Evaluating Scientific and Forensic Evidence

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Evaluating Scientific and Forensic Evidence

Richard H. Underwood†

Abstract

Professor Underwood offers a critique of the present state of scientific and forensic evidence. In the context of discussing four challenges to the field, the author arms the practitioner with strategies and tactics for making effective use of scientific and forensic testimony.

I. Introduction

In this short Article I would like to comment on some of the challenges presented by the flood of expert testimony in our courts. My views are directed to practitioners, although my original drafts were directed to law teachers who might be interested in developing course materials on scientific and forensic evidence. In this case, at least, the curriculum and actual practice have met—a happy coincidence!

I have taught a basic course on evidence law for twenty years, written a handbook on the law of evidence,¹ and taught trial advocacy courses to students and practicing lawyers.² Still, I must admit that the introduction of new techniques and even entirely new disciplines has left me in

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¹ RICHARD UNDERWOOD & GLEN WEISSENBERGER, KENTUCKY EVIDENCE LAW COURTROOM MANUAL (Anderson, updated yearly).

² For many years the University of Kentucky CLE program offered a Nine-Day Intensive Course on Trial Advocacy. The course was offered to practicing lawyers in the early Summer, before the start of our regular Summer school session. Unfortunately, the program became too costly for a self-supporting CLE program. Fortunately, with some funding and assistance from Kentucky’s Attorney General, the Law School plans to update its courtroom facilities and offer a new Prosecutor’s “training school” during our Fall semester.
the position of playing catch-up. I should also admit up front that, like many lawyers, I am more or less pre-Copernican in my education, training, and experience. I have no formal training in the forensic sciences, and no experience as a prosecutor. My somewhat limited practice had been in civil litigation, and oddly enough, most of my research and writing has been in the area of professional ethics. I came by my newfound interest in scientific evidence and forensics, not because of any scientific or prosecutorial bent, but because I have spent a lot of time rubbing elbows with a number of local physicians and scientists who have been kind enough to assist me in teaching a survey course in Legal Medicine. Suddenly, I had to become conversant with such esoteric topics as genetic testing and DNA—a "brave new world" for me. I became aware of the need to prepare young lawyers to be skeptical of and challenge scientific evidence and professed expertise when I was writing a series of articles on the law of perjury. In those articles I addressed the

3 In the last few years, several law school journals have offered useful symposia. See Symposium, Decision and Inference in Litigation, 13 CARDOZO L. REV. 253 (1991); Symposium, Scientific Evidence After the Death of Frye: Criminal Forensics and DNA Evidence, 15 CARDOZO L. REV. 1959-97 (1994). The University of California at Davis sponsored a Scientific Evidence Symposium that was inspired by the first INREP conference. Edward J. Imwinkelried, Foreword, 30 U.C. DAVIS L. REV. 941-49 (1997).

4 RICHARD UNDERWOOD & WILLIAM FORTUNE, TRIAL ETHICS (1988); WILLIAM FORTUNE, RICHARD UNDERWOOD & EDWARD IMWINKELRIED, MODERN LITIGATION AND PROFESSIONAL RESPONSIBILITY (1996); UNIVERSITY OF KENTUCKY, CLE, KENTUCKY LEGAL ETHICS AND PROFESSIONAL RESPONSIBILITY DESK BOOK (Richard Underwood ed., 1993). I served as the Chairman of the Kentucky Bar Association Ethics and Ethics Hotline Committees for fourteen years.

5 I am particularly indebted to the many fine physicians and scientists from the College of Medicine, University of Kentucky, and from the University of Kentucky Chandler Medical Center, as well as the scientists and technicians working at the Kentucky State Police Crime Laboratory, and investigators in the Lexington-Fayette County, Kentucky, Police Department, all of whom have volunteered their time. Qui docet discit.


problems of false expert testimony, police perjury, and prosecutorial misconduct. Although the reader may suspect that my professional environment is somewhat cloistered, I suggest that some of the things I have learned along the way about scientific and forensic evidence may be of practical use to many lawyers.⁸

**II. Some of the Challenges**

I group the challenges facing scientific evidence under four headings—system or control problems, accuracy problems, honesty problems, and lawyer skills problems. These are merely convenient, descriptive labels. Needless to say, these broad categories overlap.

There is also nothing original about my selection of these categories.⁹ As Professor Imwinkelried notes, as the use of scientific testimony accelerates, "we are gaining alarming insights into the level of scientific misanalysis. . . . [Sometimes] the source of error is reliance on an inadequately validated theory. [system or control problems] . . . In other cases, the cause of the error is sloppy test procedure"¹⁰ [accuracy problems]. Other commentators have pointed out the obvious but often overlooked fact that the science may be valid but the expert witness may

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⁹ Indeed, some of my interest in current issues in scientific and forensic evidence rubbed off on our CLE Director. See Course materials: Scientific, Technical and Forensic Evidence, UK/CLE, September 4, 2000, which includes extensive materials on the law of expert testimony, DNA, blood alcohol determinations, accident reconstructions, document examination and handwriting analysis, firearms, ballistics and toolmarks, medical examiners and forensic pathology, deception detection and the polygraph, scientific evidence in civil cases, etc. For a new piece expressing views consistent with mine, see Scott Bales, *Turning the Microscope Back on Forensic Scientists*, 26 Litig., no. 2, at 51 (Winter 2000).

¹⁰ Imwinkelried, *supra* note 3, at 941-42.
be biased, conflicted, or dishonest\textsuperscript{11} [honesty problems]. My lawyer skills category recognizes that many times lawyers default\textsuperscript{12} on their professional obligation to challenge the evidence. If practitioners keep these categories in mind, they may get a better angle on ways to present or attack scientific evidence.

Although this short sketch suggests the possibilities that test results may be inaccurate, that some forensic scientists may be over-zealous or manipulated by their prosecutorial “customers,” and that some “experts” may be down-right dishonest, I need to add a word of caution. Most of the time the test results will be accurate, and the forensic scientists will be honest and professional. Counsel must, as a professional, be skeptical of the opposition and do his homework and discovery. But in many cases the decision not to confront the forensic evidence and the forensic scientist directly will be the correct decision.

A. System or Control Problems

The control problems revolve around the need for useful testimony from the expert witness, but also the desire for the witness to avoid advocacy. The witness should not exert too great an influence and usurp the function of the trier of fact.\textsuperscript{13} As philosopher C.A.J. Coady puts it, “[one] can concede the important, even essential, role of the expert witness . . . [and yet worry about] whether the vastly increased role of experts in the law poses a threat to the proper exercise of the court’s arbitral role.”\textsuperscript{14}


\textsuperscript{12} Sometimes lawyers do not challenge the evidence for a reason, even when it is challengeable. A lawyer’s judgment on a tactical point may be the “right” judgment, and yet leave scientist and layman alike disappointed. See also Cyril H. Wecht, Legal Medicine and Forensic Science: Parameters of Utilization in Criminal Cases, 34 DUQ. L. REV. 797, 807-08 (1996).

\textsuperscript{13} C.A.J. COADY, TESTIMONY: A PHILOSOPHICAL STUDY 289 (1992). The control problems were described and lamented by Learned Hand in a famous article. Learned Hand, Historical and Practical Considerations Regarding Expert Testimony, 15 HARV. L. REV. 40, 50-52 (1901-02).

\textsuperscript{14} COADY, supra note 13, at 300.
One suspects that control problems are perceived to be more worrisome where the law operates through an adversary system. Coady describes the relationship between the law and expert testimony in English law as a "shotgun marriage" in which the men of law have attempted to keep the expert in a "subordinate role." He suggests that the tensions may be more aggravated in America, where "the relationship [between the law and expert testimony] seems more like open concubi-


[M]uch might be gained from the inquisitorial practice by having the experts exchange the information which they had with each other and then determine the conclusions to be drawn. With the rise of the adversary system in which witnesses were looked upon as being called by the parties and expected to represent their position in the case, it was not surprising that the use of scientific proof developed into a testimonial battle of experts.

Id.; see also Ian Freckelton, The Trial of the Expert: A Study of Expert Evidence and Forensic Experts, Foreword by Hon. Justice M.D. Kirby, C.M.G., at ix, xii, & 132 (Melbourne: Oxford University Press 1987); Hand, supra note 13, at 56 ("[T]he jury] will do no better with the so-called testimony of experts than without, except where it is unanimous. If the jury must decide between [conflicting experts] they are as badly off as if they had none to help."); Mike Redmayne, Expert Evidence and Scientific Disagreement, 30 U.C. Davis L. Rev. 1027, 1072 (1997). Cf. Petra van Kampen & Hans Nijboer, Daubert in the Lowlands, 30 U.C. Davis L. Rev. 951, 985 (1997).

Under Dutch law[, ] both culturally and institutionally[ ] the expert is primarily an assistant to the court[ ] and expertise and experts have been regarded in terms of neutrality and impartiality. In the Dutch legal system, experts are expected to solve disagreements among themselves and not bring them into the open. The joint report that follows their negotiation catches two flies at once; it legitimizes reliance upon experts in light of the perceived impartiality and neutrality of their arguments, and it prevents potential conflicts from disrupting the proceedings.

Id. As Dutch authorities suggest, "the American legal system's involvement with these cases and its struggle to stop the flood of unreliable scientific expert evidence, a struggle of which Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993) is representative, seems to have few parallels in the western world." Kampen & Nijboer, supra, at 955; see also John Langbein, The German Advantage in Civil Procedure, 52 U. Chi. L. Rev. 823, 835 (1985) (stating that, in Germany, the experts "are thought of as judge's aides"). For evidence that the "junk science" problem is real in the United States and in Commonwealth countries, see David Bernstein, Junk Science in the United States and the Commonwealth, 21 Yale J. Int'l L. 123 (1996); Paul C. Giannelli, "Junk Science": The Criminal Cases, 84 J. Crim. L. & Criminology 105 (1993).
nage, with all the shifting complexities of power and dominance that image suggests."

The adversary system, adversary politics, and adversary rhetoric complicate things. At the risk of sounding like an enemy of the adversary system (I am not), and at the risk of sounding overly simplistic (I may be), I think there is something to the following. If my stereotyping offends, so be it.

In America, lawyers can be grouped into sociological and political camps. One camp consists of plaintiffs’ lawyers in civil cases. This is a large and increasingly well organized group that knows how to get its points across. Conservative politicians refer to this group as “The Trial Lawyers.” The second camp consists of defense lawyers in civil cases. This group is less organized than the first, and probably smaller in number. Civil defense lawyers support and are supported by corporations and insurance companies. Then there are the prosecutors (and other government lawyers—lawyers in enforcement agencies, such as the FDA and EPA, who use scientific evidence) at the state and federal level, and their opposites, the criminal defense lawyers. There are more criminal defense lawyers in the private bar than there are prosecutors. I suggest

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16 COADY, supra note 13, at 277.
17 For example, note the hostility expressed by a spokesman for the plaintiff’s bar in the Preface to the American Lawyer’s Code of Conduct:

[The draft Model Rules of Professional Conduct are the product of] . . . the sort of thinking you get from a commission made up of lawyers who work for institutional clients, in institutional firms, and who have lost site of the lawyer’s basic function. Lawyers are not licensed to write prospectuses for giant corporations, or to haggle with federal agencies over regulations and operating rights. We are licensed to represent people in court, which often means people in trouble with the law, and with the government. We are the citizens’ champions against official tyranny.

American Lawyer’s Code of Conduct preface (Revised Draft May 1982).
18 Lawyer-bashers associate the group with hot-button code words like “contingent fee” and “entrepreneurial” litigation. For critics of “junk science” like Peter Huber, the “trial lawyers” are purveyors of “junk scholarship.” See Galileo’s Retort: Peter Huber’s Junk Scholarship, 42 AM. U.L. REV. 1637 n.167 (1993).
19 Lawyer-bashers like to think this group consists of corporate lackeys who specialize in delay and feed from the “billable hour machine.”
that the numbers favor the plaintiffs' bar on the civil side and the defense bar on the criminal side. Judges do not exactly let lawyers vote on what the rules should be, however, and where the actual power of persuasion lies is not clear. Furthermore, the locus of power changes over time, just as judicial attitudes change over time. My point is that America has a free and independent bar, but lawyers of these particular feathers do flock together, philosophically and politically.

The forces on opposite sides of the "v." have different ideas about the desirability of limits on the introduction of scientific evidence. The civil plaintiffs' bar wants a loose standard for the admission of scientific evidence—the plaintiffs’ lawyers would prefer that the question be one of evidentiary weight or sufficiency. Presumably, they would like the Daubert problem to be treated as a Federal Rule of Evidence 104(b) problem. The civil defense lawyers want a strict, Frye-type standard, and want the court to treat the problem as a Rule 104(a) problem. Alternatively, the prosecutors want a liberal standard of admissibility, or at least a standard that will apply in the same way to both the prosecution and the defense. On the other hand, the criminal defense lawyers want a strict, Frye-type standard to be applied to the prosecution, but want a more liberal standard or no standard at all to be applied to the defense.

All of these contending groups advance plausible arguments in support of their positions; and the language of Daubert is sufficiently cryptic to give each group some comfort. So the fight over the meaning of

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24 They like the "sauce rule": "What is sauce for the goose is sauce for the gander."


Daubert rages on. I invite anyone who questions my admittedly stereotypical observations about the politics of the situation to read the contentious literature that appeared following the publication of the Federal Judicial Center's "Daubert Handbook."

This choosing of sides between the Daubert- and Frye-type standards was exhibited before and after the Supreme Court's decision in Kumho Tire Co. v. Carmichael. I call Kumho Tire a "My Cousin Vinny" case. The plaintiff in Kumho Tire was trying to make a case against a tire manufacturer by offering the testimony of a "tire failure expert," who would have testified that a defect in a tire's manufacture or design caused a blow-out and a fatal accident. After holding a "Daubert hearing," the trial judge refused to admit the testimony, finding that it was not reliable, and alluding to some of the Daubert guidelines. I think the testimony was weak by anyone's standards—except, of course, the standards of the plaintiff and his lawyer. The policy question is whether we want to let this kind of evidence "come in for what it is worth" or have a "judicial gatekeeper" screen it out. The trial judge's nostrils and Daubert told the

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29 In the movie by the same name a novice defense lawyer was representing his cousin, who had been charged with murdering a convenience store clerk. MY COUSIN VINNY (Tri Mark 1992). The defendant was saved when the lawyer's girlfriend, an auto mechanic, took the stand and provided convincing technical evidence that incriminating skid marks left at the scene could not have been left by the defendant's car.

30 Kumho Tire, 526 U.S. at 137.

31 Id. at 137-38. The Daubert Court set forth several guidelines in determining reliability of scientific theories and techniques including: testing, peer review, error rates, and general acceptance. Daubert, 509 U.S. at 593-94.

32 Nothing fosters belief like self interest. The expert conceded that the allegedly defective tire had been in use so long that some of the tread was bald; the tire should have been taken out of service; the tire had been inadequately repaired for punctures, and it bore marks indicative of abuse rather than defect. Kumho Tire, 526 U.S. at 143. The expert sidestepped all of this by advancing a theory shared by no one else in the industry, and unsupported in the literature, that there needed to be at least two signs of abuse. Id. at 145. I think that it is not too extreme a suggestion to characterize the opinion as self-sealing advocacy rather than helpful testimony. The expert sees only what he needs to support his argument, and responds to embarrassing or inconvenient facts by thinking up some new, untested theory.
judge that he did not have to let the jury hear the expert's testimony. The plaintiff insisted that the evidence was not scientific testimony, but instead technical or skills testimony, and that the Daubert criteria should not have been used to judge its reliability. The appellate court agreed with the plaintiff and reversed. The case then went to the United States Supreme Court.

Before Kuhmo Tire was decided, proponents of forensic evidence in criminal cases, and the plaintiffs' lawyers in civil cases, were arguing that the Daubert criteria are actually more liberal than Frye (a plausible argument), and that in any event their application should be limited to cases involving pure science, or at least some kind of science, as opposed to practical or technical skill (a less plausible argument).\(^3\) The Supreme Court's decision in Kuhmo Tire surprised the commentators by rejecting any "scientific versus technical" dichotomy.\(^4\) I did not find the Court's decision the least bit surprising or reactionary, but perhaps that is because I did not read that much into the Daubert decision in the first place. While Justice Blackmun may have been more comfortable than most judges and lawyers when it came to rubbing elbows with scientists\(^5\) and reasoning in terms that seemed scientific,\(^6\) his judicial opinions did not "do" science. Justice Blackmun did not provide, and could not have provided, a (dare I say it?) litmus test. Although he used a great number

\(^{31}\) See also Michael Saks, *Merlin and Solomon: Lessons From the Law's Formative Encounters with Forensic Identification Science*, 49 Hastings L.J. 1069, 1133-34 (1998) (noting that, "[i]ronically, as a result of Starzecpyzel and its progeny, it can be said that courts had once admitted handwriting identification expertise because they believed it was scientifically well-founded and well-tested, while now they admit it because they know it is scientifically unfounded and untested"). *Cf.* United States v. Starzecpyzel, 880 F. Supp. 1027, 1050 (S.D.N.Y. 1995) (The court instructed the jury: "Forensic document examiners may be of assistance to you. However, their skill is practical in nature, and despite anything you may hear or have heard, it does not have the demonstrable certainty that some sciences have. . . . I am not in any way suggesting what you should do.").

\(^{34}\) *Kumho Tire*, 526 U.S. at 137 (applying Daubert factors to technical and scientific testimony).

\(^{35}\) Justice Blackmun had been counsel to the Mayo Clinic.

\(^{36}\) I agree with those commentators who argue that, in the real world, falsifiability may not be of that much use as a judicial tool for distinguishing good science from bad. *See, e.g.*, Redmayne, *supra* note 15, at 1078-79.
of words to get his point across, as arguably all he was saying in Daubert was that in some circumstances the trial judge has discretion, and the judge should exercise that discretion to prevent the jury from hearing the expert's testimony because the expert is just too "far out." While Daubert offered criteria or considerations rooted in Justice Blackmun's notion of what science is, these criteria may not be that special. Science may not be that heretical after all.

In any event, I think it was predictable that the Daubert Court would express time-honored judicial views about the control problems and pick the Federal Rule of Evidence 104(a) route as one means of maintaining judicial control over the expert and the jury, while also maintaining that a resort to Frye alone would result in the exclusion of too much expert testimony. Still, Frye had the virtue of allowing the trial judge to base his Rule 104(a) decision on what the scientists think about a science. After Daubert, judges may have to make their own judgment about the reliability of the expert's science. "By a preponderance of the evidence, the proponent of the expert evidence has to demonstrate to the judge that it is good evidence, perhaps in spite of what other experts think about it." This sounds good, but it may be a rather daunting task in particular cases. The judge must decide

37 See James McElhaney, Trial Notebook: Fixing the Expert Mess, LITIG., Fall 1993, at 53, 54 (discussing the Daubert majority's standard for admitting scientific evidence and that the Court "found" the word "science" implies a grounding in scientific methods and procedures and the word "knowledge" means something more than a subjective belief or unsupported speculation).

38 "The correct methodology of science is the correct methodology of civilization, too." PAUL JOHNSON, ENEMIES OF SOCIETY 145 (1977).


40 The "ultimate issue" rule was another control device, but it has largely been abandoned in American jurisdictions, except insofar as psychiatric and psychological experts are concerned. See FED. R. EVID. 704(b); see also Scallen & Wiethoff, supra note 22, at 1166 (discussing the John Hinkley case--attempted assassination of Ronald Reagan--and the amendment of Federal Rule of Evidence 704, which otherwise abolished the "ultimate issue" rule, and the Dan White murder case--the so-called "Twinkie" defense case--and subsequent amendment of the California Penal Code); FRECKLELTON, supra note 15, at 68-81.

41 Fenner, supra note 26, at 948.
at least three questions: (1) whether the witness is indeed expert in the field; (2) whether the field is a genuine area of science; (3) whether, given a positive answer to (1) and (2), his particular depositions are credible. . . . All three of these questions pose difficulty for a legal tribunal since they seem to be questions that only an expert can answer. Hence the specter of a vicious logical regress arises.\(^4\)

This logical regress might be avoided if we opted for some procedural "reform" based on the European model, or referred the matter to some certifying body or institution.\(^3\) Of course, such reforms might present their own problems,\(^4\) and most elements of the bar would oppose such "reforms."

In cases involving nascent, novel, or neo-science,\(^4\) the "soft" social\(^4\) or psychological sciences,\(^4\) or non-scientific technical or skills experts, the judge may have to hold a Daubert hearing.\(^4\) The Daubert case perpetuates the problem of logical regress, sets up the need for a new form of mini-trial, and offers yet another stage for the adversary rhetoricians. My prediction is that, in civil cases, Daubert hearings will result in additional delay and litigation cost. At least for the time being, the

\(^{42}\) COADY, supra note 13, at 281.


\(^{44}\) See Alex Kozinski, \textit{Brave New World}, 30 U.C. DAVIS L. REV. 997, 1010 (1997) (questioning whether, in the Dutch system, the experts do not, in effect, become the judges who operate in secret).

\(^{45}\) COADY, supra note 13, at 291-94.

\(^{46}\) See Michael Rustad & Thomas Koenig, \textit{The Supreme Court and Junk Social Science: Selective Distortion in Amicus Briefs}, 72 N.C.L. REV. 91 (1993) (offering an interesting discussion on the injection of so-called "junk social science" into appellate briefs).

\(^{47}\) Coady offers cogent criticisms of the appearance of the witnesses of psychology, sociology, and anthropology. See COADY, supra note 13, chs. 15 & 16, at 262-303; see also Charles P. Ewing, \textit{Yes: Good Lawyering Can Weed Out Unscientific Testimony}, 83 A.B.A. J. 76 (1997) (alluding to John Grisham's novel \textit{A Time to Kill}, in which both the prosecution and the defense present fraudulent expert testimony).

\(^{48}\) But see Greenwell v. Boatwright, 184 F.3d 492, 498 (6th Cir. 1999) (stating that the trial court is not required to hold an actual hearing to comply with \textit{Daubert}); see also Fugate v. Commonwealth, 993 S.W.2d 931, 937 (Ky. 1999) (holding RFLP and PCR DNA testing admissible in future without \textit{Daubert} hearing).
defense bar will over-litigate *Daubert* issues. Will the *Daubert* hearing eliminate "junk science" or will it turn out to be yet another negative development in civil litigation?49 One thing is for sure—we are going to see some controversial opinions at the state and federal level, all resulting from this new judicial enthusiasm for "gatekeeping."

For example, consider the interesting Kentucky opinion in *Goodyear Tire & Rubber Co. v. Thompson*, a products liability case against arising from the plaintiff's injuries that he suffered when he was changing a multi-piece tire rim manufactured by Goodyear.50 When the plaintiff mounted a wheel assembly to the axle of a trailer, the assembly exploded and an FL-type lock ring struck the plaintiff.51 The plaintiff wanted to offer the testimony of Dr. O.J. Hahn, who would have testified that the wheel multi-piece tire rim was defectively designed, and a safer technology was available.52 Dr. Hahn had earned numerous degrees, including a Ph.D. in mechanical engineering from Princeton, and he had taught mechanical engineering at the University of Kentucky since 1973.53 He had testified as an expert witness on multi-piece rims in over one hundred cases in forty-nine states, and he had studied this type of rim for twenty-six years.54 His testimony was based on the application of his knowledge of engineering principles, and his study of technology from the 1930s revealed patents used in the aircraft industry, including wheel bolting systems.55 These systems were successfully used on B-52s, and Dr. Hahn

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49 Some plaintiffs' lawyers on the civil side argue that *Daubert* puts them at risk unfairly. They worry about taking a novel or cutting edge case, investing huge sums of money on expert witness fees and other litigation expenses, having the case thrown out by the judge on *Daubert* grounds (unfairly? by surprise?), and then being sued by their disappointed client for malpractice. Of course, the counterarguments are that the "entrepreneur" lawyer takes his or her chances along with the client. The disappointed client would have to show that, except for negligence in the selection of the expert or in the preparation or presentation of the expert's testimony, the client would have won the case.

50 11 S.W.3d 575, 576 (Ky. 2000).
51 *Thompson*, 11 S.W.3d at 579.
52 *Id.* at 580.
53 *Id.* at 583.
54 *Id.* at 584.
55 *Id.* at 580.
sensibly concluded that a similar bolting system would work on wheel assemblies on trucks and trailers. However, after holding a 104(a) hearing, the trial court concluded that, because Dr. Hahn had never (1) used a B-52 system on a truck, (2) submitted his views to any tire manufacturer, (3) submitted his suggested design for peer review, nor (4) published his "B-52 bolting theory" in any article, his testimony was not admissible. Goodyear prevailed on a motion for a directed verdict because the plaintiff had no other expert testimony to present. The Supreme Court affirmed the trial judge's exercise of discretion. Was this a proper exercise of Daubert gatekeeping power? The dissent questioned whether it was not more sensible to admit testimony based on accepted scientific principles of engineering, and let the jury consider the points made by defendant as matters going to the weight and not the admissibility of the evidence. After all, this was no charlatan advancing new, self-sealing theories. Was the majority of the Supreme Court not "preoccupied with industry practices"? Was the trial judge not "confusing its role as gatekeeper with the jury's role in determining the weight evidence should have"?

On the criminal side of the house, the defense bar may see Daubert as an invitation to challenge previously accepted types of forensic evidence. My prediction here is that most everything successfully offered in the past by prosecutors will survive Daubert scrutiny. Additionally,

56 Thompson, 11 S.W.3d at 580.
57 Id. at 581.
58 Id. at 583.
59 Id. at 584.
60 Id.
61 Thompson, 11 S.W.3d at 584.
62 Id. For a fascinating case involving a burnt up body, a BIC lighter, and no obvious alternative explanation for a source of the fire that consumed the victim, see Pride v. BIC Corp., 218 F.3d 566, 568 (6th Cir. 2000) (plaintiff's expert testimony on cause and origin of fire excluded after a Daubert hearing).
64 See Margolin, supra note 25, at 1255 ("When the Supreme Court decided Daubert, a paroxysm of creative inventiveness seized the criminal defense bar.... Hope seemed luxuriously victorious over experience."). One of my operating assumptions as an
defendants will have another weapon to use against their own lawyers when litigating post-conviction. On appeal defendants could allege that counsel did not raise the issue or pursue it with enough competence and zeal.

B. Accuracy Problems

Lawyers, judges, and critics of expert evidence assume that the public in general, and jurors in particular, accord an "honorable" status to the expert. Indeed, the time-honored catechism in which the proponent tenders the expert to the court and receives an acknowledgment from the judge that the witness may now testify to the jury as an "expert" has been condemned in a number of American jurisdictions, including my own, on the theory that jurors can be swept away by any hint of judicial certification of a witness's authority!

American lawyer is that the judge (in state court) is probably a former prosecutor. In contrast, in federal court, the judge is probably a former Senatorial campaign manager.

For a recent case excluding defense expert testimony concerning the pitfalls of eyewitness identification on the theory that the expert's points were within the ordinary experience of jurors see Christie v. Commonwealth, 2000 WL 968069 (Ky. Ct. App. 2000).

65 Are our assumptions about juror attitudes justified, or are they simply elitist? Perhaps not all of them are justified. Daniel Shuman et al., Assessing the Believability of Expert Witnesses: Science in the Jurybox, 37 Jurimetrics J. 23 (1996). Shuman devotes a majority of his work to findings that jurors do not give more credence to experts from hard sciences than those in soft fields. In addition, Shuman notes that jurors decide not on the basis of their own characteristics but on the expert's qualifications, the expert's use of good reasoning, the expert's familiarity with the facts of the case, and the expert's appearance of impartiality. Id. at 28-30. These findings contradict those of prior "studies." Even more interesting is the fact that this recent study found that jurors are influenced by who retained the expert, and that jurors tend to believe the defense experts in civil cases. Should we reevaluate some of our assumptions about the inability of jurors to evaluate and discount "junk science"? See also Symposium, Applying Lawyers' Expertise to Scientific Experts: Some Thoughts about Trial Court Analysis of the Prejudicial Effects of Admitting and Excluding Expert Scientific Testimony, 25 WM. & MARY L. REV. 619 (1984).

To the degree that an expert can parade as . . . a scientist . . . his opinion [may] have a weight and authority that it may not deserve, not just because he may not be a particularly good specimen of "homo scientificus" but also because what he testifies to may be much more contestable than the deferential lay person is inclined to believe.67

As previously stated, counsel could challenge many forensic science procedures if the courts rigorously applied the Daubert criteria. Professor Jonakait68 and others69 have argued that some procedures have been subjected to little or no testing, and that "most of forensic science operates outside of [any] peer review systems."70 Publication is limited. Many techniques are not used "outside," and may not be generally accepted, at least by the larger scientific community.

Then there is the problem of "error rate."71 Daubert invites the opponent of the scientific testimony to make much ado about error rates. Jonakait claims that "'[l]ittle is . . . known about the true error rates for almost all forensic science techniques . . . [and that] [t]he few disclosed

67 COADY, supra note 13, at 280 (emphasis added).
70 Jonakait, supra note 63, at 2117.
71 Here I refer to the need to assess real error rates based on the actual use of techniques and procedures. See Jonakait, supra note 63, at 2115-16 (providing a discussion of the importance of the distinction between actual and theoretical error rates); Margaret Berger, Laboratory Error Seen Through the Lens of Science and Policy, 30 U.C. DAVIS L. REV. 1081 (1997).
error rates . . . are shockingly high.”72 It is no wonder “the argument that the testing laboratory might have made an error appears to be the most fruitful line of attack in DNA cases.”73 Indeed, the National Research Council’s report DNA In Forensic Science actually encouraged such attacks when it initially suggested that the results of laboratory proficiency testing be used in deciding whether testimony should be admitted.74

Actually “error rate” may refer to more than one thing and may suggest multiple avenues of attack. What was Justice Blackmun talking about when he alluded to the importance of “error rate?” Are we to consider the degree of error inherent in a test or technique even when it is properly conducted (theoretical accuracy)? Or are we talking about performance rates on a particular lab’s or a particular individual’s proficiency tests? Should an expert be required to combine the probability of a match due to lab error with the random-match probabilities (RMP)?75 Should the

72 Jonakait, supra note 63, at 2117; see also Randolph Jonakait, Stories, Forensic Science, and Improved Verdicts, 13 CARDOZO L. REV. 343, 350-51 (1991) (arguing that information regarding error rates should be presented to the jury); Richard Lempert, Some Caveats Concerning DNA As Criminal Identification Evidence: With Thanks to the Reverend Bayes, 13 CARDOZO L. REV. 303, 324 (1991) (discussing evidence of high error rates in forensic laboratories, and stating, “[f]orensic experts often present their findings with great confidence, but infallibility is unfortunately not a characteristic of forensic laboratories”); Ryan McDonald, Juries and Crime Labs: Correcting the Weak Links in the DNA Chain, 24 AM. J.L. & MED. 345 (1998) (stating that “[t]he problem with DNA evidence is no longer one of validity, but one of proficiency”).

73 Redmayne, supra note 15, at 1061 (emphasis added). At this point I should note that I tend to agree that overall error rates may not be all that relevant. See, e.g., David Balding, Errors and Misunderstandings in the Second NRC Report, 37 JURIMETRICS J. 469 (1997); Berger, supra note 71, at 1093.

74 Committee on DNA Technology in Forensic Science, National Research Council, DNA Technology in Forensic Science (1992) [hereinafter NRC1]. The report had something for everyone, at least after its contents were subjected to a little spin. Accordingly, it is cited by both “sides of the v.” See Don DeBenedicts, DNA Report Raises Concerns, 78 A.B.A. J., July 1992, at 20.

judy be told anything about "error rates"? Or should we demand some evidence of actual human error in the particular case before we inject "possibilities" into the trial? If we are primarily concerned with the possibility of actual error in the particular case, can the risks be minimized by providing opportunities for reciprocal discovery and testing? Now that the courts have accepted PCR testing, there should be material around for the defense to test if it so desires.

In order to get an appreciation of the problem of human error (not to mention dishonesty) one should read In re an Investigation of the West Virginia State Police Crime Laboratory, Serology Division. Reports of investigations of other crime laboratories are also available on several forensic web pages on the internet.

In the case of the West Virginia lab, the operating procedures of the serology department were found to be deficient in the following particulars:


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76 According to NRC2, prosecutors should not be required to inform the jury of laboratory proficiency-testing rates. NRC2, supra note 75.

77 Of course, there is the problem of paying for a defense expert. See John Devlin, Comment, Genetics and Justice: An Indigent Defendant's Right to DNA Expert Assistance, 1998 U. CHI. LEGAL F. 395, 397 (1998) ("[A] DNA expert can assist the defense team in four important ways. . . . First, a DNA expert can review the documents prepared by the prosecution's testing laboratory to ensure that the lab did not make any errors, a persistent problem on DNA cases. Second, a defense expert can conduct independent testing on any unused [DNA] samples to check the results." Third, a defense expert can testify at trial about the problems with DNA statistics and potentially offer the jury a lower probability estimate. Fourth, a defense expert can point out the shortcomings of the newer DNA testing method, if the prosecutor uses it. A defendant who cannot afford his own expert will lose these benefits unless the government provides one for him.).


review of work product; [6] no written documentation of instrument maintenance and calibration; [7] no written testing procedures manual; [8] [a] failure to follow generally accepted scientific testing standards with respect to certain tests; [9] inadequate record-keeping; and [10] [a] failure to conduct collateral testing.80

The reader might also profit from a perusal of some common sense articles on the ways in which error can be injected into evidence collecting, testing, and documentation.81 Forensic scientists may view such “checklists” as defense lawyers’ propaganda and complain that such laundry lists invite wasteful discovery and harassment. But there are bad labs as well as good labs. Pointless discovery and harassment are to be avoided, but counsel cannot afford to take evidence at face value either.

A related problem is the “gee whiz factor.” Assuming that we have an accurate result, and that the expert is not trying to mislead the jury (which I will discuss as an honesty problem), what is the result going to mean to the lay jurors? Given their lack of scientific sophistication and innumeracy,82 jurors are likely to overestimate the significance of the result.83 Professor Jonakait provides us with one of his own experiences with possible juror confusion:

The split verdicts could only be explained by the serological evidence. The two defendants linked by the forensic scientist to the victim were convicted

80 In re Investigation of W.V. State Police Crime Lab, 438 S.E.2d at 504.
81 See, e.g., Kim Kruglick, A Beginner’s Primer on the Investigation of Forensic Evidence, at http://www.scientific.org/tutorials/articles/kruglick/kruglick.html (last visited Nov. 7, 2000). Kruglick provides the novice with a useful “Discoverable Materials Checklist” (laboratory specific, technician specific, and case specific documentation that should be available to the defense—for example, did you get all of the laboratory bench notes?) as well as a “Forensic Case Issue Checklist” that suggests many avenues of attack. See also Paul Giannelli, Criminal Discovery, Scientific Evidence, and DNA, 44 VAND. L. REV. 791, 795-97 (1991).
Such evidence has an important impact on jury verdicts. I considered whether one in a hundred meant a 99% certainty that Jose was guilty, or a 99% certainty that the blood came from the victim.\textsuperscript{84}

Professor Andre Moenssens is of the view that jurors often confuse issues, assuming that statistical percentages reported by forensic experts are statements about the probability of guilt.\textsuperscript{85} Moenssens contends that jurors do this despite cautionary instructions,\textsuperscript{86} and perhaps jurors are sometimes urged to do this by the fallacious arguments of prosecutors.

C. Honesty Problems

It is no secret that expert witnesses can be “co-opted” by the prosecution—they may be little more than hired guns of the state.\textsuperscript{87} Even honest witnesses who are trying to be objective may not be asked the right questions and may have their testimony filtered or contorted by the advocate.\textsuperscript{88} “Untoward results follow when expert evidence in complex cases is presented in adversarial fashion: Expert witnesses are manipu-


\textsuperscript{86} \textit{MOENSSENS ET AL.}, supra note 85, at 584-85.

\textsuperscript{87} William C. Thompson, \textit{A Sociological Perspective on the Science of Forensic DNA Testing}, 30 U.C. \textit{Davis} L. Rev. 1113, 1115 (1997); see Michelle Ketchum, Comment, \textit{Experts: Witnesses for the Persecution? Establishing an Expert Witness’s Bias Through the Discovery and Admission of Financial Records}, 63 \textit{U.M.K.C. L. Rev.} 133 (1994). I have not found this to be true of good labs and good forensic scientists. For example, the Associate Medical Examiners in Kentucky pride themselves on being equally available to the defense as well as the prosecution. Indeed, they are more than happy to give lectures on forensic science to defense oriented organizations.

\textsuperscript{88} Of course, this is also true on the defense “side of the v.”, and true of expert witnesses in civil cases. \textit{See Carol Jones, Expert Witnesses: Science, Medicine, and the Practice of Law} 225 (1994); \textit{Freckelton, supra} note 15, at 3-5, 132-36.
LATED FOR PARTISAN PURPOSES, SOME RELEVANT SCIENTIFIC FINDINGS ARE NEVER INTRODUCED, AND UNWARRANTED CONCLUSIONS ARE NOT DISTINGUISHED FROM VALID RESEARCH . . . . FORENSIC SCIENTISTS HAVE SPECIAL GRIEVANCES OVER THE ADVERSARY SYSTEM."

Professor Coady agrees, noting that "[t]he adversary system is probably the best tool we have for detecting . . . [overconfidence, self-deception, and dishonesty] . . . though, ironically, it is itself responsible for one common defect, namely, the expert’s temptation to identify overmuch with the cause of his ‘side.’"

Good detectives follow the evidence and do not manipulate the evidence to fit their pre-conceived notions or theories. We all know, however, that there are bad detectives as well as over-zealous prosecutors. Forensic scientist D.H. Garrison, Jr. puts it this way: "Bad science is what forensic science becomes when an attorney or prosecutor, who often display[s] all the ethics of a full-grown hamster, get[s] a forensic scientist to play ball, to get with [the advocate’s] program and see [the advocate’s] big picture." Sometimes prosecutors will "shop around" until they find an expert who will tell them what they want to hear. This happened in the infamous Rolando Cruz case.

The first lab guy says it’s not the boot. . . . We don’t like that answer, so there’s no paper [report]. We go to a second guy who used to do our lab. He says yes. So we write a report on Mr. Yes. Then Louise Robbins arrives. This is the boot, she says. That’ll be $10,000. So now we have evidence.

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89 Franklin Strier, Making Jury Trials More Truthful, 30 U.C. DAVIS L. REV. 95, 113-15 (1996); see also Peter Sperlich, Scientific Evidence in the Courts: The Disutility of Adversary Proceedings, 66 JUDICATURE 472, 474-75 (1982) (stating, "the greatest single obstacle to complete and accurate scientific information . . . is the adversary system").

90 COADY, supra note 13, at 295. Coady proposes, not the abandonment of the adversary system, but rather some reforms. One suggestion calls for the foundation of independent institutes of forensic science. Id. at 296. Of course, the trick is to ensure that the independence is not illusory. Id.; see also Giannelli, supra note 11, at 441.

91 See, e.g., The Liar, supra note 7, at 979.


93 162 Ill. 2d 314, 643 N.E.2d 636 (1994); see also The Liar, supra note 7, at 996.

The same sequence happened in several cases involving police serologist Fred Zain.\textsuperscript{95} Under suspicion of faking test results, Zain left his job as head of a serology lab in West Virginia to take a position in a Texas crime lab.\textsuperscript{96} When the remaining West Virginia lab technicians were unable to give the prosecutors the results they wanted, they shipped the work off to Texas to the accommodating Officer Zain.\textsuperscript{97} Garrison reports a variation of "shopping" he calls "Jeopardy" [after a game show], in which the lab "managers give their subordinates a desired answer and demand that they come up with the appropriate research questions to support it."\textsuperscript{98}

Lawyer and criminology Professor William Thompson tells a troubling tale about DNA.

[T]he laboratory report indicated that the DNA test had produced powerful evidence against both suspects [Thompson's client suspect 1, and suspect 2 who was not his client]--a five locus match between each suspect and the DNA found in semen extracted from the victim. The report gave no indication that the evidence against suspect 1 was weaker than that against suspect 2. . . . Examination of the underlying autorads confirmed a clear, unambiguous match with suspect 2, but indicated the evidence against suspect 1 was ambiguous and equivocal . . . My initial suspicion was . . . examiner bias . . . When I raised concerns about examiner bias . . . the prosecution took the position that the autorads had been scored objectively by a computer-assisted imaging device. The prosecution claimed a scanner was used to create a digital image of each autorad . . . making the process entirely objective . . . I obtained a court order that required the forensic laboratory to re-score the autorads with the computer imaging device while an independent expert and I watched . . . During this re-scoring, the claim that the process was objective evaporated . . . In order to detect bands in the male vaginal extract lane that corresponded to those of suspect 1, the analyst had to increase the sensitivity of the computer to the point that it detected many additional "bands" that matched neither suspect. The analyst

\textsuperscript{95} See discussion infra text at note 109.
\textsuperscript{97} Id.; see also FRECKELTON, supra note 15, at 123-50; MOENSSENS ET AL., supra note 85, at 618-20.
\textsuperscript{98} Garrison, supra note 92.
then performed a "manual override" of the computer's scoring, instructing the computer to "delete" (i.e., ignore) all of the bands that matched neither suspect. When asked to state the basis for "deleting" some bands while leaving others, the analyst responded that he could tell by looking that the undeleted bands, which happened to match my client, were "true" bands while the others were not. A number of the bands he deleted had higher optical densities than the bands scored as matching my client. So much for objectivity.  

There are several ways to get people to play ball. Some who cannot be bought can be persuaded. There are reported cases involving experts who were pressured to change their results or delete potentially exculpatory results from their reports. And experts can be steered, or have their testimony "structured" by prosecutors and police who withhold information or feed only selected information to the expert witness.  

Sometimes forensic scientists and bench operators are coached to give opinions outside of their expertise. Garrison alludes to a case in which a bartender, who was the victim of a robbery, testified that the defendant had a glass of beer in his tavern earlier in the evening. Three unwashed glasses found at the scene of the robbery were tested. Two had prints, but they did not belong to the defendant. The prosecutor attempted to get the print examiner to testify that the defendant must have used the third glass and then wiped it clean. While Garrison reports that the print examiner refused to testify, there are reported cases in which similar testimony appears to have been given.  

Often the questions that are asked, or not asked, result in misleading opinion testimony. According to Garrison, prosecutors and defense


100 Giannelli, supra notes 11, 15 & 94 (citing a number of cases, including Jones v. City of Chicago, 856 F.2d 985 (7th Cir. 1988)).


102 Garrison, supra note 92.

 lawyers alike try to get experts to provide improper opinions about intent or absence of intent—questions that must be answered by the jury—by “disguising a question to [the] expert as something vaguely science-like in nature.”\textsuperscript{104} For example, a firearms expert has no way of knowing the intent behind the bullet. But the prosecutor may invite a helpful and prejudicial comment or two, and some witnesses will accept the invitation. One might profitably compare this sort of thing to some of the defendant sponsored psychiatric testimony in Dan White’s trial (which involved, among other things, the “Twinkie Defense”), in which the defense experts frequently “usurped the jurors’ prerogative to decide matters of guilt and innocence.”\textsuperscript{105} The defendant’s suspicious reloading of the gun was an “automatic action,” and the defendant “was literally not focusing” when he shot George Moscone two times in the head.\textsuperscript{106}

Pathologist Michael Baden admits that “[c]onsistent with’ is one of those catch-all phrases that means [little more than] something could be possible. It is used a lot . . . especially on the witness stand when evidence can be interpreted in more than one way.”\textsuperscript{107} In the famous Sacco & Vanzetti case\textsuperscript{108} Captain William Proctor, the ballistics expert, testified:

\begin{quote}
Q: Have you an opinion as to whether bullet no. 3 was fired from the Colt automatic which is in evidence [Sacco’s pistol]?
A: I have.
Q: And what is your opinion?
A: My opinion is that it is consistent with being fired by that pistol.\textsuperscript{109}
\end{quote}

The presiding judge accepted this as if it were a statement that “it was . . . [Sacco’s] pistol that fired the bullet that caused the death of

\begin{footnotes}
\item[105] Scallen & Wiethoff, \textit{supra} note 22, at 1163.
\item[106] Id. at 1164.
\item[107] MICHAEL BADEN & JUDITH HENNESSEE, \textit{UNNATURAL DEATH: CONFESSIONS OF A MEDICAL EXAMINER} 22 (1989); see \textquote{X-Spurt} Witnesses, \textit{supra} note 7, at 394-96.
\end{footnotes}
Berardelli.10 Later Captain Proctor would give an affidavit that he was never able to find any convincing evidence to support another expert's testimony that the bullet was marked with scratches to prove it went through Sacco's pistol.11 He also said he told the district attorney he would answer "no" if he were asked if he had found any such "affirmative" evidence, but that he had not been asked that question at the trial.12 A similar abdication of responsibility occurred in the notorious and perplexing Dotson-Webb rape case.13 Forensic scientist Timothy Dixon testified that seminal material in the victim's panties matched the defendant's blood type, but the forensic scientist did not disclose that the victim's own vaginal discharges could have yielded the same results.14 When the scientist was asked later why he had not so testified, he responded that he was not asked!15

Outright lying seems to occur more frequently than one would suspect. A few bad apples have told outright lies about everything from their academic credentials to the tests they performed and the results they obtained.16

10 The quotation is from the judge's instructions to the jury. EHRMAN, supra note 109, at 268.
12 Id. at 23.
14 Giannelli, supra note 11, at 467-68.
15 Id. at 468 (citing Blake Fleetwood, From the People Who Brought You the Twinkie Defense; The Rise of the Expert Witness Industry, 19 WASH. MONTHLY, June 1987, at 33).
16 See Skaggs v. Commonwealth, 803 S.W.2d 573, 574 (Ky. 1990) (finding that the expert witness falsely portrayed himself as a well-credentialed doctor for forensic psychology); State v. Ruybal, 408 A.2d 1284, 1285 n.1 (Me. 1979) (The prosecution introduced testimony of an expert in forensic serology. Investigation of a case unrelated to the instant case revealed that the expert had reported results of lab tests that he did not in fact conduct.); State v. DeFronzo, 394 N.E.2d 1027, 1029-30 (Ohio 1978) (The prosecution's witness, Sergent Richard Zielinski, elevated his level of expertise in drug analysis, weapon operability, and handwriting analysis. Zielinski later pled guilty to eight counts of falsification for misstating his academic credentials.).
Professor Coady alludes to an excerpt from an American cartoon version of Robin Hood in criticizing the way lawyers meekly accept the qualifications of the expert:

Mouse: Who are you?
Fox: I'm Robin Hood.
Mouse: You don't look like Robin Hood, but if you say you are then it must be true, because Robin Hood wouldn't tell a lie.\textsuperscript{117}

Nevertheless, several commentators have offered up collections of cases involving experts who lied about their credentials. For example, one firearms expert apparently went so far as to take credit for some aspect of the development of penicillin and the atomic bomb.\textsuperscript{118} Lab technicians have been prosecuted for lying about their academic credentials.\textsuperscript{119} On the civil side of the house, Dr. Jeffrey Goltz was recently convicted of perjury for lying about his credentials in a civil case.\textsuperscript{120}

Perhaps the most spectacular cases of lying involved Fred Zain, the former Chief of Serology at the West Virginia State Police Crime Laboratory, Dr. Ralph Erdmann, a pathologist for forty-two Texas counties, and the late Dr. Louise Robbins, an anthropologist for hire who is remem-

\textsuperscript{117} Coady, supra note 13, at 277.

\textsuperscript{118} See Giannelli, supra note 94, at 5 (citing Starrs, Mountebanks Among Forensic Scientists, in 2 FORENSIC SCI. HANDBOOK 1, 7, 20-29 (R. Saferstein ed. 1988)).

\textsuperscript{119} Id. at 4 (citing State v. Elder, 199 Kan. 607, 608, 433 P.2d 462, 463 (1967) (involving defendant who stated he received a B.S. in chemistry and bacteriology and had attended medical school for two years, but no record could be found to indicate his enrollment or attendance at either institution); State v. DeFronzo, 394 N.E.2d 1027, 1030 (Ohio 1978)); see Giannelli, supra note 11, at 468 n.175; Moenssens, supra note 9, at 9-10.

\textsuperscript{120} Ruth Marcus, Civil Perjury is Prosecuted, SEATTLE TIMES, Mar. 3, 1998, at A2. This article reports the perjury conviction and eighteen-month prison sentence of orthopedic surgeon Jeffrey Goltz. Goltz had clearly lied about his education and training while testifying as an expert witness in a personal injury case. See Richardson v. AmTrak, 150 F.R.D. 1, 2-3 (D.D.C. 1993) (involving questions about Goltz's testimony about the operations that he had performed on the plaintiff), aff'd, 49 F.3d 760 (D.C. Cir. 1995). For other misconduct by Dr. Goltz, see Nat'l Capital Orthopedic Assocs., P.C. v. Goltz, 1997 WL 625117, *1 (D. Md. 1997) ("Dr. Goltz knew that [the] plaintiff was being underpaid but actively concealed this fact by causing false entries to be made in books and records, and falsely advising [the] plaintiff that he was being paid in full.").
bered for her bogus shoeprint and "Cinderella" testimony\(^\text{121}\) in a number of criminal cases, including \textit{Buckley v. Fitzsimmons}.\(^\text{122}\)

The specific acts of misconduct by the pro-prosecution Officer Zain were enumerated as follows:

\begin{itemize}
  \item [1] overstating the strength of results;
  \item [2] overstating the frequency of genetic matches on individual pieces of evidence;
  \item [3] misreporting the frequency of genetic matches on multiple pieces of evidence;
  \item [4] reporting that multiple items had been tested, when only a single item had been tested;
  \item [5] reporting inconclusive results as conclusive;
  \item [6] repeatedly altering laboratory records;
  \item [7] grouping results to create the erroneous impression that genetic markers had been obtained from all samples tested;
  \item [8] failing to report conflicting results;
  \item [9] failing to conduct or to report conducting additional testing to resolve conflicting results;
  \item [10] implying a match with a suspect when testing supported only a match with the victim;
  \item [11] reporting scientifically impossible or improbable results.\(^\text{123}\)
\end{itemize}

For his part, Erdmann became infamous for faking autopsy results—indeed, generating entirely fake autopsies!\(^\text{124}\) In one case, a defendant attempted to prove that his robbery victim was not harmed and that she must have died of a heart attack rather than strangulation.\(^\text{125}\) The prosecution responded with Erdmann's testimony that her coronary arteries were like those of a thirty-year-old woman.\(^\text{126}\) To prove his point he swore that certain microscopic slides were those of the eighty-year-old

\(^{\text{121}}\) The "Cinderella cases" involved Robbins' claimed ability to match footprints with the insoles of shoes belonging to suspects. \textit{See} Giannelli, \textit{supra} note 11, at 458.

\(^{\text{122}}\) \textit{509 U.S.} 259, 262, 113 S. Ct. 2606, 2610, 125 L. Ed. 2d 209, 219 (1993) (Buckley claimed that, "[a]fter three separate studies by experts . . . were unable to make a connection between the print and a pair of boots that [Buckley] had voluntarily supplied, [prosecutors] obtained a 'positive identification' from . . . Robbins . . . who was allegedly well known for her willingness to fabricate unreliable expert testimony."). The case resurfaced and continues to generate controversy because of alleged prosecutorial misconduct in the prosecution(s) of Rolando Cruz, another suspect in the same crime. \textit{See} "\textit{X-Spurt} Witnesses, supra note 7, at 402-03.


\(^{\text{124}}\) Giannelli, \textit{supra} note 11, at 449.


\(^{\text{126}}\) \textit{Id.}
Heid not reveal that he had made the slides from the arteries taken from the autopsy of a thirty-year-old! In another case Erdmann amended one of his "findings" after his initial testimony conflicted with the prosecutor's theory. He originally testified that a bullet hole had definitely not been made by a small .22 caliber weapon, but the prosecution built its case around a .22 caliber—so Erdman went back on the stand after a short recess to say that the bullet hole in the skull was from a .22 caliber that was enlarged by maggots. The defense sat passively. When the testimony was ultimately challenged later at trial, the court would not allow the jurors to hear the evidence of blatant contradiction!

We have already discussed how Dr. Robbins was "for hire" by prosecutors who were shopping for an expert. Still, Robbins' most fantastic performance came when she stated that, based on her examination of a human footprint, the footprint in question was made by a prehistoric woman who was five and a half months pregnant!

Despite the fact that forensic scientists may join, then tout their memberships in a variety of professional organizations, many of which have adopted codes of ethics, there is virtually no risk of sanctions from professional organizations.

Perhaps the most distressing aspect of the honesty problem is the complicity of lawyers, particularly prosecutors. If we cannot expect decency from our prosecutors, what can we expect to get from the other side of the "v."? Yet the literature is full of cases in which prosecutors went along with, and in a few cases even solicited, bogus evidence while

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127 Id.
128 Id.
130 Id.
131 Id. at 46.
132 Id.
133 Mark Hanson, Believe it or Not, 79 A.B.A. J., June 1993, at 64.
135 Cf. Berger v. United States, 295 U.S. 78, 88, 55 S. Ct. 629, 633, 79 L. Ed. 1314, 1321 (1935) ("It is as much [the prosecutor's] duty to refrain from improper methods calculated to produce a wrongful conviction as it is to use every legitimate means to bring about a just one.").
at the same time withholding exculpatory evidence. This withholding of exculpatory evidence has been done in spite of prosecutors’ constitutional duty to disclose when asked, and despite prosecutors’ affirmative ethical responsibility to disclose even in the absence of a triggering request. 

When I was looking for articles for my students to read I came across a piece by former Attorney General Dick Thornburgh. Thornburgh is a respected politician, and a former governor of Pennsylvania. I would not have counted him as an ethics expert, although I would not have counted him out either. When I saw he had written an article on junk science and legal ethics, I hoped that he had written, *ex cathedra*, on the subjects of “junk science” in criminal cases and prosecutorial misconduct. Alas, my hopes were dashed. He held forth on the subject of the breast implant cases and hammered the civil plaintiffs’ bar!

D. Lawyer Skills Problems

One of the common complaints of the critics is that lawyers do not challenge questionable forensic testimony. The testimony may be too

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138 See also Joseph Weeks, *No Wrong Without a Remedy: The Effective Enforcement of the Duty of Prosecutors to Disclose Exculpatory Evidence*, 22 OKLA. CITY U. L. REV. 833, 898 (1997) (stating that “the disciplinary process has been almost totally ineffective in sanctioning even egregious Brady violations”).


140 See generally id. Mr. Thornburgh is now in private practice in a large law firm. Of course, in the United States prosecutors enjoy absolute immunity for malicious prosecution, so most of the theorizing about discipline and tort liability for harm caused by “junk science” tends to focus on plaintiffs’ lawyers. See, e.g., Cynthia Grant Bowman & Elizabeth Mertz, *Attorneys As Gatekeepers to the Court: The Potential Liability of Attorneys Bringing Suits Based on Recovered Memories of Childhood Sexual Abuse*, 27 HOFSTRA L. REV. 223 (1998).
good to be true or even suggest the impossible. In too many cases, the
defense lawyer sits by as silent as the proverbial potted palm.\textsuperscript{141} This is
hardly a new phenomenon. It has been reported that in the infamous
Dreyfus case, the expert testimony of the great criminalist Alphonse
Bertillon incorrectly concluded that the incriminating document passing
French military information to the Germans was written by the innocent
Dreyfus. But Bertillon’s testimony (by deposition) was “in fact so
incomprehensible that it escaped cross examination at trial.”\textsuperscript{142} There is
nothing new under the sun.

Law school and CLE skills training cannot solve this problem, but they
can help. Additionally, lawyers can try to brush up on questionable
forensic testimony by consulting some of the available literature. I have
included as Appendix A a good basic bibliography for lawyers and law
students. Practitioners should also consider taking a tour of their local
crime lab. The more adventurous might even try to attend an autopsy.
I have found that state labs generally welcome visitors. Lawyers can also
become familiar with the codes of ethics promulgated by the various
professional associations,\textsuperscript{143} and can learn effective techniques for cross-
examination in trial advocacy courses.\textsuperscript{144} For the civil practitioner, I offer

\textsuperscript{141} See Giannelli, \textit{supra} note 94, at 11 (citing cases involving claims of “ineffective
assistance of counsel”). In one case in which a prosecution was dropped because of
conflicting an inconclusive expert testimony, Giannelli reports that “[o]ne of the defense
attorneys later admitted, ‘I suppose I was like the average citizen. They said it was a
match, I thought it was like a fingerprint.’” \textit{Id.} (quoting Bob Baker & Paul Lieberman,
\textit{Faulty Ballistics in Deputy’s Arrest: Eagerness to Wake Gun Cited in LAPD Lab Error},
L.A. TIMES, May 22, 1989, at 1); \textit{see also} Symposium, \textit{supra} note 65, at 637 (The article
quotes Professor Stephen Saltzburg: “[T]he adversary system is largely based on
exposure of weaknesses in witnesses, testimony, and physical evidence through cross-
examination, impeachment, and counter-evidence. Evidence not attacked is evidence
readily accepted.”).

\textsuperscript{142} F. Taroni, C. Champod, & P. Margot, \textit{Forerunners of Bayesianism in Early

\textsuperscript{143} See MOENSSENS ET AL., \textit{supra} note 85, at 91-92. Many of these codes can be
found on the forensic Web sites.

\textsuperscript{144} For a pre-\textit{Daubert} article that is still extremely useful see Lee Woldman Miller,
\textit{Cross-Examination of Expert Witnesses: Dispelling the Aura of Reliability}, 42 \textit{U. Miami
as Appendix B lawyer Sam Davies\textsuperscript{145} excellent outline on how to qualify an expert under the *Daubert-Kumho* rules.

\textsuperscript{145} Samuel Davies P.S.C., Town Square Place, 230 Knox Street, Barbourville, Kentucky, 40906, Phone (606) 546-5196.
Appendix A
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Appendix B
Direct Examination Model for Expert Witnesses†

Introduction
• Name and Address
• Highest Earned Degree (if allows you to, address the witness as “Doctor”)

Profession (Explain in Lay Terms)
• What it Involves
• How it Relates to this Case
• Length and Extent of Experience

Educational Background
• Each Degree, Number of Years to Acquire
• Specific Subjects Related to Case
• Special Training and Certifications

Area of Special Interest Within Profession (Focus of Testimony)
• Description
• Acceptance (Establish Reliable and Recognized Area)
• Experience and Recognition in Special Area
• Relevant Publication
• Résumé - Other Special Information

Consulting (Testimony) Experience
• Length and Frequency
• Party Alignment or Bias
• Pay Not Dependent on Outcome

† This outline developed by Samuel E. Davies, of Barbourville, Kentucky, and is used here with permission.

Job in this Case
- How Became Involved
- What Asked to Do (What Was Your Role?)
  Note: The Following “determinations” should be made by experts in any case.
  - How the Accident Occurred
  - The Product (Procedure) Is Unsafe
  - The Defect (Deviation) Caused Injury
  - Why the Defect (Deviation) Occurred
  - The Injury Was Preventable

Information Reviewed Significant to Opinions in this Case
- List (A written summary will be helpful)

Offer Opinions Within Range of Reasonable Probability Within Area of Expertise

Description of How the Expert Made Each Determination
(This is “Show-and-Tell” with exhibits, and the experts should establish the following:)

- Establish How the Accident Occurred
  - Rely Upon the Basic Underlying Data and Facts
  - Describe With Photos, Drawings, or Models

- Establish the Product (Procedure) Unsafe\(^\text{147}\)
  (Note: This will establish the “potential” for causation.)
  - Rely Upon Basic Concepts, Principles, and Authorities
  - Explain and Demonstrate Basic Concepts and Principles
    * Refer to Published Authorities
  - Compare to Similar Products (Procedures)
    * Show the Subject is Comparatively More Dangerous
  - Use Charts and Drawings to Demonstrate How and Why Unsafe

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• Establish Actual Causation as a Result of the Defect (Deviation)\textsuperscript{148}
  – Describe the Methodology (Testing, Examination, or Reconstruction) Specific to this Case
  * Establish Methodology Recognized and Reliable
  – Use Photos, Videos, Test Data, and Results to Demonstrate
  – Establish Substantially Similar if Necessary

• Establish Why the Defect (Deviation) Occurred
  (Note: This should establish that the defendant failed to do one or more of the following:)
  – Follow Basic Concepts and Principles
  – Follow Appropriate Standards
  – Appropriately Test
  – Evaluate the Risk
  – Warn of the Hazard
  – Guard Against the Hazard
  – Eliminate the Hazard

Opinion Product Unreasonably Dangerous (Or Deviated From Accepted Standards)
• Based Upon Background and Work in This Case

Opinion Defect or Deviation Was Cause of Injury\textsuperscript{149}
• Based Upon Background and Work in This Case

Establish that Safe Alternative Design (Or Procedure) Was Feasible and Would Have Prevented Injury (Note: This is also "Show-and-Tell" with Exhibits)

• Explain and Demonstrate How Alternative Feasible and Safe
  – Establish Alternative Known and Available
  – Describe Methodology Utilized to Establish Safe

\textsuperscript{148} Methodology: Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993); United States v. Bonds, 12 F.3d 540 (6th Cir. 1993); Mitchell v. Commonwealth, 908 S.W.2d 100 (Ky. 1995).

\textsuperscript{149} Ultimate Opinion: Stinger v. Commonwealth, 956 S.W.2d 883 (Ky. 1997).
Opinion

Bottom Line: A Safe Design (Procedure) Would have Prevented the Injury