



NATIONAL COMMISSION ON FORENSIC SCIENCE



PRESENTATION OF EXPERT TESTIMONY POLICY RECOMMENDATIONS

1. Experts should be asked to identify and explain the theoretical and factual basis for any conclusion and the reasoning on which the conclusion is based — and any limitations of their conclusions.
2. Experts should present testimony in a manner that accurately and fairly conveys the significance of their conclusions, avoiding unexplained or undefined technical terms or words of art.
3. Experts should remain neutral, and attorneys should respect this neutrality.
4. Experts should not testify beyond their expertise and should also appreciate the difference between testimony that the witness may give as an expert and testimony that the same witness may give as a lay/fact witness.¹
5. Experts should not testify on direct or redirect examination concerning case-specific conclusions not contained in the report(s)/documentation submitted in discovery — unless in fair response to issues raised on cross-examination. If an expert changes his or her opinion, a supplementary report should be submitted except where the change is occasioned by new information, presented during testimony and not previously available to the witness.

¹ The same witness may provide testimony as both an expert or a lay witness. The two roles need to be distinguished. The Federal Rules do “not distinguish between expert and lay witnesses, but rather between expert and lay testimony. Certainly it is possible for the same witness to provide both lay and expert testimony in a single case.” FED. R. EVID. 701 advisory committee’s note (2000).

6. Experts should not testify concerning conclusions that are beyond the limits of a laboratory’s testing protocols.

7. Experts should not use invalid or problematic terms in their reports or when testifying.²

8. Experts should not use misleading terms³ that suggest that the methodology or the expert is infallible when testifying.⁴

9. Experts should not use potentially misleading terms in their reports or when testifying without a clear explanation of the term’s significance and limitations.⁵

10. Experts should not use the term “scientific” when testifying unless the basis for their opinions has been scientifically validated.

11. Trial judges should not declare a witness to be an expert in the presence of the jury.

12. Attorneys have an obligation to understand the discipline — including its strengths and limitations — underlying the expert testimony that is

² For example: “to the exclusion of all others” and “reasonable scientific certainty.” These terms are discussed below. Jurisdictions that require the phrase “reasonable scientific (or medical) certainty” should reconsider its use.

³ In this context, “misleading” does not imply an intent to mislead; the effect of the testimony on the jury is the focus. In short, a jury can be misled even in the absence of an intent to mislead. *See* FED. R. EVID. 403 (“misleading the jury”); *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595 (1993) (“Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it.”) (quoting Jack B. Weinstein, *Rule 702 of the Federal Rules of Evidence Is Sound: It Should Not Be Amended*, 138 F.R.D. 631, 632 (1991)); NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* 4 (2009) (“imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence”).

⁴ For example: “zero error rate” and “100 percent accurate.” *See* NAS FORENSIC SCIENCE REPORT, *supra* note 3, at 142-43. These terms are discussed below.

⁵ For example: “match” and “consistent with.” *Id.* at 21. These terms are discussed below.

presented at trial and to appreciate the importance of consulting with experts prior to trial.⁶

13. The proponent of the expert testimony should not cause an expert to testify beyond the opinion submitted in discovery or beyond the limits of the laboratory's testing protocols.

14. Attorneys should not mischaracterize expert evidence in their comments to the jury.

DIRECTIVE RECOMMENDATIONS

1. The Attorney General should direct federal prosecutors, forensic laboratories within the Department of Justice, and laboratories under contract with the Department of Justice to follow the policies outlined above that are applicable to their duties.

2. The Attorney General should request that the Organization for Scientific Area Committees (OSAC) consider these policies in their best practices and standards development.

3. The Attorney General should ask other jurisdictions to consider adopting the policies outlined above.

BACKGROUND

⁶ The American Bar Association has made competence the first requirement in the rules of professional conduct. *See* ABA MODEL RULES OF PROF'L CONDUCT R. 1.1(a) ("Competent representation requires . . . thoroughness and preparation reasonably necessary for the representation."). Moreover, the Supreme Court has decided several recent cases on the Sixth Amendment right to effective assistance of counsel. *See* *Hinton v. Alabama*, 134 S. Ct. 1081 (2014) (finding counsel ineffective for failing to understand how to retain a defense expert); *Harrington v. Richter*, 131 S. Ct. 770, 788 (2011) ("Criminal cases will arise where the only reasonable and available defense strategy requires consultation with experts or introduction of expert evidence.").

The National Academy of Sciences (NAS) report⁷ on forensic science raised numerous issues about the presentation of expert testimony at trial, noting that “imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence.”⁸ Such evidence undercuts the justification for expert testimony. In *Kumho Tire Company, Ltd. v. Carmichael*,⁹ the Supreme Court wrote: “*Daubert* pointed out that Federal Rules 702 and 703 grant expert witnesses testimonial latitude unavailable to other witnesses on the ‘assumption that the expert’s opinion will have a reliable basis in the knowledge and experience of his discipline.’”¹⁰ This memo identifies a number of problems that have arisen in the presentation of expert testimony in criminal prosecutions.¹¹

I. TESTIFYING BEYOND THE LIMITS OF THE LABORATORY REPORT

*State v. Troedel*¹² illustrates this problem. Defendants Troedel and Hawkins were convicted of capital murder in separate trials. A report of a gunshot residue test using neutron activation analysis concluded that swabs “from the hands of Troedel and Hawkins contained antimony and barium in amounts typically found on the hands of a person who has discharged a firearm or has had his hands in close proximity to a discharging firearm.”¹³ The expert testified in accordance with this report at Hawkins’ trial but enhanced his testimony at Troedel’s trial, where he testified that “Troedel had fired the murder weapon.”¹⁴ Troedel’s conviction was upheld by the state courts. During federal habeas proceedings, the expert’s deposition was taken, at which time he testified that “he could not, from the results of his tests, determine or say to a scientific certainty

⁷ NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD (2009) [hereinafter NAS FORENSIC SCIENCE REPORT].

⁸ *Id.* at 4.

⁹ 526 U.S. 137 (1999) (quoting *Daubert* and pointing out that experts may testify to opinions, including those that are not based on firsthand knowledge or observation).

¹⁰ *Id.* at 147.

¹¹ The courts, however, have not applied *Daubert* rigorously in criminal cases: “The bottom line is simple: In a number of forensic science disciplines, forensic science professionals have yet to establish either the validity of their approach or the accuracy of their conclusions, and the courts have been utterly ineffective in addressing this problem.” NAS FORENSIC SCIENCE REPORT, *supra* note 3, at 53. *See also id.* at 106 (“Review of reported judicial opinions reveals that, at least in criminal cases, forensic science evidence is not routinely scrutinized pursuant to the standard of reliability enunciated in *Daubert*. . . . As the reported cases suggest, however, *Daubert* has done little to improve the use of forensic science evidence in criminal cases.”).

¹² *Troedel v. Wainwright*, 667 F. Supp. 1456 (S.D. Fla. 1986), *aff’d*, 828 F.2d 670 (11th Cir. 1987).

¹³ *Id.* at 1458.

¹⁴ *Id.* at 1459.

who had fired the murder weapon” and the “amount of barium and antimony on the hands of Troedel and Hawkins were basically insignificant.”¹⁵

The district court found the trial testimony “at the very least” misleading. The expert claimed that the prosecutor had “pushed” him further in Troedel’s trial, a claim that the prosecutor substantiated: “[O]ne of the prosecutors testified [at the habeas hearing] that, at Troedel’s trial, after [the expert] had rendered his opinion which was contained in his written report, the prosecutor *pushed* to ‘see if more could have been gotten out of this witness.’ When questioned why, in the Hawkins trial, he did not use [the expert] opinion that Troedel had fired the weapon, the prosecutor responded he did not know why.”¹⁶ In granting habeas relief, the court observed:

In light of this admission, the above testimony received at the evidentiary hearing and the inconsistent positions taken by the prosecution at Hawkins’ and Troedel’s trials, respectively, the Court concludes that the opinion Troedel had fired the weapon was known by the prosecution not to be based on the results of the neutron activation analysis tests, or on any scientific certainty or even probability. Thus, the subject testimony was not only misleading, but also was used by the State knowing it to be misleading.¹⁷

(The court also found Troedel’s counsel ineffective. Because defense counsel knew that the gunshot residue testimony was “critical,” his “failure either to depose the State’s expert witness or, more importantly, to consult with any other expert in the field, fell outside the scope of reasonably professional assistance.”¹⁸)

Witness Preparation

As *Troedel* demonstrates, attorneys bear significant responsibility for the presentation of expert testimony. The adversary process requires attorneys to put forth their strongest case, a requirement that incents lawyers to encourage their

¹⁵ *Id.*

¹⁶ *Id.* at 1459.

¹⁷ *Id.* at 1459-60.

¹⁸ *Id.* at 1461.

witnesses to testify in a way most favorable to their client’s position.¹⁹ Sometimes the pressure is overt.²⁰ At other times it is subtle but nevertheless unmistakable.²¹ The issue has arisen so often that the *ABA Standards on Criminal Justice* includes this provision: “A prosecutor who engages an expert for an opinion should respect the independence of the expert and should not seek to dictate the formation of the expert’s opinion on the subject.”²² The commentary to the Standard reads:

Statements made by physicians, psychiatrists, and other experts about their experiences as witnesses in criminal cases indicate the need for circumspection on the part of prosecutors who engage experts. Nothing should be done by the prosecutor to cast suspicion on the process of justice by suggesting that the expert color an opinion to favor the interests of the prosecutor.²³

A comparable standard applies to defense counsel — and for the same reasons.²⁴

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¹⁹ See Michael J. Saks, *Accuracy v. Advocacy: Expert Testimony Before the Bench*, TECH. REV. 43, 44-45 (1987) (“[E]xperts [are] vulnerable to the possibly distorting influence of lawyers. Long before the expert and lawyers arrive in court, a bond has formed between them. The influence of the lawyer is considerable.”); John I. Thornton, *Uses and Abuses of Forensic Science*, 69 ABA J. 288, 292 (1983) (“The evidence will be selected or rejected with only those items that conform to the arguments of one side actually being submitted for examination. A distinct possibility exists that the results of the examination by the forensic scientist will be skewed These situations represent potential sources of mischief The danger is that conflicts easily arise between scientist and lawyer — the former attempts to describe the evidence as it actually is, while the latter attempts to describe it in the most favorable light.”).

²⁰ See *Bank of Nova Scotia v. United States*, 487 U.S. 250, 258 (1988) (stating that the “District Court further concluded that one of the prosecutors improperly argued with an expert witness during a recess of the grand jury after the witness gave testimony adverse to the government”); Flynn McRoberts & Steve Mills, *From the Start, A Fault Science: Testimony on Bite Marks Prone to Error*, CHI. TRIB., Oct. 19, 2004 (“You get pushed a little bit by prosecutors, and sometimes you say OK to get them to shut up. . . . ‘I allowed myself to be pushed.’”) (quoting a forensic dentist).

²¹ See BARRY SCHECK ET AL., ACTUAL INNOCENCE: FIVE DAYS TO EXECUTION AND OTHER DISPATCHES FROM THE WRONGLY CONVICTED 31 (2000) (“Asked later if he was pressured to change his findings on Coakley, [Dr.] Shaler [the expert] said no. ‘Most attorneys,’ Shaler would also say, ‘like to let you know what their opinions of the facts of the case are — irrespective of the scientific conclusions.’”).

²² ABA STANDARDS ON CRIMINAL JUSTICE, PROSECUTION AND DEFENSE FUNCTION, Standard 3-3.3(a) (3d ed. 1993).

²³ *Id.* cmt. at 59.

²⁴ *Id.* Standard 4-4.4(a).

In sum, experts should not testify beyond the opinions expressed in their laboratory reports. If an expert changes her opinion, a supplementary report should be written and disclosed. This is consistent with the “continuing duty to disclose” (which is found in pretrial discovery rules) and is intended to prevent trial by ambush. Such a requirement also provides experts with some protection from overreaching by litigators.

II. TESTIFYING BEYOND THE LIMITS OF LABORATORY PROTOCOLS

Inconsistent testimony concerning the same technique probably occurs because experts do not follow laboratory protocols when testifying and because their testimony is not monitored by the laboratory.²⁵ This was a major problem in the bullet lead cases. Comparative analysis of bullet lead compared trace chemicals found in bullets at crime scenes with ammunition found in the possession of a suspect.²⁶ For over thirty years experts testified about bullet lead composition, a technique that was first used in the investigation into President Kennedy’s assassination.

The published cases reveal a wide variety of interpretive conclusions. In some cases, experts testified only that two exhibits were “analytically indistinguishable.”²⁷ In other cases, experts concluded that samples *could have* come from the same “source” or “batch.”²⁸ In still other cases, experts stated that the samples *came* from the same source.²⁹ The testimony in a number of cases went further and referred to a “box” of ammunition (usually fifty loaded cartridges, sometimes twenty). For example, two specimens:

- Could have come from the same box,³⁰

²⁵ The lack of a protocol could also cause inconsistent testimony.

²⁶ Various analytical techniques (e.g., neutron activation analysis, inductively coupled plasma-atomic emission spectrometry) have been used to determine the concentrations of seven elements — arsenic, antimony, tin, copper, bismuth, silver, and cadmium — in the bullet lead alloy of both the crime-scene and suspect’s bullets. Statistical tests are then used to compare the elements in each bullet.

²⁷ *Wilkerson v. State*, 776 A.2d 685, 689 (Md. Ct. Spec. App. 2001).

²⁸ *State v. Krummacher*, 523 P.2d 1009, 1012-13 (Or. 1974) (en banc).

²⁹ *United States v. Davis*, 103 F.3d 660, 673-74 (8th Cir. 1996); *People v. Lane*, 628 N.E.2d 682, 689-90 (Ill. App. Ct. 1993) (“He testified that the two bullets were analytically indistinguishable. Special Agent Riley opined that the two bullets came from the same source and that the match was as good as he had ever seen in his twenty years with the FBI.”).

³⁰ *State v. Strain*, 885 P.2d 810, 817 (Utah Ct. App. 1994); *State v. Jones*, 425 N.E.2d 128, 131 (Ind. 1981).

- Could have come from the same box or a box manufactured on the same day,³¹
- Were consistent with their having come from the same box of ammunition,³²
- Probably came from the same box,³³
- Must have come from the same box or from another box that would have been made by the same company on the same day.³⁴

Several other (and different) statements appear in the opinions. An early case reported that the specimens “had come from the same batch of ammunition: they had been made by the same manufacturer on the same day and at the *same hour*.”³⁵ One case reports the expert’s conclusion with a statistic.³⁶ In another case, the expert used the expressions “rare finding”³⁷ and “a very rare finding.”³⁸ In still another case, the expert “opined that the same company produced the bullets at the same time, using the same lead source. Based upon Department of Justice records, she opined that an overseas company called PMC produced the bullets around 1982.”³⁹

In later years, the testimony became more limited. A 2002 publication states the conclusion as follows: “Therefore, they likely originated from the same manufacturer’s source (melt) of lead.”⁴⁰ Testimony to the same effect was also

³¹ State v. Grube, 883 P.2d 1069, 1078 (Idaho 1994); People v. Johnson, 499 N.E.2d 1355, 1366 (Ill. 1986); State v. Earhart, 823 S.W.2d 607, 614 (Tex. Crim. App. 1991) (en banc) (“He later modified that statement to acknowledge that analytically indistinguishable bullets which do not come from the same box most likely would have been manufactured at the same place on or about the same day; that is, in the same batch.”), *vacated*, 509 U.S. 517 (1993).

³² State v. Reynolds, 297 S.E.2d 532, 534 (N.C. 1982).

³³ Bryan v. Oklahoma, 935 P.2d 338, 360 (Okla. Crim. App. 1997).

³⁴ United States v. Davis, 103 F.3d 660, 666-67 (8th Cir. 1996) (“An expert testified that such a finding is rare and that the bullets must have come from the same box or from another box that would have been made by the same company on the same day.”); Commonwealth v. Daye, 587 N.E.2d 194, 207 (Mass. 1992); State v. King, 546 S.E.2d 575, 584 (N.C. 2001) (The expert “opined that, based on her lead analysis, the bullets she examined either came from the same box of cartridges or came from different boxes of the same caliber, manufactured at the same time.”).

³⁵ Brown v. State, 601 P.2d 221, 224 (Alaska 1979) (emphasis added).

³⁶ State v. Earhart, 823 S.W.2d 607, 614 (Tex. Crim. App. 1991).

³⁷ United States v. Davis, 103 F.3d 660, 666 (8th Cir. 1996).

³⁸ *Id.* at 667.

³⁹ People v. Villarta, No. H021354, 2002 Cal. App. Unpub. Lexis 4776, at *15 (Cal. Ct. App. Jan. 17, 2002).

⁴⁰ Charles A. Peters, *The Basis for Compositional Bullet Lead Comparisons*, 4 FORENSIC SCI. COMMUNICATIONS No. 3, at 5 (July 2002) (emphasis added).

proffered: “Well, bullets that are analytically indistinguishable likely come from the same molten lead sources of lead, uh, as opposed to bullets that have different composition come from different, uh, melts of lead.”⁴¹

A 2004 NAS report undercut this testimony, finding that the amount of bullets that can be produced from a melt “can range from the equivalent of as few as 12,000 to as many as 35 million 40grain, .22 caliber longrifle bullets.”⁴² Based on this finding, the report concluded: “The available data do not support any statement that a crime bullet came from a particular box of ammunition. In particular, references to ‘boxes’ of ammunition in any form should be avoided as misleading under Federal Rule of Evidence 403.”⁴³

III. WITHHOLDING INFORMATION AT TRIAL

In *Driscoll v. Delo*,⁴⁴ a capital murder case, the laboratory report indicated that blood traces on Driscoll’s knife were type A, which matched the blood of a prison guard who had been injured by a stab wound but did not match the blood type of a murdered guard whose blood type was O. To explain the absence of type O blood, the prosecution offered several theories, one of which was that the presence of the type O blood was “masked” by the type A blood. The chief serologist of the state crime laboratory testified about this theory at trial. Only in a subsequent habeas proceeding was it revealed that the serologist had performed another test, which had eliminated the “masking” problem, revealing the lack of type O blood. “The jury was never informed that the latter test was performed or that no type O blood was on the knife In its closing argument, the state made much of the masking theory, turning unfavorable serology evidence into neutral evidence at worst.”⁴⁵

⁴¹ Transcript of Trial Testimony of Charles Peters, *Commonwealth v. Wilcox*, Kentucky, Feb. 28, 2002.

⁴² *Id.*

⁴³ NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, FORENSIC ANALYSIS: WEIGHING BULLET LEAD EVIDENCE 6 (2004).

⁴⁴ 71 F.3d 701, 707 (8th Cir. 1995). The effective assistance of counsel was also raised: Whether alleged murder weapon “had blood matching the victim’s constituted an issue of the utmost importance. Under these circumstances, a reasonable defense lawyer would take some measures to understand the laboratory tests performed and the inferences that one could logically draw from the results. At the very least, any reasonable attorney under the circumstances would study the state’s laboratory report with sufficient care so that if the prosecution advanced a theory at trial that was at odds with the serology evidence, the defense would be in a position to expose it on cross-examination.” *Id.* at 709.

⁴⁵ *Id.* at 708.

In the Cruz and Hernandez prosecutions, the misuse of scientific evidence as well as other evidence led a police officer and an Assistant Attorney General to resign in protest during the initial proceedings and eventually lead to trials of the original prosecutors and police officers.⁴⁶ For example:

When a crime technician arrived at the courthouse to testify for the state, he pulled aside one of the prosecutors and relayed some news: representatives from the Nike shoe company said that the prints at the back window had been made by a woman's shoe, perhaps size six or five and a half. Either size was too small for Cruz or Hernandez. The prosecutor put the technician on the witness stand and carefully avoided any mention of the shoe size or likely gender. In fact, the defense was not told about the Nike analysis.⁴⁷

The defendants were later exonerated by DNA analysis.⁴⁸

In *Mitchell v. Gibson*,⁴⁹ an expert provided the jury with evidence implicating the accused in an sexual assault, which — based on evidence withheld from the defense — the expert knew was misleading. The Tenth Circuit observed that this improper conduct was compounded by “the prosecutor, whom the district court found had ‘labored extensively at trial to obscure the true DNA test results and to highlight [the expert’s] test results,’ and whose characterization of the FBI

⁴⁶ See Barry Siegel, *Presumed Guilty; An Illinois Murder Case Becomes a Test of Conscience Inside the System*, L.A. TIMES, Nov. 1, 1992, (Magazine) at 18 (quoting former detective John Sam); Brandon L. Garrett, *CONVICTING THE INNOCENT: WHERE CRIMINAL PROSECUTIONS GO WRONG* (2011) (discussing case)..

⁴⁷ SCHECK ET AL., *supra* note 21, at 178.

⁴⁸ EDWARD CONNORS ET AL., NAT'L INST. OF JUSTICE, *CONVICTED BY JURIES, EXONERATED BY SCIENCE: CASE STUDIES IN THE USE OF DNA EVIDENCE TO ESTABLISH INNOCENCE AFTER TRIAL* 44 (1996) (discussing cases of Rolando Cruz and Alejandro Hernandez) [hereinafter *Exonerated by Science*]. See also Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1 (2009) (The study identified several different types of invalid testimony: (1) presenting non-probative evidence as probative, (2) discounting exculpatory evidence, (3) using inaccurate frequencies or statistics, (4) providing a statistic without support, (5) providing non-numerical statements without empirical support, and (6) attributing the source of evidence to the defendant.).

⁴⁹ 262 F.3d 1036 (10th Cir. 2001). “The results thus completely undermined Ms. Gilchrist’s testimony.” *Id.* at 1064 (emphasis in original) (“An expert testified at the evidentiary hearing that the DNA testing performed by Agent Vick unquestionably eliminated Mr. Mitchell This expert reviewed Ms. Gilchrist’s trial testimony . . . and stated that the testimony was based on the use of test methods Ms. Gilchrist knew were less precise than the DNA tests which eliminated Mr. Mitchell. Moreover, he pointed out that one of the tests she performed in fact excluded Mr. Mitchell.”).

report in his closing argument was ‘entirely unsupported by evidence and . . . misleading.’⁵⁰

In the North Carolina Innocence Inquiry Commission’s investigation into the Greg Taylor case, the bench notes of the serologist, who had examined evidence for Taylor’s original trial, surfaced. The lab report noted that there were “chemical indications for the presence of blood.”⁵¹ In contrast, the bench notes showed that a subsequent confirmatory test was negative. These results were not disclosed to the prosecution or the defense at trial. As a result of this disclosure, the State Attorney General commissioned an investigation into the lab’s practices, which was conducted by two former FBI officials. They concluded:

This report raises serious issues about laboratory reporting practices from 1987-2003 and the potential that information that was material and even favorable to the defense of criminal charges filed was withheld or misrepresented. The factors that contributed to these issues range from poorly crafted policy; lack of objectivity[;] the absence of clear report writing guidance; inattention to reporting methods that left too much discretion to the individual Analyst[;] lack of transparency; and ineffective management and oversight of the Forensic Biology Section from 1987 through 2003.⁵²

In particular, the investigation identified four different types of improper reporting. These included reports that: (1) mentioned that tests for the presence of blood are not conclusive but fail to report a confirmatory negative test; (2) failed to mention one or more negative or inconclusive confirmatory tests; (3) stated that no further tests were conducted when, in fact, one or more confirmatory tests were conducted with negative or inconclusive results; and (4) overstated laboratory test results or where lab notes contradicted reported result.⁵³

IV. OVERSTATEMENTS IN TESTIMONY

⁵⁰ *Id.*

⁵¹ Mike Klinkosum, *State v. Taylor and the North Carolina State Bureau of Investigation Lab Scandal*, CHAMPION 10 (May 2011).

⁵² CHRIS SWECKER & MICHAEL WOLF, AN INDEPENDENT REVIEW OF THE SBI FORENSIC LABORATORY 4 (2010), available at http://www.ncids.com/forensic/sbi/Swecker_Report.pdf.

⁵³ *Id.* at 3.

Cases in which expert testimony goes beyond the limitations of a scientific technique are not uncommon.⁵⁴ For example, hair evidence has frequently been misused.⁵⁵ In one case, the expert testified that the crime scene hair sample “*was unlikely to match anyone*” other than the defendant, Edward Honaker.⁵⁶ At best, the expert could have testified that the hairs were “consistent,” which means that they could have come from Honaker or thousands of other people.⁵⁷ Honaker was later exonerated by DNA testing.

Similarly, in *Williamson v. Reynolds*,⁵⁸ the expert testified that hair samples were “consistent microscopically”⁵⁹ and then went on to explain what this meant: “In other words, hairs are not an absolute identification, but they either came from this individual or there is — could be another individual *somewhere in the world* that would have the same characteristics to their hair.”⁶⁰ Five days before Williamson’s scheduled execution for murder, a federal judge granted his petition for habeas relief. He was later exonerated by DNA testing.⁶¹

V. TESTIFYING BEYOND EXPERTISE; LAY TESTIMONY

An expert’s testimony must relate to the subject matter on which the expert has been qualified. “It goes without saying that an expert qualified to testify upon one topic may be completely unqualified to testify about another as to which he lacks special knowledge, skill, experience, or training, but some applications of

⁵⁴ See *State v. Spencer*, 216 N.W.2d 131, 134 (Minn. 1974) (“We are concerned . . . about the sweeping and unqualified manner in which [the expert’s] testimony was offered An expert witness could be permitted to testify that in his opinion the chemicals present on defendant’s hand may have resulted from the firing of a gun. He should not have been permitted to state, as he did, that this defendant had definitely fired a gun.”); Dennis S. Karjala, *The Evidentiary Uses of Neutron Activation Analysis*, 59 CAL. L. REV. 997, 1024 (1971) (“[F]ew experts have used appropriate care in limiting their testimony.”).

⁵⁵ “Sixty-five of the trials examined involved microscopic hair comparison analysis. Of those, 25 — or 38% — had invalid hair comparison testimony. Most (18) of these cases involved invalid individualizing claims.” Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 47 (2009).

⁵⁶ EXONERATED BY SCIENCE, *supra* note 48, at 65 (emphasis added).

⁵⁷ See B.D. Gaudette, *Probabilities and Human Pubic Hair Comparisons*, 21 J. FORENSIC SCI. 514, 514 (1976) (“If a pubic hair from the scene of a crime is found to be similar to those from a known source, [the courts] do not know whether the chances that it could have originated from another source are one in two or one in a billion.”).

⁵⁸ 904 F. Supp. 1529, 1558 (E.D. Okl. 1995), *aff’d*, 110 F.3d 1508, 1523 (10th Cir. 1997).

⁵⁹ *Id.* at 1554.

⁶⁰ *Id.* (emphasis added).

⁶¹ See JOHN GRISHAM, *THE INNOCENT MAN: MURDER AND INJUSTICE IN A SMALL TOWN* (2006) (discussing Williamson case).

this principle take the unwary by surprise.”⁶² In *People v. Ayala*,⁶³ an expert recognized this limitation: “Dr. Kellerhouse acknowledged that he was not a ballistics expert, and declined to testify about the bullets’ caliber As a radiologist, Dr. Kellerhouse could testify that the bullets were located so that their relative size would not be distorted in the X-ray photographs.”⁶⁴

Further, a witness may be an expert on one aspect of a technique but not on other aspects. Accordingly, courts must “differentiate between ability to operate an instrument or perform a test and the ability to make an interpretation drawn from use of the instrument.”⁶⁵ For example, a police officer may be qualified to conduct a horizontal gaze nystagmus test (an intoxication test) but not be qualified to interpret the results.

[The officer’s] opinion that appellant was under the influence of alcohol, to the extent it was based on the nystagmus test, rests on scientific principles well beyond his knowledge, training, or education. Without some understanding of the processes by which alcohol ingestion produces [eye] nystagmus, how strong the correlation is, how other possible causes might be masked, what margin of error has been shown in statistical surveys, and a host of other relevant factors, [the officer’s] opinion on causation, notwithstanding his ability to recognize the symptom, was unfounded.⁶⁶

Moreover, a witness may testify as both a lay (fact) witness and an expert witness — e.g., a pathologist performing an autopsy.⁶⁷ The Federal Rules do “not distinguish between expert and lay *witnesses*, but rather between expert and lay *testimony*. Certainly it is possible for the same witness to provide both lay and expert testimony in a single case.”⁶⁸ Attorneys and experts should appreciate the difference.

VI. MISLEADING TERMS IN TESTIMONY

⁶² JOHN MAGUIRE, EVIDENCE: COMMON SENSE AND COMMON LAW 30-31 (1947).

⁶³ 6 P.3d 193 (Cal. 2000).

⁶⁴ *Id.* at 215.

⁶⁵ *People v. King*, 72 Cal. Rptr. 478, 491 (Cal. Ct. App. 1968).

⁶⁶ *People v. Williams*, 5 Cal. Rptr. 2d 130, 135 (Cal. Ct. App. 1992).

⁶⁷ Testimony that involves the observation of wounds on a decedent is lay testimony, while the interpretation of those wounds involves expertise.

⁶⁸ Fed. R. 701 advisory committee’s note (2000).

As noted above, the NAS report on forensic science raised numerous issues about the presentation of expert testimony at trial, noting that “imprecise or exaggerated expert testimony has sometimes contributed to the admission of erroneous or misleading evidence.”⁶⁹ The report later voiced concern about the use of terms such as “match,” “consistent with,” “identical,” “similar in all respects tested,” and “cannot be excluded as the source of.” These terms can have “a profound effect on how the trier of fact in a criminal or civil matter perceives and evaluates scientific evidence.”⁷⁰

The Supreme Court identified the same concern in *Daubert*: “Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it.”⁷¹ Moreover, Federal Rule of Evidence 403 provides: “The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, *misleading the jury*, undue delay, wasting time, or needlessly presenting cumulative evidence.”⁷² In this context, “misleading” does not imply an intent to mislead; the effect of the testimony on the jury is the focus of Rule 403. In short, a jury can be misled even in the absence of an intent to mislead. Courts are concerned about the “CSI effect” — i.e., “scientific proof may in some instances assume a posture of mystic infallibility in the eyes of a jury of laymen.”⁷³ Courts often exclude polygraph evidence on this basis.⁷⁴

Certain terms should not be used in presenting expert testimony because they are either invalid or confusing. Other terms should not be used at trial without an explanation because of their potential to mislead the trier of fact.

A. “Zero Error Rate”

⁶⁹ NAS FORENSIC SCIENCE REPORT, *supra* note 3, at 4.

⁷⁰ *Id.* at 21.

⁷¹ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 595 (1993) (quoting Jack B. Weinstein, *Rule 702 of the Federal Rules of Evidence Is Sound: It Should Not Be Amended*, 138 F.R.D. 631, 632 (1991)).

⁷² FED. R. EVID. 403 (emphasis added).

⁷³ *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974).

⁷⁴ *See United States v. Call*, 129 F.3d 1402, 1406 (10th Cir. 1997) (“There is also the danger that the jury may overvalue polygraph results as an indicator of truthfulness because of the polygraph’s scientific nature.”); *United States v. Falsia*, 724 F.2d 1339, 1342 (9th Cir. 1983) (noting polygraph’s “misleading appearance of accuracy”).

In *United States v. Havvard*,⁷⁵ which involved a *Daubert* challenge to fingerprint evidence, the expert claimed that the “error rate for the method is zero.”⁷⁶ Note the word *method* in the above quote. Examiners argued that, while individual examiners may make mistakes, the methodology itself is perfect. However, the dichotomy between “methodological” and “human” error rates in this context is “practically meaningless”⁷⁷ because the examiner is the method.⁷⁸

The 2009 NAS report addressed this point: “Although there is limited information about the accuracy and reliability of friction ridge analyses, claims that these analyses have zero error rates are not scientifically plausible.”⁷⁹ The report goes on to observed: “Some in the latent print community argue that the method itself, if followed correctly. . . has a zero error rate. Clearly, this assertion is unrealistic The method, and the performance of those who use it, are inextricably linked, and both involve multiple sources of error (e.g., errors in executing the process steps, as well as errors in human judgment.)”⁸⁰

Several courts also commented on this issue. For example, in *United States v. Mitchell*,⁸¹ the Third Circuit wrote: “Testimony at the *Daubert* hearing indicated that some latent fingerprint examiners insist that there is no error rate associated with their activities This would be out-of-place under Rule 702.”⁸² The same issue arose in a firearms identification case. In *United States v.*

⁷⁵ 117 F. Supp. 2d 848 (S.D. Ind. 2000), *aff’d*, 260 F.3d 597 (7th Cir. 2001).

⁷⁶ *Id.* at 854.

⁷⁷ Jennifer L. Mnookin, *Fingerprint Evidence in an Age of DNA Profiling*, 67 BROOK. L. REV. 13, 60 (2001). Professor Mnookin goes on to provide this analogy: “The same argument could be made of eyewitness testimony, a notoriously unreliable form of evidence. People are all distinct from one another in observable ways; therefore the theoretical error rate of eyewitness identification is zero, though in practice observers may frequently makes errors.” *Id.* See also Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 1040 (2005) (“in fingerprint practice the concept is vacuous”). Professor Cole identified twenty-two misidentifications, which he argues “are most likely only the tip of the proverbial iceberg of actual cases of fingerprint misattribution.” *Id.* at 991. The misidentification cases include some that involved (1) verification by one or more other examiners, (2) examiners certified by the International Association of Identification, (3) procedures using a sixteen-point standard, and (4) defense experts who corroborated misidentifications made by prosecution experts.

⁷⁸ See Sandy L. Zabell, *Fingerprint Evidence*, 13 J.L. & POL’Y 143, 172 (2005) (“But, given its unavoidable subjective component, in latent print examination people *are* the process.”) (emphasis added).

⁷⁹ NAS FORENSIC SCIENCE REPORT, *supra* note 3, at 142.

⁸⁰ *Id.* at 143.

⁸¹ 365 F.3d 215 (3d Cir. 2004) (admitting fingerprint evidence).

⁸² *Id.* at 245-46. Rule 702 is the governing rule on expert testimony.

Glynn,⁸³ the court wrote that “[t]he problem is compounded by the tendency of ballistics experts . . . to make assertions that their matches are certain beyond all doubt, that the error rate of their methodology is ‘zero,’ and other such pretensions.”⁸⁴

B. “Hundred Percent Accurate”

In a different firearms identification case, *United States v. Monteiro*,⁸⁵ the court noted:

[T]he examiners testified to the effect that they could be 100 percent sure of a match. Because an examiner’s bottom line opinion as to an identification is *largely a subjective one*, there is no reliable statistical or scientific methodology which will currently permit the expert to testify that it is a “match” to an absolute certainty, or to an arbitrary degree of statistical certainty.⁸⁶

The 2009 NAS report concurred: “The insistence by some forensic practitioners that their disciplines employ methodologies that have perfect accuracy and produce no errors has hampered efforts to evaluate the usefulness of the forensic science disciplines.”⁸⁷

In its first report on DNA profiling, the National Academy of Sciences report commented: “Prosecutors and defense counsel should not oversell DNA evidence. Presentations that suggest to a judge or jury that DNA typing is infallible are rarely justified and should be avoided.”⁸⁸

C. “Scientific”

⁸³ 578 F. Supp. 2d 567 (S.D.N.Y. 2008).

⁸⁴ *Id.* at 574.

⁸⁵ 407 F. Supp. 2d 351 (D. Mass. 2006).

⁸⁶ *Id.* at 372 (emphasis added).

⁸⁷ NAS FORENSIC SCIENCE REPORT, *supra* note 3, at 47.

⁸⁸ NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, DNA TECHNOLOGY IN FORENSIC SCIENCE 26 (1992).

The use of terms such as “science” or “scientific” in presenting expert testimony is also problematic.⁸⁹ In 1995, a federal district court in *United States v. Starzeczyzel*⁹⁰ concluded that “forensic document examination, despite the existence of a certification program, professional journals and other trappings of science, cannot, after *Daubert*, be regarded as ‘scientific . . . knowledge.’”⁹¹ The court further stated that “while scientific principles may *relate* to aspects of handwriting analysis, they have little or nothing to do with the day-to-day tasks performed by [Forensic Document Examiners] [T]his attenuated relationship does not transform the FDE into a scientist.”⁹²

Although the court went on to admit the testimony as technical evidence, it placed conditions on its admissibility.⁹³ Because FDEs use terms such as “laboratory” and refer to authorities with titles containing the words “science” or “scientific,” there is a risk, according to the court, that jurors may bestow upon FDEs the aura of the infallibility of science. The court approved a jury instruction, which stated that “FDEs offer practical, rather than scientific expertise.”⁹⁴ Similarly, in *United States v. Glynn*,⁹⁵ a firearms identification case, the court observed: “Based on the *Daubert* hearings . . . , the Court very quickly concluded that whatever else ballistics identification analysis could be called, it could not fairly be called ‘science.’”⁹⁶

The NAS report provides support for this position: “The law’s greatest dilemma in its heavy reliance on forensic evidence . . . concerns the question of whether — and to what extent — there is *science* in any given forensic science discipline.”⁹⁷ A subsequent passage concluded: “Among existing forensic methods, only nuclear DNA analysis has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a

⁸⁹ Philosophers of science disagree about the definition of “science.” The Supreme Court quoted one definition in *Daubert*: KARL POPPER, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE 37 (5th ed. 1989) (“[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.”). *Daubert*, 509 U.S. at 593.

⁹⁰ 880 F. Supp. 1027 (S.D.N.Y. 1995).

⁹¹ *Id.* at 1038.

⁹² *Id.* at 1041.

⁹³ In the court’s view, *Daubert* did not apply to nonscientific experts. The court relied on the following statement in *Daubert*: “Our discussion is limited to the scientific context because that is the nature of the expertise offered here.” 509 U.S. at 590 n.8. This position was undercut by *Kumho Tire*, which held that all expert testimony must pass the *Daubert* reliability test. *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 149 (1999).

⁹⁴ 880 F. Supp. at 1049.

⁹⁵ 578 F. Supp. 2d 567 (S.D.N.Y. 2008).

⁹⁶ *Id.* at 570.

⁹⁷ NAS FORENSICS SCIENCES REPORT, *supra* note 3, at 9.

connection between an evidentiary sample and a specific individual or source.”⁹⁸ Other passages are in accord.⁹⁹

Many forensic identification disciplines are ultimately subjective, and there are often no meaningful standards¹⁰⁰ — factors that undercut claims that these techniques are “scientific.”¹⁰¹

In *Kumho Tire*, the Supreme Court rejected the distinction between “scientific” and “technical” evidence for purposes of applying the *Daubert* test, observing that the distinction would be difficult to draw.¹⁰² Thus, the

⁹⁸ *Id.* at 100.

⁹⁹ “The simple reality is that the interpretation of forensic evidence is not always based on scientific studies to determine its validity. This is a serious problem. Although research has been done in some disciplines, there is a notable dearth of peer-reviewed, published studies establishing the scientific bases and validity of many forensic methods.” *Id.* at 8. “Much forensic evidence — including, for example, bite marks and firearm and toolmark identifications — is introduced in criminal trials without any meaningful scientific validation, determination of error rates, or reliability testing to explain the limits of the discipline.” *Id.* at 107-08

¹⁰⁰ “Often there are no standard protocols governing forensic practice in a given discipline. And, even when protocols are in place . . . , they often are vague and not enforced in any meaningful way.” *Id.* at 6.

¹⁰¹ Jennifer L. Mnookin, et al., *The Need for a Research Culture in the Forensic Sciences*, 58 UCLA L. Rev. 725, 731 (2011) (“In our collective opinion, the pattern identification disciplines, as well as other forms of forensic science evidence, must be placed on a more rigorous scientific foundation. More generally, we believe that a significant culture shift is required: Forensic science needs to focus more on science than on law, to shift from a quasi-adversarial perspective to a research orientation. In short, we call for the development and instantiation of what we will term a research culture within forensic science”); Jennifer L. Mnookin, *The Courts, The NAS, and the Future of Forensic Science*, 75 BROOKLYN L. REV. 1209, 1215 (2010) (“This forensic science culture — a culture in which claims derived from experience are often accepted as a substitute for data; a culture in which interpretations are often framed in absolute terms rather than in more limited or modest language; a culture in which potentially biasing information is not systematically kept from the forensic examiner; and a culture in which institutionally cozy relationships between detectives, forensic analysts, and prosecutors may encourage unconscious partisanship — remains very much the norm within forensic science laboratories today. It is, in the end, this culture that needs to change; new and improved forensic techniques will not, by themselves, provide an adequate solution.”).

¹⁰² The Court wrote:

[I]t would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction between “scientific” knowledge and “technical” or “other specialized” knowledge. There is no clear line that divides the one from the others. Disciplines such as engineering rest upon scientific knowledge. Pure scientific theory itself may depend for its development upon observation and properly engineered machinery. And conceptual efforts to distinguish the two are unlikely to produce clear legal lines capable of application in particular cases. Cf. Brief for National Academy of Engineering as *Amicus Curiae* 9 (scientist seeks to understand nature while the engineer seeks nature’s modification); Brief for Rubber Manufacturers Association as *Amicus Curiae* 14-16 (engineering, as an “‘applied science,’ ” relies on “scientific reasoning and methodology”); Brief for John Allen et al.

classification of evidence as scientific or nonscientific is not important for *admissibility* purposes; all expert testimony must satisfy the *Daubert* validity/reliability requirement. However, the term “scientific” may unduly impress the jury.¹⁰³

There is little question that physical evidence (e.g., distinctive shoe print) can be probative and powerful even though it is not scientific.

D. “Reasonable Degree of Scientific Certainty”

The expression “reasonable scientific certainty,” which is often included (and sometimes demanded) in expert testimony, is another phrase that should be abandoned.¹⁰⁴

1. *Lack of a Scientific Bases*

The phrase, which combines two suspect words — “scientific”¹⁰⁵ and “certainty” — has no scientific meaning. One scholar summed it up this way:

as *Amici Curiae* 6 (engineering relies upon “scientific knowledge and methods”).

Kumho Tire, 526 U.S. at 148.

¹⁰³ See *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974) (“[S]cientific proof may in some instances assume a posture of mystic infallibility in the eyes of a jury of laymen.”).

¹⁰⁴ The term “reasonable medical certainty” is similarly problematic.

¹⁰⁵ See *United States v. Glynn*, 578 F. Supp. 2d 567, 570 (S.D.N.Y. 2008) (“Based on the *Daubert* hearings . . . , the Court very quickly concluded that whatever else ballistics identification analysis could be called, it could not fairly be called ‘science.’”); *United States v. Starzecpyzel*, 880 F. Supp. 1027, 1038, 1041 (S.D.N.Y. 1995) (“forensic document examination, despite the existence of a certification program, professional journals and other trappings of science, cannot, after *Daubert*, be regarded as ‘scientific . . . knowledge.’”; “while scientific principles may relate to aspects of handwriting analysis, they have little or nothing to do with the day-to-day tasks performed by [Forensic Document Examiners] [T]his attenuated relationship does not transform the FDE into a scientist.”). See also NAS FORENSICS SCIENCES REPORT, *supra* note 3, at 9, 107-08 (“The law’s greatest dilemma in its heavy reliance on forensic evidence . . . concerns the question of whether — and to what extent — there is science in any given forensic science discipline.”; “Much forensic evidence — including, for example, bite marks and firearm and toolmark identifications — is introduced in criminal trials without any meaningful scientific validation, determination of error rates, or reliability testing to explain the limits of the discipline.”).

The reasonable-degree-of-scientific-certainty language almost certainly was drafted by the lawyers. Scientists have no use for this phrase (outside the courtroom). Indeed, “a reasonable degree of scientific certainty” is not a defined concept in scientific disciplines or even in law. . . . It is legal mumbo jumbo derived from archaic cases in which lawyers discovered that if a medical doctor did not utter the incantation “to a reasonable degree of medical certainty,” his testimony might be excluded because doctors were not supposed to talk about mere probabilities. Modern cases usually recognize that suitably explained information about less-than-certain possibilities can be helpful in various circumstances, but experts want to (or are induced to) incant not only “medical certainty” but also “clinical certainty,” “psychological certainty,” “psychiatric certainty,” “engineering certainty,” “architectural certainty,” “ballistic certainty,” “professional certainty,” and even “forensic certainty” and “legal certainty.”¹⁰⁶

The requirement that experts testify in terms of probability most likely originated as a “sufficiency” rule in civil cases in which causation was an issue. The plaintiff in a civil action would have to prove causation by preponderance of evidence (i.e., more probable than not). The term may then have been improperly transmuted into an “admissibility” rule in civil cases and then improperly applied in criminal cases.¹⁰⁷

2. *Federal Rules of Evidence*

Article VII of the Federal Rules of Evidence, which governs expert testimony, does not require the use of the phrase “reasonable scientific (or medical) certainty, as some courts have recognized: “There is no such requirement.”¹⁰⁸ It is a common law requirement that, at least in theory, was abolished by Federal Rule 402, which makes all relevant evidence in the absence of a rule of exclusion.¹⁰⁹

¹⁰⁶ DAVID H. KAYE, *THE DOUBLE HELIX AND THE LAW OF EVIDENCE* 82 (2010).

¹⁰⁷ See PAUL C. GIANNELLI, *BALDWIN’S OHIO PRACTICE, EVIDENCE* § 702.6 (3d ed. 2010) (describing the Ohio experience with the term).

¹⁰⁸ *United States v. Cyphers*, 553 F.2d 1064, 1072 (7th Cir. 1977).

¹⁰⁹ Edward J. Imwinkelried & Robert G. Scofield, *The Recognition of an Accused’s Constitutional Right to Introduce Expert Testimony Attacking the Weight of Prosecution Science Evidence: The Antidote for the Supreme Court’s Mistaken Assumption in California v. Trombetta*, 33 *Ariz. L. Rev.* 59, 69 (1991) (“Many courts continue to exclude opinions which fall short of expressing a probability or certainty. . . . These opinions have been excluded in jurisdictions which have adopted the Federal Rules of Evidence.”).

3. *Ambiguous and Misleading*

Although the phrase is used frequently in cases, its legal meaning is ambiguous at best.¹¹⁰ One commentator observed: “Although judges expect, and sometimes insist, that expert opinions be expressed with ‘reasonable medical certainty,’ and although attorneys ritualistically intone the phrase, no one knows what it means! No consensus exists among judges, attorneys, or academic commentators as to whether ‘reasonable medical certainty’ means ‘more probable than not’ or ‘beyond a reasonable doubt’ or something in between.”¹¹¹

The ambiguity of the term is illustrated in *Burke v. Town of Walpole*,¹¹² a bite mark identification case. The First Circuit had to interpret the term as used in an arrest warrant:

[W]e must assume that the magistrate who issued the arrest warrant assigned no more than the commonly accepted meaning among lawyers and judges to the term “reasonable degree of scientific certainty” — “a standard requiring a showing that the injury was *more likely than not* caused by a particular stimulus, based on the general consensus of recognized [scientific] thought.” Black’s Law Dictionary 1294 (8th ed.2004) (defining “reasonable medical probability,” or “reasonable medical certainty,” as used in tort actions). That standard, of course, is fully consistent with the probable cause standard.¹¹³

Note that the case involved a magistrate, not a jury. It seems doubtful that a jury would understand that the term “reasonable scientific certainty” meant only “more probable than not” — *i.e.*, 51 percent. It is more likely that the jury would understand the term to mean 95% certain or perhaps “beyond a reasonable doubt.”

¹¹⁰ Sometimes the phrase seems to be used as a confidence statement (*i.e.*, “I am confident of my opinion.”), in which case the expert could avoid the phrase altogether and directly testify how confident she is in her opinion. See James E. Hullverson, *Reasonable Degree of Medical Certainty: A Tort et a Travers*, 31 ST. LOUIS U.L.J. 577, 582 (1987) (“[T]here is nevertheless an undercurrent that the expert in federal court express some basis for both the confidence with which his conclusion is formed, and the probability that his conclusion is accurate.”).

¹¹¹ Jeff L. Lewin, *The Genesis and Evolution of Legal Uncertainty About “Reasonable Medical Certainty,”* 57 MD. L. REV. 380 (1998).

¹¹² 405 F.3d 66 (1st Cir. 2005).

¹¹³ *Id.* at 91 (emphasis added).

The problem could be rectified by using the phrase “more probable than not” rather than “reasonable scientific certainty.” However, this solution introduces its own problems. Federal Rule 401 requires only that evidence be relevant, not probable. For example, evidence that a suspect had a .38 caliber handgun and that a .38 caliber bullet was found during a murder victim’s autopsy satisfies Rule 401.¹¹⁴ But the expert could not say that suspect’s handgun *probably* fired the bullet.¹¹⁵

4. *Recent Cases*

The phrase has come under attack in recent cases. In *United States v. Glynn*,¹¹⁶ the court ruled that the term “reasonable scientific certainty” could not be used in a firearms identification case. In light of the expert’s admission concerning the subjective nature of the examination, “the Government did not seriously contest the Court’s conclusions that ballistics lacked the rigor of science and that, whatever else it might be, its methodology was too subjective to permit opinions to be stated to ‘a reasonable degree of ballistic certainty.’”¹¹⁷

Similarly, in *United States v. Taylor*,¹¹⁸ the court wrote: “[B]ecause of the limitations on the reliability of firearms identification evidence discussed above, [the expert] will not be permitted to testify that his methodology allows him to reach this conclusion as a matter of scientific certainty. [The expert] also will not be allowed to testify that he can conclude that there is a match to the exclusion, either practical or absolute, of all other guns. He may only testify that, in his opinion, the bullet came from the suspect rifle to within a reasonable degree of certainty in the firearms examination field.”¹¹⁹

¹¹⁴ Fed. R. Evid. 401 (“Evidence is relevant if: (a) it has any tendency to make a fact more or less probable than it would be without the evidence; and (b) the fact is of consequence in determining the action.”).

¹¹⁵ This type of evidence has been admitted in numerous cases. *See, e.g.*, *People v. Horning*, 102 P.3d 228, 236 (Cal. 2004) (expert “opined that both bullets and the casing could have been fired from the same gun . . . because of their condition he could not say for sure”); *Luttrell v. Commonwealth*, 952 S.W.2d 216, 218 (Ky. 1997) (expert “testified only that the bullets which killed the victim could have been fired from Luttrell’s gun”).

¹¹⁶ 578 F. Supp. 2d 567 (S.D.N.Y. 2008).

¹¹⁷ *Id.* at 571. In *United States v. Willock*, 696 F. Supp. 2d 536, 549 (D. Md. 2010), based on a comprehensive magistrate’s report, the court held that “[the expert] shall not opine that it is a ‘practical impossibility’ for a firearm to have fired the cartridges other than the common ‘unknown firearm’ to which [the expert] attributes the cartridges.” Thus, “[The expert] shall state his opinions and conclusions without any characterization as to the degree of certainty with which he holds them.” *Id.*

¹¹⁸ 663 F. Supp. 2d 1170 (D. N.M. 2009)

¹¹⁹ *Id.* at 1180.

However, replacing the term “reasonable scientific certainty” with the term “reasonable ballistic certainty” does not solve the problem.¹²⁰ That phrase suffers from the same defects. In sum, the phrase should be abandoned. Jurisdictions that require the phrase “reasonable scientific (or medical) certainty” should reconsider its use.

E. Claims of “uniqueness”

Courts have responded in different ways to claims of uniqueness. Due to a lack of foundational research,¹²¹ several courts have limited the scope of handwriting testimony, permitting expert testimony about the similarities and dissimilarities between exemplars but not the specific conclusion that the defendant was the author (“common authorship” opinion).¹²² Although the courts have used this approach most frequently in questioned document cases, they have sometimes applied it to other types of forensic expertise such as firearms identification examinations.¹²³ One court took a less restrictive approach, ruling

¹²⁰ See also *United States v. Diaz*, No. CR 05-00167 WHA, 2007 WL 485967, at *1 (N.D. Cal. Feb. 12, 2007) (“[T]he examiners who testify in this case may only testify that a match has been made to a ‘reasonable degree of certainty in the ballistics field.’”); *United States v. Monteiro*, 407 F. Supp. 2d 351, 372 (D. Mass. 2006); *Commonwealth v. Pytou Heang*, 942 N.E.2d 927, 945 (Mass. 2011) (“Where a qualified expert has identified sufficient individual characteristic toolmarks reasonably to offer an opinion that a particular firearm fired a projectile or cartridge casing recovered as evidence, the expert may offer that opinion to a ‘reasonable degree of ballistic certainty.’”).

¹²¹ See *United States v. Hidalgo*, 229 F. Supp. 2d 961, 967 (D. Ariz. 2002) (“Because the principle of uniqueness is without empirical support, we conclude that a document examiner will not be permitted to testify that the maker of a known document is the maker of the questioned document. Nor will a document examiner be able to testify as to identity in terms of probabilities.”); *United States v. Fujii*, 152 F. Supp. 2d 939, 940 (N.D. Ill. 2000) (“Handwriting analysis does not stand up well under the *Daubert* standards. Despite its long history of use and acceptance, validation studies supporting its reliability are few, and the few that exist have been criticized for methodological flaws.”).

¹²² See *United States v. Oskowitz*, 294 F. Supp. 2d 379, 384 (E.D.N.Y. 2003) (“Many other district courts have similarly permitted a handwriting expert to analyze a writing sample for the jury without permitting the expert to offer an opinion on the ultimate question of authorship.”); *United States v. Rutherford*, 104 F. Supp. 2d 1190, 1194 (D. Neb. 2000) (“[T]he Court concludes that FDE Rauscher’s testimony meets the requirements of Rule 702 to the extent that he limits his testimony to identifying and explaining the similarities and dissimilarities between the known exemplars and the questioned documents. FDE Rauscher is precluded from rendering any ultimate conclusions on authorship of the questioned documents and is similarly precluded from testifying to the degree of confidence or certainty on which his opinions are based.”); *United States v. Hines*, 55 F. Supp. 2d 62, 67 (D. Mass. 1999) (holding that expert testimony concerning the general similarities and differences between a defendant’s handwriting exemplar and a stick up note was admissible but not the specific conclusion that the defendant was the author).

¹²³ See *United States v. Green*, 405 F. Supp. 2d 104, 107 (D. Mass. 2005).

that the expert would be permitted to testify only that it was “more likely than not” that recovered bullets and cartridge cases came from a particular weapon.¹²⁴

“To the Exclusion of All Others”

Experts have frequently testified that they have made a match “to the exclusion of all other firearms.”¹²⁵ This is simply another way of claiming uniqueness. In *United States v. Green*,¹²⁶ the court questioned such testimony: “[The expert] declared that this match could be made ‘to the exclusion of every other firearm in the world.’ . . . That conclusion, needless to say, is extraordinary, particularly given [the experts] data and methods.”¹²⁷ Further, in 2008, a year before the NAS report on forensic science was issued, a different NAS report, one on computerized ballistic imaging, addressed this issue. The report cautioned: “*Conclusions drawn in firearms identification should not be made to imply the presence of a firm statistical basis when none has been demonstrated.*”¹²⁸ In particular, that report was concerned about testimony cast “in bold absolutes” such as that a match can be made to the exclusion of all other firearms in the world: “Such comments cloak an inherently subjective assessment of a match with an extreme probability statement that has no firm grounding and unrealistically implies an error rate of zero.”¹²⁹ Several courts are in accord.¹³⁰

“Individualization”

It is easier to identify what an expert should *not* say than to prescribe what an expert may legitimately opine at trial. Some scholars have questioned whether

¹²⁴ *United States v. Glynn*, 578 F. Supp. 2d 567, 575 (S.D. N.Y. 2008).

¹²⁵ *See* FBI HANDBOOK OF FORENSIC SCIENCES 57 (rev. ed. 1994).

¹²⁶ *United States v. Green*, 405 F. Supp. 2d 104 (D. Mass. 2005).

¹²⁷ *Id.* at 107 (citations omitted).

¹²⁸ NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES, BALLISTIC IMAGING 82 (2008) (emphasis in original).

¹²⁹ *Id.*

¹³⁰ *See* *United States v. Alls*, slip opinion, No. CR2-08-223(1) (S.D. Ohio Dec. 7, 2009) (“[T]his Court follows the approach taken by *Glynn*, *Monteiro*, *Green*, *Diaz* and *Mouzone*, and places a limitation on [the expert] testimony. Although [the expert] may testify as to her methodology, case work, and observations in regards to the casing comparison she performed for this case, she may not testify as to her opinion on whether the casings are attributable to a single firearm to the exclusion of all other firearms. Such testimony would be misleading and prejudicial given the inherent subjectivity in Firearm and Toolmark Identification.”); *United States v. Diaz*, No. CR 05-00167 WHA, 2007 WL 485967, at *1 (N.D. Cal. Feb. 12, 2007).

individualization is even achievable.¹³¹ Other scholars do not accept this “radical skepticism” and believe that such an approach would mislead the jury in the other direction — by vitiating the probative value of the evidence.¹³² This position, however, does not endorse the overstatements described above. Nor does it minimize the risk of misleading the jury or give the expert carte blanche authority:

Let us assume that the jury gets the message — a match is not an absolute identification. Can the criminalist do something more to explain its probative value? Obviously, this depends on what is known about the frequency of the identifying trait in the relevant population. Are the features very common, rarely seen, or somewhere in between? There will be occasions when such qualitative testimony is reasonable. When no duplicates have been seen after systematic, careful and (one hopes) representative studies, a criminalist determined to refer to uniqueness might even assert that a trait is either unique or very rare in a population.¹³³

F. “Consistent With”

The phrase “consistent with” has long been recognized as problematic. The controversial Sacco and Vanzetti case, in which the defendants were executed for a murder during a payroll robbery in 1921, is illustrative. Firearms identification evidence played a critical role in this prosecution. After reviewing the case, Professors Morgan and Joughin, wrote:

On October 23 Captain Proctor made an [post-trial] affidavit indicating that he had repeatedly told [the prosecutor] that he would have to answer in the negative if he were asked whether he had found positive evidence that the fatal bullet had been fired from Sacco’s pistol. The statement which Proctor made on the witness stand was: “My opinion is that it is consistent with being fired by that pistol.”¹³⁴

¹³¹ Michael J. Saks & Jonathan J. Koehler, *The Individualization Fallacy in Forensic Science Evidence*, 61 VAND. L. REV. 199, 205 (2008) (“The concept of ‘individualization,’ which lies at the core of numerous forensic science subfields, exists only in a metaphysical or rhetorical sense. It has no scientific validity, and it is sustained largely by the faulty logic that equates infrequency with uniqueness.”).

¹³² David H. Kaye, *Probability, Individualization and Uniqueness in Forensic Science Evidence: Listening to the Academies*, 75 BROOK. L. REV. 1163, 1185 (2010).

¹³³ *Id.* at 1180.

¹³⁴ LOUIS JOUGHIN & EDMUND M. MORGAN, *THE LEGACY OF SACCO & VANZETTI* 15 (1948). These authors concluded: “In effect it is an act of self-impeachment by one of the experts who testified for the prosecution at the Dedham trial.” *Id.*

What does the term “consistent with” mean in hair analysis? The probative value of this conclusion would, of course, vary if only a hundred people had microscopically indistinguishable hair as opposed to several million. The crime scene hair could have come from 5 other persons — or 10, 50, 100, 500, 1,000, 100,000, and so forth. As one hair examiner wrote: “If a pubic hair from the scene of a crime is found to be similar to those from a known source, [the courts] do not know whether the chances that it could have originated from another source are one in two or one in a billion.”¹³⁵

G. “Match”

Professor Berger put it this way:

We allow eyewitnesses to testify that the person fleeing the scene wore a yellow jacket and permit proof that a defendant owned a yellow jacket without establishing the background rate of yellow jackets in the community. Jurors understand, however, that others than the accused own yellow jackets. When experts testify about samples matching in every respect, the jurors may be oblivious to the probability concerns if no background rate is offered, or may be unduly prejudiced or confused if the probability of a match is confused with the probability of guilt, or if a background rate is offered that does not have an adequate scientific foundation.¹³⁶

VII. DECLARATION OF EXPERTISE

ABA Civil Trial Practice Standard 14 provides: “The court should not, in *the presence of the jury*, declare that a witness is qualified as an expert or to render an expert opinion, and counsel should not ask the court to do so.”¹³⁷ This policy was later extended to criminal cases. As one court remarked,

¹³⁵ B.D. Gaudette, *Probabilities and Human Pubic Hair Comparisons*, 21 J. FORENSIC SCI. 514, 514 (1976).

¹³⁶ Margaret A. Berger, *Procedural Paradigms for Applying the Daubert Test*, 78 MINN. L. REV. 1345, 1357 (1994).

¹³⁷ ABA CIVIL TRIAL PRACTICE STANDARD 14 (2007).

Great care should be exercised by a trial judge when the determination has been made that the witness is an expert. If the jury is so informed such a conclusion obviously enhances the credibility of that witness in the eyes of the jury. All such ruling should be made outside the hearing of the jury and there should be no declaration that the witness is an expert.¹³⁸

In 1994, Judge Richey recommended this approach, noting that such a practice “ensures that trial courts do not inadvertently put their stamp of authority” on a witness’ opinion, and protects against the jury’s being “overwhelmed by the so-called ‘experts.’”¹³⁹

IX. ATTORNEY COMPETENCE

A. Ethical Duty

Perhaps the most basic of all professional ethical precepts is competence. Indeed, it appears as the first of the ABA Model Rules of Professional Conduct: “A lawyer shall provide competent representation to a client. Competent representation requires the legal knowledge, skill, thoroughness and preparation reasonably necessary for the representation.”¹⁴⁰ An accompanying comment explains that relevant factors in determining whether a lawyer acts competently include “the relative complexity and specialized nature of the matter.”¹⁴¹

Thus, questions of competence under Model Rule 1.1 can be broken down into issues of expertise and preparation. The first — which the rule refers to with the words “knowledge” and “skill” — deals with the capability of a lawyer to handle a particular representation. The second — which the rule refers to with the words “thoroughness and preparation” — deals with the time and effort the lawyer invests in preparing the case. In other words, a lawyer may violate the

¹³⁸ *Luttrell v. Commonwealth*, 952 S.W.2d 216, 218 (Ky. 1997). *See also* *United States v. Laurienti*, 611 F.3d 530, 547 (9th Cir. 2010) (“To the extent that Defendants argue that the district court abused its discretion by failing to describe Meyer as an ‘expert’ in front of the jury, we disagree. The determination that a witness is an expert is not an express imprimatur of special credence; rather, it is simply a decision that the witness may testify to matters concerning ‘scientific, technical, or other specialized knowledge.’ Fed.R.Evid. 702.”).

¹³⁹ Charles Richey, *Proposals to Eliminate the Prejudicial Effect of the Use of the Word “Expert” Under the Federal Rules of Evidence in Civil and Criminal Jury Trials*, 154 F.R.D. 537, 559 (1994).

¹⁴⁰ ABA MODEL RULES OF PROF’L CONDUCT R. 1.1.

¹⁴¹ *Id.* at R. 1.1 cmt. 1.

duty of competence by lacking sufficient knowledge of a particular area of law. Or, even if the lawyer has sufficient expertise, the lawyer may violate the duty of competence by failing to investigate and prepare the case sufficiently.

No attorney can try criminal cases today without a grounding in forensic evidence. The ABA has adopted the following recommendations: (1) “Training in forensic science for attorneys should be made available at minimal cost to ensure adequate representation for both the public and defendants,” and (2) “Counsel should have competence in the relevant area or consult with those who do where forensic evidence is essential in a case.”¹⁴²

B. Right to Effective Assistance of Counsel

In addition, the Sixth Amendment right to counsel includes the right to effective assistance of counsel.¹⁴³ The Supreme Court has decided several recent cases on the subject. In *Harrington v. Richter*,¹⁴⁴ the Court wrote: “Criminal cases will arise where the only reasonable and available defense strategy requires consultation with experts or introduction of expert evidence.”¹⁴⁵ In *Hinton v. Alabama*,¹⁴⁶ the Court found counsel ineffective for failing to understand how to apply for funds in order retain a defense expert. In many of the cases cited earlier, defense counsel failed to provide adequate representation.

X. CLOSING ARGUMENT

Properly presented evidence may become misleading due to its characterization in closing argument to the jury.¹⁴⁷ *Williamson* (discussed above) exemplifies this issue. In summation, the prosecutor claimed: “[T]here’s a match.”¹⁴⁸ Even the state court misinterpreted the evidence, writing that the “hair

¹⁴² REPORT OF THE ABA CRIMINAL JUSTICE SECTION’S AD HOC INNOCENCE COMMITTEE TO ENSURE THE INTEGRITY OF THE CRIMINAL PROCESS, ACHIEVING JUSTICE: FREEING THE INNOCENT, CONVICTING THE GUILTY 47 (Paul C. Giannelli & Myrna Raeder eds. 2006).

¹⁴³ See *Evitts v. Lucey*, 469 U.S. 387, 396 (1985) (“[A] party whose counsel is unable to provide effective representation is in no better position than one who has no counsel at all.”).

¹⁴⁴ 131 S. Ct. 770 (2011).

¹⁴⁵ *Id.* at 788.

¹⁴⁶ 134 S. Ct. 1081 (2014).

¹⁴⁷ See *Darden v. Wainwright*, 477 U.S. 168, 181-82 (1986) (“The prosecutors’ argument did not manipulate or misstate the evidence . . .”).

¹⁴⁸ 904 F. Supp. at 1557.

evidence placed [petitioner] at the decedent’s apartment.”¹⁴⁹ As noted above, using the term “match” — without further explication — may be misleading.

Similarly, in *People v. Linscott*¹⁵⁰ the Illinois Supreme Court found that the prosecutor improperly argued that hairs collected from the victim’s apartment “were conclusively identified as coming from defendant’s head and pubic region. There simply was not testimony at trial to support these statements. In fact, [the prosecution experts] and the defense hair expert . . . testified that no such identification was possible.”¹⁵¹ Linscott was subsequently exonerated by DNA evidence.¹⁵²

In *United States v. Hebshie*,¹⁵³ an arson case involving an accelerant-detecting dog (Billy), the court found the closing argument misleading. The “government’s closing argument . . . dramatically overstated Billy’s significance.”¹⁵⁴ In its summation, the prosecutor “placed special emphasis on Billy the dog, implying that she had alerted to one space *to the exclusion of all the others* — which was not the case. Billy had not been shown ‘all other’ areas.”¹⁵⁵ Defense counsel failed to object. For this and other lapses, the court found that the defense counsel rendered ineffective assistance.

The *ABA Criminal Justice Standards* state that “[i]t is unprofessional conduct for the prosecutor intentionally to misstate the evidence or mislead the jury as to the inferences it may draw.”¹⁵⁶ The same rule applies to the defense.¹⁵⁷

¹⁴⁹ Williamson v. State, 812 P.2d 384, 397 (Okla. Crim. App. 1991).

¹⁵⁰ 566 N.E.2d 1355 (Ill. 1991).

¹⁵¹ *Id.* at 1359.

¹⁵² EXONERATED BY SCIENCE, *supra* note 41, at 65 (“The State’s expert on the hair examination testified that only 1 in 4,5000 person would have consistent hairs when tested for 40 different characteristics. He only testified between 8 and 12 characteristics, however, and could no remember which ones. The appellate court ruled on July 29, 1987, that his testimony coupled with the prosecution’s use of it at closing arguments, constituted denial of a fair trial.”).

¹⁵³ 754 F. Supp. 2d 89 (D. Mass. 2010).

¹⁵⁴ *Id.* at 95. *See also* Mitchell v. Gibson, 262 F.3d 1036, 1064 (10th Cir. 2001) (Expert’s misconduct compounded by “the prosecutor, whom the district court found had ‘labored extensively at trial to obscure the true DNA test results and to highlight [the expert’s] test results,’ and whose characterization of the FBI report in his closing argument was ‘entirely unsupported by evidence and . . . misleading.’”).

¹⁵⁵ *Id.* at 105.

¹⁵⁶ ABA Standard 5.8(a), *supra* note 22.

¹⁵⁷ *Id.* Standard 4-7.7.

