2012

Daubert Rises: The (Re)Applicability of the Daubert Factors to the Scope of Forensics Testimony

Geoffrey M. Pipoly

Note

Daubert Rises: The (Re)applicability of the *Daubert* Factors to the Scope of Forensics Testimony

*Geoffrey M. Pipoly**

On May 6, 2004, Brandon Mayfield's life was turned upside down. The thirty-eight-year-old attorney's home was raided by federal agents, and Mayfield was arrested pursuant to an FBI investigation of the March 2004 Madrid train bombings which killed ninety-one civilians.[1] The basis for the FBI's interest in Mayfield was fingerprint evidence: Spanish police lifted prints from the scene of the bombing, which were then run through FBI and Interpol databases.[2] The FBI told Mayfield that "his fingerprints matched those of the Madrid train bomber, and that he was the prime suspect in a crime punishable by death."[3] Indeed, the FBI's affidavit underlying Mayfield's arrest claimed that Mayfield's fingerprints were a "100% positive identification" to the prints lifted from the scene of the bombing.[4] However, the FBI's theory had one critical flaw: Mayfield was innocent. The fingerprint evidence on which the FBI relied was

* J.D. 2011, University of Minnesota Law School; B.A. 2005, University of Dayton. The Author would like to extend his heartfelt thanks to Prof. Stephen Cribari for being a mentor and teacher, and without whom the Author would never have developed his (near-obsessive) interest in the topic. Thank you also to the hardworking staff and editors of *Minnesota Law Review*: working with you was a true pleasure. Additional thanks to Jason Steck, who was a great help in developing and narrowing the focus of this Note. The Author also extends his gratitude to his family and friends for their steadfast support during law school and Law Review. Finally, thanks to Erin, whose support and encouragement helped the Author get through law school with his sanity intact.

1. Garrett Epps, *Vengeance Is Brandon Mayfield's*, SALON (Oct. 3, 2007, 11:01 AM), http://www.salon.com/news/feature/2007/10/03/brandon_mayfield.

2. Mayfield v. United States, 599 F.3d 964, 966–67 (9th Cir. 2010), *cert. denied*, 131 S. Ct. 503 (2010).

3. *Id.* at 967.

4. *Id.*

erroneous; Mayfield was not involved in the Madrid bombing.[5] Mayfield was quickly exonerated, and no criminal trial was ever held. But if Mayfield's case had gone to trial, what might his fate have been if an FBI analyst had testified with certainty that Mayfield's fingerprints were a "100%" match?

If Mayfield's case had gone to trial, the admissibility of the forensics testimony against him would have been governed by Federal Rule of Evidence 702, which permits expert testimony based on "scientific, technical, or other specialized knowledge."[6] The seminal United States Supreme Court case defining Rule 702's contours in federal court is *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[7] in which the Court held that scientific evidence must be both "relevant" and "reliable"[8] to be admissible, and outlined a five-factor test to aid district courts in their reliability determinations.[9] *Daubert* is clear that the "overarching subject" of a court's inquiry should be the "scientific validity . . . of the principles that underlie" a proffered theory or technique.[10] In *Kumho Tire Co. v. Carmichael*, the Court clarified *Daubert*, explaining that although reliability was still the sine qua non of admissibility for expert testimony, the *Daubert* factors were not dispositive in every case.[11] *Kumho Tire* held that judges may formulate reliability criteria on a case-by-case basis that relied "on the nature of the issue, the expert's particular expertise, and the subject of his testimony."[12]

At admissibility hearings, federal district courts must assess the reliability of forensics testimony for admissibility, either by applying the *Daubert* factors or some other case-specific

5. *See id.* ("On May 20, 2004, news reports revealed that Spain had matched [Mayfield's ostensible fingerprint] with a man named Ouhane Daoud, an Algerian citizen. Mayfield was released from prison the following day.").

6. FED. R. EVID. 702.

7. 509 U.S. 579 (1993).

8. *Id*. at 589.

9. *Id*. at 592–94 (explaining that, in assessing the reliability of scientific evidence, courts should consider empirical testing (falsifiability) of the technique; peer review of the technique; known or potential error rate of the technique; existence and maintenance of standards controlling operation of the technique; and general acceptance of the technique in the field).

10. *Id*. at 594–95.

11. *See* 526 U.S. 137, 150 (1999) ("[W]e can neither rule out, nor rule in, for all cases and for all time the applicability of the factors mentioned in *Daubert*, nor can we now do so for subsets of cases categorized by category of expert or by kind of evidence. Too much depends on the particular circumstances of the particular case at issue.").

12. *See id*. (quoting Brief for the United States as Amicus Curiae Supporting Petitioners at 19, *Kumho Tire*, 526 U.S. 137 (No. 97-1709)).

reliability criteria suggested by *Kumho Tire*. At these hearings, forensics experts commonly testify that their methods are either traditional "science" or "firmly rooted in the scientific method"[13] without legitimate bases in science for those claims.[14] Despite the vast subjectivity their techniques entail,[15] forensics practitioners often express their findings in "bold absolutes."[16] For example, a firearm-and-toolmark analyst may testify that a bullet from a crime scene was fired by a suspect's gun, "to the exclusion of all other firearms in the world,"[17] or a fingerprint analyst may testify that the discipline of fingerprint analysis is more than ninety-nine percent accurate.[18] Nonetheless, courts almost categorically admit forensics testimony without limitation or nuance.[19]

This Note presents a new framework for courts grappling with the treatment of forensics evidence and argues that the *Daubert* factors themselves hold the key to balancing courts' need to admit forensics testimony against well-founded concerns surrounding the scientific reliability and validity of forensic techniques. Part I provides an overview of the field of forensics, explains its deficiencies with regard to scientific

13. *See, e.g.*, Ronald G. Nichols, *Defending the Scientific Foundations of the Firearms and Tool Mark Identification Discipline: Responding to Recent Challenges*, 52 J. FORENSIC SCI. 586, 586 (2007); *see also* United States v. Diaz, No. CR 05-00167, 2007 WL 485967, at *13 (N.D. Cal. Feb. 12, 2007) ("There is a method and science behind firearm-and-toolmark identification."); United States v. Foster, 300 F. Supp. 2d 375, 376 (D. Md. 2004) (equating fingerprinting analysis with "science").

14. *See* Jonathan J. Koehler & Michael J. Saks, *Individualization Claims in Forensic Science: Still Unwarranted*, 75 BROOK. L. REV. 1187, 1204 n.64 (2010) ("The notion that forensic individualization claims are extreme and fundamentally unscientific is neither a radical idea nor one that is original with us.").

15. *See* Daniel L. Cork et al., *Some Forensic Aspects of Ballistic Imaging*, 38 FORDHAM URB. L.J. 473, 481 (2010) ("[C]urrently, the interpretation of individualization/identification is subjective in nature . . . ."(internal citations omitted)); *see also* United States v. Llera Plaza, 188 F. Supp. 2d 549, 571 (E.D. Pa. 2002) (discussing the amount of subjectivity inherent in expert fingerprint examiners' testimony).

16. NAT'L RESEARCH COUNCIL, BALLISTIC IMAGING 67 (Daniel L. Cork et al. eds., 2009).

17. *Id.*

18. *Llera Plaza*, 188 F. Supp. 2d at 556 (reporting a fingerprint expert's testimony that his field had a "proficiency error rate of just under one percent.").

19. *See* Elizabeth L. DeCoux, *The Admission of Unreliable Expert Testimony Offered by the Prosecution: What's Wrong with* Daubert *and How to Make It Right*, 2007 UTAH L. REV. 131, 132 ("[P]rosecutors fending off challenges to the reliability of their expert witnesses enjoy a success rate of ninety-two percent in trial courts and ninety-eight percent in appellate courts.").

notions of falsifiability and validity, and introduces the existing evidentiary framework under which forensics testimony is admitted. Part II explores courts' rationale for admitting these techniques (and their scientific flaws), and critically distinguishes the admissibility of evidence from the scope of a witness's testimony. Part II also suggests that forensics' scientific deficiencies are insufficient to warrant such techniques' wholesale exclusion, but are sufficient to warrant significant limits on the scope of forensics practitioners' testimony once they take the witness stand at trial. Part III proposes a framework courts should use for limiting the scope of forensics practitioner's testimony: applying the *Daubert* factors (currently used only to determine the admissibility of evidence) to the weight and scope of forensics testimony. Consequently, under the methodology this Note proposes, the scope of forensics practitioners' testimony would be limited to avoid existing problems permissible under the current framework.

I. FORENSICS AND FRAMEWORKS

This Part introduces forensic techniques and the legal tests courts apply when considering their admissibility in litigation. Section A provides an overview of the goals of forensics as compared to traditional science and shows why forensics fail to meet scientific standards of falsifiability and validity. Section B summarizes the legal framework though which forensics are analyzed in federal court. This Part also explains why, after the Supreme Court's decision in *Kumho Tire*, lawyers wrongly believed that scientific problems with forensics might have legal significance.

A. FORENSICS "SCIENCE?"

The term "forensics" refers not to a single unified discipline, but is a broad term encompassing a diverse array of practices and techniques[20] typically employed by the state to gener-

20. Although many disciplines fall under the broad term "forensics," some examples of forensic disciplines include general toxicology; firearms/toolmarks; controlled substances; impression evidence; blood-pattern analysis; crime scene investigation; and digital evidence. NAT'L RESEARCH COUNCIL, FORENSIC SCIENCE IN THE UNITED STATES 38 (2009); *see also* NAT'L INST. OF JUSTICE, STATUS AND NEEDS OF FORENSIC SCIENCE SERVICE PROVIDERS: A REPORT TO CONGRESS 2 (2006), *available at* www.ojp.usdoj.gov/nij/pubs-sum/213420.htm. Although this Note is concerned with the evidentiary framework for forensics generally, many of its examples will be of two fields in particular: fingerprinting (long considered the "gold standard" of forensic reliability), 1 DAVID L.

ate evidence to aid in the investigation and prosecution of crimes.[21] Although many individual fields in the forensics universe claim a basis in science or roots in scientific principles,[22] the types of techniques employed by forensics practitioners depart from the methods and practices of traditional science in several meaningful ways.

Traditional science is grounded in the scientific method, which begins with an empirical question about the world,[23] followed by theories that scientists propose to answer the question, and hypotheses to test those theories.[24] Empirical studies

FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY: STATISTICS & RESEARCH METHODS § 1:30 (2008–2009 ed.), and firearm-and-toolmark analysis.

21. *See* 4 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE*:* THE LAW AND SCIENCE OF EXPERT TESTIMONY: FORENSICS § 29:3 (describing forensics practitioners as the "hired help" of the state, and arguing that unlike other disciplines that seek to gain objective knowledge about the world, forensics historically arose with a specific purpose in mind, the investigation and prosecution of crimes).

22. *See, e.g.*, Suzanne Bell, *Forensic Chemistry*, 2 ANN. REV. ANALYTICAL CHEMISTRY 297, 313 (2009) (arguing that although forensic chemists must "meet the requirements of both the scientific community . . . and the legal community," scientific concerns that underlie the practice are paramount); Thomas R. May, *Fire Pattern Analysis, Junk Science, Old Wives' Tales, and Ipse Dixet: Emerging Forensic 3D Imaging Technologies to the Rescue*, 16 RICH. J.L. & TECH. 1, 6 (2010) (stating that forensic fire-scene reconstruction is "based upon relevant scientific principles and research"); Ronald Nichols, *The Scientific Foundations of Firearms and Tool Mark Identification—A Response to Recent Challenges*, CAL. ASS'N CRIMINALISTS NEWS, 2d Quarter 2006, at 9, *available at* http://firearmsid.com/Feature%20Articles/nichols060915/AS%20Response%20110805.pdf (arguing that "Firearms and Tool Mark Identification is [r]ooted in [s]ound [s]cientific [f]oundations"); *Standard Terminology of Friction Ridge Examination*, SCIENTIFIC WORKING GROUP ON FRICTION RIDGE ANALYSIS, STUDY AND TECHNOLOGY, 1 (Feb. 11, 2011), http://www.swgfast.org/documents/terminology/110323_Standard-Terminology_3.0.pdf (describing the ACE-V fingerprinting identification method as "a scientific method").

23. "Is the moon made of green cheese?" and "Is astrology valid?" are empirical questions: they inquire as to something that can be established through observation, testing, and data gathering. *See, e.g.*, 1 FAIGMAN ET AL., *supra* note 20, § 5:3 (internal quotation marks omitted). "Is the death penalty moral?" and "Does God exist?" are not empirical questions: their answers are not "confined to the natural world." *See id.*

24. *See* WILLIAM D. CRANO & MARILYNN B. BREWER, PRINCIPLES AND METHODS OF SOCIAL RESEARCH 5 (2d ed. 2002) ("One of the most important . . . methods of hypothesis generation involves the logical deduction of expectations from some established theory . . . : Theory *X* implies that *B* will result from *A*. We hypothesize that if *X* is true, producing *A* will result in the occurrence of *B*."); MARK MITCHELL & JANINA JOLLEY, RESEARCH DESIGN EXPLAINED 116 (1988) ("The simple experiment starts with an experimental hypothesis . . . .").

and tests are then designed and performed to attempt to disconfirm, or falsify, the hypothesis.[25] This attempt to falsify one's hypotheses is traditional science's end-goal.[26] Theories that survive multiple, evolving attempts at falsification become accepted and relied upon when examining future questions because "a theory that that can withstand such scrutiny is one that deserves credence."[27]

Forensics practitioners, by contrast, are concerned with making comparisons.[28] For example, forensics practitioners might make comparisons between two fingerprints, or between a shell casing and a firearm. Relying on assumptions about those items, forensics practitioners draw conclusions about those comparisons—for example, whether the two fingerprints originate from the same source, or whether the shell casing was fired from the firearm in question. This methodology departs from traditional science because the goal of forensics comparisons is not to falsify a theory about the probable match between two items, but to confirm the theory that the two items match.[29]

Moreover, forensic methods lack falsifiability because many forensic practices rely on the subjective judgment of the examiner rather than objectively observable data.[30] Although

25. *See* ERICA BEECHER-MONAS, EVALUATING SCIENTIFIC EVIDENCE 40–44 (2007) (describing the relationship between empirical testing and falsifiability); 1 FAIGMAN ET AL., *supra* note 20, § 5 (describing the scientific method).

26. *See* KARL R. POPPER, CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE 37 (3d ed. 1969) ("[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.").

27. 1 FAIGMAN ET AL., *supra* note 20, § 5:5.

28. *See* 4 FAIGMAN ET AL., *supra* note 21, § 29:6 ("The forensic scientist undertakes to compare evidence found at the crime scene to evidence known to belong to a suspect.").

29. *See, e.g.*, United States v. Williams, 506 F.3d 151, 159 (2d Cir. 2007) (explaining that a firearm-and-toolmark expert "compares the height, depth, width, length and spatial relations of their striations. Significant similarity between striations signals an 'identification' or a 'match'—that is, the bullets were fired from the same firearm" while not indicating that the expert looks for dissimilarities); WILLIAM J. BODZIAK, FOOTWEAR IMPRESSION EVIDENCE: DETECTION, RECOVERY, AND EXAMINATION 347 (2d ed. 2000) ("Positive identifications may be made with as few as one random identifying characteristic . . . ."); 4 FAIGMAN ET AL., *supra* note 21, § 29:40 ("Whenever a fingerprint analyst encounters a fingerprint with a dozen or so matching characteristics and one dissimilarity, he will invariably rationalize the dissimilarity somehow, even if the rationalization is contrived.").

30. *See* Craig M. Cooley, *Forensic Science and Capital Punishment Reform: An "Intellectually Honest" Assessment*, 17 GEO. MASON U. C.R. L.J. 299, 339 (2007) ("[T]he process [of forensic identification] is entirely subjective in that an examiner's discriminatory ability (or inability) is based wholly on his

specific physical characteristics or constituent data about evidence may be determined absent the examiner's subjective judgment,[31] she must apply her subjective judgment based on her experience as an examiner, rather than quantitative data, when determining whether the evidence supports a conclusion that two items match.[32]

Forensic techniques also lack scientific validity. In traditional science, validity refers to a measure or test's ability to measure what it purports to measure.[33] Because forensics practitioners' conclusions rest heavily on experience and subjective judgment rather than objective experimentation it is difficult, if not impossible, to objectively determine if forensics practitioners' conclusions are scientifically valid.[34]

Recent independent studies confirm forensics' scientific deficiencies. Two recent congressionally funded reports by the National Research Council[35] found that, with the exception of nuclear DNA analysis, "no forensic method 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 or source."[36] These reports called for further study of the scientific reliability of various forensics

experience and training."); Michael J. Saks, *Banishing Ipse Dixit: The Impact of* Kumho Tire *on Forensic Identification Science*, 57 WASH. & LEE L. REV. 879, 883 (2000) ("Forensic identification science examinations are overwhelmingly subjective affairs.").

31. For example, the number of "ridge-marks" or "whorls" on a fingerprint may be measured by a computer, as might the physical depth, frequency, and length of tool marks on a shell casing.

32. *See, e.g.,* Bradford T. Ulery et al., *Accuracy and Reliability of Forensic Latent Fingerprint Decisions*, 108 PROCEEDINGS NAT'L ACAD. SCIS. 7733, 7733 (2011) (stating that fingerprint examiners "use[] their expertise rather than a quantitative standard to determine if the information content [from a set of prints] is sufficient to make a decision").

33. *See* KELLY M. PYREK, FORENSIC SCIENCE UNDER SIEGE: THE CHALLENGES OF FORENSIC LABORATORIES AND THE MEDICO-LEGAL INVESTIGATION SYSTEM 241–45 (2007) (discussing the scientific method and its requirements of validity).

34. *See id.* at 245–75 (noting some difficulties of proving the validity of forensics practitioners' conclusions).

35. BALLISTIC IMAGING, *supra* note 16; NAT'L RESEARCH COUNCIL, *supra* note 20.

36. NAT'L RESEARCH COUNCIL, *supra* note 20, at 7; *see also* BALLISTIC IMAGING, *supra* note 16, at 3 ("The validity of the fundamental assumptions of uniqueness and reproducibility of firearms-related toolmarks has not yet been fully demonstrated."); NAT'L RESEARCH COUNCIL, *supra* note 20, at 111–83 (contrasting principles of scientific knowledge and the scientific method with those that underlie forensic techniques).

disciplines.[37] One such study examined fingerprint analysis from a scientific perspective, subjecting fingerprint analysts to double-blind tests to gauge the accuracy of the process.[38] The study concluded simultaneously that, although it is possible to establish systematic methods by which fingerprint analysis can be tested,[39] the interpretation of data in fingerprint analysis "relies on the expertise of latent print examiner,"[40] and that "[e]xaminers frequently differed on whether fingerprints were suitable for reaching a conclusion."[41]

In short, forensics fail to meet basic scientific principles of falsifiability and validity. This is significant, for it has the potential to affect both a court's admissibility decision, and the scope of the expert's testimony once on the witness stand.

B. THE STANDARDS FOR ADMISSIBILITY: *DAUBERT* AND *KUMHO TIRE*

Case law governing the admissibility of expert testimony has evolved substantially over time. From 1922 to 1993, the admissibility of expert testimony in federal court was governed by *Frye v. United States*.[42] In *Frye*, the D.C. Circuit Court of Appeals considered a criminal defendant's challenge to the admissibility of the results of his systolic blood pressure test, the technological precursor to the polygraph, which at the time was an incipient technology.[43] Frye, the defendant, argued that his test results should be excluded because the theory on which the systolic test was based was not widely accepted by the legal or scientific community.[44] The Court agreed, and in a two-page decision that would later be adopted by nearly all federal and state jurisdictions,[45] held that a field of science, the application

37. NAT'L RESEARCH COUNCIL, *supra* note 20, at 22 (recommending that "[t]he National Institute of Forensic Science should competitively fund peer-reviewed research" for, among other things, "[s]tudies establishing the scientific bases demonstrating the validity of forensic methods" and "[t]he development and establishment of quantifiable measures of the reliability and accuracy of forensic analysis").

38. *See* Ulery et al., *supra* note 32, at 7733.

39. *Id*.

40. *Id*.

41. *Id*.

42. 293 F. 1013 (D.C. Cir. 1923).

43. *Id.* at 1013–14.

44. *Id.* at 1014.

45. *See* Alice B. Lustre, Annotation, *Post*-Daubert *Standards for Admissibility of Scientific and Other Expert Evidence in State Courts*, 90 A.L.R. 5TH 453 (2001) (discussing states' and other federal circuits' adoption of *Frye*).

of a particular field of science, or even a non-scientific technique was admissible only if the judge could find that such "general acceptance" by a meaningful segment of the relevant expert community existed.[46]

In 1975, Congress enacted the Federal Rules of Evidence.[47] Rule 702 governed expert testimony and allowed experts to testify to their opinions in court provided their opinions were predicated on "scientific, technical, or other specialized knowledge" and supported by the expert's "knowledge, skill, experience, training, or education."[48]

The Supreme Court was asked to evaluate *Frye*'s applicability to scientific testimony under Rule 702 in *Daubert v. Merrell Dow Pharmaceuticals, Inc*.[49] In *Daubert*, the plaintiff submitted in vitro studies of animals, reanalysis of existing studies, and pharmacological studies to establish that the drug Bendectin could cause birth defects.[50] At the trial stage, the defendants won summary judgment because, under *Frye*, the plaintiff's experts' methods for arriving at their conclusion were not generally accepted.[51] The Supreme Court reversed, and held that *Frye*'s "general acceptance" standard did not control courts' admissibility determinations under the Federal Rules of Evidence; in so holding, the Court overruled *Frye*.[52] The Court explained that under the Federal Rules of Evidence, the trial judge's function was one of "gatekeep[er]" for expert testimony.[53] In making a gatekeeping admissibility determination, a trial judge's ultimate inquiry is whether the proffered expert testimony is both relevant to the proceeding at hand and reliable.[54] The *Daubert* Court was careful to distinguish between "evidentiary reliability" and "scientific reliability," noting that "*evidentiary reliability* will be based upon *scientific validity*."[55] The Court enumerated five non-exhaustive factors to aid

46. *Frye*, 293 F. at 1014.

47. Act to Establish Rules of Evidence for Certain Courts and Proceedings, Pub. L. 93-595, 88 Stat. 1926 (1975).

48. PAUL F. ROTHSTEIN, UNDERSTANDING THE NEW FEDERAL RULES OF EVIDENCE 93 (Supp. 1974).

49. 509 U.S. 579 (1993).

50. *Id.* at 582–83.

51. *Id.* at 584.

52. *Id.* at 588 ("Nothing in the text [of Rule 702] establishes 'general acceptance' as an absolute prerequisite to admissibility.").

53. *Id.* at 597.

54. *Id.*

55. *Id.* at 590 n.9.

trial judges in determining whether a particular scientific technique or theory is scientifically valid, and thus legally reliable.[56] Critically, these factors require falsifiability (testing), and validity (known error rate, peer review, maintenance of standards, and general acceptance).

Daubert addressed "scientific" knowledge under Rule 702, but was silent as to Rule 702's other two prongs: "technical knowledge," and "other specialized knowledge."[57] Following *Daubert*, federal courts and scholars disputed whether the *Daubert* factors applied outside the scientific context, and many courts restricted their application of the factors to testimony they deemed "science," declining to apply the factors to non-scientific "technical" or "specialized knowledge."[58] The Supreme Court clarified this issue in *Kumho Tire Co. v. Carmichael*.[59] In *Kumho Tire*, the Court clarified that a court's ultimate inquiries—relevance and evidentiary reliability—were the same for all expert testimony under Rule 702, scientific or not.[60] The Court wrote that there was "no relevant distinction" among the

56. The factors the Court enumerated were (1) whether the technique or theory at issue can be tested, *id.* at 593; (2) "whether the theory or technique has been subjected to peer review and publication," *id.* at 593; (3) whether the technique or theory at issue has a known error rate, *id.* at 594; (4) whether "standards controlling the technique's operation" exist, *id.*; and (5) whether the theory "ha[d] achieved general acceptance in the relevant scientific community." *Id.*

57. FED R. EVID. 702; *see Daubert*, 509 U.S. at 600 (Rehnquist, C.J., concurring) (characterizing the *Daubert* majority as focusing on "scientific knowledge" while remaining silent on the issues of "technical knowledge" and "other specialized knowledge").

58. *See, e.g.*, Sementilli v. Trinidad Corp., 155 F.3d 1130, 1134 (9th Cir. 1998) ("[B]ecause [the proffered expert's] declaration does not constitute 'scientific' testimony, but rather testimony based on the doctor's training and experience, the standards set out in [*Daubert*], governing admissibility of scientific expert testimony, do not apply."); Sorenson v. Robert B. Miller & Assocs., No. 95-5085, 1996 WL 515351, at *2 (6th Cir. Sept. 10, 1996) (concluding that the *Daubert* factors are unhelpful when applied to technical knowledge); Berry v. City of Detroit, 25 F.3d 1342, 1349 (6th Cir. 1994) (stating that the *Daubert* factors are of "limited help" in a case regarding the admissibility of police testimony based solely on experience and not the scientific method); *see also* Linda Sandstrom Simard & William G. Young, Daubert*'s Gatekeeper: The Role of the District Judge in Admitting Expert Testimony*, 68 TUL. L. REV. 1457, 1471 (1994) ("Although the specific factors noted by the *Daubert* Court may indicate the reliability of scientific knowledge, however, they might not offer probative evidence of reliability for all types of expert testimony.").

59. 526 U.S. 137 (1999).

60. *Id.* at 149 ("We conclude that *Daubert*'s general principles apply to the expert matters described in Rule 702.").

three prongs of Rule 702,[61] and that therefore federal courts that grounded their admissibility decisions in such a distinction were incorrect.[62] The Court wrote that a trial judge may assess evidentiary reliability using the *Daubert* factors provided the testimony is ultimately found to be relevant and reliable.[63] The Court did not hold, however, that a trial judge *must* apply the *Daubert* factors to non-scientific testimony. Whether a court should use the *Daubert* factors in determining the admissibility of non-scientific expert testimony, the *Kumho Tire* Court wrote, "depends upon the particular circumstances of the particular case at issue,"[64] and noted that some *Daubert* factors may or may not be relevant to a court's admissibility decision in a given case.[65]

Kumho Tire thus empowered district court judges with broad discretion in assessing reliability and relevance of expert testimony. As the next Part will show, however, that discretion sometimes led to admissibility decisions that were directly at odds with the principles outlined in *Daubert*, the case *Kumho Tire* purportedly clarified.

II. ADMISSIBILITY AND SCOPE OF TESTIMONY

This Part addresses three distinct components of the post-*Kumho Tire* landscape. Section A examines post-*Kumho Tire* courts' various rationales for admitting forensics testimony. Section B examines the scope of forensics practitioners' testimony post-*Kumho Tire* and argues that once in the witness chair, forensics practitioners tend to overstate the capabilities of their fields and make assertions that are belied by their fields' respective deficiencies regarding falsifiability and validity. Section C argues that, under existing Rule 702 precedent, forensics' scientific deficiencies should affect the weight and scope of forensics practitioners' testimony but should not bar forensics' admissibility altogether.

61. *Id.* at 147.

62. *Id.*

63. *Id.* at 149.

64. *Id.* at 150.

65. *Id.* at 151 ("In certain cases, it will be appropriate . . . to ask, for example, how often an . . . expert's experience-based methodology has produced erroneous results, or whether such a method is generally accepted in the relevant . . . community.").

A. POST-*KUMHO TIRE* RATIONALES FOR ADMISSIBILITY

Kumho Tire was a "wake-up call for defense counsel in criminal cases."[66] Prior to *Kumho Tire*, defense counsel tended to "assume[] that [forensics] experts could do what they claimed they did," and not challenge forensic fields or techniques.[67] *Kumho Tire*, for the first time, "raised the issue of what bases *all* experts [not just scientists] have to support their testimony" and thus opened new doors for admissibility challenges on the basis of forensics' reliability and validity.[68] These defense attorneys reasoned that *Kumho Tire* gave them more "freedom to provide reliability factors [distinct from *Daubert*'s factors] to corroborate their expert's testimony."[69] Despite a slew of challenges to forensics testimony on the basis of that testimony's lack of scientific validity, post-*Kumho Tire* courts nonetheless tended to admit forensics testimony.[70]

Some post-*Kumho Tire* courts justified their admission of forensics testimony by purportedly applying *Daubert*'s factors but stretching their meaning to the brink. For example, in *United States v. Havvard*,[71] the district court characterized fingerprint identification as "the very archetype of reliable expert testimony under [*Daubert* and *Kumho Tire*]"[72] and found that the error rate of fingerprint examination was "vanishingly small"[73] with no meaningful explanation as to how it arrived at that conclusion. As to *Daubert*'s testing requirement, the *Havvard* court reasoned that because fingerprinting had withstood a century of adversarial testing, it was reliable for *Daubert* purposes.[74] The *Havvard* court misread *Daubert* entirely: *Daubert* is unconcerned with testimony's ability to withstand the crucible of litigation; it is concerned with whether ex-

66. 1 FAIGMAN ET AL., *supra* note 20, § 1:30.

67. *Id.*

68. *Id.*

69. Leslie Morsek, *Get on Board for the Ride of Your Life! The Ups, the Downs, the Twists, and the Turns of the Applicability of the "Gatekeeper" Function to Scientific and Non-Scientific Expert Evidence:* Kumho*'s Expansion of* Daubert, 34 AKRON L. REV. 689, 736 (2001).

70. *See* DeCoux, *supra* note 19, at 132 ("[P]rosecutors fending off challenges to the reliability of their expert witnesses enjoy a success rate of ninety-two percent in trial courts and ninety-eight percent in appellate courts.").

71. 117 F. Supp. 2d 848 (S.D. Ind. 2000).

72. *Id.* at 855.

73. *Id.* at 854.

74. *Id.* at 854–55.

pert testimony rises to the level of scientific reliability.[75] To that end, *Daubert*'s testing requirement, which arose specifically in the scientific context, addressed scientific falsifiability, not cross-examination in a courtroom.[76] The *Havvard* court misunderstood the principles upon which the *Daubert* Court based its rationale and consequently misapplied *Daubert*'s factors.

Other post-*Kumho Tire* courts grappling with forensics testimony took notice of *Kumho Tire*'s instruction that trial courts need not always consider the *Daubert* factors, provided that the proffered testimony is otherwise reliable and relevant. In *United States v. Williams*,[77] the Second Circuit upheld the admission of a firearm-and-toolmark analyst's testimony that shell casings found at the scene of a homicide matched those fired from the defendant's gun. The court noted *Kumho Tire*'s clarification that the specific *Daubert* factors are nonexhaustive and therefore chose to ignore them altogether as criteria to assess the testimony's admissibility.[78] The Court found the testimony reliable not because the method of firearm and toolmark identification relied on by the expert was scientifically valid, but because the particular expert in that case had extensive training.[79] The implication, of course, is that in the Second Circuit, the testimony of a firearm-and-toolmark expert with twenty years' experience is more reliable than an expert with ten years' experience.[80] This confirms the subjective nature of this type of testimony: an experienced examiner's conclusions are more reliable than an inexperienced examiner's conclusions only if the nature of the conclusion was essentially a subjective judgment.

A third set of post-*Kumho Tire* courts combine the two approaches: relying on some *Daubert* factors, but not others. For

75. Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 590 n.9 (1993) (stating that "*evidentiary reliability* will be based upon *scientific validity*").

76. *Id.* at 593 (specifically linking the "testing" factor to falsifiability in a scientific sense).

77. 506 F.3d 151 (2d Cir. 2007).

78. Although the *Williams* court did take notice of the *Daubert* factors, *id.* at 160, it did not apply any of them to the firearm-and-toolmark examiner's methodology, *id.* at 161–62.

79. *Id.* at 161 ("*Daubert* was satisfied here . . . [because of the expert's] service as a firearms examiner for approximately twelve years; her receipt of 'hands-on training' from her section supervisor . . . ; her experience examining approximately 2,800 different types of firearms; and her prior expert testimony on between twenty and thirty occasions.").

80. *Id.* ("We do not wish this opinion to be taken as saying that any proffered ballistic expert should be routinely admitted.").

example, in *United States v. Ford*, the Third Circuit upheld a trial court's admission of the prosecution's shoeprint analyst's testimony linking the defendant to the crime scene.[81] The theory of footprint analysis is based on the assumption that each person's footprint is potentially unique, due to the type of shoes worn, unique characteristics acquired as the shoes are worn, and how weight and gait affect the impression the shoe leaves on the ground.[82] The examiner compares a shoeprint left in the ground to characteristics of a criminal suspect[83] and determines, based on training and experience, whether the two match, or at minimum whether the suspect can be excluded as a match.[84]

The *Ford* Court noted that the district court found that the examiner's techniques were "general[ly] accept[ed] . . . subject to peer review . . . [and that] the potential error rate is known."[85] However, the court also noted in a footnote that the error rate for shoeprint analysis "has not been firmly established,"[86] and that, after *Kumho Tire*, "a strict application of the *Daubert* factors" to forensics testimony was probably a "fruitless exercise."[87] Put simply, *Ford* belies itself: it upholds shoeprint testimony's admission as reliable under *Daubert* while at the same time explaining why shoeprint testimony is unreliable according to scientific notions of falsifiability and validity.

At least one court has grappled with forensics' admissibility following the National Research Council studies which questioned forensics' scientific reliability.[88] In *United States v. Love*,[89] the district court relied on the May 2011 Proceedings of the National Academy of Sciences study[90] when concluding that fingerprint analysis had an error rate of 0.01%. However, the *Love* court ignored crucial passages of the study that noted that

81. 481 F.3d 215, 222 (3d Cir. 2007).

82. SUZANNE BELL, ENCYCLOPEDIA OF FORENSIC SCIENCE 324–25 (2008).

83. For example, if the examiner knows that the suspect weighs 250 pounds, she may infer that the suspect's shoeprint may be deeper in the ground than that of someone who weighs 150 pounds. *See id.* ("[E]ach person will generate unique [shoe impression patterns] based on their weight, gait, and how they use and wear the shoes.").

84. *Id.*; *see also id.* at 218 (defining "individualization" of physical evidence as the process of "linking" that evidence to a "common source").

85. *Ford*, 481 F.3d at 218.

86. *Id.* at 218 n.4.

87. *Id.* at 218 n.5.

88. *See supra* notes 35–41 and accompanying text.

89. No. 10-CR-2418-MMM, 2011 WL 2173644 (S.D. Cal. June 1, 2011).

90. *Id.* at *3 (citing Ulery et al., *supra* note 32, at 7733, 7735).

fingerprint analysis was fundamentally subjective[91] and that "there is currently no objective basis for determining the sufficiency of information necessary to reach a fingerprint examination decision."[92]

The forensic techniques at issue in *Havvard*, *Williams*, *Ford*, and *Love* "utterly fail to meet *Daubert*'s basic criteria . . . [of] reliability beyond the ipse dixit of those who practice them."[93] The hypothesis that two people wearing identical shoes will produce distinct, unique prints has never been tested;[94] nor has the notion that all fingerprints are unique;[95] nor has the proposition that firearm barrels leave unique marks on shell casings. Moreover, all three techniques require the subjective assessment of the examiner to determine that any similarities between items are significant.[96] Since subjective judgments cannot be objectively falsified,[97] it is impossible to know the error rate of any of the techniques in these cases.[98] None of these

91. Ulery et al., *supra* note 32 ("Latent print examiners compare latents to exemplars, using their expertise rather than a quantitative standard to determine if the information content is sufficient to make a decision.").

92. Ulery et al., *supra* note 32, at 7738.

93. 1 FAIGMAN ET AL., *supra* note 20, § 1:30 n.4.

94. *See* Brandon L. Garrett & Peter J. Neufeld, *Invalid Forensic Science Testimony and Wrongful Convictions*, 95 VA. L. REV. 1, 72 (2009) ("No data supports [the] opinion" that "the effect of gait on the sole of a shoe is unique.").

95. United States v. Crisp, 324 F.3d 261, 267 (4th Cir. 2003) (referring to a fingerprint expert who "was unable to reference any study establishing that no two persons share the same fingerprint; she was able only to testify that no study had ever proven this premise false"); *see also* 4 FAIGMAN ET AL., *supra* note 21, § 32:1 ("Many of the most basic claims of fingerprint identification have never been tested empirically, and the field's most thoughtful research and scholarship have concluded that, in the strong form in which they are usually presented, those claims in fact are unprovable.").

96. *See* Saks, *supra* note 30, at 883 ("Forensic . . . examinations are overwhelmingly subjective affairs. . . . [T]he field requires [fingerprinting] experts to be doubly subjective: Not only must they reach a subjective judgment about the likelihood of a coincidental match, but they may not testify to an identification unless they believe that every other fingerprint expert's subjective judgment would render the same conclusion. Thus, fingerprint examiners must draw subjective impressions about other people's subjective impressions.").

97. *See* 1 FAIGMAN ET AL., *supra* note 20, § 5:2.

98. Simon A. Cole, *More Than Zero: Accounting for Error in Latent Fingerprint Identification*, 95 J. CRIM. L. & CRIMINOLOGY 985, 1033 (2005) ("The existing data are inadequate to calculate a meaningful error rate for forensic fingerprint identification."); Lyn Haber & Ralph Norman Haber, *Error Rates for Human Latent Fingerprint Examiners*, *in* AUTOMATIC FINGERPRINT RECOGNITION SYSTEMS 339, 339 (Nalini Ratha & Ruud Bolle eds., 2004) ("It is impossible to determine from existing data whether true error rates are miniscule or substantial."); *see also* United States v. Diaz, No. CR 05-00167 WHA, 2007 WL 485967, at *8 ("The peer-reviewed literature and the three ex-

techniques is scientifically valid, because all three methodologies suffer from confirmation bias:[99] by looking primarily for similarities among fingerprints, shell casings, and shoeprints, the examiner selectively identifies information that confirms her theory while ignoring areas of dissimilarity.

Ford, *Havvard*, *Williams*, and *Love* are only a few of many examples of federal courts' admitting forensics testimony while disregarding *Daubert*'s command that legal reliability equates with scientific validity.[100] After *Kumho Tire*, courts apparently concluded that they are no longer required to link scientific reliability to admissibility for any type of expert testimony.[101] In cases where courts directly apply *Daubert*'s factors, as in *Havvard*, they misconstrue the meaning of those factors, stretching their meaning beyond what the *Daubert* court intended.

B. SCOPE OF TESTIMONY AT TRIAL, POST-*KUMHO TIRE*

During trial, forensics practitioners often testify with confidence about the accuracy of their fields. That is, even if courts take notice of forensics' deficiencies with respect to the scientific method and scientific reliability, those courts rarely limit the scope of practitioners' testimony because of those deficiencies.

Many forensics practitioners make bold claims about their field's accuracy and reliability. For example, more than one fingerprinting analyst has testified before a jury that fingerprint identification has a negligible error rate (one percent or less) when the technique is applied properly by trained examiners; any error, they said, was a result of human misapplication of the methodology, not the methodology itself.[102] As recently as June 2011, a fingerprint examiner testified in *United States v. Love* that "[e]rrors [in the fingerprinting process] occur, but

perts who testified conceded that it is not possible to calculate an absolute error rate for firearms identification.").

99. SCOTT PLOUS, THE PSYCHOLOGY OF JUDGMENT AND DECISION MAKING 233 (1993) (defining "confirmation bias," and giving examples).

100. Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 590 n.9 (1993).

101. *See* Kumho Tire Co. v. Carmichael, 526 U.S. 137, 147–48 (stating that, in the scientific context, evidentiary reliability meant scientific validity, but evidentiary reliability in other contexts might mean something else depending on the nature of the particular case).

102. United States v. Llera-Plaza, 188 F. Supp. 2d 549 (E.D. Penn. 2002) (FBI fingerprint examiner testified that the error rate of fingerprinting generally was approximately one percent); Larkin v. Yates, CV 09-2034-DSF, 2009 WL 2049991, at *16 (C.D. Cal. 2009) (fingerprint expert testified at trial that the error rate of the field was 0.08%).

those errors are human errors resulting from human implementation of the . . . process. Because human errors are nonsystematic . . . there is no overall predictive error rate in latent fingerprint analysis."[103]

These examples are not unique to fingerprint analysts. Most forensics examiners are trained to either testify with absolute certainty or not at all. A firearm-and-toolmark examiner testified that, applying generally accepted principles of firearm and toolmark identification, "if two cartridge cases share the same magazine mark, then one could say with one hundred percent certainty that the two cartridge cases had been cycled through the same magazine."[104] Even a forensic shoe print analyst "offered a potential error rate of zero for the method, stating that any error is attributable to examiners."[105]

These statements about the purported error rate of forensic techniques strain credulity at best and are deceitful at worst. They completely upend the meaning of "error rate" as used in *Daubert* and in traditional science. When the *Daubert* Court spoke of "error rate," it referred to the scientific validity of measurements:[106] the way we know how often a technique measures what it purports to measure is because we know how often the technique *does not* measure what it purports to measure. Scientific validity can only be established through objective testing and an application of the scientific method.[107] Scientific validity cannot be established through the basis of most forensic conclusions: the subjective opinion of the practitioner.[108]

Still other forensics practitioners go further, testifying to their level of certainty in particular cases. For example, one firearm-and-toolmark examiner concluded with "100% certainty" that specific shell casings found at a crime scene matched the defendant's gun.[109] While testifying to a level of certainty was historically endorsed by some medical authorities, some organizations have subsequently prohibited experts to make such sweeping claims.[110]

103. United States v. Love, No. 10CR2418-MMM, 2011 WL 2173644 at *5 (S.D. Cal., June 1, 2011).

104. Sexton v. State, 93 S.W.3d 96, 98–99 (Tex. Crim. App. 2002).

105. United States v. Mahone, 453 F.3d 68, 72 (1st Cir. 2006).

106. *See* Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 594 (1993).

107. *See* PYREK, *supra* note 33, at 245–75.

108. Cooley, *supra* note 30, at 343 ("[D]ata for the individualizing forensic sciences are non-existent and nearly impossible to calculate.").

109. United States v. McCaleb, 302 Fed. App'x 410, 413 (6th Cir. 2008).

110. *Compare* Burke v. Town of Walpole, 405 F.3d 66, 90 n.30 (1st Cir.

This type of bold certitude renders such testimony decidedly un-scientific. Science's lexicon is that of uncertainty, not certainty.[111] Indeed, "[w]ithout skepticism there can be no science, because uncertainty promotes growth."[112] The very nature of traditional science dictates that as more and better data becomes available, previous assumptions about a state of affairs is called into doubt, replaced by new and better established hypotheses.[113]

And yet some forensics practitioners continue to simultaneously claim both certainty in their conclusions and scientific basis in their methods. This dissonance may be explained by the forensics examiner's continuing role as a state agent, testifying on behalf of the prosecution. "Error is a concept that causes a good deal of consternation in the minds of forensic scientists" due to "a widespread belief" that identifying errors in past testimony "will be used to discredit them in court" in the future or even "compromise their entire career."[114] Understandably then, these practitioners have an incentive to make "bold absolute[]"[115] findings in their fields of expertise to bolster their expert reputations. Uncertainty is "antithetical to prosecutorial criminal law;"[116] consequently, the more doubt a practitioner expresses about the error rate of his field generally or his con-

2005) (citing AM. BD. OF FORENSIC ODONTOLOGISTS, *Bite-Mark Terminology Guidelines* (1995) (arguing that the ABFO's guidelines conflate "several arguably distinct levels of certainty," even equating "reasonable degree of medical certainty" with "virtual certainty")), *with* AM. BD. OF FORENSIC ODONTOLOGY, *Policies, Procedures, Guidelines, & Standards*, *in* DIPLOMATES REFERENCE MANUAL 57, 77, 114–18 (2012) (reasonable medical certainty is defined as "beyond reasonable doubt," and that bitemark "[t]erms assuring unconditional identification of a perpetrator, or without doubt, are not sanctioned as a final conclusion").

111. *See* Daubert v. Merrell Dow Pharms., 509 U.S. 579, 590 (1993) ("It would be unreasonable to conclude that the subject of scientific testimony must be 'known' to a certainty . . . there are no certainties in science.").

112. Cooley, *supra* note 30, at 362.

113. 1 FAIGMAN ET AL., *supra* note 20, at 259–61; *see also* Julie E. Blend, *Using Expert Witnesses in Employment Litigation*, 17 REV. LITIG. 27, 36 (1998) ("[S]cientists can and do distinguish between 'good science' and 'bad science.' They go about this principally by assessing the extent to which the theory or technique has survived the rigors of testing and replication by other scientists.").

114. *See* John I. Thornton & Joseph L. Peterson, *The General Assumptions and Rationale of Forensic Identification*, *in* 4 FAIGMAN ET AL., *supra* note 21, at 1, 29.

115. BALLISTIC IMAGING, *supra* note 16, at 67.

116. Cooley, *supra* note 30, at 365.

clusions in a specific case, the less likely it becomes that prosecutors will rely on him in future cases.[117]

C. THE COURTS' CONUNDRUM: EXCLUSION VS. SCOPE OF TESTIMONY

In light of forensics' demonstrated failure to meet scientific standards of validity, reliability, and falsifiability, courts considering forensics evidence face a conundrum: whether the evidence's scientific deficiencies render it so unreliable as to warrant exclusion from courtrooms. Under *Kumho Tire*, that forensic techniques fail to meet traditional scientific standards does not bar their admissibility. However, forensics' deficiencies should affect a court's determination about whether to limit the scope of a forensics practitioner's testimony once on the witness stand.

Many scholars have addressed forensics' scientific deficiencies.[118] These scholars tend to argue that forensic techniques should be excluded to the extent they fail to satisfy traditional notions of scientific validity, falsifiability and reliability.[119] For example, Prof. Adina Schwartz, a longtime critic of firearm and toolmark testimony, argues that "because of . . . systemic scientific problems, firearms and toolmark identification testimony should be inadmissible across-the-board."[120] Prof. Simon Cole, in a review of fingerprinting cases, noted that "fingerprint identification might be inadmissible under . . . *Daubert*/*Kumho*" because of scientific deficiencies in the technique.[121] Professor David Faigman, reacting to a case in which a district court

117. *See, e.g.*, BALLISTIC IMAGING, *supra* note 16, at 67 ("If a firearms examiner is impeached . . . his or her ability to testify in other cases can be severely affected; being associated with an error or misidentification can tarnish reputations.").

118. *See, e.g.*, Simon A. Cole, *Grandfathering Evidence: Fingerprint Admissibility Rulings from* Jennings *to* Llera Plaza *and Back Again*, 41 AM. CRIM. L. REV. 1189 (2004); Robert Epstein, *Fingerprints Meet* Daubert*: The Myth of Fingerprint 'Science' is Revealed*, 75 S. CAL. L. REV. 605 (2002); Garrett & Neufeld, *supra* note 94; Adina Schwartz, *A Systemic Challenge to the Reliability and Admissibility of Firearms and Toolmark Identification*, 6 COLUM. SCI. & TECH. L. REV. 1 (2005). These, of course, represent only a small sample of the vast scholarship documenting forensic techniques' failures to satisfy science's requirements.

119. *See, e.g.*, David L. Faigman et al., *A Matter of Fit: The Law of Discrimination and the Science of Implicit Bias*, 59 HASTINGS L.J. 1389, 1390 (2008) ("[A] necessary precondition for admissibility is basic [scientific] validity.").

120. Schwartz, *supra* note 118, at 3.

121. Cole, *supra* note 118, at 1246 n.247.

excluded fingerprint evidence[122] (a ruling on which the court quickly reversed itself)[123] said "[t]here are a lot of emperors out there testifying who have no clothes. Where's the science behind it? Where's the data?"[124]

Although these scholars are correct in their diagnosis of the disease (forensics, as has been shown here and elsewhere fail to meet scientific standards of reliability and validity), their prescribed course of treatment (drawing a nexus between admissibility and traditional science) is misguided. Non-scientific expert testimony is generally admissible in federal courts. *Kumho Tire* specifically ruled that distinctions among "scientific," "technical," and "specialized knowledge" under Rule 702 are immaterial to courts' admissibility determination.[125] Further, the *Kumho Tire* Court found that the specific factors in *Daubert*—which evaluate the evidentiary reliability, falsifiability, and scientific validity—may be inapplicable in some cases where experience, and not traditional science, was the principal basis of the expert's opinion.[126] Indeed, *Kumho Tire* held that the *Daubert* factors were "meant to be helpful, not definitive" and all may not be inapplicable altogether.[127] Consequently, a technique need not be science *qua* science to be admissible under Rule 702, and that forensics fail to meet traditional science's rigors cannot bar their admissibility.

For example, under *Kumho Tire*, police officers are permitted to testify on the basis of experience alone as to the meaning of "street terminology" if such a translation will aid a jury in understanding the lexicon of the illicit drug trade.[128] Similarly,

122. United States v. Llera Plaza, Nos. CR 98-362-10, CR 98-362-11, CR 98-362-12, 2002 WL 27305, at *19 (E.D. Pa. Jan. 7, 2002) (*Plaza I*).

123. United States v. Llera Plaza, 188 F. Supp. 2d 549 (E.D. Pa. 2002) (*Plaza II*) (vacating *Plaza I*, which was withdrawn from the Federal Supplement).

124. Cole, *supra* note 118, at 1246 n.250 (citing Joann Loviglio, *Reliability of Fingerprint Evidence on Trial in Philadelphia*, ASSOCIATED PRESS, Feb. 24, 2002).

125. Kumho Tire Co. v. Carmichael, 526 U.S. 137, 147–49 (1999).

126. *Id*. at 141 (arguing that the *Daubert* factors "neither necessarily nor exclusively apply to all experts or in every case").

127. *Id*. at 151.

128. *See, e.g*., United States v. Wilson, 484 F.3d 267, 276 (4th Cir. 2007) (reasoning that the *Daubert* factors were inapplicable and that "because the primary purpose of coded drug language is to conceal the meaning of the conversation from outsiders through deliberate obscurity, drug traffickers' jargon is a specialized body of knowledge and thus an appropriate subject for expert testimony" (citing United States v. Gibbs, 190 F.3d 188, 211 (3d Cir. 1999)).

engineers are permitted to testify on the basis of their training and experience, not the scientific method, that a product was built to industry standards.[129] Like forensics practitioners, the police officer and the engineer apply their subjective judgment to objective data they gathered working in their respective fields.

Indeed, on one level, the only meaningful difference between forensics practitioners and other experience-based experts is the level of certainty that they express. The police officer does not testify "with 100% certainty" that his interpretation of the drug lexicon is accurate,[130] nor does the engineer testify that his opinion as to product safety "has zero error rate" when it does not.[131] To the contrary, they testify as to the details of their relative experiences in their fields, explain their methodology dispassionately, and explain their conclusions.[132] Forensics practitioners, by contrast, tend to make broad pronouncements regarding the high degree of accuracy and objectivity of their field and techniques without scientific basis for such claims.[133]

Thus, although forensic techniques' deficiencies cannot bar their admissibility, these methods' fallibilities are reason to limit the scope of forensics practitioners' testimony once it is admitted to prevent practitioners from making unfounded claims about their fields' capacity for certainty. The scope of an expert witness's testimony is significant, principally because jurors tend to defer to experts, and an expert testifying in bold,

129. White v. Ford Motor Co., 312 F.3d 998, 1006–09 (9th Cir. 2002) (noting that engineers are permitted to testify on the basis of experience in the field following *Kumho Tire*).

130. *See* STEVEN D. STEWART, CLARK CNTY. PROSECUTING ATT'Y, EFFECTIVE COURTROOM PERFORMANCE FOR INDIANA LAW ENFORCEMENT (2011), *available at* http://www.clarkprosecutor.org/html/victim/ptips.pdf (Jan. 11, 2011) (advising that police officers be honest: "Do not guess or make up an answer. If you do not know the answer it is best to say, 'I don't know.' If you are asked about details that you do not remember it is best to say, 'I don't remember'").

131. *See* Brief of The National Academy of Engineering as Amicus Curiae Supporting Petitioner, Kumho Tire Ltd. v. Carmichael, 526 U.S. 137 (1999) (No. 97-1709), 1998 WL 541971 (arguing that "[b]ecause engineers frequently rely on calculations and testing, 'the known or potential rate of error' of a technique for evaluating failure bears directly on that technique's validity within the engineering discipline," but not claiming a particular level of accuracy).

132. *See, e.g.*, STEWART, *supra* note 130 ("Answer all questions directly. Answer only the questions asked, then stop.").

133. *See* BALLISTIC IMAGING, *supra* note 16, at 67 (noting that forensics practitioners often make "bold absolute" claims); *supra* notes 102–10 and accompanying text.

conclusory fashion that his technique is ninety-nine percent accurate will undoubtedly have prejudicial effects on the jury.[134] Mere deference to the adversarial process will not prevent a practitioner from making unfounded claims in court. A cross-examination of a forensics expert as to the falsifiability of his methodology or the known error rate of his field will inevitably descend into a debate between the attorney and the witness on the finer points of statistics, the meaning of scientific validity, base-rate data, or other technicalities whose discussion distracts the jury from its purpose. Indeed, these are the very issues that, under *Daubert* and *Kumho Tire*, the judge is supposed to determine. Deference to the adversarial process on the scope of testimony, therefore, runs counter to the very "judge-as-gatekeeper" principle that *Daubert* and *Kumho Tire* have endorsed.

In short, although the deficiencies of forensics from a scientific perspective should matter to courts, under *Kumho Tire*, the field's insufficiency as a scientific discipline may affect the scope of a practitioner's testimony, not its admissibility.

III. *DAUBERT* RISES: LIMITING THE SCOPE OF FORENSICS TESTIMONY

The notion that the remedy to concerns surrounding the evidentiary reliability of forensics lies in limiting the practitioner's sworn speech is not new or unique—several district courts have limited the scope of firearm-and-toolmark witnesses to varying degrees.[135] However, these courts grounded their

134. *See, e.g.*, Jeffrey Heinrick, *Everyone's an Expert: The CSI Effect's Negative Impact on Juries*, TRIPLE HELIX, Fall 2006, at 60; Neil Vidmar, *Expert Evidence, the Adversary System, and the Jury*, 95 AM. J. PUB. HEALTH SUPPLEMENT S137, S138 (2005) ("Among cases that eventually went to trial, physician ratings of whether negligence had occurred were positively related to jury verdicts at a statistically significant level.").

135. *See, e.g.*, United States v. Willock, 696 F. Supp. 2d 536(D. Md. 2009). In *Willock*, the district court adopted the magistrate judge's recommendation limiting a firearm-and-toolmark examiner's testimony so that the examiner could not "opine that it is a 'practical impossibility' for any other firearm to have fired the cartridges other than the common 'unknown firearm' to which [the examiner] attributes the cartridges." *Id*. at 574. *See also, e.g.*, United States v. Glynn, 578 F. Supp. 2d 567, 574–75 (S.D.N.Y. 2008) (permitting firearm-and-toolmark examiner to testify only that a bullet "more likely than not" came from the suspect's gun, and not to his degree of certainty); United States v. Monteiro, 407 F. Supp. 2d 351, 355 (D. Mass 2006) (allowing firearms expert to testify that a bullet came from a suspect's gun "to a reasonable degree of certainty" and prohibiting the witness from framing his conclusion in terms of "an exact statistical certainty").

limitations as to scope of testimony on case-specific factors. In cases involving forensics—where proffered evidence is unreliable but not so unreliable as to merit wholesale exclusion—courts do not seem to have agreed-upon a methodology for how, or to what extent, a forensics practitioner's testimony should be limited. This Part proposes such a methodology: given the need to limit the scope of forensics experts to mitigate the effects of conclusory or absolutist testimony, the *Daubert* factors are the solution.

Following their initial admissibility determination under *Daubert* and *Kumho Tire*, courts should reapply the *Daubert* factors to the proposed testimony, using the factors as rough boundaries of the testimony's scope. To the extent that a practitioner satisfies a particular *Daubert* factor, she may testify to conclusions or opinions that fall materially under that factor. To the extent a witness fails to satisfy a factor, she may not testify to conclusions or opinions that fall materially under that factor. This is not to say, however, that forensics practitioners should not be permitted to testify to objective data points they observed—training and experience alone is a sufficient reliability factor for these types of identifications.[136]

The reapplication of *Daubert* to the scope of forensics practitioners' testimony would produce results both faithful to *Daubert* and *Kumho Tire* and mindful of the myriad issues of falsifiability and scientific validity the forensics field engenders. To demonstrate how, consider the following hypothetical. A firearm-and-toolmark examiner testifies in limine that (1) she found "agreement" based on twelve matching class characteristics and five matching individual characteristics between shell casings at a crime scene and a defendant's firearm; (2) the field of firearm-and-toolmark analysis is ninety-eight percent accurate based on her department's internal assessments; and (3) in this case, she is "virtually certain" that her conclusion is accurate. Under *Kumho Tire*, the first piece of testimony, that there are matching class and individual characteristics, is readily admissible—this is not opinion, but observable data. Even her conclusion that there is "agreement" between the casings is admissible under *Kumho Tire*—this is a conclusion based on training and experience, much like the police officer's testifying

136. Rule 702 expressly authorizes expert testimony on the basis of experience and training, but it, like the Supreme Court case law interpreting it, is silent on the issue of scope of testimony.

to the unique vocabulary of illicit narcotics trafficking.[137] However, her testimony that her field is ninety-eight percent accurate is an empirical (that is, scientific) claim; one which is not scientifically valid. There is no way to know whether the methodology of firearm-and-toolmark analysis measures what it purports to measure ninety-eight percent of the time, because the field's conclusions are made entirely on the basis of subjective opinions of the various participants in it.[138] Thus, she may not testify to her error rate under *Daubert*'s "known error rate" factor, as her error rate is her opinion, and not "known." Similarly, because her conclusion that she is "virtually certain" that the two shell casings match is based on her opinion, not falsifiable tests, she may not testify to her level of certainty under *Daubert*'s "testing" prong.[139] Using *Daubert* as a metric on the scope-of-testimony inquiry, she would be able to testify as to her opinion, but not to its degree of scientific certainty. Her conclusions would be presented as what they are, the opinion of a practitioner—and not a scientific conclusion. Under this framework, the practitioner would be a vehicle for observable data, not a generator of conjecture passing itself off as science.

Some might believe that the distinction this solution depends upon—scope of testimony versus admissibility—is one without a difference. They might argue that admissibility is the ultimate question, and that the reasons a forensics practitioner's testimony is reliable for admissibility purposes is the same reason it is reliable for scope of testimony purposes, and therefore the former should inform the scope of the latter. The difference, however, is in the *Daubert* opinion itself. The *Daubert* Court cautioned that "[t]he focus [of the trial judge's *admissibility* decision] must be solely on principles and methodology, not on the conclusions that they generate."[140] Thus, although the *Daubert* Court cautioned against too-heavy a focus on con-

137. *See, e.g.*, United States v. Wilson, 484 F.3d 267, 276 (4th Cir. 2007) (a police officer may testify on the basis of training and experience as to the meaning of certain words unique to the illegal drug trade).

138. *See, e.g.*, United States v. Diaz, No. CR 05-00167 WHA, 2007 WL 485967 (N.D. Cal. Feb. 12, 2007) (describing that the firearm examiner conceded that the error rate of the technique is not known in the scientific sense and erroneously reasoned that the falsifiability prong *Daubert* is satisfied despite "[t]he few critiques—such as the impossibility of calculating a true error rate and the fact that there can be no statistical, objective verification of an examiner's conclusions").

139. Daubert v. Merrell Dow Pharms., Inc., 509 U.S. 579, 593 (1993).

140. *Id.* at 595.

clusions at the admissibility stage, it was silent as to the scope of testimony.

This Note does not purport to suggest the myriad ways that courts might adopt this solution in particular cases. It does, however, argue that the re-application of *Daubert* when determining the scope of forensics expert's testimony is a principled way under *Kumho Tire* of balancing information that would be helpful to the jury against the need to exclude testimony that vastly overstates the capabilities of both forensics and individual examiners in light of those fields' documented deficiencies with respect to falsifiability and scientific validity.

CONCLUSION

The myriad disciplines within the field of forensics attempt to pass themselves off as science. Those within the those disciplines may make empirical claims, but apply subjective judgments, selective data, and a bias towards the state in criminal cases when making those claims. However, under *Kumho Tire*, this alone cannot be a wholesale bar to this testimony's admissibility. The solution is to limit the scope of the expert's testimony once admitted using the *Daubert* reliability factors as guideposts. Doing so will lead to juries presented with information not riddled with "bold absolute" testimony from practitioners with no scientific basis to make the claims they do.