COMMENTARY ON *THE NEED FOR A RESEARCH CULTURE IN THE FORENSIC SCIENCES*

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A number of articles written over the past two years have addressed the need to strengthen forensic science, not only in the United States but internationally. Most have focused on the National Research Council of the National Academy of Sciences' (NAS) February 2009 report entitled Strengthening Forensic Science in the United States: A Path Forward. *In looking for solutions to problems we all know existed pre-2009, most point fingers instead of looking inward. Finally, after hundreds of pages of "we know how to solve this problem" monologues, a learned treatise appears that goes beyond the NAS Report in addressing the need to strengthen forensic science.*

The Need for a Research Culture in the Forensic Sciences *by Jennifer Mnookin et al. is one of the first publications to minimize the blame game that has become so pervasive in evaluating forensic science. This article successfully provides a root cause assessment of the salient issues we face today and contains solutions that those who care about forensic science should consider.*

INTRODUCTION 782
I. SCANDALS INVOLVING CRIME LABORATORIES 782
A. The Brandon Mayfield Case 783
II. THE ERROR RATE 784
III. LIMITATIONS IN FORENSIC SCIENCE REPORT WRITING 785
IV. RESEARCH 786
CONCLUSION 787

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INTRODUCTION

There is a reality in the world of forensic science: What was good enough is no longer good enough. Some believe that the methodology isn't broken, so there is no need to fix it. Others view the National Academy of Sciences (NAS) Report as an authoritative text and quote chapter and verse in the process of discrediting almost everything related to specific forensic science disciplines. Those arguments aside, it is time to look at the evolution of forensic science and move forward. Those who truly care about the profession must build upon what is right about forensic science, while at the same time acknowledging that there are many issues that can no longer be ignored.

In this Commentary, I evaluate a number of the article's points, in some cases concurring and in others presenting another perspective.

I. SCANDALS INVOLVING CRIME LABORATORIES

The authors cite examples of serious concern in laboratories in Boston, Chicago, Detroit, Houston, Los Angeles, New York, North Carolina, Oklahoma, San Francisco, and West Virginia and the embarrassing revelations that have raised doubts about the trustworthiness and accuracy of some reported findings in a disturbing number of other laboratories.

There is no doubt that errors have occurred; however, in many of these purported scandals, the facts are distorted in newspaper articles. While the press may be effective at raising the level of awareness of problems in the forensic science community, too often, the press takes issues out of context when passing judgment on what is reported. In some cases, the so-called scandals were the result of one individual's malfeasance and ineptitude as opposed to a systemic problem. And in other cases, the charges stem from practices accepted many years ago, at the time the forensic science analysis was initially conducted. It is unfair to condemn a laboratory system in 2010 for practices that were in effect and accepted in the late 1980s or early 1990s, but that is precisely what is occurring in some instances cited above. With the instrumentation and microscopy available twenty to thirty years ago, comparisons of hair, soil, glass, and other kinds of trace evidence were conducted and documented. Caveated conclusions were, or should have been, reported. Blood and semen stains were analyzed to determine an ABO blood type, and later, enzyme systems were determined by protocols recognized as state of the art at the time. In the case of biological stains, their powers of discrimination did not approach the highly probabilistic individualization that DNA allows today. However, they were useful and served

as corroborating evidence. In many instances, these types of analysis were also used to exclude an individual as a possible perpetrator.

Forensic science laboratory practices have evolved and improved exponentially since accreditation became a pro-forma requirement for testifying in court. Accreditation does not guarantee an error-free laboratory; however, it is one important component of a solution to minimize inaccuracies. To describe laboratory systems as imploding based on reports in the media without at the same time citing reports from investigative bodies presents only one side. The stories from Oklahoma, San Francisco, and West Virginia are examples of one or two people placing a stain on an entire scientific community.

A. The Brandon Mayfield Case

In 2004, FBI examiners erroneously associated Brandon Mayfield with the Madrid train bombing through fingerprint evidence.[1] This case remains one of the most egregious examples of faulty forensic science over the past decade. Erroneous identification can never be justified or rationalized. The question is what happened, and what can be done to ensure that it never happens again? Was there a fault in the basic methodology used to make the identification, individualization, association, match, or whatever you choose to call it? Or were the individuals who made the call responsible?

The FBI examiners and the independent examiner hired by the defense all came to the same conclusion by evaluating the friction ridge pattern details on a scanned copy of the latent print from the bag containing the explosive device that was found on the train in Madrid. The original latent was later evaluated by another examiner in Europe using identical methodology: a friction ridge pattern detail evaluation. The method did not change; however, the examiners and the quality of the latent print did. The result was an identification of the correct individual associated with preparing and handling the explosive device. This correct identification information was later corroborated by other evidence in the investigation.

The issue here is not one of mitigating or justifying the misidentification in the Mayfield case but rather demonstrating that with the proper use of examination methods, friction ridge pattern associations can be powerful tools in criminal investigations. To suggest that all forensic science investigations involving friction ridge pattern identifications are flawed is as questionable as the counterargument.

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1. *See* OVERSIGHT & REVIEW DIV., U.S. DEP'T OF JUSTICE, A REVIEW OF THE FBI'S HANDLING OF THE BRANDON MAYFIELD CASE (2006).

The authors correctly assert that the International Association for Identification (IAI) has finally changed its position on probabilistic reporting in friction ridge pattern investigations. Without developing examination standards, defining methodologies, or establishing reporting thresholds, especially in the examination of partial latent prints, examiners must consider changing reporting protocols that refer to findings in absolute terms. This same principle applies to all pattern evidence associations, including firearms and toolmarks, questioned documents, and forensic odontology investigations, among others. In the hands of the qualified examiner who produces reviewable data or images, these techniques provide valuable information for ascertaining the truth in a criminal investigation.

Lest we forget the adversarial environment in the courtroom, the defense and prosecution also have a corresponding responsibility to question any forensic examiner who formulates a conclusion associated with any evaluation of physical evidence. In the absence of demonstrative evidence, the six most questionable words in a courtroom are: "Based on my training and experience . . . ." Admissibility of expert witness forensic science testimony (EWFST) should be challenged if there is a legal or scientific reason to question relevance and reliability. This article properly cites the correct bases for challenging the admissibility of EWFST (and it is not the NAS Report). State and federal rules of evidence as well as court decisions, including but certainly not limited to *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[2] *Frye v. United States*,[3] and *Kumho Tire Co. v. Carmichael*,[4] are the proper grounds for challenging admissibility.

The requirements for producing the experimental data that verify the methodology and empirical data or images that verify the conclusion are not negotiable.

II. THE ERROR RATE

The article refers to an ongoing discussion about measuring and reporting an error rate as a way to evaluate the validity of a forensic science method. There is a difference between arguing that a method is infallible, which is almost always erroneous, and quantifying an error rate, which requires elementary mathematics. In my opinion, there is little substance in a discussion of a generalized error rate as applied to any forensic science discipline (as opposed to whether there was error in a particular case). The question should not be

2. 509 U.S. 579 (1993).
3. 293 F. 1013 (D.C. Cir. 1923).
4. 526 U.S. 137 (1999).

whether an error could have occurred in a particular analysis, but rather whether an error in fact occurred in the analysis under discussion. As a number of the article's authors have rightfully pointed out in other discussions with me, discerning when and why errors occur is more important than attempting to quantify how often errors occur. There is also the question of whether quantifying an error rate will truly enhance any science.

III. LIMITATIONS IN FORENSIC SCIENCE REPORT WRITING

There is an interesting discussion in the article related to the "analysts' experience-based intuitive judgments about the correspondence sufficient to declare a match . . . ."[5] A number of issues in this discussion should be addressed. First, the term "match," which appears nine times in this article and also occurs in a number of reports across many forensic science disciplines, is not clearly defined. "Match" does not always mean that two samples originate from the same source. It can also suggest that two items have the same physical characteristics. Yet in many reports and commentaries describing forensic science techniques, the term appears repeatedly and eventually takes on a life of its own.

The authors are correct when they discuss the salience of terminology and the corresponding connotation of terms that appear in forensic science reports. The words used to formulate conclusions in forensic science reports or testimony are extremely important. We address problems and evaluate solutions by the terminology we choose to define those issues. In many forensic science reporting documents, the terminology lacks substance and form and must be clarified. There are still too many instances where the originator of a forensic science report will use verbiage that, while correctly demonstrating similarities and even possible associations, does not go far enough in making the reader aware of alternate explanations. There are instances when (within the limits of scientific certainty as it exists today) there might not be alternate explanations. This is an example of what direct and cross examination in the courtroom should address. There is also a presumption here that the attorneys on either side have enough knowledge to effectively clarify not only what is being testified to, but as importantly, what it means.

Differing opinions exist on acceptable forensic science reporting and testimony. It is not necessary or perhaps even scientifically defensible to testify to absolutes in the results of examinations. Explaining what the author of a report sees through the comparison microscope, on the printout from the scientific

5. Jennifer L. Mnookin et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. REV. 725, 738 (2011).

instrument, or under the magnifier, and then explaining its significance without embellishment is probably an acceptable way to approach report writing and ensuing testimony. If individualization is going to be assessed, a statistical framework that allows quantification of statements regarding association should be required before the issue of individualization can be intelligently discussed. In addition, forensic science must determine if individualization is necessary or even possible. As David H. Kaye has asked:[6] Does the claim of individualization exceed the power of the science? Perhaps, as suggested in this article, the examiner should testify to her findings and include a caveat. Examples of qualified testimony from recent court cases include the following: a reasonable degree of scientific certainty, a reasonable degree of certainty within the discipline, and more likely than not. The standard in criminal cases is reasonable doubt. The authors are absolutely correct: Why should the standards for reporting and testifying be any different? All forensic science disciplines must standardize and clarify the terminology used in reporting and testifying about conclusions and must provide more information related to the sources of data used in formulating these conclusions.

Another concept that the authors did not address but which must be stated is that forensic science does not convict or acquit. That decision remains the responsibility of the judge or the jury. No matter how valid, invalid, or unvalidated the testimony of the forensic examiner may appear, the prosecutor and the defense attorney have a responsibility to ensure that the lines of demarcation remain intact when expert witnesses on either side cross the line from valid and reliable testimony into speculation that is not substantiated by the data.

IV. RESEARCH

The authors ask, "Who can take a stand against research?" The question also arises as it relates to a research culture, which is the article's focal point. The analogies to medicine are applicable: Proper training in medicine as a physician is usually a requirement for conducting medical research, but there is no need to turn every practicing forensic scientist into a researcher. However, there are two important requirements in this discussion that are often minimized in the literature but that the authors address, at least indirectly: Applied research must include those who have lived the challenges of the forensic science discipline that is being studied. Leaving the practitioner out of the process cannot be justified. To provide an answer when there is no understanding of the question is

6. David H. Kaye, Impression and Pattern Evidence Seminar: *The Black Swan Club* (Aug. 3, 2010).

less than ideal. The second requirement is one that the authors have not addressed vigorously enough: The research must be directed at solving a specific problem. Theoretical research without applicability in the real world is a waste of time, talent, and resources. Think problem-solving.

The authors are absolutely correct when they say experience alone is a problematic basis for making universalistic claims like individualization. Unvalidated or invalid methods remain undefined. While there is disagreement on what does qualify as validation methodology, casework does not. There are, however, methods in use in many laboratories around the world that produce valid results even if validation data cannot be produced. How does one address the fact that no two fingers have ever been shown to have the same full friction ridge patterns? The question is how to determine what constitutes enough similarity in friction ridge pattern characteristics to draw a conclusion on individualization. No two projectiles fired from two different weapons have ever been shown to have the same visible class and individual characteristics. Mass spectroscopy has been used for decades to identify some controlled substances to the exclusion of other drugs because of the uniqueness of the resulting analytical data. The chemical structure for the cocaine molecule is unique, and the manner in which the cocaine molecule undergoes fragmentation (breaks apart) is also unique. In other words, no substance other than the cocaine molecule has ever been shown to have a fragmentation pattern mass spectrum associated with a traceable cocaine standard. Philosophical arguments aside, the reality of individualization in properly conducted forensic identifications is credible. The question is how to prove individualizations or identifications absolutely and whether such proof is even necessary. Research may be able to answer these questions. The scientific community should at least make an attempt.

CONCLUSION

In this article, I have finally discovered a treatise that, for the most part, fairly and impartially addresses the state of forensic science. While I do not agree with all of the suggestions in this article, I acknowledge that contained therein are ideas and concepts worth discussing, which are presented without a preexisting agenda. I am also struck by the fact that, unlike the committee that prepared the NAS Report, the diverse group of authors presents an impartial cross-sectional perspective on how to strengthen forensic science. The authors of this article are more intent on strengthening forensic science than providing another indictment of the field. This article strikes just the right balance of presenting "the good" with the "we must do better."