



# THE BLAME GAME HAS RUN ITS COURSE

## STRENGTHENING FORENSIC SCIENCE INVESTIGATION

BY JOSEPH P. BONO

**T**his year, the American Academy of Forensic Sciences (AAFS) annual meeting was themed “Relevant, Reliable, and Valid Forensic Science: Eleven Sections — One Academy.” The focus of this year’s theme was influenced by an occurrence in September 2009 during a graduate class I was teaching at Indiana University-Purdue University Indianapolis. A student informed me that her father had read an article in a magazine that dealt with “popular mechanics.” The magazine included an article that contained what I considered to be some questionable evaluations of forensic science. The student’s father asked why she would want to pursue a career in a “shaky,” “weak,” or “misleading” science. Driving home that evening, I decided that during my year of service to the membership of the Academy, I would make advocacy and promotion of what is right about the forensic sciences in the AAFS the focus of the coming year.

At the same time, I was determined that I would be the first to say “stop” when faulty forensic science was brought to my attention. I’ve done so in the past and I wasn’t about to change my approach to challenging those who claim, “I’m right because I’ve been doing this for 30 years.” Being from Missouri, I’ve always said, “Show Me (the data).”

## Strengthening Forensic Science

The National Research Council of the National Academies report, “Strengthening Forensic Science in the United States: A Path Forward” (NAS report), was issued in February 2009. The report discusses long overdue constructive recommendations for improvements in the forensic sciences. However, even in the absence of the report, many of us who had been in the forensic sciences for years knew what the challenges were and had been advocating improvements for years. That document reinforced our conviction that we had a lot of work ahead of us in strengthening our profession. In fact, there were few recommendations in that report that surprised us. What did surprise many of my colleagues was the manner in which the recommendations were taken out of context and used as an indictment of forensic science, as opposed to an opportunity to identify those areas where we needed to move forward with enhancements. At the same time, “good forensic science” was held hostage to “best forensic science.” The perfect world viewed by some became the adversary of the better world of forensic science that we knew could be achieved through consensus building. The goal here was always to find the best possible solutions that we could live with, as opposed to finding the perfect solutions that were not workable in a profession wrought with diverse opinions.

The first and most important word that appears in the title and throughout the NAS report is “strengthening.” From the medical profession to the courts to our education system, every profession can and must be continuously “strengthened.” Every day, forensic scientists in laboratories and educators in forensic science programs are conducting research to strengthen the diverse scientific theories in forensic disciplines. This work will continue long after a consensus is reached on how to address the immediate challenges at hand as documented in the report.

Policy makers should consider some of the recommendations included in the report as soon as possible. For the record, I accept the goal of the report to strengthen forensic science; I do not accept the insistence of some related to acknowledging the differences between a “recommendation” for problem solving and what they view as a “requirement” for “doing it their way.” No one has a monopoly on the truth.

Much work is required in compiling the existing research and methodologies, especially in the “impression evidence” sciences to document the empirical bases of these disciplines. The literature contains data from many scientific studies in the areas of friction ridge pattern identifications (including fingerprint studies), firearm and toolmark identifications, handwriting in questioned document examinations, and forensic odontology examinations. The challenge for forensic scientists includes compiling the literature references and conducting more targeted research into using these methods to “individualize” evidence. Individualization/association is a process wherein an examiner identifies the source of evidence (for example, identifying a fingerprint as having come from one person or identifying a bullet as having come from one weapon) to the exclusion of all others. Statistical probabilities in individualiza-

tion using empirical data should be pursued in this research. In many instances, the individual characteristics can be identified; however, the question of “thresholds” (how much is required in classifying and categorizing individual characteristics) remains to be addressed. One interesting question that must be and has been considered is this: “Is there a requirement to individualize pattern evidence or is a demonstration of ‘characteristics’ with a probabilistic associative statement enough?” After all, the requirement of the courts in criminal cases is “beyond a reasonable doubt,” not “absolute certainty.”

Forensic science has improved dramatically (as have medicine, engineering, physics, and biology) over the past 15 to 20 years. The development of DNA protocols have provided the most important scientific data to move forward in formulating statements related to statistical probabilities for associating evidence to a crime scene through population studies. With today’s technology, it is possible to determine statistical probabilities based on population studies for identifying the source of a biological fluid. There have also been quantum leaps forward in the areas of forensic pathology, trace evidence examinations, drug chemistry, arson and explosive identifications, and digital and multimedia examinations. All these scientific advances can be attributed to dedicated forensic scientists and educators who recognize their responsibilities to the justice system, in both criminal and civil litigation. Their goal has been to get it right.

The evolution and conformance to standards formulated by the scientific working groups (SWGs) in most forensic disciplines demonstrate the proactive approach to developing validated methods that have scientific bases. These enhancements occurred because practitioners and academics from within and outside the forensic science community worked together and were willing to listen to contrary viewpoints in the development of the best, validated scientific methods possible. Any time a professional endeavor is open for comment and constructive criticism, that endeavor has a maximized probability for success and acceptance. The development of new forensic science standards and the enhancement of existing standards with suggestions on ways to strengthen the methodologies will continue in the forensic sciences.

Since the issuance of the report, many forensic science stories in the media have been critical without affording those with differing opinions the opportunity for constructive comments. National Public Radio, CNN, and *The New Yorker* have reported on criminal cases where forensic science supposedly played a part in a conviction that was later questioned based on DNA studies unavailable at the time of the conviction. These media reports are important and are recognized as beneficial to understanding the role of forensic science in the criminal justice system. However, there are always two sides to every report, and the “other side” has not always been included in the presentations.

During the past year, I have read more and more purported “authoritative texts” and “learned treatises” from those who in my opinion were neither authorities nor learned in any science,

much less the forensic sciences. As leaders in the forensic science profession, the members of the forensic science community realize there are issues that must be addressed and strengthened. We approach problem solving by the way in which we label the problem/challenge. The words in the title of the report were “Strengthening Forensic Science.” I believe that objective and totally credible evaluations of forensic science are neither possible nor credible from those who have never entered a forensic science laboratory, never evaluated a forensic science exhibit, never read a literature reference in the discipline for which they proffered an opinion, or never been sworn as an expert witness or been exposed to forensic science testimony in a specific forensic science discipline. And all of this must be assessed before beginning a discussion of open-mindedness in these contrary evaluations.

These self-proclaimed experts were the same people disseminating their opinion cloaked in the mantle of fact. And those who disagreed with them were labeled as biased, especially if the forensic scientist had ever worked for a law enforcement-affiliated laboratory at any point during their careers. As someone who had been there and done that, this argument was simply not true. There is no culture of conviction in any reputable forensic science laboratory in 2010, regardless of how the organizational chart is constructed. The legal ramifications for such a mindset are daunting.

Though the stand-alone philosophical arguments using “unvalidated/invalidated” might sound worthy of discussion to some (I believe any issue where controversy exists should be discussed), most *Daubert* hearings involving expert witness testimony in the forensic sciences have demonstrated that facts and data are more powerful and convincing than the corresponding philosophical arguments. In most instances these arguments, which have no scientific basis, are actually becoming less convincing with each iteration. The words might change and become more inflammatory; the arguments never get stronger. I’ve heard the rationalization that *Daubert* hearings are not science based. Then why should these hearings even be held? My suggestion to those who use this argument is to read the appropriate jurisdictional rules of evidence — especially the sections (numbers change from jurisdiction to jurisdiction) related to evaluating relevant and reliable testimony — then take note of who by law is responsible for making the determination of whether the legal requirement for admissibility has been met. It’s the judge!

In public discussions with those holding divergent views, two factors have become readily apparent:

1. Those who argue at the highest decibel level are not always correct. In fact, there is usually an inverse exponential relationship between a rational thought process and the level at which the discourse occurs.
2. Contrary to what some may have us believe, there are differing viewpoints on the interpretation of data, usually at opposite ends of the same spectrum. And the truth is usually somewhere in the middle.

It is also difficult to attach credibility to any argument made by those who have no technical expertise or academic training in any scientific discipline where academic credentials do not exist.

The mistakes in the forensic sciences are most often the result of unqualified examiners formulating unsubstantiated conclusions in reports that have no basis in fact rather than in the methods those examiners are using to formulate these reports, which have no supporting data. In reviewing most of these mistakes, there have always been indicators that managers or case reviewers in the laboratory and the lawyers trying the case had responsibilities to note with the red pen, and in the latter instances, to cross examine the “so-called expert witness” in such a way as to expose the mistake.

Those who use a broad brushstroke approach to categorize all forensic science methods as lacking validity (except for DNA) have either not read the report correctly or are reading something into the report that is not documented. There are many who continue to demand validated methods without ever specifying the requirements for validated methods. Even among those who espouse this concept, there are disagreements.

Granted, mistakes had been made and perhaps were continuing in some laboratories. Strengthening, or, in some cases, censuring, is required among those examiners who lack the technical expertise or the moral turpitude required for conducting any kind of scientific analysis. But the vast majority of all legitimate forensic scientists are doing everything possible to ensure the best forensic science work product possible all the time. The continuing bombardment of criticism without specificity for improvements across the chasm of disagreement benefits no one.

A re-examination of some cases with associated physical evidence from the past disclosed that so-called forensic scientists may not have properly evaluated or reported the corresponding findings from the exhibits they were responsible for analyzing. In other examples, especially from many years past, physical evidence had been properly evaluated with existing techniques and conclusions were rendered with strong caveats to place conclusions in the proper context. The forensic science testimony may have encompassed 15 percent of the case, with the other 85 percent of the case involving eyewitness testimony or ineffective counsel. And yet, “faulty forensic science” remained the purported counterpoise on which the conviction was allegedly attributed. To criticize a conviction from the 1970s or early 1980s where blood typing data was introduced and was correct, but where the convicted party was later exonerated on DNA, as “faulty forensic science” makes no sense. A/B/O/AB blood typing was a limiting factor in the available serology technology in the 1970s. And those reports with this information should have always contained caveats with population statistics. The morphological characteristics of hair exhibits were compared and the corresponding results reported with caveats. The use of words “similar” and “consistent” were used because that was the accepted format. To criticize this format from many years ago is justified; but to ascribe a conviction to this

fact alone and label it as “faulty forensic science” is open for discussion. Forensic science did not and does not convict; that is the responsibility of judges and juries. And to continue pointing to examples from 10 to 25 years ago and attributing this alleged norm as the state of forensic science in 2011 is disingenuous at best.

One of our responsibilities as leaders in the forensic science profession is to question any “science” laboratory and analyst with facts, not innuendoes; with expertise, not exaggeration; and with reality, not rhetoric. There is a difference between the science being faulty and the analyst being incompetent or embellishing the truth. When the latter happens, there are mechanisms in place to remove those who are incompetent or unethical. Criminal charges related to perjury are also an option. However, painting so many forensic science methods that do indeed have empirical bases with the broad brush of “invalid” without specificity as to what constitutes “invalid” defies logic.

Here is a scenario I would like to pose to those who use this broad brush approach of invalid/unvalidated methods: A close friend is found murdered and, at the crime scene, two full friction ridge patterns (fingerprints) are found that are later associated with a person of interest (POI). The POI’s home is then searched and a .38-caliber revolver is found, test fired in the laboratory, and with current methodology, determined to be the “same” weapon used to fire the projectile taken from the body of the friend. Will those claims of “unvalidated/invalid” methods still exist in the minds of those who today challenge friction ridge pattern individualizations/associations and firearms examinations? To be clear, in an adversarial system, I would be the first to challenge the conclusions by evaluating the data/images; however, that is different from challenging the methods as unvalidated. In many “pattern evidence” sciences — and they are sciences — there may not be standardized quantitative thresholds for a conclusion. I believe that methods must be better defined in laboratory reports and that we must determine those thresholds for any individualization/association. For example, how much of the friction ridge pattern is required for an individualization of a fingerprint? One fact is known: there are no known examples in the Automated Fingerprint Identification System (AFIS) of replicative patterns of full “tap prints.” They are all different. This statement is based on empirical data, not on philosophical or legal arguments. Is a quarter-inch by quarter-inch print with distinguishable and demonstrative detail enough? How about a one-eighth-inch by one-eighth-inch print? Is there enough distinguishable detail here for an individualization/association? This is what I mean by establishing a threshold for individualizing/associating a fingerprint to a print on ten-print card. This is an example where research would serve forensic science well. I am pointing here to something specific in addressing what should be done. But to say that the methodology in friction ridge pattern individualization remains unvalidated is subject to discussion.

The reality is this: All forensic science disciplines must be strengthened. There are some issues that must be addressed

regarding how much data is required for some conclusions to be proffered in court as expert witness testimony. Again, what is the threshold that must be met for issuing a scientifically valid conclusion? Except for the rarest cases where “invalid” or “unvalidated” is used by the media, the 11 sections in our Academy do practice forensic science, which is relevant, reliable, and valid.

One other issue raised in questioning forensic scientists revolves around the term “error rate.” The term error rate seemed to take on a life of its own after the U.S. Supreme Court’s 1993 landmark decision in *Daubert v. Merrill Dow Pharmaceutical*. Examples of the questions to forensic scientists are phrased as such: What is the error rate in what you do? What is your error rate? What is the error rate in questioned document examinations?

These are questions without answers because no one has yet defined the term “error rate” as a measure of scientific validity when evaluating performance. A “rate” of any type requires a numerator and a denominator ( $A/B \times 100$ ). But, without defining the two variables in the equation (A and B), the term “error rate” has no scientific, mathematical, or statistical relevance. It is possible to determine a type of defined “error rate” in a specific proficiency test by dividing the number of unacceptable responses in that one test by the total number of test results. However, to then use this result to extrapolate to a conclusion related to what is happening across a forensic science discipline is statistically invalid. Instead of questioning a conclusion based on the absence of an error rate — which, by the way, is not a requirement of *Daubert* (read *Kuhmo Tire*) — a more valid approach to challenging the result of a forensic science examination would be to examine the data and the factors surrounding the collection of that data in a particular case.

### Bridging the Gap

Mistakes, intentional or otherwise, happen on a case-by-case basis. Why are forensic science commentators so reticent to address possible inconsistencies and solutions using a case-by-case approach during the course of a trial? The demonstrable approach of “blame them, not us” seems to be one where adversaries try to address every possible scenario in which something could go wrong simply to see what might stick. This applies to prosecutors, defense attorneys, and forensic scientists. There appears to be little in the way of self-criticism in the legal community to question its own responsibility to adequately discover and address mistakes or questionable conclusions and then provide a defense on a case-by-case basis *before* or *during* a trial. Why does the criticism of forensic science in a case usually surface after — in some cases, many years after — the conviction? Everyone who participates in the justice system has a responsibility to get it right before and during the trial. The retrospective approach is not sufficient.

In every case where a mistake was made by a forensic science laboratory or by an individual, there has always been an accompanying “smoking gun” that should have been acted upon by either the prosecution or the defense before or during the trial,

not left to be discovered years later. The responsibility of the prosecution is to elicit truthful, clear, concise, unambiguous, and convincing testimony that is presented to the jury without embellishment during closing arguments. At the same time, the responsibility of the defense is to ask the proper questions on cross-examination to instill reasonable doubt in the minds of the judge or jurors. (In a perfect world, this should be done without muddying the waters, but this is a discussion for another day.) If the data does not support the conclusions, the defense has an obligation to meticulously dissect the testimony to demonstrate the flaws that compromise the conclusion. Procrastinating on criticism of the presentation of evidence until the defendant has spent years in prison is not only questionable, but constitutes incompetence and overshadows the accusations of negligence being directed solely at forensic scientists.

It is easier to abrogate responsibility and minimize accountability in adequately defending or prosecuting an individual by a blanket condemnation of the forensic scientist. All forensic scientists have responsibilities and obligations to improve what they do and how they do it. Perhaps criticism should be muted by bridging the gap between scientists and lawyers. There is enough blame to go around. Those involved in this argument should perhaps look inward and not to someone else as a target. Assessing blame never solved any problem. Working together, forensic scientists, lawyers, and academics will not

achieve the ultimate goal in a day, a month, or a year. However, it is time to begin the process of incrementally addressing the challenges that lie ahead. Perhaps the most influential adversary we face in getting it right is ourselves.

In order to minimize to near zero egregious errors in the future, realistic dialogues between interested parties must replace the rhetorical monologues that are viewed as indictments of forensic science or rock-throwing back at the critics. The best way to maximize the probability for success in strengthening the forensic sciences is for interested parties across the scientific, legal, and academic communities to find common ground and build upon it. Until now, adversaries usually start the dialogue (or most likely proselytizing) from opposite ends of the same spectrum and attempt to argue inward. That rarely works in any professional environment. A more successful approach would be to start the discussions from the middle — where some agreement does exist — and then move outward and in the same direction incrementally to reach a consensus on how to strengthen forensic science.

### Conclusion

Trained, experienced, and ethical forensic scientists from federal, state, local, and private laboratories will work tirelessly to strengthen the science used in their laboratories. By using the best scientific instrumentation, methods, and, most important, scientific thought processes at their disposal, forensic scientists will continue to provide valuable information based on valid methodologies for presentation in both criminal and civil cases. These same forensic scientists will also work with, learn from, and educate lawyers and judges in the forensic science methods and terminology to ensure that the adversarial system functions properly. By its very nature, our justice system is adversarial. However, the processes to arrive at the truth and the advocates for determining the truth need not be adversarial.

The system will not function properly unless all participants are transparent and all agree to use non-inflammatory language that everyone understands. In criminal cases, this means witnesses testifying for both the prosecution and the defense have the same responsibilities in presenting the best science possible. Most important, forensic scientists who care about the justice system must remain advocate neutral. Forensic scientists must commit to getting it right by continuing to develop valid methodologies and reporting techniques that do not extend beyond the limitations of the data or images. The alternative is not acceptable in our justice system. There is too much at stake to do otherwise.

### JOSEPH P. BONO

MA, F-AAFS, D-ABC, is past president of the American Academy of Forensic Sciences. He lives in Indianapolis, Ind.

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