the new information regarding the scientific validity and reliability of its source. Nothing in *Frye*¹⁸ or *Daubert*¹⁹ commands unyielding adherence to past methodologies or practices once they are found wanting. As one state court in a *Frye* jurisdiction has aptly observed:

Science moves inexorably forward and hypotheses or methodologies once considered sacrosanct are modified or discarded. The judicial system, with its search for the closest approximation to the “truth,” must accommodate this ever-changing scientific landscape.²⁰

The Supreme Court made the same point in *Daubert* when it reminded us that “scientific conclusions are subject to perpetual revision.”²¹ I really do not understand how any jurist could reasonably think otherwise.

If courts blindly follow precedent that rests on unfounded scientific premises, this will lead to unjust results. Nothing in established law compels this course. So when the Report was released and I said that judges must continue to follow the law, I did not mean to suggest that judges would apply existing law without taking into account the findings in the Report that raise serious doubts about the validity and reliability of certain forensic disciplines and practices. Our system of justice demands more than this. What I expected is that judges would, within the existing evidentiary regimes, consider the Report's findings and recommendations.

What I believe is a reasonable and balanced account of the Committee's 2009 Report is found in a judgment recently issued by Judge Nancy Gertner in the United States District Court for the District of Massachusetts. Here is what she said:

While the [NAS] report does not speak to admissibility or inadmissibility in a given case, it raised profound questions that need to be carefully examined in every case prior to trial: “(1) the extent to which a particular forensic discipline is founded on a reliable scientific methodology that gives it the capacity to accurately analyze evidence and report findings and (2) the extent to which practitioners in a particular forensic discipline rely on human interpretation that could be tainted by error, the threat of bias, or the absence of sound operational procedures and robust performance standards.”

The Report noted that these fundamental questions have not been “satisfactorily dealt with in judicial decisions pertaining to the admissibility” of evidence. . . . In the past, the admissibility of this kind of evidence was effectively presumed, largely because of its pedigree – the fact that it had been admitted for decades. As such, counsel rarely challenged it, and if it were challenged, it was rarely excluded or limited.

The NAS report suggests a different calculus – that admissibility of such evidence ought not to be presumed; that it has to be carefully examined in each case, and tested in the light of the NAS concerns, the concerns of *Daubert/Kumho* case law, and Rule 702 of the Federal Rules of Evidence.²²

As Judge Gertner recognizes, new and better scientific data helps judges assess the reliability of forensic evidence to ensure that it serves, rather than defeats, the ends of justice. The information amassed by the Committee regarding hair comparison provides a noteworthy example of such new data. The Committee's Report states that “testimony linking microscopic hair analysis with particular defendants is highly unreliable.”²³ We now know that hair comparisons without mitochondrial DNA are highly questionable. A number of people whose convictions were based in part on faulty hair comparisons have been exonerated by DNA testing. An FBI publication reviewed by the Committee stated that subsequent DNA testing proved that hairs did not match in 11% of cases in which hair examiners previously declared two hairs to be “similar.”²⁴ Surely this new data on hair comparisons would be highly relevant under existing law in any judge's assessment of the admissibility of such evidence.

Bullet lead comparisons offers another example. Comparative bullet lead analysis, or CBLA, compares trace chemicals found in bullets at crime scenes with ammunition found in the possession of a suspect. This forensic technique was used for many years, until a retired FBI examiner began questioning the procedure.²⁵ The FBI consequently asked the National Academy of Sciences to review the technique. The NAS report, published in 2004, severely undercut CBLA.²⁶ The report found that the available data did not support any expert claim that a crime bullet came from a particular box of ammunition. In the wake of the National Academy's report, several state courts excluded CBLA evidence, finding that, because the forensic technique was based on erroneous scientific foundations, CBLA no longer satisfied the requirements of *Frye* for the admissibility of scientific expert testimony.²⁷

The point here is simple: *When scientific methodologies once considered sacrosanct are modified or discredited, the judicial system must accommodate the changed scientific landscape.*

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Let me turn now to the Report itself and highlight a few points made there to underscore the problems to which I have alluded.

First: Science. I think that the most important part of our Committee's Report is its call for real science to support the forensic disciplines. Simply increasing the number of staff within existing crime laboratories will not solve the principal problems of the forensic science community. What is needed is interdisciplinary, peer-reviewed, scientific research to determine the validity and reliability of existing disciplines and to achieve technological advancements. What we are talking about is adding a culture of "science" to the forensic science community. From what I have seen, we have a long way to go.

Second: Subjective Interpretations, Exaggerated Testimony, and a Paucity of Research. Often in criminal prosecutions and civil litigation, forensic evidence is offered to support a claim that an evidentiary specimen is a "match" to a particular individual or other source. But, as I have already said, with 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. Yet, for years, the courts have been led to believe that disciplines such as fingerprinting stand on par with nuclear DNA analysis. Indeed, a noted FBI fingerprint expert had testified in federal court that "the error rate for fingerprint comparison is essentially zero," and his testimony was credited with approval in later cases.²⁸

The Committee's Report rejects as scientifically implausible any claims that fingerprint analyses have "zero error rates."²⁹ We also found a dearth of scientific research to establish limits of performance, to ascertain quantifiable measures of uncertainty, and to address the impact of the sources of variability and potential bias in fingerprint examinations and in other forensic disciplines that rely on subjective assessments of matching characteristics.

One of the most telling moments for me during the Committee's hearings occurred when I heard the testimony of an expert fingerprint analyst who is a member of the Scientific Working Group on Friction Ridge Analysis, Study, and Technology. At one point in his testimony, he was asked what was the scientific basis for determining a "match" in prints in situations when the examiner has only a partial or smudged print. The expert did not hesitate in conceding that the "research has yet to be done." Last April at a major conference on forensic science at Arizona State University,³⁰ the Director of the National Institute of Justice was asked why NIJ had not funded any serious studies to determine the validity of fingerprint analyses. He acknowledged the dearth of research and urged everyone to be patient as NIJ tried to develop some "foundational studies." Eight months later, UCLA was awarded almost \$900,000 to conduct a comprehensive study of error rates in latent fingerprint evidence.³¹

The Committee found that, as is too often the case, when there is no good scientific basis to support a forensic discipline and experts cannot quantify certainty and uncertainty, the testimony that they offer is not infrequently exaggerated and sometimes even fabricated. Not too long ago, a story in the *San Jose Mercury* reported that, for years, San Jose police never told anyone when fingerprint technicians could not agree on whether a suspect's prints matched those taken from the crime scene.³² Instead, the police department's Central Identification Unit generated a report indicating that two technicians agreed that the suspect's prints had been positively identified, while omitting that a third technician dissented. Stories like this are appalling and disheartening, to say the least.

Another serious concern is contextual bias. In one study, for example, fingerprint examiners were asked to analyze fingerprints that, unknown to them, they had analyzed previously in their careers. Contextual biasing was introduced – that is, examiners were told that the "suspect confessed to the crime" or the "suspect was in police custody at the time of the crime." In twenty-five percent of the examinations that included contextual manipulation, the examiners reached conclusions that were different from the results they had previously reached.³³

Third: Inconsistent Practices in Crime Laboratories. In recent years, the integrity of crime laboratories has been called into question, with some heavily publicized cases highlighting (1) unqualified practitioners, (2) sometimes lax standards that have generated questionable or fraudulent evidence, and (3) the absence of quality control measures to detect questionable evidence. In one notorious case, the Texas Department of Public Safety confirmed serious inadequacies in the procedures used by the Houston crime laboratory, including routine failure to run essential scientific controls, to take adequate measures to prevent contamination of samples, to adequately document work performed and results obtained, and to follow correct procedures for computing statistical frequencies.³⁴ There have been a number of other dismaying reports about crime labs – most recently, the San Francisco drug lab³⁵ – that suffer from problems like those uncovered in Houston.

Fourth: Scientific Working Groups or SWGs. There are a number of scientific working groups, or SWGs, for forensic disciplines. For example, the SWGDRUG group recommends minimum standards for the forensic examination of seized drugs. The chair of SWGDRUG testified

before the Committee and explained how his SWG group operates. His answers to my questions indicated that, as a general matter, SWGs are of questionable value. Why? Because:

- SWG committees meet irregularly and have no clear or regular sources of funding.
- There are no clear standards in place to determine who gains membership on SWG committees.
- Neither SWGs nor their recommendations are mandated by any federal or state law or regulation.
- SWG recommendations are not enforceable.
- A number of SWG guidelines are too general and vague to be of any great practical use.
- SWG committees have no way of knowing whether state or local agencies even endorse the standards.
- Complaints are not filed when a practitioner violates an SWG standard.
- SWG committees do not attempt to measure the impact of their standards by formal study or survey.

In other words, there is nothing to indicate that the standards are routinely followed and enforced in a way to ensure best practices in the forensic science community.

Problems such as these merely highlight some glaring weaknesses in the forensic science community. The Report illuminates many more problems.

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The work of the forensic science community is critically important in our system of criminal justice. Forensic science experts and evidence are routinely used in the service of the criminal justice system. So it matters a great deal whether an expert is qualified to testify about forensic evidence and whether the evidence is sufficiently reliable to merit a fact finder's reliance on the truth that it purports to support.

In June of last year, the Supreme Court issued a judgment in *Melendez-Diaz v. Massachusetts*, a case involving a drug conviction in a Massachusetts state court.³⁶ The prosecutor in *Melendez-Diaz* introduced written certificates prepared by state laboratory analysts confirming that material seized by police and connected to the defendant was cocaine of a certain quantity. The crime lab analysts were not called to testify. The defendant claimed that the admission of the lab

certificates violated his Sixth Amendment right to confront the analysts who prepared the certificates. The Supreme Court ruled that, because the laboratory certificates were testimonial statements against the defendant, the defendant was entitled to confront the persons giving this testimony at trial.³⁷

This holding would have been enough to decide the case. However, during the arguments before the Supreme Court, the state had urged that laboratory analysts should not be made to testify, because forensic science evidence is the product ““of neutral, scientific testing.””³⁸ The Court went out of its way to reject this claim. The Court first noted that “[s]erious deficiencies have been found in the forensic evidence used in criminal trials.”³⁹ The Court then pointed out, by way of example, that:

The affidavits submitted by the [forensic] analysts [in the *Melendez-Diaz* case] contained only the bare-bones statement that “[t]he substance was found to contain: Cocaine.” At the time of trial, [the defendant] did not know what tests the analysts performed, whether those tests were routine, and whether interpreting their results required the exercise of judgment or the use of skills that the analysts may not have possessed.⁴⁰

Finally, The Court cited the finding from our Committee’s Report that:

The forensic science system, encompassing both research and practice, has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country.⁴¹

The Court’s statements in *Melendez-Diaz* are hardly laudatory of our existing forensic science system. It is also particularly noteworthy that the Supreme Court did not say that the availability of cross-examination in criminal trials will cure the ills of the forensic science community. Rather, what the Court said was that “[c]onfrontation is one means of assuring accurate forensic analysis.”⁴² In other words, cross-examination is a minimal constitutional safeguard that helps to test the reliability of forensic evidence that is offered in criminal trials. But it is far from adequate.

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There is an inherent dilemma in the Committee’s Report, one that we really do not address. Better science to determine the validity and reliability of forensic disciplines will take time. So there is a question as to how we can ensure better practices before we know whether a particular forensic discipline is founded on good science. For example, if we cannot quantify measures of uncertainty and we do not know sources of variability, how can we establish best practices? The UCLA study on fingerprint error rates hopefully will address some of these issues, at least with respect to that discipline. To my knowledge, no one seriously doubts that we should require mandatory certification of practitioners and mandatory accreditation of labs, but we have yet to decide by whom and on what terms.

As scientific studies are being conducted, there are three recommendations relating to forensic *practice* that I am sure will have salutary effects, even in the short term. The first is the Committee's recommendation requiring forensic experts to use standardized, honest, and clear terminology in reporting on and testifying about the results of forensic science investigations.⁴³ When their testimony is admitted in court, forensic experts should offer nothing more than what they actually know, leaving it to the jury or judge to weigh the evidence offered against the other evidence that is presented in a case. My concern is that some forensic practitioners may not know what they do not know about the limits of their discipline. They will have to be taught this so that they can be appropriately circumspect in their testimony.

Relatedly, the Committee also recommended the adoption of model laboratory reports with specifications regarding the minimum information that should be included in a lab report.⁴⁴ This recommendation is intended to facilitate the ability of lawyers, judges, and jurors to better comprehend the limits of forensic evidence that is offered in a case. Obviously, this is crucially important.

Lastly, the Committee recommended the removal of all public forensic laboratories and facilities from the administrative control of law enforcement agencies or prosecutors' offices.⁴⁵ As the Report makes clear, forensic scientists should function independently of law enforcement administrators. Here is what the Supreme Court had to say about this issue in the *Melendez-Diaz* decision:

According to a recent study conducted under the auspices of the National Academy of Sciences, “[t]he majority of [laboratories producing forensic evidence] are administered by law enforcement agencies . . . where the laboratory administrator reports to the head of the agency.” . . . And “[b]ecause forensic scientists often are driven in their work by a need to answer a particular question related to the issues of a particular case, they sometimes face pressure to sacrifice appropriate methodology for the sake of expediency.” A forensic analyst responding to a request from a law enforcement official may feel pressure – or have an incentive – to alter the evidence in a manner favorable to the prosecution.⁴⁶

The Committee believed that this is not as it ought to be.

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As we continue to face terrorist threats – like the recent attempted bombing in Times Square, New York – we are reminded of our need for reliable forensic methods and practices, and also skilled forensic practitioners. Every forensic laboratory in the United States – not just the FBI Laboratory – should use appropriate protocols and employ highly skilled practitioners. Right now, however, this is merely an aspiration, not a reality. We have every incentive to do all that we can to help the forensic science community get its house in order.

Let me be very clear in what I am saying. I do not mean to suggest that no forensic discipline has value. Rather, as the Committee’s Report makes clear, because of a dearth of scientific data, we do not know how to assess the value of many forensic disciplines because we cannot measure their limits. For example, all fingerprint samples are not equally good, and not every forensic practitioner is equally good in understanding and explaining the differences. Hopefully, better scientific research, mandatory accreditation and certification, uniform standards, better practices, and national oversight will cure issues of this sort. For now, however, it is the responsibility of the legal profession to protect the integrity of the criminal justice system.

Professor Jennifer L. Mnookin, who will head the study on error rates in latent fingerprint evidence, wrote a telling piece for the *Los Angeles Times* just after the NAS Report was released. Her words are worthy of our consideration:

Science deals in probabilities, not certainty. The only forensic science that makes regular use of formal probabilities is DNA profiling, in which experts testify to the probability of a match. None of the rest of the traditional pattern-identification sciences – such as fingerprinting, ballistics, fiber and handwriting analysis – currently has the necessary statistical foundation to establish accurate probabilities. Yet, instead of acknowledging their imperfect knowledge, fingerprint experts, for example, routinely testify that they can identify a specific person’s prints to the exclusion of all other people in the world with 100% certainty. . . .

The courts have almost entirely turned a deaf ear to these [problems], essentially giving forensic science and its practices a free pass, simply because they’ve been part of the judicial system for so long. Meanwhile, scandals continue to come to light across the nation involving error and even fraud in labs.

The findings in the National Academy of Sciences report should spur judges to require higher standards. At a bare minimum, judges should immediately prohibit experts from testifying to impossibilities such as “an error rate of zero” or asserting that they are capable of making 100% certain identifications. . . .

We want and need forensic science in our legal system, but we have to be able to trust it. . . . [W]hen forensic science rests on an appropriate scientific foundation, it will be far more deserving of our confidence. Our system of justice demands no less.⁴⁷

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I hope that the members of the bench and bar heed the concerns raised by Professor Mnookin. She does not subscribe to the view that all forensic science disciplines and practitioners are unworthy or bad; nor do I. Moreover, we agree that the adversarial process relating to the admission and exclusion of scientific evidence is not always well suited to the task of finding “scientific truth.” However, we also agree that there is still much more that can be done by members

of the legal profession, bench and bar, within the existing legal framework, to ensure that forensic evidence is properly assessed and admitted only when it will serve the ends of justice. If we insist on valid and reliable forensic methodologies and practices, and qualified practitioners, change will happen. And our systems of law enforcement and criminal justice will be the better for it.

1. COMMITTEE ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCE COMMUNITY, NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* (2009) [hereinafter NAS Report].
2. Kenneth E. Melson, *President's Editorial: The Journey to Justice*, 48 J. OF FORENSIC SCI. 705, 707 (2003).
3. See Thomas L. Bohan, *President's Editorial: Strengthening Forensic Science: A Way Station on the Journey to Justice*, 55 J. OF FORENSIC SCI. 5, 5-7 (2010).
4. See NAS report, *supra* note 1, at 1-33.
5. See *id.* at 19-33.
6. *Strengthening Forensic Science in the United States: the Role of the National Institute of Standards and Technology: Hearing Before the H. Subcomm. on Technology & Innovation*, 111th Cong. (2009) (statement of Carol E. Henderson, Professor, Stetson University College of Law).
7. NAS Report, *supra* note 1, at 7.
8. See News Release, Lauri Gavel, UCLA Newsroom, UCLA Professors Awarded Major Federal Grant to Study Error Rates in Fingerprint Evidence (Feb. 11, 2010), available at <http://newsroom.ucla.edu/portal/ucla/two-ucla-professors-awarded-national-153642.aspx>.
9. Press Release, American Academy of Forensic Sciences, The American Academy of Forensic Sciences Approves Position Statement in Response to the National Academy of Sciences' "Forensic Needs" Report (Sept. 4, 2009) (on file with author), available at http://www.aafs.org/pdf/AAFS_Position_Statement_for_Press_Distribution_090409.pdf.
10. *Science in Court*, 464 NATURE 325, 325 (2010).
11. Press Release, American Statistical Association, American Statistical Association Supports Major Reforms of the Nation's Forensic Science System (May 3, 2010) (on file with author), available at <http://www.amstat.org/about/pressreleases/ASASupportsMajorReformsOfForensicScienceSystem.pdf>.
12. Government's Opposition to Defendant's Motion to Exclude Expert Testimony Concerning Latent Fingerprint Evidence at 3, *United States of America v. Titus Faison*, No. 2008-CF2-16636 (D.C. Super. Ct. Feb. 19, 2010).
13. See *Frye v. United States*, 54 App. D.C. 46, 293 F. 1013 (1923).
14. Opening Statement, The Honorable Harry T. Edwards, Co-Chair, Forensic Science Committee (Feb. 18, 2009), available at <http://www.nationalacademies.org/includes/OSedwards.pdf>.
15. The National Academies, 'Badly Fragmented' Forensic Science System Needs Overhaul, Podcast of Press Conference (Feb. 18, 2009), <http://nationalacademies.org/morenews/20090218.html>.
16. *The Need to Strengthen Forensic Science in the United States: The National Academy of Science's Report on a Path Forward, Hearing Before the S. Judiciary Comm.*, 111th Cong. (2009) (statement of Hon. Harry T. Edwards, C.J. Emeritus, D.C. Circuit, and Co-Chair, Comm. on Identifying the Needs of the Forensic Science Community).
17. *Id.*
18. *Frye*, 293 F. at 1013-14.

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19. *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).
 20. *State v. Behn*, 868 A.2d 329, 343 (N.J. Super. Ct. App. Div. 2005).
 21. *Daubert*, 509 U.S. at 597.
 22. *United States v. Oliveira*, Crim. No. 08-10104 (D. Mass. Mar. 8, 2010) (procedural order on trace evidence) (quoting NAS Report) (internal citations omitted).
 23. NAS Report, *supra* note 1, at 161.
 24. *See id.* at 47 (citing Max M. Houck & Bruce Budowle, *Correlation of Microscopic and Mitochondrial DNA Hair Comparisons*, 47 J. OF FORENSIC SCI. 964, 964-67 (2002)).
 25. *See* Paul C. Giannelli, *Daubert and Forensic Science: The Pitfalls of Law Enforcement Control of Scientific Research* 35-36 (Case Research Paper Series in Legal Studies, Working Paper No. 2010-6, 2010) (describing retired FBI examiner William Tobin).
 26. COMMITTEE ON SCIENTIFIC ASSESSMENT OF BULLET LEAD ELEMENTAL COMPOSITION COMPARISON, NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, *FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE* (2004).
 27. *See Clemons v. State*, 896 A.2d 1059, 1078 (Md. 2006); *State v. Behn*, 868 A.2d 329, 344 (N.J. Super. Ct. App. Div. 2005); *see also Blackwell v. Wyeth*, 971 A.2d 235, 243 (Md. 2009) (describing *Clemons* as a case where the court “consider[ed] whether a theory, which had been accepted in the scientific and legal communities, continue[d] to meet the [Frye] standard”). CBLA evidence has also been excluded in *Daubert* jurisdictions in the wake of the 2004 report and other new studies criticizing CBLA. *See Ragland v. Commonwealth*, 191 S.W. 3d 569, 578-80 (Ky. 2006).
 28. *See, e.g., United States v. John*, 597 F.3d 263, 275 & n.38 (5th Cir. 2010); *United States v. Crisp*, 324 F.3d 261, 269 (4th Cir. 2003); *State v. Escobido-Ortiz*, 126 P.3d 402, 412 (Haw. Ct. App. 2005). These cases rely on expert testimony described in *United States v. Havvard*, 260 F.3d 597, 599 (7th Cir. 2001). In overstating the expert’s testimony in *Havvard*, they give rise to the misconception that the forensic discipline of fingerprinting is infallible. *See* NAS Report, *supra* note 1, at 103-04.
 29. *See* NAS Report, *supra* note 1, at 142.
 30. Papers from the Arizona State University conference are published at 50 JURIMETRICS J. 1, 1-110 (2009).
 31. *See supra* note 8 and accompanying text.
 32. *See* Tracey Kaplan, *Fingerprint-Match Doubts: S.J. Police Reverse Policy Cops Had Withheld Dissenting Views*, SAN JOSE MERCURY NEWS, Mar. 7, 2009, at 1A.
 33. *See* NAS Report, *supra* note 1, at 123 (citing Itiel E. Dror & David Charlton, *Why Experts Make Errors*, 56 J. OF FORENSIC IDENTIFICATION 600, 600-16 (2006)).
 34. *See* NAS Report, *supra* note 1, at 44-45, 193.
 35. *See, e.g.,* Jaxon Van Derbeken, *Prosecutor: SFPD Ignored Tech’s Unreliability*, SAN FRANCISCO CHRON., Apr. 15, 2010, at A-1.
 36. 129 S. Ct. 2527 (2009).

37. *Id.* at 2532.

38. *Id.* at 2536 (quoting Brief for Respondent at 29).

39. *Id.* at 2537.

40. *Id.* (internal citation omitted).

41. *Id.* (citing COMMITTEE ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIENCE COMMUNITY, NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD P-1 (2009) (Prepublication Copy Feb. 2009) [hereinafter NAS Report Prepublication Copy]).

42. *Id.* at 2536 (emphasis added).

43. *See* NAS Report, *supra* note 1, at 21-22 (discussing Recommendation 2).

44. *See id.*

45. *See id.* at 23-24 (discussing Recommendation 4).

46. *Melendez-Diaz*, 129 S. Ct. at 2536 (quoting NAS Report Prepublication Copy at 6-1, S-17).

47. Jennifer L. Mnookin, Op-Ed., *Clueless ‘science,’* L.A. TIMES, Feb. 19, 2009, at A21.