THE SHIFTING BATTLEGROUND OVER THE ADMISSIBILITY OF EXPERIENTIALLY BASED EXPERT TESTIMONY: HOW FAR MAY EXPERTS GO IN ELABORATING ON THE PERSONAL EXPERIENCE SUPPOSEDLY VALIDATING THEIR METHODOLOGY?

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ABSTRACT

After the Supreme Court's 1993 Daubert v. Merrell Dow Pharmaceuticals, Inc. *and 1999* Kumho Tire Co. v. Carmichael *decisions, one of the major controversies in expert testimony law was whether the courts should continue to admit testimony about experience-based forensic sciences such as fingerprint examination and questioned-document analysis. Several leading commentators urged the exclusion of this testimony, and the 2009 National Research Council and 2016 President's Council of Advisors on Science and Technology reports were highly critical of forensic methodologies that lack truly scientific empirical validation. Nevertheless, with the exception of a few disciplines, such as forensic odontology, that appear destined for inadmissibility, courts, for the most part, have continued to admit this testimony. In his 2019* United States v. Bonds *decision, Judge Frank Easterbrook voiced the prevailing judicial view that it would be a mistake to exclude this testimony and force the courts to rely even more heavily on error-prone lay testimony.*

As a result, the battleground has shifted from the global question of the admissibility of the testimony to the more specific question of the permissible wording of the expert's opinion. There is a growing consensus over what experience-based experts may not say. In particular, there is a growing body of authority that experts may not do any of the following: describe their opinion as a "fact," characterize the opinion as a certainty, or purport to identify a specific person or object to the exclusion of every other person or object in the world.

The more vexing problem, though, is deciding how experts may phrase their opinions. This Article assumes arguendo that the judge has already ruled that the

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methodology passes muster under Federal Rule of Evidence 702. The focus of this Article, following that assumption, is the extent that experts ought to be permitted to elaborate on their personal experience using the methodology for the purpose of convincing the jury to ascribe more weight to the opinion because it was reasonable for the expert to rely on the methodology. Even if the expert does not have a formal feedback loop, the quantum of the experience is relevant because the more extensive the experience, the greater is the probability that even accidentally the expert would have discovered a deficiency in the methodology. Testimony about the quantum of experience presents few probative dangers, since cross-examination, closing argument, and a cautionary instruction can drive home the point that without a feedback loop, the expert may simply have been repeating the same error over and over again.

It is a closer question, though, whether experts should be allowed to embellish the quality of their experience by explaining that after forming their opinion in prior cases, they received reports about matters, such as confessions and consistent results of superior forensic techniques (such as DNA), that seemed to confirm the validity of their opinion. On the one hand, this testimony can survive both logical relevance and hearsay objections. On the other hand, at least in some cases, that type of testimony will be vulnerable to an objection under Federal Rule of Evidence 403.

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I. INTRODUCTION

As Tacitus once said, circa 109, "Experience teaches."[1]

In the past half century, there has been growing skepticism about the validity of many of the types of expert testimony that were previously and routinely admitted by U.S. courts.[2] There have been two landmark reports. In 2009, the National Research Council (NRC) of the National Academies of Science released *Strengthening Forensic Science in the United States: A Path Forward*.[3] Chapter 5 of the report reviewed many of the most commonly used forensic techniques. The NRC concluded that nuclear DNA testing is the only "forensic method [that] has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual."[4] In a 2016 report, the President's Council of Advisors on Science and Technology (PCAST) largely echoed the criticisms leveled by the NRC report.[5] For example, based

1. W. S. TYLER, THE HISTORIES OF CAIUS CORNELIUS TACITUS: WITH NOTES FOR COLLEGES 217 (1849).

2. *See* COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCIS. CMTY., NAT'L RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD 4 (2009) [hereinafter NAT'L RESEARCH COUNCIL]; *see also* ANDREW W. JURS, EXPERT EVIDENCE 381 (2019).

3. NAT'L RESEARCH COUNCIL, *supra* note 2.

4. *Id.* at 7.

5. *See generally* PRESIDENT'S COUNCIL OF ADV. ON SCI. & TECH., EXEC. OFFICE OF PRESIDENT, FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC

on a number of black-box empirical studies,[6] PCAST concluded that fingerprint examination is foundationally valid; however, the methodology has "a false positive rate that is substantial and is likely to be higher than expected by many jurors."[7] The report cited two studies: one finding a false-positive rate "that could be as high as 1 [error] in 306" and another reporting a rate of one error in 18 cases.[8] The PCAST report was especially critical of bite-mark, firearms, and footwear analysis. In the case of bite-mark analysis, the report states the methodology "does not meet the scientific standards for foundational validity, and is far from meeting such standards."[9] For firearms, the report bluntly asserts, "[F]irearms analysis currently falls short of the criteria for foundational validity . . . ."[10] The report adds, regarding footwear analysis, "[T]here are no appropriate empirical studies to support the foundational validity of footwear analysis to associate shoeprints with particular shoes based on specific identifying marks . . . . Such conclusions are unsupported by any meaningful evidence . . . ."[11]

It is true that the PCAST report expresses skepticism about some scientific techniques that rest on classic empirical validation studies. For example, PCAST questions the soundness of the current techniques for analyzing complex, mixed DNA samples.[12] However, like the 2009 NRC

VALIDITY OF FEATURE-COMPARISON METHODS (2016), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_forensic_science_report_final.pdf [https://perma.cc/2GRV-DCQW] [hereinafter cited as PCAST].

6. *Id.* at 5–6. On the one hand, these studies do not dissect the methodology and determine error rates for each step. *See id.* at 5. On the other hand, they generally test whether experts in the field can accurately do what they claim to be able to do, such as identifying the person who is the source of a finger mark. In other words, they test whether the black box "works." *See id.* at 6.

7. *Id.* at 9.

8. *Id.* at 96.

9. *Id.* at 87.

10. *Id.* at 112.

11. *Id.* at 117.

12. *See id.* at 75–83. By *complex*, PCAST means samples that may include more than the victim's DNA and the DNA of a single assailant. *Id.* at 75. If there is only one assailant, it is a relatively simple matter to deduct the victim's DNA profile from the mixture; the remaining profile must be that of the assailant. *See id.* However, when there

report, the PCAST report reserves its harshest criticisms for forensic techniques, such as firearms identification practiced by experts who rely on their collective and personal experience rather than controlled laboratory experimentation or systematic field observation to validate their methodology.[13]

In the note accompanying the 2000 amendment to Federal Rule of Evidence 702, the Rules Advisory Committee addresses the topic of experientially based methodologies. The note observes, "Some types of expert testimony will not rely on anything like a scientific method . . . ."[14] The note acknowledges that, on occasion, "[E]xperience alone . . . may . . . provide a sufficient foundation for expert testimony."[15] The note points out that the language of Rule 702 refers to witnesses who qualify "as an expert by knowledge, skill, experience, training, *or* education."[16] In the words of the note:

> [T]he text of Rule 702 expressly contemplates that an expert may be qualified on the basis of experience. In certain fields, experience is the predominant, if not sole, basis for a great deal of reliable expert testimony. *See, e.g., United States v. Jones*, 107 F.3d 1147 (6th Cir. 1997) (no abuse of discretion in admitting the testimony of a handwriting examiner who had years of practical experience and extensive training . . . .). *See also Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167, 1178 (1999) (stating that "no one denies that an expert might draw a conclusion from a set of observations based on extensive and specialized experience.").[17]

Yet, in a crucial respect, the note takes a position consistent with the criticisms that the NRC and the PCAST directed at some popular experientially based techniques. The NRC and PCAST reports favor applying a rigorous validation standard to both scientifically derived methodologies and those that are more experientially based.[18] The note strikes the same tone:

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are multiple assailants, it becomes much more challenging to decide either the number of contributors or each contributor's profile. *See id.* at 75–76; *see generally* JURS, *supra* note 2, at ch. 7.

13. PCAST, *supra* note 5, at 111–12.
14. FED. R. EVID. 702 advisory committee's note to 2000 amendment.
15. *Id.*
16. *Id.* at 702 (emphasis added).
17. *Id.* advisory committee's note to 2000 amendment.
18. *See generally* NAT'L RESEARCH COUNCIL, *supra* note 2; PCAST, *supra* note 5.

> The trial court's gatekeeping function applies to testimony by any expert. . . . While the relevant factors for determining reliability will vary from expertise to expertise, the [rule] rejects the premise that an expert's testimony should be treated more permissively simply because it is outside the realm of science. An opinion from an expert who is not a scientist should receive the same degree of scrutiny for reliability as an opinion from an expert who purports to be a scientist. *See Watkins v. Telesmith, Inc.*, 121 F.3d 984, 991 (5th Cir. 1997) ("[I]t seems exactly backwards that experts who purport to rely on general engineering principles and practical experience might escape screening by any district court simply by stating that their conclusions were not reached by any particular method or technique.").[19]

The note specifically cites the example of law enforcement agents who rely on "extensive experience" as a basis for offering expert opinions about the meaning of supposed code words in conversations among alleged drug traffickers.[20]

The tension reflected in the note is also mirrored in the evolving case law governing the admissibility of testimony based on experientially based techniques.[21] On the one hand, there are a number of points of general agreement among the courts.[22] To begin with, as the 2000 Advisory Committee Note explicitly points out, a witness can qualify as an expert on the basis of experience alone without either formal education or systematic in-service training.[23] Next, as a counterpoint, there is a growing consensus that the showing of the witness's experience does not automatically validate the technique as "reliable principles and methods" under Federal Rule of Evidence 702(c).[24] The witness may not merely "invoke[] 'my expertise'"[25]

19. FED. R. EVID. 702 advisory committee's note to 2000 amendment; *see* Evanston Ins. Co. v. Xytex Tissue Servs., L.L.C., 378 F. Supp. 3d 1267, 1279 (S.D. Ga. 2019) ("However, '[t]he inquiry is no less exacting where the expert "witness is relying solely on experience" rather than scientific methodology'" (alteration in original) (quoting Summit at Paces, L.L.C. v. RBC Bank, No. 1:09-cv-03504-SCJ, 2012 WL 13076793, at *2 (N.D. Ga. May 22, 2012))).

20. *See* FED. R. EVID. 702 advisory committee's note to 2000 amendment.

21. *See id.*

22. *See id.*

23. *Id.*

24. *See id.* at 702(c) ("A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if . . . (c) the testimony is the product of reliable principles and methods . . . .").

25. *See* Troudt v. Oracle Corp., 369 F. Supp. 3d 1134, 1139 (D. Colo. 2019)

and, on that basis alone, offer a "bottom line" opinion.[26] Like the case law, the text of Rule 702 treats the witness's qualification as an expert and the validity of the witness's methodology as separate predicate elements, requiring different foundational showings.[27] Finally, while a few experientially based disciplines such as bite-mark analysis are at risk of soon being consigned to inadmissibility,[28] for the most part courts have found experientially based methodologies such as fingerprint and questioned-document examination sufficiently reliable to be admissible.[29]

("[E]xperience is not a methodology" (quotation omitted)); Padilla v. Hunter Douglas Window Coverings, Inc., 14 F. Supp. 3d 1127, 1137 (N.D. Ill. 2014) (quoting Zenith Elects. Corp. v. WH-TV Broad. Corp., 395 F.3d 416, 419 (7th Cir. 2005)); *see also* MCCORMICK ON EVIDENCE § 13 (Kenneth Broun et al. eds., 7th ed. 2013) (noting that witnesses relying on an experientially based methodology sometimes insist they cannot articulate a more specific description of the methodology than the invocation of their experience; "An ineffable notion might be acceptable mysticism at a meeting of the Jedi Council, but it does not qualify as acceptable expertise in court.").

26. *See* Rogers v. K2 Sports, L.L.C., 348 F. Supp. 3d 892, 897 (W.D. Wis. 2018); S.E.C. v. ITT Educ. Servs., Inc., 311 F. Supp. 3d 977, 996 (S.D. Ind. 2018).

27. *See* FED. R. EVID. 702.

28. *See In re* Richards, 371 P.3d 195, 211 (Cal. 2016); Commonwealth v. Ross, No. 1738 WDA 2018, 2019 WL 6211324, at *5–6 (Pa. Super Ct. Nov. 21, 2019); *Ex parte* Chaney, 563 S.W.3d 239, 275, 285 (Tex. Crim. App. 2018); Janet Ainsworth & Patrick Juola, Commentary, *Who Wrote This?: Modern Forensic Authorship Analysis as a Model for Valid Forensic Science*, 96 WASH. U. L. REV. 1159, 1180 (2019) ("[T]he PCAST report recommended that no further research in that field be conducted, as it was extremely unlikely that bitemark forensics could ever provide reliable evidence on the source of purported bitemarks."); Kirk Cooper, *The Texas Junk Science Writ*, 82 TEX. B.J. 798, 799 (2019) (discussing *Ex parte Chaney*); Jules Epstein, *Is a "*Frye*" Finding Forever? As Science Grows, We Turn to Judges*, LEGAL INTELLIGENCE (Dec. 27, 2019), https://www.law.com/thelegalintelligencer/2019/12/27/is-a-frye-finding-forever-as-science-grows-we-turn-to-judges/?slreturn=20200002175625 [https://perma.cc/922W-Q76G] (discussing *Commonwealth v. Ross*).

29. *See* Paul C. Giannelli, *Forensic Science*: Daubert*'s Failure*, 68 CASE W. RES. L. REV. 869, 917–21 (2018) [hereinafter Giannelli, Daubert*'s Failure*]; *see also* United States v. Romero-Lobato, 379 F. Supp. 3d 1111, 1120 (D. Nev. 2019) ("The mere fact that an expert's opinion [on firearms identification] is derived from subjective methodology does not render it unreliable."); Evanston Ins. Co. v. Xytex Tissue Servs., L.L.C., 378 F. Supp. 3d 1267, 1279 (S.D. Ga. 2019) (citing United States v. Valdes, 681 F. App'x 874, 881 (11th Cir. 2017)) ("[A]ffirming admission of testimony from expert identifying firearms based upon years of experience working with firearms . . . ."); *see generally* D. Michael Risinger, *Goodbye to All That, or a Fool's Errand, by One of the Fools: How I Stopped Worrying About Court Responses to Handwriting Identification (and "Forensic Science" in General) and Learned to Love Misinterpretations of* Kumho Tire v. Carmichael, 43 TULSA L. REV. 447 (2007).

The critiques in the NRC and PCAST reports have assuredly made judges more conscious of the weaknesses in experientially based methodologies.[30] However, rather than completely barring testimony about these methodologies, courts have taken less drastic steps, such as giving jurors cautionary instructions that in deciding how much weight to assign to the testimony, the jurors should realize that the technique does not qualify as full-fledged science.[31] Completely banning this testimony could force jurors to rely, by default, even more heavily on alternative types of evidence such as eyewitness testimony, which has been demonstrated to be dangerously error prone.[32] Given that unattractive option, most courts have balked at altogether excluding testimony based on experientially based methodologies.[33]

The upshot is that the battleground has shifted. As a practical matter, when the proponent's expert relies on such a methodology, the real question is no longer the threshold issue of whether the judge will allow any testimony based on the technique. Rather, the question has become how experts may phrase an opinion. Even more specifically, the decisive issue is how far experts may go in elaborating on the personal experience that supposedly helps validate their methodology in order to increase the jury's estimation of the weight of expert testimony.

The recent controversy over the wording of opinions by fingerprint examiners is a case in point. For its part, the Department of Justice (DOJ) released a document for federal examiners, the Uniform Language for Testimony and Reports.[34] Responding to critiques such as the NRC report, the DOJ document "forbids examiners from claiming that 'two friction ridge

30. *See* Giannelli, Daubert*'s Failure*, *supra* note 29, at 870–72.

31. *E.g.*, United States v. Starzecpyzel, 880 F. Supp. 1027, 1049 (S.D.N.Y. 1995); State v. Quintana, 103 P.3d 168, 170 (Utah Ct. App. 2004) (Thorne, J., concurring); Tamara F. Lawson, *Can Fingerprints Lie? Re-Weighing Fingerprint Evidence in Criminal Jury Trials*, 31 AM. J. CRIM. L. 1, 59–61 (2003) (proposing wording for these instructions).

32. *See* ELIZABETH F. LOFTUS, EYEWITNESS TESTIMONY 9 (1979); *see also* United States v. Wade, 388 U.S. 218, 228 (1967) ("The vagaries of eyewitness identification are well-known; the annals of criminal law are rife with instances of mistaken identification.").

33. *See, e.g.*, United States v. Romero-Lobato, 379 F. Supp. 3d 1111, 1123 (D. Nev. 2019); *Starzecpyzel*, 880 F. Supp. at 1049; *Quintana*, 103 P.3d at 170; *see also* United States v. Bonds, 922 F.3d 343, 346 (7th Cir. 2019).

34. *See* 1 PAUL C. GIANNELLI, EDWARD J. IMWINKELRIED, ANDREA ROTH & JANE CAMPBELL MORIARTY, SCIENTIFIC EVIDENCE § 16.10 (Supp. 2018) [hereinafter 1 GIANNELLI ET AL.].

prints originated from the same source to the absolute exclusion of all' others."[35] In the past, examiners had often made that claim[36]—sometimes going to the extreme of asserting that they could exclude both anyone who had ever walked the face of the earth and any human being who would ever inhabit the planet.[37] Yet, the DOJ document permits examiners to testify that they "would not expect to see that arrangement of features repeated in an impression that came from another source."[38] On March 26, 2018, Rush Holt, the chief executive officer of the American Association for the Advancement of Science (AAAS), sent a letter to Deputy Attorney General Rod Rosenstein to object to the "expectation" language in the DOJ document.[39] In pertinent part, Mr. Holt's letter states:

> There is no scientific basis for estimating the number of individuals who might have a particular pattern of features; therefore, there is no scientific basis on which an examiner might form an expectation of whether an arrangement comes from the same source. The . . . language fails to acknowledge the uncertainty that exists regarding the rarity of particular fingerprint patterns. Any such expectations that an examiner asserts necessarily rest on speculation, rather than scientific evidence.[40]

Mr. Holt strongly urged the DOJ to adopt the more conservative language proposed in an AAAS report on fingerprint analysis:

> The latent print on Exhibit ## and the record print bearing the name XXX have a great deal of corresponding ridge detail with no differences that would indicate they were made by different fingers. There is no way to determine how many people might have a finger with a corresponding set of ridge features, but it is my opinion that this set of features would be unusual.[41]

As the sharp exchange between the DOJ and the AAAS suggests, if courts are going to continue to admit expert testimony based on experientially based methodologies, they must more closely scrutinize the

35. *Id.*

36. Clive Thompson, *The Myth of Fingerprints*, SMITHSONIAN MAG. (Apr. 2019), https://www.smithsonianmag.com/science-nature/myth-fingerprints-180971640/ [https://perma.cc/VD5V-25RW].

37. *See, e.g.*, *Quintana*, 103 P.3d at 171.

38. 1 GIANNELLI ET AL., *supra* note 34, § 16.10.

39. *Id.*

40. *Id.*

41. *Id.*

manner in which the experts word their opinions and, in particular, the manner in which the experts invoke their personal experience to support the opinion. The second Part of this Article addresses the question: What should courts forbid experts from saying? When the expert cannot point to well-designed validation studies to establish an error rate, there are certain indefensible claims that a court should never allow the expert to make on the witness stand.[42] The third Part of this Article turns to the much more vexing question: What should experts be allowed to say? And, more specifically, how far should experts be permitted to go in describing the personal experience that supposedly helps validate their reasoning process in order to persuade the jury to attach greater weight to the experts' opinion?

II. WHAT EXPERTS SHOULD NOT BE PERMITTED TO SAY

As previously stated, experientially based methodologies do not rest on highly organized collections of empirical data. In opining, the experts do not rely on empirical data compiled by either controlled laboratory experiments or systematic field observation.[43] Given the lack of these data compilations, there should be several restrictions on the manner in which these experts express their opinions.

A. *Experts May Not Describe Their Conclusion as a "Fact"*

It is debatable whether even scientists relying on organized empirical data sets should be allowed to characterize their inferences as "facts." Assuming arguendo that they should be permitted to do so, it would be unjustifiable for experientially based experts to use that terminology. In a 2013 California case, the defense challenged the manner in which the prosecution's fingerprint expert had expressed her conclusion.[44] The court rejected the challenge because the expert had conceded that her comparison was inherently subjective and that her conclusion represented an opinion rather than an established scientific fact.[45] In the same vein, in 2014 a Massachusetts court insisted experientially based experts, such as fingerprint examiners, expressly characterize their conclusions "as an opinion, not a fact."[46]

42. *See infra* Part II.

43. *See* FED R. EVID. 702 advisory committee's note to 2000 amendment.

44. O.D. v. O.D., 164 Cal. Rptr. 3d 578, 583–84 (Ct. App. 2013).

45. *Id*.

46. Commonwealth v. Joyner, 4 N.E.3d 282, 289 (2014); *see also* United States v. Zajac, 748 F. Supp. 2d 1327 (D. Utah 2010), *aff'd*, 680 F. App'x 776 (10th Cir. 2017).

B. *Experts May Not State They Are "Certain" About the Truth of the Opinion*

In its celebrated 1993 decision, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court recognized the unavoidable uncertainty in investigational science.[47] In his lead opinion, Justice Harry Blackmun wrote: "[I]t would be unreasonable to conclude that the subject of scientific testimony must be 'known' to a certainty; arguably, there are no certainties in science."[48] As support for his statement, Justice Blackmun pointed to a number of amicus briefs in which individual scientists and scientific organizations attempted to educate the Court about the modern understanding of the limitations of the scientific process.[49] It is true that in some circumstances, scientists rely on classic deductive reasoning. By way of example, if one defines *two* in a particular way and *four* in a particular way, one can deduce with certainty that two plus two equals four.[50] However, investigational science does not proceed in that fashion.[51] Rather, it relies on inductive and abductive reasoning.[52] Based on their observations of phenomena, investigators use inductive reasoning to identify a hypothesis plausible enough to investigate.[53] Then the expert subjects the hypothesis to empirical testing, evaluates the results, and employs abductive reasoning to refine the hypothesis.[54] If one experiment after another yields outcomes consistent with the truth of the hypothesis, the investigator can have growing confidence in the truth of the hypothesis—enough confidence to allow society to make important public policy decisions based on the hypothesis.[55] However, another empirical test of the hypothesis is always conceivable; so long as that is the case, in principle the hypothesis can never be regarded as conclusively, definitively, or certainly validated.[56]

47. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 597–98 (1993).

48. *Id.* at 590; JURS, *supra* note 2, at 113.

49. Edward J. Imwinkelried, *Evidence Law Visits Jurassic Park: The Far-Reaching Implications of the* Daubert *Court's Recognition of the Uncertainty of the Scientific Enterprise*, 81 IOWA L. REV. 55, 64–65 (1995).

50. Edward Imwinkelried, *The Importance of Forensic Metrology in Preventing Miscarriages of Justice: Intellectual Honesty About the Uncertainty of Measurement in Scientific Analysis*, 7 J. MARSHALL L.J. 333, 346 (2014).

51. *Id.*

52. *Id.*

53. *Id.*

54. *Id.*

55. *Id.*

56. *Id.*

Courts, commentators, and organizations such as the NRC and PCAST have recognized that experts relying on experientially based methodologies should never be permitted to claim certainty, infallibility,[57] or a "zero error rate."[58] In this setting, certainty is mythical.[59] The 2014 Massachusetts decision declared: "[O]pinions expressing absolute certainty about, or the infallibility of, an 'individualization' of a [finger]print should be avoided."[60] In 2017, a North Carolina court found that it was error to admit a fingerprint examiner's categorical opinion.[61] After surveying the available studies, Dean Jennifer Mnookin concluded claims of "absolute, certain confidence in identification" are unsupportable.[62] The PCAST report was highly critical of overstated claims that a forensic technique has a "zero-error" rate.[63] The report repudiated "longstanding claims about the infallibility of fingerprint analysis."[64] In 2015, the United States Army's Defense Forensic Science

57. *See* Jason M. Chin, Gianni Ribeiro & Alicia Rairden, *Open Forensic Science*, 6 J.L. & BIOSCIENCES 1, 8–9 (2019); Sandy L. Zabell, *Fingerprint Evidence*, 13 J.L. & POL'Y 143, 177 (2005).

58. Zabell, *supra* note 57, at 177; Paul C. Giannelli, *Fingerprints: Misidentifications*, CRIM. JUST., Spring 2005, at 50, 50 (asserting it is "astounding" that some experts still claim "there is a 'zero error rate' in fingerprint examinations").

59. *See* Cedric Neumann, *Fingerprints at the Crime Scene: Statistically Certain, or Probable?*, SIGNIFICANCE, Feb. 2012, at 21, 21.

60. Commonwealth v. Joyner, 4 N.E.3d 282, 289 (Mass. 2014) (quoting Commonwealth v. Gambora, 933 N.E.2d 50, 61 n.22 (Mass. 2010)).

61. State v. McPhaul, 808 S.E.2d 294, 306 (N.C. Ct. App. 2017), *review improvidently allowed by* 818 S.E.2d 102 (N.C. 2018).

62. Jennifer L. Mnookin, *The Validity of Latent Fingerprint Identification: Confessions of a Fingerprinting Moderate*, 7 LAW PROBABILITY & RISK 127, 139 (2008); *see* 1 SIR ANTHONY CAMPBELL, THE FINGERPRINT INQUIRY REPORT 741 (2011) (detailing that after a high-profile case of alleged fingerprint misidentification, a report commissioned by the Scottish government recommended "[e]xaminers should discontinue reporting conclusions on identification or exclusion with a claim to 100 percent certainty or on any other basis suggesting that fingerprint evidence is infallible"); Tamara F. Lawson, *Can Fingerprints Lie? Re-Weighing Fingerprint Evidence in Criminal Jury Trials*, 31 AM. J. CRIM. L. 1, 7 (2003) (questioning if it is "appropriate to allow latent fingerprint expert witnesses to testify regarding their findings which are purported to conclusively link an accused to a crime"); Kristin Romandetti, Note, *Recognizing and Responding to a Problem with the Admissibility of Fingerprint Evidence Under* Daubert, 45 JURIMETRICS J. 41, 57 (2004) (noting that the expert should not "testify[] that a match conclusively ties a defendant to a print found at the crime scene" and that the state of the empirical research does not support "an absolutist claim").

63. PCAST, *supra* note 5, at 29–30.

64. *Id.* at 9.

Center forbade its analysts from expressly or impliedly claiming absolute certainty.[65] The center instructed its analysts, when questioned, to expressly acknowledge the uncertainty of their opinions.[66]

C. *Experts May Not Claim They Have Identified a Particular Person or Object to the Exclusion of All Other Persons or Objects*

It is one thing for experts to truthfully testify that, in their opinion, the characteristics of a person or sample match those of a person or object under investigation. It is quite another matter for experts to go to the length of asserting they can exclude every other person or object on Earth. On some occasions in the past, fingerprint examiners made the obviously exaggerated claim that they could exclude not only all other persons on the face of the Earth but also all other persons who had ever or would ever walk the face of the Earth.[67] Commentators and organizations such as the PCAST condemn these hyperbolic claims.[68] Addressing this topic, the PCAST denied an expert's ability to individualize to the exclusion of all other persons or objects.[69] An official inquiry commissioned by the Scottish government similarly concluded, "The ability of any examiner to 'individualise' without the potential for any error at the claimed level of one person in the whole of human history is not scientifically validated."[70] As previously stated, the consensus on this topic is so solid that when the DOJ released its guidance for federal analysts, the Uniform Language for Testimony and Reports, the document prohibited the analysts from testifying that "two friction ridge prints originated from the same source to the absolute exclusion of all" others.[71]

65. *See* B. Garrett, G. Mitchell & N. Scurich, *Comparing Categorical and Probabilistic Fingerprint Evidence*, 63 J. FORENSIC SCI. 1712, 1712 (2018).

66. *See id.*

67. Chin et al., *supra* note 57, at 4.

68. *See* PCAST, *supra* note 5, at 29–30.

69. *Id.*; *see* United States v. Tibbs, No. 2016-CF1-19431, 2019 WL 4359486, at *6, *17, *20 (D.C. Super. Ct. Sept. 5, 2019); United States v. Shipp, 19-CR-029 (NGG), 2019 WL 6329658, at *1 (E.D.N.Y. Nov. 26, 2019); Jules Epstein, *Bullet Points—Challenges to Firearms-Matching Evidence*, LEGAL INTELLIGENCE (Jan. 22, 2020), https://www.law.com/thelegalintelligencer/2020/01/22/bullet-points-challenges-to-firearms-matching-evidence/ [https://perma.cc/844F-792U].

70. Simon A. Cole, *Individualization Is Dead, Long Live Individualization! Reforms of Reporting Practices for Fingerprint Analysis in the United States*, 13 LAW PROBABILITY & RISK 117, 118 (2014).

71. 1 GIANNELLI ET AL., *supra* note 34, § 16.10.

III. WHAT EXPERTS MAY SAY

Although there is substantial agreement as to what an experientially based expert should be prohibited from testifying to, it is much more problematic to determine what the expert ought to be allowed to say.[72]

A. *Should Experts Be Permitted to Say the Characteristics of the Person or Object in Question "Match" Those of the Unknown Person or Object?*

At the very least, experts will attempt to testify that in their opinion, the characteristics of the person or object "match" those of the unknown person or object. The expert might reach that opinion on the basis of a macroscopic, microscopic, or instrumental analysis. For instance, the expert might offer the opinion that two hair strands are "microscopically indistinguishable."[73] Many hair analysts consider 15 characteristics of hair strands and opine there is a match when both the known hair strand and the suspect strand display the same characteristic in all respects.[74]

Does this testimony pass muster under Federal Rule of Evidence 401, which provides that evidence must be logically relevant to be admissible?[75] In the words of Rule 401(a), the evidence must have "any tendency to make a fact more or less probable than it would be without the evidence."[76] The statutory standard is both liberal[77] and low.[78] The dispositive inquiry is whether the admission of the evidence will at all affect the balance of probabilities of the existence of a fact of consequence.[79] When the question is whether there is an association between the known person or object and

72. *See id.* § 1.01, at 2–3.

73. 2 PAUL C. GIANNELLI, EDWARD J. IMWINKELRIED, ANDREA ROTH & JANE CAMPBELL MORIARTY, SCIENTIFIC EVIDENCE § 24.02(a), at 802 (5th ed. 2012) [hereinafter 2 GIANNELLI ET AL.].

74. Commonwealth v. Perrot, Nos. 85–5415, 5416, 5418, 5420, 5425, 2016 WL 380123, at *26 (Mass. Dist. Ct. Jan. 26, 2016) (explaining the list includes characteristics such as color treatment (e.g., dyed, bleached, curled, permed), pigment aggregation (e.g., streaked, clumped, patchy), pigment distribution, medulla appearance if present, cuticular margin, and pigment density); *see* United States v. Nelson, No. 18-CO-53, 2019 WL 4865847 (D.C. Ct. App. Oct. 3, 2019) (stating the prosecution's witness referred to 20 characteristics).

75. *See* FED. R. EVID. 401(a).

76. *Id.*

77. United States v. Boswell, 772 F.3d 469, 475–76 (7th Cir. 2014); United States v. Harry, 20 F. Supp. 3d 1196, 1221 (D.N.M. 2014), *aff'd*, 816 F.3d 1268 (10th Cir. 2016).

78. *Boswell*, 772 F.3d at 476; United States v. Nason, 9 F.3d 155, 162 (1st Cir. 1993).

79. FED. R. EVID. 401 advisory committee's note to 1972 proposed rules.

the suspect person or object, evidence of matching characteristics is undeniably relevant. Admitting evidence of the match slightly nudges the balance of probabilities and increases the probability of an association. The evidence thus passes muster under Rule 401.

However, the Rule 401 analysis is not the end of the inquiry. Virtually all types of relevant evidence are subject to discretionary exclusion under Rule 403.[80] Rule 403 empowers trial judges to exclude even logically relevant evidence in their discretion when they conclude attendant probative dangers such as "unfair prejudice" substantially outweigh the probative value of the item of evidence.[81] One form of prejudice is the danger that lay jurors will overvalue the item of evidence. That danger is one of the policy rationales for the character-evidence prohibition codified in Rules 404 and 405.[82] Numerous psychological studies have found many laypersons, such as jurors, assign too much weight to the general construct of a person's character in forecasting a person's conduct on a specific occasion.[83] Similarly, that danger served as one of the primary justifications for the traditional, conservative test of general acceptance from *Frye v. United States* for the admissibility of

80. *Id.* at 403; Paul F. Rothstein, *Some Themes in the Proposed Federal Rules of Evidence*, 33 FED. B.J. 21, 29, 32 (1974) (pointing out the scope of Rule 403 is so broad that it arguably applies across the board to all types of evidence). There is a single possible exception of convictions involving an element of fraud and deceit, which some claim are automatically admissible under Rule 609(a)(2). However, Rule 609(a) cannot be read in isolation. Rule 609(b) is part of the context for construing Rule 609(a)(2). Rule 609(b) is not only part of the same statutory scheme; it is "right next door"—the adjacent subpart of the same rule. Rule 609(b) seemingly authorizes the trial judge to exclude any conviction too remote in time, and 609(b) purports to apply to any conviction. *See* FED. R. EVID. 609(a), (b). It is true Rule 609(b) does not empower the judge to conduct a full, Rule 403 analysis. *See id.* at 609(b). However, remoteness in time is one of the considerations trial judges customarily weigh in assessing probative value under Rule 403. *See id.* at 403.

81. FED. R. EVID. 403.

82. *See id.* at 404–05.

83. *See* People v. Reyes, 247 Cal. Rptr. 3d 247, 256 (Ct. App. 2019) ("The reason for this rule is not that such evidence is never relevant; to the contrary, the evidence is excluded because it has too much probative value. . . . 'The natural and inevitable tendency' is to give excessive weight to the prior conduct and allow it to bear too strongly on the present charge, or to take the proof of it as justifying a conviction irrespective of guilt of the present charge."); Randolph Jonakait, *Biased Evidence Rules: A Framework for Judicial Analysis and Reform*, 1992 UTAH L. REV. 67, 77 n.30; *see generally* Miguel Angel Mendez, *California's New Law on Character Evidence: Evidence Code Section 352 and the Impact of Recent Psychological Studies*, 31 UCLA L. REV. 1003, 1044–59 (1984).

scientific testimony.[84] The courts subscribing to *Frye* feared lay jurors would uncritically accept scientific testimony and routinely give it undeserved, dispositive weight.[85] Even in the *Daubert* case,[86] in which the Supreme Court abandoned the "austere"[87] *Frye* test, the Court approvingly quoted Judge Jack Weinstein's observation that lay jurors may have difficulty determining the appropriate probative value of expert testimony.[88]

To what extent does unadorned expert testimony about a match pose this danger? In the minds of many, this testimony presents that risk to an acute and intolerable degree. For example, while there is contra authority,[89] some courts have excluded testimony about a DNA match when the testimony was not accompanied by a random-match probability for the profile.[90] As one court remarked, "Without [a] probability assessment . . . the jury does not know whether the patterns are as common as pictures with two eyes, or as unique as the Mona Lisa."[91] In its discussion of hair evidence, the 2016 PCAST report takes the same position.[92] The PCAST asserts that a trace-evidence expert's testimony about two hair strands are "microscopically indistinguishable" and "scientifically unacceptable. Without appropriate estimates of accuracy, an examiner's statement that two samples are similar—or even indistinguishable—is scientifically meaningless: it has no probative value, and considerable potential for prejudic[e]."[93] The report's dismissal of the evidence as having "no probative value" is overstated and erroneous.[94] That evidence affects the balance of probabilities and consequently satisfies Rule 401.[95] However, the

84. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923), *superseded by* Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 597–98 (1993).

85. *See* 1 GIANNELLI ET AL., *supra* note 34, at § 1.06[a].

86. *Daubert*, 509 U.S. at 595 ("Expert evidence can be both powerful and quite misleading because of the difficulty of 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))).

87. *Id.* at 589.

88. *Id.* at 595 (quoting Weinstein, *supra* note 86, at 632).

89. *See* Turner v. State, 924 So. 2d 737, 765–66 (Ala. Crim. App. 2002).

90. *See* United States v. Yee, 134 F.R.D. 161, 181 (N.D. Ohio 1991), *aff'd sub nom.* United States v. Bonds, 12 F.3d 540 (6th Cir. 1993).

91. *Id.*

92. *See* PCAST, *supra* note 5, at 121.

93. *Id.* at 120–21.

94. *See id.* at 120.

95. FED. R. EVID. 401.

report is correct in predicting that without accompanying frequency data, a lay trier of fact is likely to struggle to gauge the extent of the probative value of match testimony and decide whether that testimony is a weighty-enough basis for a finding of fact.[96]

Nevertheless, it is untenable to treat Rule 403 as the source for a categorical rule that match testimony is always inadmissible unless the expert also presents frequency data.[97] Rule 403 must be read in the context of Rule 402.[98] Federal Rule of Evidence 402 provides that logically relevant evidence is admissible unless the judge can exclude it on the basis of the Constitution, a federal statute, a provision in the Federal Rules of Evidence, or a provision in other court rules adopted pursuant to statutory authority such as the Federal Rules of Civil and Criminal Procedure.[99] Rule 402 makes no mention of case, common, or decisional law.[100] The legislative intent was to deprive the courts of their common law power to enunciate and enforce uncodified exclusionary rules of evidence.[101] The Congress that enacted the Federal Rules was jealous of its prerogatives; it was the same Congress that had recently fought President Richard Nixon in federal court over claims of

96. PCAST, *supra* note 5, at 45.

97. In two Washington trial court cases, the trial judges held that, under Washington's version of Rule 403, in a drunk driving case, an expert could not testify to a single value-point estimate of the defendant's blood or breath alcohol concentration without providing an accompanying confidence interval for the estimate. State v. King Cty. Dist. Ct. W. Div., 307 P.3d 765, 766 (Wash. Ct. App. 2013). The trial judges reasoned that without the benefit of a confidence interval, the jury could easily overestimate the reliability of the point estimate. *Id*. at 769. In *State v. King*, the intermediate state court reversed. *Id*. at 767. The court held Rule 403 did not empower the trial judges to adopt such a categorical rule. *Id*. However, the court left open the possibility that the specific facts in a given case could justify the trial judge in requiring the presentation of testimony about a confidence interval. *Id*. at 770.

98. Edward J. Imwinkelried, *The Need to Amend Federal Rule of Evidence 404(b): The Threat to the Future of the Federal Rules of Evidence*, 30 VILL. L. REV. 1465, 1477 (1985) [hereinafter Imwinkelried, *Need to Amend*].

99. FED. R. EVID. 402. As restyled in 2011, Rule 402 refers to "other rules prescribed by the Supreme Court." *Id.* Rule 101(b)(5) defines that expression as meaning "a rule adopted by the Supreme Court under statutory authority." *Id.* at 101(b)(5). The Federal Rules of Civil and Criminal Procedure have been adopted pursuant to statutory authority. Rules Enabling Act, 28 U.S.C. § 2072 (2018). By definition, common law rules are not.

100. *See* FED. R. EVID. 402.

101. *See* 1 EDWARD J. IMWINKELRIED, THE NEW WIGMORE: A TREATISE ON EVIDENCE: EVIDENTIARY PRIVILEGE § 4.2.2 (Richard D. Friedman ed., 3d ed. 2017).

executive privilege.[102] Three years after the effective date of the Rules, Professor Edward Cleary, the reporter for the Advisory Committee that drafted the Rules, wrote: "In principle, under the Federal Rules no common law of evidence remains."[103] On two occasions, the Supreme Court itself has approvingly quoted Professor Cleary's statement.[104] If courts could use Rule 403 to resurrect their common law power to formulate general exclusionary rules of evidence, Rule 403 would be at odds with Rule 402.[105] Rule 403 would directly conflict with Rule 402 because it would reinstate the common law power that Rule 402 was intended to abolish.[106] The only way to harmonize the two rules is to constrain the judicial authority under Rule 403 to ad hoc, case-specific rulings, based on the particular probative value of and the specific probative dangers posed by a certain item of evidence.[107]

On that assumption, while the match testimony proffered in a given case may be vulnerable to a Rule 403 objection, courts cannot enforce a categorical rule that match testimony is always inadmissible unless it is accompanied by frequency data.[108] Of course, that conclusion makes it even more important to reach the next question: To enhance the jurors' estimation of the probative weight of the match, what may experts say about their personal experience applying the methodology?

B. *Should Experts Be Allowed to Say the Degree of Similarity They Observed Exceeds the Degree They Would "Expect" to See If the Samples Originated from Different Sources?*

As the introduction noted, although the DOJ guidelines forbid federal analysts from testifying to an "absolute exclusion of all others,"[109] the DOJ

102. *Id.*

103. Edward W. Cleary, *Preliminary Notes on Reading the Rules of Evidence*, 57 NEB. L. REV. 908, 915 (1978).

104. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 587–88 (1993); United States v. Abel, 469 U.S. 45, 51–52 (1984).

105. *See* Edward J. Imwinkelried, *The Meaning of Probative Value and Prejudice in Federal Rule of Evidence 403: Can Rule 403 Be Used to Resurrect the Common Law of Evidence?*, 41 VAND. L. REV. 879, 883–84 (1988) [hereinafter Imwinkelried, *Meaning of Probative Value and Prejudice*].

106. *See id.* at 882.

107. *See id.* at 884.

108. *E.g.*, State v. King Cty. Dist. Ct. W. Div., 307 P.3d 765, 767 (Wash. Ct. App. 2013).

109. ANDRE A. MOENSSENS, BETTY LAYNE DESPORTES & STEVEN D. BENJAMIN, SCIENTIFIC EVIDENCE IN CIVIL AND CRIMINAL CASES § 3.10, at 127 (7th ed. 2017).

document permits an analyst to opine that the "quality and quantity of corresponding information" are "such that the examiner would not expect to see that same arrangement of features repeated in another source."[110] As previously stated, though, in 2018 the AAAS took issue with the language *expect to see* in the DOJ's document.[111] The essence of the AAAS's complaint is that in the case of experientially based disciplines, there is no empirical data indicating how often an analyst should "expect to see" such an arrangement.[112]

Although the AAAS letter does not couch its contention in these terms, the basic thrust of the criticism is that like the word *match*, the expression *expect to see* can mislead a juror into ascribing excessive weight to the analyst's testimony.[113] Here too, the juror might attach undue weight to the testimony because the juror could mistakenly assume the "expectation" has a scientific basis resting on organized empirical studies.[114] If so, like the word *match*, *expectation* is vulnerable to a Rule 403 objection.[115] If trace-evidence experts claim their "expectation" rests on truly scientific empirical studies, in most cases, the claim would lack sufficient validation to satisfy *Daubert.*[116] The empirical studies are nonexistent. It is true that in experientially based fields, many experts have extensive personal experience, and in total, that quantum of experience is considerable. However, that experience has never been aggregated and synthesized in a careful, critical manner. Consequently, even in total, that experience does not warrant classifying the methodology as genuinely scientific.[117]

Genomic DNA analysis has become the gold standard in forensic evidence in part because experts can appeal to huge, systematically compiled databases to define the probative value of a match.[118] These databases provide trustworthy information about the frequency of certain genomic

110. *Id.*

111. Letter from Rush D. Holt., Chief Exec. Officer, AAAS, to Rod Rosenstein, Deputy Attorney Gen. 1–2 (Mar. 26, 2018).

112. *See id.* at 1.

113. *See id.*

114. *See id.* at 2.

115. *See generally id.* at 1–2.

116. *See* Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 590 (1993).

117. *See* FED. R. EVID. 702 advisory committee's note (2000).

118. *See* JoAnn Marie Longobardi, Note, *DNA Fingerprinting and the Need for a National Data Base*, 17 FORDHAM URB. L.J. 323, 337–38 (1989).

variations in particular population groups.[119] Forensic laboratories can obtain frequency data from sources such as the American Association of Blood Banks, which regularly updates its data.[120] Sadly, in most cases, trace-evidence analysts do not have the benefit of similar databases. To be sure, spurred on by critiques such as the NRC and PCAST reports, some progress is being made in a few experientially based forensic disciplines.[121] The fingerprint field is gradually accumulating this data. In modern fingerprint analysis, examiners can consider three levels of detail: L1 data of basic ridge-flow patterns such as loops, L2 data of ridge minutiae such as bifurcations, and L3 data characteristics such as pore edges.[122] Researchers have compiled considerable data on the frequency of L1 data details[123] and some for L2 data features.[124] There are similar efforts to generate population frequencies for handwriting characteristics in questioned-document examination, but those initiatives are still in the early stages.[125] The DNA databases dwarf these limited data collections.

The state of hair analysis is typical. In 2012, after the disturbing revelation of several misidentifications by FBI hair experts, the FBI, the

119. *See id.* at 327–28.

120. *See id.* at 331 n.66.

121. NAT'L RESEARCH COUNCIL, *supra* note 2, at 5; Chin et al., *supra* note 57, at 7.

122. CHRISTOPHE CHAMPOD, CHRIS J. LENNARD, PIERRE A. MARGOT & MILUTIN STOILOVIC, FINGERPRINTS AND OTHER RIDGE SKIN IMPRESSIONS 36 (2004); *see* Arent deJongh, Anko R. Lubach, Sheryl L. Lie Kwie & Ivo Alberink, *Measuring the Rarity of Fingerprint Patterns in the Dutch Population Using an Extended Classification Set*, 64 J. FORENSIC SCI. 108, 109, 117 (2019).

123. *See* CHAMPOD ET AL., *supra* note 122, at 215; Andrés J. Washington, *Fingerprint Geometric Analysis*, DERMATOGLYPHICS, http:www.dermatoglyphics.com [https://perma.cc/B27A-STRU].

124. CHAMPOD ET AL., *supra* note 122, at 108 (citing S.R. Gupta, *Statistical Survey of Ridge Characteristics*, INT'L CRIM. POLICE REV., 1968, at 130); *see generally* James W. Osterburg et al., *Development of a Mathematical Formula for the Calculation of Fingerprint Probabilities Based on Individual Characteristics*, 72 J. AM. STAT. ASS'N 772 (1977).

125. Mark E. Johnson, Thomas W. Vastrick, Michèle Boulanger & Ellen Schuetzner, *Measuring the Frequency Occurrence of Handwriting and Handprinting Characteristics*, 62 J. FORENSIC SCI. 142, 142 (2017); Thomas W. Vastrick, Ellen Schuetzner & Kelsey Osborn, *Measuring the Frequency Occurrence of Handwritten Numeral Characteristics*, 63 J. FORENSIC SCI. 1215, 1215 (2018); *Developing a Database of Cursive and Printed Handwriting Characteristics*, NAT'L INST. JUST. (Nov. 26, 2017), https://nij.ojp.gov/topics/articles/developing-database-cursive-and-printed-handwriting-characteristics [https://perma.cc/W929-EFTB] (containing data gathered by researchers at the University of Central Florida).

National Association of Criminal Defense Lawyers, and the Innocence Project entered into a Memorandum of Understanding (MOU). Under the terms of the MOU, the FBI undertook a review of hundreds of cases in which its hair experts had testified.[126] The MOU states, "[P]robabilities to a particular inclusion of someone as a source of hair of unknown origin cannot be scientifically supported."[127] In 2016, a Massachusetts court cited the discussion of hair evidence in the 2009 NRC report and concluded, "[O]ne cannot know whether one in five people could be the source [of the hair strand] or whether one in five million could be the source."[128]

In the final analysis, the court's conclusion flows from the status of hair analysis—and many other forensic disciplines—as an experientially based methodology, that is, not one validated by classical scientific methodology, controlled laboratory experiments, or systematic field observations.[129] Because hair analysis has not evolved beyond an experiential stage, trustworthy population-frequency data are unavailable.[130] Consequently, like most experts whose methodology is experientially based, hair experts should neither claim their opinion rests on rigorous empirical research nor use terminology such as *expect* that could easily imply to lay jurors that there is a more formalized basis for the methodology. The expert is testifying to a subjective impression of rarity, not an empirically supported population frequency. In many forensic disciplines, if experts propose embellishing on

126. *Innocence Project and NACDL Announce Historic Partnership with the FBI and Department of Justice on Microscopic Hair Analysis Cases*, INNOCENCE PROJECT (July 10, 2013), https://www.innocenceproject.org/innocence-project-and-nacdl-announce-historic-partnership-with-the-fbi-and-department-of-justice-on-microscopic-hair-analysis-cases/ [https://perma.cc/58PZ-XYTR]; *see generally* ABS GROUP, ROOT AND CULTURAL CAUSE ANALYSIS OF REPORT AND TESTIMONY BY FBI MHCA EXAMINERS (2018).

127. *See* U.S. DEP'T OF JUSTICE, FED. BUREAU OF INVESTIGATION, MICROSCOPIC HAIR COMPARISON ANALYSIS 1 (2012); *see also* United States v. Nelson, Case No. 1985 FEL 1057, 2017 WL 10241961, at *6 (D.C. Super. Ct. Dec. 21, 2107) (stating the prosecution's expert cited a 1-in-25 million probability, but "'there has been no published scientific study to confirm' the possibility of assigning any statistical probability of a false positive" in hair analysis and "[n]o 'valid statistical weight can be assigned to a microscopic hair association'").

128. Commonwealth v. Perrott, Nos. 85-5415, 5416, 5418, 5420, 5425, 2016 WL 380123, at *33 (Mass. Dist. Ct. Jan. 26, 2016).

129. *Id.* at *41–42.

130. *See* Dee J. Hall, *Flawed Forensics: Wrong by a Hair*, CRIME REP. (May 3, 2017), https://thecrimereport.org/2017/05/03/flawed-forensicswrong-by-a-hair/ [https://perma.cc/2YEH-D98H].

experience to enhance their qualifications and the weight of their opinion, the judge should strictly limit the expert to a description of the personal experience.[131]

C. *How Far Should Experts Be Permitted to Go in Describing the Quantity and Quality of Their Own Personal Experience?*

Assume that to eliminate the validation and Rule 403 problems posed by terminology such as *expect*, judges direct experts to testify about only their personal experience. Assume further that experts comply and use that precise expression, *my personal experience*. The jury should find it relevant and helpful to know that the witness in question has *some* experience in using the methodology employed in the instant case. However, without more, that testimony will be of minimal assistance to the jury. In order to intelligently decide how much weight to ascribe to the witness's opinion, the jury must decide not only whether the witness qualifies as an expert but also how well-qualified the witness is.[132] The jury must also decide whether it was reasonable for the witness to rely on the methodology employed by the witness.[133] Given the necessity for jurors to make those decisions, may experts go farther and elaborate on the extent of their personal experience? More specifically, what should experts be permitted to say about the quantity and quality of their experience?

131. In this context, the focus is on showing the witness's qualification as an expert. As Part II points out, the witness's qualification as an expert and the validity of the methodology are separate elements of the foundation for the witness's opinion. *See* FED. R. EVID. 702 advisory committee's note (2000). To validate the methodology—whether it is classically scientific or experientially based—"The proponent must marshal enough empirical data to persuade the judge . . . that by using the particular technique or theory . . . the expert can accurately draw the specific type of inference he or she contemplates testifying to." Edward J. Imwinkelried, *The Best Insurance Against Miscarriages of Justice Caused by Junk Science: An Admissibility Test That Is Scientifically and Legally Sound*, 81 ALB. L. REV. 851, 857 (2017) [hereinafter Imwinkelried, *Junk Science*]. For the purpose of validating an experientially based methodology, the judge often allows the proponent to point to the experience of analysts other than the witness. *Id*. at 858. For that purpose, it is surely relevant to show that the witness is not the only expert using the methodology. *Id*. at 865. However, if the discipline rests on the informally cumulated experience of the experts in the field, no expert should be able to invoke the stronger inference of reliability that arises when the practitioner's experience has been closely examined and systematically aggregated.

132. *See* Imwinkelried, *Junk Science*, *supra* note 131, at 859.

133. *Id.*

1. *The Quantum of the Experience*

Suppose the witness is prepared to testify only that the witness has a certain quantum of experience. For example, the witness might testify to serving as a fingerprint examiner at a state laboratory for 10 years or conducting over 1,000 microscopic hair examinations.[134] However, in the instant case, the witness cannot truthfully testify to ever having the benefit of a feedback loop with respect to the accuracy of the determinations. For instance, the fingerprint examiner did not work in a laboratory that followed the ACE-V methodology: Analysis, Comparison, Evaluation, and Verification.[135] In the verification step of that methodology, the first examiner's analysis is routinely checked by a second examiner.[136] Or the hair analyst who did not work in a laboratory that made it a routine quality-control practice to have senior analysts randomly check the work of junior analysts. When the expert can testify only to the quantum of experience, is that testimony relevant under Federal Rule of Evidence 401? Even if it is relevant, is the testimony susceptible to a Rule 403 objection on the grounds that the jury will have a difficult time deciding how much weight to ascribe to the testimony?

As previously stated, the logical-relevance test under Rule 401 is lax: Does the item of evidence have any impact, ever so slight, on the balance of probability of a fact of consequence? Judged by that relaxed standard, testimony about the witness's quantum of experience is relevant.[137] It is true that during years of practice and hundreds or even thousands of analyses, the witness could have been merely repeating the same mistake over and over again.[138] However, the longer the period of practice or the larger the absolute number of analyses, the greater the possibility is that, at least by

134. The assumption here is that witnesses' testimony about the extent of their experience is truthful. United States v. Nelson, Case No. 1985 FEL 1057, 2017 WL 10241961, at *6 (D.C. Super. Ct. Dec. 21, 2017) (finding testimony was likely fabricated when, over a span of several years, a prosecution witness consistently testified that he had conducted 10,000 hair examinations and granting the defendant a new trial) ("'Regardless of the year, [Malone] routinely said he had examined the hairs of "10,000 people" in his career,' even though that number should have increased significantly each year . . . .").

135. United States v. Llera Plaza, 179 F. Supp. 2d 492, 498–99 (E.D. Pa. 2002) (describing this methodology in detail), *vacated*, 188 F. Supp. 2d 549 (E.D. Pa. 2002).

136. *See id.* at 499.

137. *See* FED. R. EVID. 401.

138. *See* JEFFREY M. JENTZEN, DEATH INVESTIGATION IN AMERICA: CORONERS MEDICAL EXAMINERS, AND THE PURSUIT OF MEDICAL CERTAINTY 205 (2009).

happenstance, an error will be discovered and reported back to the witness.[139] A mistake could conceivably go undetected for a long period of time; but the lengthier the period is, the greater the probability that, at least by accident, the mistake will be exposed.[140] By accident, the witness could passively become the recipient of an error report, which might lead the expert to identify a weakness in the methodology. The probative value of unadorned testimony about the witness's quantum of experience may be minimal, but under Rule 401's standard, the testimony possesses logical relevance. The fact of consequence is the proposition that the witness followed a sound methodology in analyzing the trace evidence; and the greater the witness's experience, the greater the probability is that a deficiency in the methodology will be identified.

Again, though, the mere fact that an item is logically relevant does not guarantee its admission. The item must also run the gauntlet of Rule 403, which, as we have seen, is implicated when the jury might struggle to gauge the probative value of the testimony.[141] Is there a substantial risk that lay jurors will overvalue the testimony? If the jury heard only the reference to the quantum of experience during the witness's direct examination, there would arguably be such a risk. At first blush, numbers such as 10 years or 1,000 tests sound quite impressive. However, both the opposing counsel and the trial judge have tools available for minimizing that risk.

To begin with, the opposing counsel has the tools of cross-examination and closing argument.[142] On cross-examination, the opposing counsel can force the witness to concede that during the witness's decade-long tenure as a fingerprint examiner, no examiner has ever had occasion to verify the witness's opinion or that at their laboratory, senior analysts never randomly check the witness's work. The use of superlatives such as *never* and *ever* can make for a potent cross-examination attack. Then in closing argument, the opposing counsel can explicitly discuss the probative danger mentioned above. After pointing to the lack of evidence of any feedback loop, the opposing counsel can bluntly tell the jury, "For all we know, the witness has simply been repeating the same mistake—over and over and over again."

139. *See* Brandon L. Garrett & Gregory Mitchell, *The Proficiency of Experts*, 166 U. PA. L. REV. 901, 939 (2018).

140. *See id.*

141. *See* Imwinkelried, *Junk Science*, *supra* note 131, at 860.

142. *See* Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 596 (1993).

Suppose, though, that the numbers describing the quantum of experience are eye-popping—20 years as an analyst or 5,000 examinations. Further, assume that the trial judge noticed at least some of the jurors were rather inattentive during the phase of the cross-examination in which the witness conceded there was no systematic feedback mechanism at the laboratory. In that situation, the judge might decide to minimize the risk of jury overvaluation of the evidence by administering a cautionary instruction to the jury. In one of the leading post-*Daubert* questioned-document cases, *United States v. Starzecpyzel*, the defense challenged the admission of the prosecution's testimony by a forensic document examiner.[143] Initially, the judge refused to altogether exclude the testimony.[144] The court pointed to Dr. Moshe Kam's experiments, which indicated that experienced questioned-document examiners can resolve identification questions much more accurately than laypersons such as jurors and judges.[145] Although, in the judge's mind, Dr. Kam's research did not elevate questioned-document expertise to the status of science, the research convinced the judge that the expertise qualifies as sufficiently reliable technical knowledge under Federal Rule of Evidence 702.[146]

However, the judge then announced that if the prosecution offered the testimony at trial, the judge would give the jury a cautionary instruction.[147] The special instruction drafted by the judge told the jury that questioned-document examiners "offer practical, rather than scientific[,] expertise."[148] The instruction made it clear that the expertise was experientially based and

143. United States v. Starzecpyzel, 880 F. Supp. 1027, 1028 (S.D.N.Y. 1995).

144. *Id.* at 1029.

145. *Id.* at 1034. See the discussion of Dr. Kam's research in 2 GIANNELLI ET AL., *supra* note 73, § 21.07(a); *see also* Adrian G. Dyer, Bryan Found & Doug Rogers, *Visual Attention and Expertise for Forensic Signature Analysis*, 51 J. FORENSIC SCI. 1397, 1397 (2006) (explaining that findings by forensic document examiners were "significantly more accurate than [the laypeople], providing further evidence of [forensic document examiner] expertise"); Paul C. Giannelli & Carin Cozza, *Forensic Science*: Daubert *Challenges to Handwriting Comparisons*, 42 CRIM. L. BULL. 347, 354–59 (2006) ("While not without flaws, the Kam studies as well as others provide a basis for establishing the superior abilities of professional document examiners when compared to laypersons."). In the terminology of the PCAST report, these are "black box" studies. PCAST, *supra* note 5, at 49. Although the studies do not dissect the analytic process and establish objective standards for each step, the studies do yield a sense of the ability of the overall process to yield accurate conclusions. *See id*.

146. *Starzecpyzel*, 880 F. Supp. at 1036–37.

147. *Id.* at 1029.

148. *Id.* at 1049.

had not been validated by traditional scientific methodology.[149] There is a trend for judges to give juries cautionary instructions about expert testimony.[150] It is especially appropriate for the judge to do so when the expertise is experientially based rather than validated by classical scientific methodology of laboratory experimentation or systematic observation. In the instruction, the judge could inform the jury that even witnesses' extensive experience does not guarantee the correctness of their opinion. The judge can explain that there is a distinct possibility of error whenever witnesses' analyses have never been verified by other analysts in the field. In the instruction, the judge should have the discretion to bluntly tell the jury that in this situation, it is possible that during their lengthy period of practice, the expert has simply been repeating the same mistake. Together, the opponent's opportunity for cross-examination, the opponent's summation, and a forceful cautionary instruction can decrease the risk that the jury will uncritically accept the witness's opinion at face value solely because the witness has a substantial quantum of experience.[151]

2. *The Quality of the Experience*

The preceding paragraphs address the situation in which the proponent of a witness testifying on the basis of experientially based expertise endeavors to increase the weight of the witness's testimony by eliciting the witness's description of the substantial quantum of the witness's experience. In addition, or alternatively, the proponent could endeavor to achieve the same objective by eliciting the witness's testimony enhancing the jury's impression of the quality of the underlying experience.[152] Again, assume the witness has not had the benefit of a formal feedback loop such as verification or random testing to verify the accuracy of the conclusions. Nevertheless, after describing the witness's experience in quantitative terms, the proponent could add that the witness has informally "followed up" on the investigations in which the witness conducted analyses and learned that a large number of the suspects in those cases later confessed, pleaded guilty, were convicted, or had their guilt verified by a subsequent, superior forensic analysis such as a nuclear DNA test. Would this testimony be relevant?

149. *Id.* at 1050–51.

150. Edward J. Imwinkelried, *Expert Witness: Cautionary Instructions*, NAT'L L.J., July 31, 2006, at 12.

151. *See id.*

152. *See* Garrett & Mitchell, *supra* note 139, at 905–06.

Assuming relevance is met, is the testimony inadmissible either on the ground that it constitutes hearsay or under Federal Rule 403 as creating an intolerable risk of jury overvaluation?

a. *Logical relevance.* Initially, consider the logical-relevance analysis. To be sure, in this state of the record, the witness's proponent cannot point to formal verification procedures, random checks, or proficiency testing to demonstrate the quality of the witness's experience.[153] Those would be highly probative methods of establishing the quality of the underlying experience, but they are absent here. Yet, the proponent can still correctly contend that the testimony is relevant.[154] The prior discussion of the quantity of the witness's experience noted the quantum of experience is relevant because the more extensive the witness's experience, the greater the possibility is that at some point a deficiency in the witness's methodology will be discovered—even accidentally.[155] In this variation of the record, the witness has made some active efforts, albeit informal, to follow up and discover whether the accuracy of the opinion had been confirmed. The witness's approach to follow up is far from ideal, but any attempt to follow up increases the probability that the witness will identify a flaw in the methodology of formulating opinions on the subject.[156]

b. *Hearsay—The plausibility of a hearsay objection.* However, as we have previously seen, standing alone, the logical relevance of an item of evidence under Rule 401 does not mandate its admission. At several points, this Article noted even logically relevant evidence must pass muster under Rule 403.[157] However, in this situation even before reaching a Rule 403 question, a trial judge might have to grapple with a hearsay objection by the opponent. A hearsay objection would be more powerful than a Rule 403 objection. As we have seen, the judge applies Rule 403 on an ad hoc, fact-specific basis; in a given case, if the potential for prejudice substantially outweighs the probative worth of the testimony in the judge's discretion, the judge could invoke Rule 403 and exclude the testimony.[158] However, if the

153. *Id.* at 937 (arguing that the courts should require proof of the witness's proficiency testing as a condition to finding that the witness qualifies as an expert); PCAST, *supra* note 5, at 57–59 (taking the same position). However, to date, no court has adopted that view.

154. *See* Garrett & Mitchell, *supra* note 139, at 906.

155. *See supra* Part III.C.1.

156. *See* Garrett & Mitchell, *supra* note 139, at 948–49.

157. *See supra* Part III.C.2.a.

158. *See* FED. R. EVID. 403.

type of testimony in question is inadmissible hearsay and there is no applicable hearsay exemption or exception, there is no need for ad hoc balancing; rather, under Federal Rule of Evidence 802, there is a categorical bar to the admission of the testimony.[159]

At first blush, it certainly seems plausible to classify this kind of testimony as hearsay.[160] Consider each of the types of subsequent developments that the witness could point to as confirmation of the validity of the methodology.

i. *The defendant later confessed.* The witness's proponent might argue that at least this type of testimony is admissible over a hearsay objection because the confession amounts to the statement or admission of a party opponent, admissible under the exemption set out in Federal Rule of Evidence 801(d)(1)(A).[161] If the witness had personally heard the defendant confess, that argument would have merit.[162] But in the usual case, the testimony is almost always double hearsay:[163] The witness heard someone, such as a police officer, say that the defendant had subsequently confessed. Just as the defendant's confession is an assertive statement under Rule 801(a),[164] the officer's statement to the witness about the confession is an assertion.[165] Under Federal Rule of Evidence 805, double testimony is admissible over a hearsay objection only if both assertions qualify under an exemption from or exception to the hearsay rule, and there is no evident exception for the officer's statement to the witness.[166] For that matter, it is hard to conceive of a situation in which there would be an applicable hearsay exception for such a statement.

ii. *The defendant later pleaded guilty.* Although the plea is more formal than an informal confession, the hearsay analysis remains the same. Like a confession, a plea can constitute a statement or admission of a party opponent.[167] Yet, unless the witness attended the court hearing at which the defendant entered the plea, the witness is relying on a third party's statement

159. *Id.* at 802.
160. *See id.* at 801(c).
161. *Id.* at 801(d)(1)(A).
162. *See id.*
163. *Id.* at 805.
164. *See id.* at 801(a).
165. *See id.*
166. *Id.* at 805.
167. *See id.* at 801(d)(2)(A).

to the witness that the defendant pleaded guilty. If the proponent cannot establish that there is an applicable hearsay exception for the third party's statement to the witness, the reference to the plea will suffer the same fate as the testimony about the confession.[168]

iii. *The defendant was later convicted.* With respect to the present case, the prior judge's or jury's finding of guilt is an assertive, out-of-court statement.[169] The verdict or judgment represents a statement by the fact-finder that the defendant committed the crime of which the defendant was convicted.[170] Federal Rule of Evidence 803 recognizes the hearsay status of prior judgments.[171] That rule contains two limited provisions, Rule 803(22) and 803(23), which carve out very limited hearsay exceptions for prior judgments.[172] Those provisions would be unnecessary if judgments did not amount to out-of-court assertions within the intendment of Rules 801(a)–(b).[173]

iv. *A subsequent, superior forensic test confirmed the defendant's guilt.* In this variation of the fact pattern, the witness is pointing to the result of the application of a later, superior forensic technique, such as DNA analysis or fingerprint examination, to confirm the validity of the witness's opinion pointing to guilt. However, even if the witness stood next to the DNA or fingerprint analyst at the time of the test, unless the witness was personally competent to evaluate the DNA or fingerprint analysis, the witness would be at least implicitly relying on an assertive statement by the other analyst, for example: "My (DNA or fingerprint) analysis indicates that . . . ."[174] Once again, the proponent will be hard-pressed to find an applicable hearsay exception for the DNA analyst's assertion.[175] Worse still,

168. *See id.* at 805.

169. *See id.* at 801(c)(1) (defining hearsay as a statement not made "while testifying at the current trial or hearing").

170. *See id.* at 803(22).

171. *Id.*

172. *Id.*; *id.* at 803(23).

173. *See id.* at 801(a)–(b).

174. *See id.* at 801(a).

175. If the court were willing to liberally apply Rule 803(1), the present-sense-impression exception, to a highly opinionated scientific conclusion, that exception could apply here. *See* Makuc v. Am. Honda Motor Co., 835 F.2d 389, 392 (1st Cir. 1987). However, courts have generally been cautious in applying that exception. *See* Edward J. Imwinkelried, *The Need to Resurrect the Present Sense Impression Hearsay Exception: A Relapse in Hearsay Policy*, 52 HOW. L.J. 319, 331 (2009). Even if the judge overruled the hearsay objection, the defense might object on the alternative ground that the admission

if a third party told the witness about the outcome of the DNA test, there would once again be double hearsay: The witness testifies that the third party told the witness the DNA analyst made the statement to the third party.[176] It would be exceedingly difficult to find a hearsay exception applicable to the third party's statement to the witness.

c. *Surmounting the hearsay objection under Rules 104(a) and 801(c).* Even though there is seemingly a strong case that all of these references amount to hearsay, the judge could consider these statements out of the jury's presence for the purpose of deciding whether the witness qualifies as an expert or whether the witness's methodology is reliable enough to satisfy *Daubert*.[177] Both of those foundational questions are governed by the preliminary fact-finding procedure codified in Federal Rule of Evidence 104(a).[178] In *Daubert*, Justice Blackmun explicitly stated Rule 104(a) governs these foundational questions.[179] In pertinent part, Rules 104(a)–(b) read:

> (a) In General. The court must decide any preliminary question about whether a witness is qualified, a privilege exists, or evidence is admissible. In so deciding, the court is not bound by evidence rules, except those on privilege.

of the statement would violate the Sixth Amendment Confrontation Clause as construed in *Crawford v. Washington*. *See generally* Crawford v. Washington, 541 U.S. 36 (2004). If two state crime laboratory analysts, a DNA analyst, and a hair technician are discussing their test results in a particular case, there is obviously a strong argument they can foresee that their analyses will be used in a subsequent prosecution. However, the Court's latest pronouncement on that topic, *Williams v. Illinois*, has muddied the *Crawford* waters. *See generally* Williams v. Illinois, 567 U.S. 50 (2012) (plurality opinion). In that case, the plurality refused to find a Sixth Amendment violation in part because, at the time of the forensic test, the police had not yet identified a specific suspect. *Id.* at 85–86. If, in our hypothetical, the investigation had not focused on a particular suspect, the prosecution could cite the plurality opinion and argue the DNA analyst's statement was nontestimonial. *See id.* In *Williams*, Justice Clarence Thomas cast the decisive fifth vote to affirm the conviction. *Id.* at 103 (Thomas, J., concurring). Although Justice Thomas agreed with the plurality that the statement was nontestimonial, he reached that conclusion on an entirely different basis, namely, that the report was not formal or solemn enough. *Id.* at 104. If the DNA analyst made only an oral statement to the other expert, Justice Thomas would probably characterize the statement as nontestimonial. *See id.* Simply stated, the *Williams* decision is a fragmented opinion.

176. FED. R. EVID. 805.

177. *See generally id.* at 104(a); Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 592–93 (1993).

178. FED. R. EVID. 104(a).

179. *Daubert*, 509 U.S. at 592.

> (b) Relevance That Depends on a Fact. When the relevance of evidence depends on whether a fact exists, proof must be introduced sufficient to support a finding that the fact does exist.[180]

Rule 104(a) governs the competence of evidence while Rule 104(b) governs conditional relevance.[181] Rule 104(b) applies to a small number of facts—such as a lay witness's personal knowledge[182] and the authenticity of exhibits[183]—that condition the logical relevance of evidence in a fundamental way.[184] The jury can be trusted to make the final decision on 104(b) issues. If the jury decides that the witness "doesn't know what he or she's talking about"[185] or that the letter "isn't worth the paper it's written on,"[186] common sense will naturally lead the jury to disregard the testimony during its deliberations; the jurors do not need any formal legal education to appreciate that this testimony is worthless. Hence, the exposure of the jury to the evidence and the related foundational testimony will not distort the balance of its deliberations. After deciding that the witness lacks personal knowledge or that the exhibit is a forgery, the jurors will be able to put the testimony out of mind.[187] For that reason, when Rule 104(b) controls, the judge initially plays a limited screening role, inquiring only whether the foundational testimony is sufficient to enable the jury to rationally conclude that the witness observed the accident or that the letter is genuine.[188] If so, the judge admits the testimony and allows the jury to make the final decision on personal knowledge or authenticity.[189] On request, the judge instructs the jurors to disregard the testimony if they find that the witness did not observe the accident or that the defendant did not write the letter.[190] Even lay jurors lacking legal training should be competent and willing to follow that instruction.

180. FED. R. EVID. 104.

181. *See id.*

182. *See id.* at 602.

183. *See id.* at 901.

184. 1 EDWARD J. IMWINKELRIED, PAUL C. GIANNELLI, FRANCIS A. GILLIGAN, FREDRIC I. LEDERER & LEISA RICHTER, COURTROOM CRIMINAL EVIDENCE § 134 (6th ed. 2016) [hereinafter 1 IMWINKELRIED ET AL.].

185. *See* FED. R. EVID. 602.

186. *See id.* at 901.

187. *See id.* at 104 advisory committee's notes to 1972 proposed rules.

188. *Id.* at 104.

189. *See* 1 IMWINKELRIED ET AL., *supra* note 184, § 134.

190. *See id.*

In contrast, under Rule 104(a) the judge is the fact finder.[191] The judge considers the foundational testimony on both sides and actually decides the existence of the preliminary fact.[192] For example, if the question is the applicability of a privilege, the judge decides whether the attorney–client conversation was confidential, that is, whether the communication occurred in a physically private setting rather than in public.[193] Unlike the typical Rule 104(b) setting, here the law does not trust the jury to make the decision.[194] By way of example, if the law allocated the privilege decision to the jury and at a conscious level the jurors decided the conversation was privileged and technically inadmissible, at a subconscious level, the jurors could still find it terribly difficult to put out of mind the fact that they had heard the defendant admitted the murder to the attorney.[195] Note one further distinction between Rules 104(a) and (b). By virtue of the second sentence of 104(a), when the judge is deciding a competence issue, the technical evidentiary rules do not apply.[196] As the Advisory Committee Note to Rule 104 observes, the conventional wisdom is that common law courts evolved the exclusionary rules, such as hearsay, due to doubts about lay jurors' ability to critically evaluate certain types of testimony.[197] However, when Rule 104(a) controls, the judge—not the jury—is the fact-finder.[198] For that matter, the judge might make the 104(a) determination on a pretrial in-limine motion before a jury has even been selected. It would make little sense to apply the technical "jury-protecting" rules to the judge's fact-finding. Thus, when Rule 104(a) applies, the judge may consider foundational testimony even if it otherwise constitutes hearsay.[199] Since *Daubert* teaches that 104(a) governs the foundational elements for expert testimony, the opposing party could not object on the grounds that the witness's references to the confession, plea, conviction, or forensic-test result were hearsay.[200] In ruling on the

191. *Id.* § 132.
192. *Id.* § 133.
193. *See* FED. R. EVID. 104(a).
194. *See id.* at 104 advisory committee's notes to 1972 proposed rules.
195. *See* 1 IMWINKELRIED ET AL., *supra* note 184, § 133.
196. FED. R. EVID. 104(a).
197. *Id.* at 104 advisory committee's notes to 1972 proposed rules.
198. *Id.* at 104(a).
199. Int'l Mgmt. Assocs. v. Perkins, 781 F.3d 1262, 1268 (11th Cir. 2015) ("[T]he court may consider any unprivileged evidence—even hearsay.").
200. *See* Daubert v. Merrell Dow Pharm, Inc., 509 U.S. 579, 592–93 (1993).

reliability of the witness's methodology under *Daubert,* the judge may consider the references even if they otherwise amount to hearsay.[201]

However, that provision in Rule 104(a) has a limited scope. The provision applies only when the trial judge is ruling on admissibility—often out of the hearing of the jury and sometimes at a pretrial in-limine hearing before a jury has been selected.[202] In our hypothetical, the current setting differs; now the proponent is attempting to present the witness's testimony to the jury in open court in order to persuade the jurors to attach greater weight to the witness's experientially based methodology. For that purpose, in open court, the proponent cannot rely on Rule 104(a). Now the hearsay rule applies with full force.[203] And again, the references to the confession, plea, conviction, and test result are seemingly hearsay. They are assertions under Rule 801(a),[204] and the source of each assertion is an out-of-court declarant under Rule 801(b).[205]

However, while the statement's assertive character and the source's status as an out-of-court declarant are two essential elements of the definition of hearsay, there is a final element that we have not yet discussed. Under Federal Rule 801(c)(2), even assertive statements by out-of-court declarants constitute hearsay only if at trial the testimony about the statements is "offer[ed] . . . to prove the truth of the matter asserted."[206] In our hypothetical, does the witness's proponent have to offer the description of the witness's follow-up efforts to prove the truth of the assertions about the confession, plea, conviction, or forensic test?

The proponent certainly could attempt to offer the testimony for that hearsay purpose.[207] The proponent wants to convince the jury that the witness's opinion is accurate and correct. In effect, the proponent could offer the testimony about the earlier confessions, pleas, convictions, and test results to persuade the jury that, in the instant case, the witness's experientially based methodology has again yielded a correct result. The confirmatory events show the methodology yields accurate conclusions, and the current opinion is another conclusion resting on the same methodology.

201. *See id.* at 595; FED. R. EVID. 104(a).
202. *See* FED. R. EVID. 104(c).
203. *See id.* at 801.
204. *See id.* at 801(a).
205. *See id.* at 801(b).
206. *Id.* at 801(c)(2).
207. *See id.*

If the proponent explicitly offered the testimony for that purpose, the testimony would be hearsay under Rule 801(c)(2),[208] and the testimony would be inadmissible unless the proponent could lay the foundation for an exemption from or exception to the hearsay rule.[209]

However, that is only part of the analysis under 801(c)(2). The decisive question is not whether the proponent *could* offer the testimony for that substantive purpose; rather, the pivotal question is whether the proponent *must* offer the testimony for that purpose.[210] In other words, is there an alternative, nonhearsay theory that is tenable on the facts?[211] If testimony constitutes hearsay on one theory of logical relevance but nonheasay under another theory, the typical solution is to admit the testimony with a limiting instruction under Federal Rule of Evidence 105.[212] The negative prong of the instruction forbids the jury from putting the testimony to a substantive, hearsay use.[213] In contrast, the affirmative prong of the instruction identifies a legitimate, nonhearsay use of the testimony.[214]

One widely recognized nonhearsay theory is "mental input": The statement is logically relevant to show its impact on the state of mind of the hearer or reader.[215] Take a simple example. Suppose the defendant is charged with homicide, but the defendant claims self-defense. The defendant offers testimony that prior to the fatal encounter, a third party told the defendant the decedent had threatened to attack the defendant. Assume further that the third party is regarded as a credible, trustworthy source of information. Even if the third party's report of the decedent's threat was erroneous—the decedent had not made any threat—the defense could introduce the testimony over a hearsay objection to support the self-defense claim.[216] If the defendant heard the third party's statement, the statement could plausibly enhance the reasonableness of the defendant's belief that the decedent intended to harm the defendant.[217]

208. *Id.*
209. *See id.* at 801, 803, 804, 807.
210. *See* 1 IMWINKELRIED ET AL., *supra* note 184, § 1004.
211. *See id.*
212. FED. R. EVID. 105.
213. *See id.*
214. *See id.*
215. 1 IMWINKELRIED ET AL., *supra* note 184, § 1004.
216. *See* FED. R. EVID. 404.
217. *See id*.

As previously stated, the proponent undeniably wants to convince the jury the witness's opinion is correct. However, at this point, assume arguendo the judge has already ruled that the witness's experientially based expertise qualifies as a reliable methodology under Rule 702(c).[218] Under that ruling, the witness's opinion is admissible. However, admissibility is only half the battle for a proponent with a burden of proof. The other half of the battle is weight;[219] at this juncture, the proponent is attempting to convince the trier of fact that the evidence is so weighty the trier should rely on the evidence and, on that basis, resolve the factual dispute in the proponent's favor.[220] More specifically, the proponent is entitled to endeavor to convince the jury that it was objectively reasonable for the witness to rely on the experientially based methodology to reach that opinion.[221] In the words of the Advisory Committee Note accompanying the 2000 amendment to Rule 702, the proponent can attempt to show that the witness's opinion is "properly grounded [and] . . . well-reasoned."[222] In that light, the proponent can argue there is a legitimate, nonhearsay theory for admitting the references to events such as pleas and convictions. The witness's receipt of the reports about the prior events makes it all the more reasonable for the witness to rely on the methodology that was apparently confirmed in previous cases by later events.[223] The effect of the reports on the witness–expert's state of mind is that they give the expert all the more reason to trust the methodology and the opinion yielded by the methodology.

The references to events such as confessions, pleas, convictions, and other test results are certainly assertive, and it is equally clear the sources constitute out-of-court declarants.[224] However, this testimony constitutes hearsay if, and only if, the proponent offers the testimony as proof of the truth of the assertions.[225] The proponent might offer the references to prove the truth of the witness's opinions in the prior cases and then reason simplistically that the accuracy of those opinions makes it more probable

218. *Id.* at 702(c).

219. *See* Crane v. Kentucky, 476 U.S. 683, 688 (1986) (stating admissibility and weight differ and even if a defendant loses the attack on the admissibility of evidence, the defendant has a right to attack the weight of the evidence).

220. *See id.* at 690.

221. *See id.* at 691.

222. FED. R. EVID. 702 advisory committee's note (2000).

223. *See id.*

224. *See id.* at 801(c)(1).

225. *Id.* at 801(c)(2).

that the opinion in the instant case is also accurate. Were the proponent to do so, the testimony would constitute hearsay and would likely be excludable under Federal Rule of Evidence 802.[226] The testimony is probably inadmissible to prove the truth in the prior cases.[227] However, as we have seen, the proponent might be astute enough to advance a more nuanced theory of logical relevance, namely, that the receipt of the reports made it objectively more reasonable for the witness to have faith in the methodology.[228] Under that theory, the focus is on the effect of the reports on the witness's state of mind.[229] That theory, mental input, is a long recognized nonhearsay use of testimony about out-of-court statements.[230] If the proponent articulates that theory, the judge should overrule the hearsay objection and admit the testimony with a limiting instruction identifying the permissible, nonhearsay use of the evidence.[231] The upshot is that like the Rule 401 objection, the Rule 801 objection would fail.[232]

d. *The potential objection that the evidence is excludable under Rule 403*. We previously saw that the opposing counsel could raise Rule 403 to circumscribe witnesses' testimony about the quantum of their personal experience.[233] Likewise, counsel might invoke Rule 403 as the basis for an argument to exclude testimony detailing the witness's follow-up efforts to learn whether, in prior cases, subsequent developments had confirmed the accuracy of the witness's opinion and thereby confirmed the reliability of the witness's methodology.

As previously stated, even when a certain type of evidence implicates Rule 403 concerns, Rule 403 does not authorize the judge to issue a categorical ban on the admission of that evidence.[234] Construed together with Rule 402, Rule 403 empowers the judge to make only ad hoc rulings based on a case-specific weighing of the probative value of the evidence

226. *See id.* at 802.

227. *See id.*

228. *See* 1 IMWINKELRIED ET AL., *supra* note 184, § 134.

229. *See id.*

230. Edward J. Imwinkelried, *The Gordian Knot of the Treatment of Secondhand Facts Under Federal Rules of Evidence 703 Governing the Admissibility of Expert Opinions: Another Conflict Between Logic and Law*, 3 U. DENV. CRIM. L. REV. 1, 15 (2013).

231. *See id.* at 15–16.

232. *See* FED. R. EVID. 801.

233. *See supra* Part III.A.

234. *See* FED. R. EVID. 403.

against the attendant probative dangers.[235] We previously saw that witnesses' testimony about the quantum of their experience could trigger the danger that juries will overvalue the testimony.[236] The jury may not fully appreciate that the lack of a feedback loop can significantly reduce the probative worth of even years of prior experience or thousands of prior tests.[237] However, in the final analysis, we concluded that in the typical case, danger does not warrant completely excluding the testimony about the quantitative aspect of the witness's experience.[238] Together with a cautionary instruction from the judge, the opposing counsel's cross-examination and closing argument can markedly reduce that danger.[239]

Does the same hold true here? Once again, there is a danger of overvaluation. Jurors may overestimate the significance of the reports of subsequent confessions, pleas, convictions, and test results. After all, there is now solid evidence that even fingerprint tests can be flawed;[240] on occasion, innocent people confess to crimes that they have not committed;[241] and sometimes innocent persons are wrongfully convicted.[242]

Despite the availability of solid proof of mistakes and wrongful convictions, a defense's cross-examination attack on the quality of the witness's experience might not necessarily be as effective as a cross-examination about the quantum of the witness's experience.[243] In the latter case, the cross-examiner can force the witness to concede that the witness

235. *See* Imwinkelried, *Meaning of Probative Value and Prejudice*, *supra* note 105, at 883–84.

236. *See supra* Part III.A.

237. *See supra* Part III.C.1.

238. *See supra* Part III.C.1.

239. *See supra* Part III.C.1.

240. Simon A. Cole, *More than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 985–86 (2005) [hereinafter Cole, *More than Zero*]; Laura Spinney, *Science in Court: The Fine Print*, 464 NATURE 344, 344 (Mar. 17, 2010).

241. 1 GIANNELLI ET AL., *supra* note 34, § 9.09.

242. *See* BOAZ SANGERO, SAFETY FROM FALSE CONVICTIONS 142 (2016); *Exonerations in 2018*, NAT'L REGISTRY EXONERATIONS, https://www.law.umich.edu/special/exoneration/Documents/Exonerations%20in%202018.pdf [https://perma.cc/G7Y3-ZDD9]; Denise Lavoie, *Fallen Forensics: Judges Routinely Allow Disavowed Science*, L.A. DAILY NEWS (Aug. 20, 2017), http://www.dailynews.com/2017/08/20/fallen-forensics-judges-routinely-allow-disavowed-science ("The National Registry of Exonerations at the University of California Irvine has documented more than 2,000 exonerations since 1989.").

243. *See supra* Part III.C.1.

has not had the benefit of a systematic feedback loop during the witness's period of service as an analyst.[244] That cross-examination gives the opposing counsel the ammunition to make a powerful summation contention such as, "For all we know, during those five years the witness has simply been repeating the same mistake."[245] In the case of the former, though, the tenor of the cross-examination will differ. To be sure, the cross-examiner can force the witness to concede lack of personal, firsthand knowledge of the suspects' pleas, confessions, convictions, and other test results. Moreover, given the scope of cross-examination,[246] the witness's direct examination testimony might open the door to questioning about the witness's subsequent discovery of the prosecution's later dismissal of charges or acquittals, despite the witness's earlier opinion incriminating a suspect.[247] But, unless the witness knows of these cases, the limited thrust of the closing-argument attack would be merely that the witness does not "know for sure" that in other cases, the witness's opinion was actually confirmed by a subsequent confession, plea, conviction, or forensic test.

Of course, the judge can also deliver cautionary instructions to the jury.[248] One instruction could inform the jury that the witness's discipline is experientially based, and despite the aggregate experience of the discipline's practitioners, the methodology does not qualify as full-fledged science.[249] The second instruction can relate to the witness's personal experience and the reasonableness of the witness's reliance on the methodology.[250] Given the strength of the proof that there have been false confessions and wrongful convictions,[251] the judge may judicially notice that these phenomena occur.[252] Having done so, the judge could refer to those phenomena in a cautionary instruction. In the instruction, the judge could then tell the jury that even if

244. *See supra* Part III.C.1.

245. *See supra* Part III.C.1.

246. FED. R. EVID. 611(b).

247. However, this cross-examination could be dangerous if the opposing counsel does not confirm in pretrial discovery that there have been such cases. If the witness truthfully denies ever learning of a mistake, the cross-examination may have the unintended effect of strengthening the impression created on direct.

248. *See* United States v. Starzecpyzel, 880 F. Supp. 1027, 1029 (S.D.N.Y. 1995).

249. *Id.* at 1050–51.

250. *Id.*

251. *See* 1 GIANNELLI ET AL., *supra* note 34, § 9.09; SANGERO, *supra* note 242, at 146, 158; Cole, *More than Zero*, *supra* note 240, at 985–86; Spinney, *supra* note 240, at 444; Lavoie, *supra* note 242; *Exonerations in 2018*, *supra* note 242.

252. *See* FED. R. EVID. 201(b)(2).

the witness received reports that there were later, seemingly confirmatory developments such as a conviction, those developments do not necessarily mean that the witness's use of the methodology in those cases yielded accurate outcomes. The jury should realize the witness is not entitled to treat those developments as an absolute validation of the witness's methodology.

In the typical case, these possibilities during cross-examination, closing argument, and judicial instruction will probably reduce the risk of overvaluation to the point that Rule 403 would not entirely bar the witness's testimony about the quality of the witness's experience.[253] Rule 403 embodies a strong bias in favor of admitting logically relevant testimony.[254] In the early House hearings on the then-proposed Federal Rules of Evidence, Albert Jenner, the chair of the Advisory Committee on the Rules, testified, "[T]he overall philosophy and thrust of the rules [are] to place the burden upon he who seeks the exclusion of relevant evidence."[255] By its terms, Rule 403 authorizes the judge to exclude logically relevant evidence only when the probative worth of the evidence "is substantially outweighed by"[256] dangers, such as the risk that the jury will ascribe undue weight to the testimony.[257] That explicit wording has persuaded the overwhelming majority of courts that the judge may exercise the discretionary power under Rule 403 only when the judge is convinced the probative dangers posed by the evidence outstrip its probative value by a wide margin.[258] There may be rare cases in which the judge strikes the balance in favor of exclusion. For example, if the witness's references to the subsequent developments include very vague descriptions of those developments, the judge may conclude the probative value of the testimony is too meager to justify running the risk of

253. *Id.* at 403.

254. *Id.*

255. *Rules of Evidence, Hearings Before the Special Subcomm. on Reform of Federal Criminal Laws of the House Comm. on the Judiciary*, 93d Cong., 1st Sess. 77; *see also* Imwinkelried, *Need to Amend*, *supra* note 98, at 1478.

256. FED. R. EVID. 403.

257. *See id.*

258. United States v. Lopez, 649 F.3d 1222, 1247 (11th Cir. 2011) ("[T]he balance should be struck in favor of admissibility."); United States v. Curtis, 635 F.3d 704, 716–17 (5th Cir. 2011) ("[T]he Federal Rules of Evidence 'embody a strong and undeniable preference' in favor of admitting probative evidence . . . ."); United States v. Muhlenbruch, 634 F.3d 987, 1001 (8th Cir. 2011), *cert. denied*, 565 U.S. 873 (2011); United States v. Devin, 918 F.2d 280, 286–87 (1st Cir. 1990).

jury misuse and overvaluation of the testimony. However, in the run-of-the-mill case, it may be difficult for the opposing counsel to convince the judge the probative dangers substantially outweigh the probative value of the testimony.

IV. CONCLUSION

For years the battle over experientially based forensic expertise has centered on the threshold question of whether courts should admit any testimony based on suspect types of expertise such as fingerprint, fiber, hair, questioned-document, and soil analysis. As we have seen, for the most part the courts have rebuffed the contention that they should altogether bar any testimony from experts in these experientially based fields.[259] Although many commentators have bemoaned the courts' reluctance to completely exclude this testimony, from a broader perspective, courts have arguably reached the right result.[260] From a policy perspective, the question is not an assessment of the absolute merit of forensic expertise resting on collective experience rather than classical scientific research. Instead, the judgment should be comparative: What other types of evidence will triers of fact have to fall back on?:

> It is misleading to focus solely on the strengths and weaknesses of [expert] evidence. In principle, the judgment must be comparative. To the extent that we discriminate against [expert] evidence, subjecting it to uniquely . . . restrictive rules . . . we encourage the courts to rely on other types of evidence. Thus, our task is not to make an absolute judgment about the merits of [expert] evidence. Rather, our task is to compare it with other types of evidence to decide whether the differential treatment of [expert] evidence is justifiable.[261]

The history of wrongful convictions demonstrates the danger of relying too heavily on error-prone, lay-eyewitness identification testimony. The Supreme Court itself has observed, "The vagaries of eyewitness identification are well known; the annals of criminal law are rife with instances of mistaken identification."[262] We have also had sobering

259. *See* Romandetti, *supra* note 62, at 54.

260. *See* Giannelli, Daubert*'s Failure*, *supra* note 29, at 937–38.

261. Edward J. Imwinkelried, *Foreword* to EDWARD CONNORS ET AL., CONVICTED BY JURIES, EXONERATED BY SCIENCE: CASE STUDIES IN THE USE OF DNA EVIDENCE TO ESTABLISH INNOCENCE AFTER TRIAL xiii–xiv (1996).

262. *See* United States v. Wade, 388 U.S. 218, 228 (1967); United States v. Bonds,

revelations of false confessions.[263] On balance, it would be a mistake to reflexively exclude all experientially based expertise and force the courts to rely even more heavily on the types of evidence that have caused so many wrongful convictions. Although the 2016 PCAST report finds, in the present state of art, fingerprint analysis is only experientially based, the report's final assessment is this analysis is reliable enough to make a useful, meaningful contribution to fact-finding.[264] As Judge Frank Easterbrook wrote in 2019, many of the alternative, nonexpert types of evidence are so fallible that the reliability of fact-finding will not be "improved by excluding professional analysis that may well have a lower error rate."[265]

But if courts are to continue to admit testimony from experts in experientially based fields, the battleground must shift. Instead of focusing on the global question of the validity of any testimony by experts in these fields, courts must more carefully police the wording of the experts' opinions. The courts must do more to ensure that the testimony is not overstated. The question becomes how far may the witnesses go in describing their experience to enable the trier of fact to intelligently decide whether the expert was reasonable in relying on the methodology and how much weight to attach to the expert's methodology. This Article does not discuss, much less purport to answer, all the questions about the parameters of what witnesses relying on experientially based methodologies may or may not say on the stand. However, hopefully it has highlighted the importance of these questions and made a small contribution to the resolution of the questions. In the words of Tacitus, "Experience teaches,"[266] but if the expert teachers are allowed to exaggerate the extent or quality of their experience, the fact-finder may embrace the wrong lesson.

922 F.3d 343, 346 (7th Cir. 2019) ("Eyewitness identification is notoriously subject to the vagaries of memory.").

263. *See* 1 GIANNELLI ET AL., *supra* note 34, § 9.09.

264. PCAST, *supra* note 5, at 87–88, 101–02.

265. *Bonds*, 922 F.3d at 346 ("Assessment must be comparative. What are the alternatives? Grainy pictures taken by bank surveillance cameras of robbers wearing masks, or confederates who testify for the prosecution, have problems of their own. Witnesses may lie on the stand; there is no science of credibility enabling jurors to detect who is telling the truth, and some witnesses who think that they are telling the truth may be confused or incorrect. Eyewitness identification is notoriously subject to the vagaries of memory. A judicial system that relies on fallible lay testimony cannot be improved by excluding professional analysis that may well have a lower error rate . . . .").

266. *See* TYLER, *supra* note 1, at 217.