



POLICY FORUM: SCIENCE AND THE LAW

Is Science Different for Lawyers?

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On 7 January of this year, Judge Lewis Pollak, former dean of the Yale Law School and a highly respected federal district court judge, stunned the legal world when he held that fingerprint experts could not testify that a latent print found at the scene of the crime “matched” the defendant’s print (1). Despite being admitted into courts for nearly 100 years, Judge Pollak found that no one had bothered to conduct any meaningful research on the technique. His ruling was based on the landmark opinion in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, in which the Supreme Court held that trial court judges must ensure, as gatekeepers, that proffered scientific evidence is valid and reliable. On 13 March, however, Judge Pollak reversed his earlier ruling (2). Upon reflection, he said, he had come to the realization that fingerprint identification was not a matter of “science,” it was a “specialization,” and thus need not meet the rigors of the scientific method to be admitted in court. This distinction between science and specialization is premised on a basic skepticism of the scientific method and its usefulness to judicial decision-making. Although this skepticism is not universally held by judges, it threatens the fundamental reform wrought by *Daubert*, because it is shared by many and is thought intellectually respectable by most. In fact, however, this skepticism stems from ignorance, a condition that can only be remedied by a sustained effort to educate these decision-makers about the practices and culture of hypothesis testing in science. Scientists should lead this effort.

Shortly after *Daubert* was decided, experts in many disciplines that assist the law looked about and realized that they did not have the research to support the opinions they routinely offered in court. These purveyors of science-“lite” cleverly sought to avoid the new rule. They claimed that the tough new gate-keeping standards did not apply to them because the decision involved only “scientific” evidence. These experts, and the lawyers who employ them, argued that when witnesses are

“technical or specialized experts,” *Daubert* does not apply. All sorts of formerly proud scientists joined the exodus from science, including psychologists, engineers, and medical doctors. To their everlasting shame, many forensic scientists also disclaimed the science mantle. Obviously, however, any failed science might make such an argument. Allowing every failed science to proclaim itself a “specialty” would have gutted the new standard. In a 1999 decision, *Kumho Tire Co. v. Carmichael* (3), the Supreme Court closed this loophole. It held that all expert testimony is subject to the requirement that it be demonstrated to have a valid and reliable basis, whether it is accounting or rocket science.



The challenge that arose after *Kumho Tire*, and one foreseen in Justice Breyer’s opinion for the Court, was the question, by what criteria should the multitude of experts who appear daily in court be evaluated? This is no easy task, because this multitude includes physicists, biologists, toxicologists, epidemiologists, psychologists, engineers, medical doctors, historians, accountants, auto mechanics, and the list goes on almost without end. This extraordinarily broad array of expertise is simply not susceptible to any one scheme of evaluation. In *Daubert*, the Court had suggested four criteria that might be used to assess the reliability of scientific opinion: (i) Is the opinion testable and has it been tested? (ii) Is the error rate associated with the technique or opinion acceptable? (iii) Has

the basis for the opinion survived peer review and has it been published? And (iv) Is it generally accepted among scientists in the pertinent field? Justice Breyer in *Kumho Tire*, however, did not attempt to offer similar criteria by which to judge the “many different kinds of experts, and many different kinds of expertise” routinely confronted by judges (4). This monumental task, the Court said, would be left to the discretion of lower court judges.

In his first opinion, Judge Pollak laid out the *Daubert* framework and found that fingerprinting had not been adequately tested, had no known error rate, had not produced research that was published in peer-reviewed journals and was only generally accepted among a group of like-thinking professionals who are all in the fingerprint identification business. At the same time, it should be noted, Judge Pollak also held that there was no dispute that each person’s fingerprint was unique so that identification could be readily accomplished when two full prints could be compared. He took judicial notice of this fact. Moreover, he held that the government expert would be permitted to introduce exhibits illustrating the similarities between the partial latent print found at the scene and the defendant’s print. These two holdings are not terribly controversial in themselves. The holding that ignited the firestorm was Judge Pollak’s order that the expert would be foreclosed from offering an opinion on the import of those similarities or that they indicated a “match.”

In reversing the first decision, Judge Pollak was obligated to explain how these factors were now met or why they were no longer relevant. Remarkably, he stated, “I concluded in the January 7 opinion that *Daubert*’s testing factor was not met, and I have found no reason to depart from that conclusion.” (5). Yet, somehow, he now found that the other three factors mentioned in *Daubert*, error rate, peer review and publication, and general acceptance, were satisfied. How this was possible, without testing, is a great mystery of the decision. For him, this mystery was solved by his observation that fingerprint identification “is not, in my judgment, itself a science.” He likened forensic scientists to “accountants, vocational experts, accident reconstruction experts, [and] appraisers of land or of art.” (5). Forensic science was a specialty, not a science.

Judge Pollak’s conclusion has been echoed by a great number of federal judges. Judge Crow similarly held that fingerprinting, though as yet untested, is admissible in court. He was persuaded by the technology’s success over the past 100 years, in which it “has withstood the scruti-

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ny and testing of the adversarial process.” (6). Scientists undoubtedly will find such an assertion laughable. Judge Crow, however, answered their snickering as follows:

“Those of a ‘scientific’ bent certainly can take issue with whether the judges and lawyers have the education or training to engage in ‘scientific’ testing and with whether the courtrooms provide the sterile, laboratory-like and objective atmosphere associated with and probably conducive to scientific analysis. Even so, it seems an unreasonable stretch simply to discard this experiential testing as wholly unreliable and to relegate the testifying opinion of all these fingerprint examiners to *ipse dixit*. Moreover, this court joins others who do not read *Daubert* and *Kumho* as elevating the scientific method to the touchstone by which all [expert] evidence is to be judged.” (6).

In doubting the value of the scientific method as the touchstone by which expert evidence is to be evaluated, judges like Pollak and Crow fail to say what should replace it. Presumably, it is some combination of “years of personal experience” and general acceptance among members of some well-meaning guild. As a matter of law, I believe this is an incorrect interpretation of *Daubert* and *Kumho Tire*. More troubling though, it reflects a basic misunderstanding of the subject of empirical expertise. Contrary to Judge Crow’s belief, this overreliance on undifferentiated experience does indeed relegate the opinions of testifying experts to *ipse dixit*—a Latin phrase that roughly translates as, “because I said so.”

Judge Crow’s statement is remarkable for both its candor and its utter failure to appreciate the culture attending scientific testing of hypotheses. Science does not “exist” categorically or in some concrete encyclopedia of knowledge that passes muster by, say, some committee of the National Academies of Science. Science is a process or method by which factual statements or predictions about the world are devised, tested, evaluated, revised, replaced, rejected, or accepted. There are as many methods of testing as there are hypotheses—indeed, probably more. Courts make a fundamental error when they try to divide the world into science and specialty categories. In truth, every expert who appears in court has “specialized” knowledge of one sort or another. At best, it is specialized knowledge based upon good applied science; at worst, it is specialized knowledge based upon “years of personal experience.” The question is, for all specialized knowledge proffered in court, how much and what kind of testing should be necessary before it is admitted? This is a policy

question that should depend on two factors. The first concerns the difficulties inherent in studying the phenomenon. The second involves the legal stakes present in cases in which the specialized knowledge might be employed. In the specialty area of fingerprinting, both factors indicate that the courts are getting it wrong.

On the difficulties of studying the phenomenon of fingerprint identification, consider the following hypothesis: There is a vanishingly small statistical likelihood that some set of ridge characteristics (say 8, 10, or 12) on a given fingerprint will be found in a random sample of the population. This hypothesis depends on the factually testable question of what proportion of the population (or relevant subpopulations) has particular ridge characteristics. This is a question of base-rates. To be admissible, fingerprint identification need not be powerful enough to show identity, but the fact-finder should be given some idea whether one person in 5, or 100, or 1000, could have left the partial print. Of course, other hypotheses could be imagined, including especially proficiency rates among practitioners of the specialty. Proficiency testing would provide data regarding the accuracy of forensic examiners in applying the technology, with possible comparisons to laypeople or even computers. But these hypotheses are hardly daunting and, indeed, a modestly bright graduate student could design research to test many of them. Over time, however, as the science of fingerprint identification progressed, more difficult and sophisticated hypotheses might emerge, requiring greater ability and resources to study. But the most basic work has yet to be done. The other forensic sciences, including bite-mark analysis, handwriting identification, firearms analysis, and so on, are similarly amenable to test. Unfortunately, like fingerprints, most have not been seriously tested.

The second factor concerns what legal risks are involved in the case, or cases, presenting the expertise in question. Fingerprint identification is offered by prosecutors in thousands of trials each year in which defendants are in jeopardy of their liberty and sometimes their lives. In addition, as a practical matter, prosecutors have the institutional wherewithal, especially through the Justice Department, to invest in the research. It is true that testing fingerprinting, not to mention the surfeit of other forensic sciences, is an expensive proposition. Cost should affect courts’ expectations regarding what research is done and when it gets done. But the government has so far not claimed that the costs would be prohibitive in this area—a claim likely to receive a skeptical response in any event. Indeed, failure to put the testing

burden on the government creates perverse incentives. If courts admit untested speculation, what incentive does the Justice Department have to do the research? The greater the costs in liberty, lives, and property, the greater should be the expectation that good-quality work be done.

In the context of fingerprinting, the amenability of the subject to test and the gravity of the legal stakes involved make it an easy case. Admittedly, other kinds of specialized knowledge will present harder cases. Particularly difficult for lawyers and judges is the first factor, whether an empirical subject is amenable to test. Scientists can be enormously helpful in addressing this question in concrete cases ranging from alcohol and drug testing to polygraphs. Organizations such as the National Academies of Science and the AAAS have already entered partnerships with legal institutions, such as the Federal Judicial Center and the National Institute of Justice (7). These and other science organizations should be encouraged to do more. Most judges and lawyers have little creativity when it comes to conceptualizing how certain empirical statements might be examined. Topics such as predictions of violence, the battered woman syndrome, post-traumatic stress disorder, fire and arson investigation, birth defects, and repressed memories, all challenge the legal imagination. If lawyers and judges are going to improve their comprehension of these and other subjects, bridges must be built between the legal and scientific communities.

Daubert initiated a scientific revolution in the law. Although it has taken more than 200 years, the law is ever so slowly coming to embrace the scientific culture of empirical testing. Yet some courts remain in a prescientific age. When Galileo announced that he saw moons around Jupiter through his telescope, the Pope declared that he was mistaken, for the Bible did not allow it. But the moons are there. Similarly, courts can decree that fingerprinting is reliable, but this does not make it true. Only testing will tell us whether it is so.

References and Notes

1. *United States v. Plaza*, 179 F. Supp. 2d 492 (E.D. Pa. 7 January 2002).
2. *United States v. Plaza*, 188 F. Supp. 2d 549 (E.D. Pa. 13 March 2002) (*Plaza II*).
3. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).
4. *Kumho Tire*, 526 U.S., p. 150.
5. *Plaza II*, 188 F. Supp. 2d, p. 564.
6. *United States v. Cline*, 188 F. Supp. 2d 1287 (D. Kan. 21 February 2002); p. 1294.
7. The interested reader will find more information on existing partnerships between scientific and legal groups at the National Institute of Justice, www.ojp.usdoj.gov/nij; the Federal Judicial Center, www.fjc.gov; and the American Association for the Advancement of Science, www.aaas.org/spp/case/case.htm.