

DEFENSE ATTACKS ON PROSECUTION SCIENTIFIC EVIDENCE: THE STANDARD FOR DEFENSE REBUTTAL EVIDENCE IS *ALREADY* LOWER THAN THE STANDARD FOR PROSECUTION EVIDENCE

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ABSTRACT

In the past fifteen years, several prestigious organizations have called for reforms to improve the reliability of prosecution forensic evidence. One way that the courts could incentivize such reform is by liberally admitting defense expert testimony that rebuts the prosecution evidence. However, one commentator recently argued that the courts admit defense rebuttal testimony more restrictively than the prosecution evidence being rebutted, and to achieve reform, the courts must formally adopt a more lenient standard for the admissibility of defense rebuttal testimony. While this Article agrees that such reform is necessary and that defense rebuttal testimony can spur such reform, it demonstrates that defense counsel can achieve the desired result by more creatively employing the current court rules and precedents.

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INTRODUCTION

In the late twentieth century the United States Supreme Court handed down its celebrated decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*¹ *Daubert* initially construed Federal Rule of Evidence 402 as impliedly superseding the traditional “general acceptance” test for the admissibility of scientific evidence.² In its next breath, the Court interpreted the reference to “scientific . . . knowledge” in Federal Rule of Evidence 702

1. 509 U.S. 579 (1993).

2. *Daubert*, 509 U.S. at 587–89.

as prescribing a new validation standard.³ In the early twenty-first century, two reports sounded an alarm about the unreliability of many types of prosecution forensic evidence that the courts have routinely admitted in the past.⁴ The thrust of both reports was that many types of prosecution forensic evidence lack the empirical validation that *Daubert* purportedly requires.⁵

In 2009, the National Research Council of the National Academies of Science (NRC) submitted its report, *Strengthening Forensic Science in the United States: A Path Forward*.⁶ Although the report was highly complimentary of nuclear DNA testing,⁷ it provided sharp criticism of many other forensic disciplines such as shoeprint analysis,⁸ microscopic analysis of hair,⁹ questioned document examination,¹⁰ and forensic odontology (bitemark analysis).¹¹ Seven years later the President's Council of Advisors on Science and Technology (PCAST) waded into the same controversy in its report entitled *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods*.¹² PCAST bluntly asserted that several popular types of forensic evidence—including bitemark, firearms, footwear, and microscopic hair analysis—still lack foundational validity.¹³

The prestigious organizations' reports fueled a hope that the courts would quickly respond by subjecting prosecution expert testimony to much more rigorous scrutiny.¹⁴ However, leading commentators, such as Professors Paul Giannelli¹⁵ and D. Michael Risinger,¹⁶ have concluded that this hope has not been realized.¹⁷ In their judgment, the

3. *Id.* at 589–92 (omission in original) (quoting FED. R. EVID. 402).

4. COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT'L RESEARCH COUNCIL, *STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES: A PATH FORWARD* (2009) [hereinafter NAT'L RESEARCH COUNCIL]; PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., EXEC. OFFICE OF THE PRESIDENT, *REPORT TO THE PRESIDENT: FORENSIC SCIENCE IN CRIMINAL COURTS: ENSURING SCIENTIFIC VALIDITY OF FEATURE-COMPARISON METHODS* (2016).

5. NAT'L RESEARCH COUNCIL, *supra* note 4, at 9–12; PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., *supra* note 4, at 21–22.

6. NAT'L RESEARCH COUNCIL, *supra* note 4.

7. *See id.* at 128–33.

8. *See id.* at 145–50.

9. *See id.* at 155–61.

10. *See id.* at 163–67.

11. *See id.* at 173–76.

12. PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., *supra* note 4.

13. *See id.* at 122 (“PCAST expects that some forensic feature-comparison methods may be rejected by courts as inadmissible because they lack evidence of scientific validity.”).

14. *See* Myeonki Kim, *The Need for a Lenient Admissibility Standard for Defense Forensic Evidence*, 86 U. CIN. L. REV. 1175, 1175–76 (2018).

15. *See* Paul C. Giannelli, *Forensic Science: Daubert's Failure*, 68 CASE W. RES. L. REV. 869, 937–41 (2018) [hereinafter Giannelli, *Forensic Science*] (describing courts' hesitancy and inability to enforce the *Daubert* ruling); *see also* Paul C. Giannelli, *Daubert and Criminal Prosecutions*, 26 CRIM. JUST. 61, 62–63 (2011) [hereinafter Giannelli, *Daubert and Criminal Prosecutions*] (discussing the differences between admissibility of evidence in civil and criminal contexts).

16. *See* D. Michael Risinger, *The NAS/NRC Report on Forensic Science: A Glass Nine-Tenths Full (This Is About the Other Tenth)*, 50 JURIMETRICS 21, 34 (2009).

17. *See* Giannelli, *Daubert and Criminal Prosecutions*, *supra* note 15, at 62–63 (quoting NAT'L RESEARCH COUNCIL, *supra* note 4); D. Michael Risinger, *Goodbye to All That, or a Fool's Errand, by One of*

courts continue to admit prosecution expert testimony of dubious validity.¹⁸ Thus, reliance on untrustworthy prosecution forensic testimony is a continuing, systemic problem.

In a recent article, Inspector Myeonki Kim, an international scholar, surveyed the landscape of American forensic science and proposed a fascinating solution to this systemic issue.¹⁹ Inspector Kim quite correctly pointed out that if the courts ordinarily admit prosecution forensic evidence lacking empirical validation, neither the prosecution nor the laboratories have a concrete incentive to conduct the validation studies needed to improve the state of expert testimony in the United States.²⁰ To provide that incentive, he recommended that American courts expressly adopt a lower standard of admissibility for defense evidence that attacks prosecution expert testimony.²¹ If the courts were to do so, and the liberal admissibility of defense rebuttal evidence made a significant dent in conviction rates, prosecutors' offices and crime laboratories would be pressured to embrace the reforms championed by NRC and PCAST.²²

Although Inspector Kim sometimes referred generally to defense expert testimony, it is clear that his primary focus was on defense rebuttal evidence.²³ He argued that the explicit adoption of a more relaxed standard for defense rebuttal evidence is necessary because many courts apply a more demanding admissibility test for defense rebuttal testimony than they do for prosecution expert testimony.²⁴ Inspector Kim recognized that in the present political climate in the United States, there is likely to be intense opposition to his proposal.²⁵ However, he is hopeful that eventually the opposition can be overcome.²⁶

Inspector Kim's proposal has undeniable merit. Its adoption would likely generate pressure to prompt government crime laboratories to implement long-overdue reforms. However, in one respect, Inspector Kim's article is dangerous. His implicit assumption is that, without the benefit of a lower admissibility threshold, defense counsel face considerable difficulty introducing probative rebuttal evidence.²⁷ As Inspector Kim noted, there are some indications that the courts apply a higher standard to defense rebuttal testimony.²⁸ However, the thesis of this Article is that even without the benefit of an explicitly lower standard, defense counsel should often succeed in introducing rebuttal evidence. Rather than generalizing about the relative rigor of the admissibility

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, 452–54 (2007) [hereinafter Risinger, *Goodbye to All That*].

18. See Giannelli, *Daubert and Criminal Prosecutions*, *supra* note 15, at 62–63 (quoting NAT'L RESEARCH COUNCIL, *supra* note 4); Risinger, *Goodbye to All That*, *supra* note 17, at 452–54.

19. Kim, *supra* note 14. Myeonki Kim is the Inspector of the Korean National Police Agency.

20. *See id.* at 1176.

21. *Id.* at 1176–77.

22. *See id.*

23. *See id.* at 1176–77, 1197–98.

24. *Id.* at 1195–97.

25. *Id.* at 1205.

26. *See id.* at 1205–09.

27. *See id.* at 1175–77.

28. *Id.* at 1195–96.

standards for prosecution and defense evidence, this Article specifically catalogues the diverse range of defense rebuttal testimony.

This Article ultimately argues that, with respect to virtually every type of defense rebuttal evidence, the standard for admitting the defense evidence is not only not higher than—but actually lower than—the standard for the prosecution evidence being rebutted.²⁹ This Article posits that there are three categories in which this is true. In the first category, *Daubert* is wholly inapplicable to defense rebuttal evidence.³⁰ In the second category, although *Daubert* is applicable, the prosecution cannot challenge the defense expert's methodology because the defense expert is employing the same methodology as the prosecution witness.³¹ In the third category, although *Daubert* is generally applicable, the validation standard applies to defense rebuttal evidence in a profoundly different manner than it applies to prosecution testimony—more specifically, to be admissible and sufficient, the defense expert's opinion does not have to be couched with the same high level of confidence as prosecution evidence.³² This Article sorts out these different categories of defense rebuttal evidence and analyzes how, if at all, *Daubert* constrains the admissibility of that specific type of defense rebuttal testimony.

Inspector Kim is correct that in the past some courts appear to have discriminated against defense rebuttal evidence.³³ However, rather than undertaking the decidedly uphill battle of convincing the courts or Congress to subject defense rebuttal testimony to a laxer admissibility standard, this Article urges a different strategy: the defense bar should shift their focus from the general admissibility standard to specific varieties of rebuttal testimony and aggressively utilize the full panoply of available evidentiary arguments, which demonstrate that defense rebuttal testimony is already subject to a laxer admissibility test.

Section I of this Article discusses *Daubert*, its progeny, and the 2000 amendment to Federal Rule of Evidence 702. Section II reviews the evidence that Inspector Kim has marshaled to argue that many courts apply a tougher standard to defense rebuttal testimony. Section III turns to the heart of the Article. It catalogues the various types of defense rebuttal evidence. With respect to each type of defense rebuttal, the Section explains why *Daubert* is inapplicable to the defense evidence, why the prosecution cannot challenge the defense expert's methodology under *Daubert*, or why *Daubert* applies differently to the defense evidence and mandates the courts to apply a lower admissibility standard to the defense evidence.

I. THE EVIDENCE LAWS GOVERNING THE ADMISSIBILITY OF EXPERT TESTIMONY: *DAUBERT* AND FEDERAL RULE OF EVIDENCE 702

Before 1993, *Frye v. United States*,³⁴ a 1923 decision by the Court of Appeals for the District of Columbia, was the leading precedent governing the admissibility of expert testimony in the United States. In the trial court, the defense proffered testimony based

29. See *infra* Section II.

30. See *infra* Part III.A.

31. See *infra* Part III.B.

32. See *infra* Part III.C.

33. See Kim, *supra* note 14, at 1175–77.

34. 293 F. 1013 (D.C. Cir. 1923).

on a systolic blood pressure deception test.³⁵ The defense expert's theory was that when a person engages in a conscious attempt to deceive, the attempt affects her systolic blood pressure.³⁶ According to the theory, an expert can determine whether an interrogee is lying during an interrogation by monitoring an interrogee's systolic blood pressure.³⁷

The defense attempted to introduce the expert's testimony that the defendant was being truthful when she denied committing the charged offense.³⁸ The trial judge excluded the testimony, and the court of appeals affirmed the exclusion.³⁹ In one of the most famous passages in the history of American evidence law, the court wrote:

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.⁴⁰

The *Frye* standard came to be known as the "general acceptance" test, and it eventually emerged as the overwhelming majority view in both federal and state courts in the United States.⁴¹

In 1975, a statutory scheme titled the Federal Rules of Evidence took effect.⁴² The question arose as to whether, after the enactment of the Federal Rules, *Frye* was still good law.⁴³ In 1993, the Supreme Court answered that question in the negative in *Daubert*, a case involving epidemiological evidence.⁴⁴ The Court issued two holdings.

First, the Court announced that the Federal Rules had superseded *Frye*.⁴⁵ The rub was that the general acceptance test was a creature of case law, and the Court could not find any statutory language that was capable of reasonably bearing the interpretation that the Federal Rules codified the common law test.⁴⁶ The Court focused on Rule 402.⁴⁷

Prior to its 2011 restyling, Rule 402 read, "[a]ll relevant evidence is admissible, except as otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by other rules prescribed by the Supreme Court pursuant to

35. *Frye*, 293 F. at 1013.

36. *Id.* at 1013–14.

37. *Id.* at 1014.

38. *See id.*

39. *Id.*

40. *Id.*

41. 1 PAUL C. GIANNELLI, EDWARD J. IMWINKELRIED, ANDREA ROTH & JANE CAMPBELL MORIARTY, SCIENTIFIC EVIDENCE § 1.06 (5th ed. 2012 & Supp. 2019).

42. RONALD L. CARLSON, EDWARD J. IMWINKELRIED, JULIE SEAMAN & ERICA BEECHER-MONAS, EVIDENCE: TEACHING MATERIALS FOR AN AGE OF SCIENCE AND STATUTES 15 (8th ed. 2018).

43. *See* GIANNELLI ET AL., *supra* note 41, § 1.06, at 1–2, 2 nn.71–73.

44. *Daubert*, 509 U.S. 579 (1993).

45. *Id.* at 587.

46. *Id.* at 587–89.

47. *Id.* at 587.

statutory authority,”⁴⁸ such as the Federal Rules of Civil and Criminal Procedure.⁴⁹ The Court approvingly quoted the statement of the late Professor Edward Cleary, the reporter for the Evidence Committee, in a 1978 law review article: “In principle, under the Federal Rules no common law of evidence remains.”⁵⁰ While Rule 402 listed several permissible bases for excluding relevant evidence, such as an act of Congress, the rule made no mention of case, common, or decisional law.⁵¹ It was immaterial that *Frye* had been the leading precedent for decades; the statutory text of the Federal Rules did not incorporate any general acceptance test.⁵²

Second, the Court derived a new validation test from the reference to “scientific . . . knowledge” in Rule 702, which governed the admissibility of expert testimony.⁵³ Initially, the Court described the noun “knowledge” as “connot[ing] more than subjective belief or unsupported speculation.”⁵⁴ The Court then turned to the adjective “scientific.” The Court, drawing heavily on amicus briefs filed by individual scientists and scientific organizations,⁵⁵ defined the adjective in methodological terms. Writing for the majority, Justice Blackmun asserted:

“Science is not an encyclopedic body of knowledge about the universe. Instead, it represents a *process* for proposing and refining theoretical explanations about the world that are subject to further testing and refinement.” . . . [I]n order to qualify as “scientific knowledge,” an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation—*i.e.*, “good grounds,” based on what is known.⁵⁶

According to the Justice, purportedly scientific testimony may be admitted only if it is “reliab[le]” in that sense.⁵⁷ The Justice then provided a nonexhaustive list of factors that the trial judge may consider: whether the theory or technique is testable, whether it has been tested, whether it has been subjected to peer review and publication, whether it has a known or ascertainable rate of error, whether there are standards for conducting the technique, and whether it is generally accepted.⁵⁸

48. *Id.* (quoting FED. R. EVID. 402 (1974) (amended 2011)).

49. The definition of “rules prescribed by the Supreme Court” has been moved to a new definitional section. *See* FED. R. EVID. 101(b)(5).

50. *Daubert*, 509 U.S. at 588 (quoting *United States v. Abel*, 469 U.S. 45, 51 (1984)).

51. *See* FED. R. EVID. 402.

52. *See Daubert*, 509 U.S. at 587–89; *see also* FED. R. EVID. 402.

53. *See Daubert*, 509 U.S. at 589–90 (omission in original); *see also* FED. R. EVID. 702.

54. *Daubert*, 509 U.S. at 590.

55. *See id.* at 598 (Rehnquist, J., concurring and dissenting) (“Twenty-two *amicus* briefs have been filed in the case, and indeed the Court’s opinion contains no fewer than 37 citations to *amicus* briefs . . .”).

56. *Id.* at 590 (quoting Brief for American Ass’n for the Advancement of Science & National Academy of Sciences as Amicus Curiae in Support of Respondent at 7–8, *Daubert*, 509 U.S. 579 (No. 92-102)).

57. *Id.*

58. *Id.* at 593–94. At first blush, the mention of the last factor, general acceptance, may seem confusing. Earlier in the same opinion, the Court had ruled that *Frye* was no longer good law. *See id.* at 587–89. Under *Frye*, though, the existence of general acceptance was dispositive. GIANNELLI ET AL., *supra* note 41, § 1.06. Under *Daubert*, general acceptance can be relevant circumstantial evidence; if a technique has been in circulation for an extended period of time and succeeded in garnering general acceptance, presumably a number of scientists in the field have reviewed the underlying empirical research and found it to be satisfactory support for the proposition. *See Daubert*, 509 U.S. at 594 (demoting general acceptance to one factor in a multifactor test).

The Justice added two caveats about the list. To begin with, he made it clear that the list was not intended to be exhaustive.⁵⁹ The Justice stated “[t]he inquiry envisioned by Rule 702 is . . . a flexible one.”⁶⁰ Second, in footnote eight of the opinion, he indicated that although those factors were appropriate for analyzing the admissibility of scientific testimony, they might not govern the admissibility of other types of expert testimony—namely, “technical” or “specialized” knowledge, which Rule 702 listed immediately after scientific knowledge.⁶¹ This second caveat virtually invited the proponents of nonscientific expert testimony to contend that such testimony is exempt from *Daubert*’s prescriptions.⁶² The lower courts split over the validity of that contention.⁶³

In 1999, the issue finally reached the Supreme Court in *Kumho Tire Co. v. Carmichael*.⁶⁴ This case involved the admissibility of a tire failure expert’s opinion that a tire had a design defect.⁶⁵ On the one hand, the Court rejected the sweeping contention that proponents of nonscientific expert testimony were not required to make some showing of objective reliability.⁶⁶ Justice Breyer acknowledged that footnote eight in *Daubert* suggested that, to some degree, *Daubert*’s teachings might be limited to formal scientific testimony.⁶⁷ However, he explained that the word “knowledge” in Rule 702 is the source of a broad reliability requirement, and the text of Rule 702 extends that requirement to all types of expert testimony.⁶⁸ In addition to that statutory construction argument, Justice Breyer reasoned:

[I]t would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gate-keeping obligation depended upon a distinction between “scientific” knowledge and “technical” or “other specialized” knowledge. There is no clear line that divides the one from the others. Disciplines such as engineering rest upon scientific knowledge. Pure scientific theory itself may depend for its development upon observation and properly engineered machinery. And conceptual efforts to distinguish the two are unlikely to produce clear legal lines capable of application in particular cases.⁶⁹

59. *Id.* at 593 (“[W]e do not presume to set out a definitive checklist . . .”).

60. *Id.* at 594.

61. *Id.* at 590 n.8 (“Rule 702 also applies to ‘technical, or other specialized knowledge.’ Our discussion is limited to the scientific context because that is the nature of the expertise offered here.”).

62. *See, e.g., Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 146 (1999) (discussing the Eleventh Circuit’s reversal because the expert testimony in the trial court was not scientific and therefore “outside the scope of *Daubert*” (quoting *Carmichael v. Samyang Tire, Inc.*, 131 F.3d 1433, 1436 (1997), *rev’d sub nom. Kumho*, 526 U.S. 137)).

63. *Id.* at 146–47.

64. 526 U.S. 137 (1999).

65. *Kumho*, 526 at 142–45.

66. *See id.* at 148–50.

67. *See id.* at 147–48.

68. *Id.* at 147–49.

69. *Id.* at 148.

The Court stressed a remark it made in another post-*Daubert* decision, *General Electric Co. v. Joiner*⁷⁰: the expert's methodology cannot be validated "only by the *ipse dixit* of the expert."⁷¹

On the other hand, Justice Breyer conceded that the factors listed in *Daubert* might not be apt for assessing the reliability of all types of expert testimony.⁷² *Daubert* had obviously extracted the listed factors from a model of the classic scientific method described in the amicus briefs, but even *Daubert* had underscored that the judge's inquiry must be "flexible."⁷³ The Justice declared:

We agree with the Solicitor General that "[t]he factors identified in *Daubert* may or may not be pertinent in assessing reliability, depending on the nature of the issue, the expert's particular expertise, and the subject of his testimony." The conclusion . . . is that we 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 upon the particular circumstances of the particular case at issue.⁷⁴

In *Joiner*, the Court had stressed that the trial judge has discretion in applying the factors relevant to assessing the reliability of scientific testimony.⁷⁵ In *Kumho*, the Court more broadly stated that the trial judge "must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable."⁷⁶ *Kumho* granted trial judges a different, deeper type of discretion—namely, to select the factors that "are reasonable measures of the reliability" of the specific type of expert testimony proffered.⁷⁷

Daubert and *Kumho* addressed the fundamental question of whether the methodology that the expert relied on, the general technique or theory, rested on sufficient validation to qualify as reliable "knowledge" under Rule 702.⁷⁸ However, that question obviously did not exhaust the questions related to the admissibility of expert testimony. Consequently, in 2000, one year after *Kumho*, Rule 702 was amended and expanded to provide greater clarity.⁷⁹ As restyled in 2011, Rule 702 now reads:

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:

- (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and

70. 522 U.S. 136, 146 (1997).

71. *Kumho*, 526 U.S. at 157 (quoting *Joiner*, 522 U.S. at 146).

72. *See id.* at 150–51.

73. *See id.* at 150 (quoting *Daubert v. Merrell Dow. Pharma., Inc.*, 509 U.S. 579, 594 (1993)).

74. *Id.* (alteration in original) (citation omitted) (quoting Brief for United States as Amicus Curiae Supporting Petitioners at 19, *Kumho*, 526 U.S. 137 (No. 97-1709)).

75. *Joiner*, 522 U.S. at 142–43.

76. *Kumho*, 526 U.S. at 152.

77. *Id.*

78. *See id.* at 141–42; *Daubert*, 509 U.S. at 582–85.

79. FED. R. EVID. 702 advisory committee's note to 2000 amendment.

(d) the expert has reliably applied the principles and methods to the facts of the case.⁸⁰

Rule 702(c) codified *Daubert* and *Kumho* while 702(a), (b), and (d) set out other foundational requirements for the admission of expert testimony.⁸¹

II. THE INDICATIONS THAT IN GENERAL, MANY (IF NOT MOST) COURTS APPLY *DAUBERT* AND RULE 702 MORE STRICTLY TO THE DEFENSE REBUTTAL EXPERT TESTIMONY THAN TO THE PROSECUTION EXPERT TESTIMONY BEING ATTACKED

In his article, Inspector Kim asserts that “defense-proffered [expert] evidence tends to be scrutinized more strictly” than prosecution expert testimony.⁸² Part II.A explains that, at first blush, two studies appear to lend support to Inspector Kim’s assertion. However, Part II.B demonstrates that on closer examination, the data do not dictate the conclusion that there is a need for a formally more lenient standard for defense rebuttal testimony.

A. *The Courts’ Disparate Treatment of Prosecution and Defense Expert Testimony*

To support his assertion, Inspector Kim cites two studies: one by Professor Jennifer Groscup and her coauthors,⁸³ and a second by Professor D. Michael Risinger.⁸⁴ While Professor Groscup’s study focuses on appellate opinions,⁸⁵ Professor Risinger’s study includes both appellate and trial court opinions.⁸⁶

1. The Groscup Study

Inspector Kim characterizes the Groscup study as “reveal[ing] that more than 95% of the prosecution’s forensic experts are admitted at trial, while fewer than 8% of the defense’s forensic experts are allowed to testify.”⁸⁷ That description is accurate—to a degree. The Groscup study, funded by a National Science Foundation grant, is an analysis of exclusively appellate court opinions.⁸⁸ The researchers reviewed a total of 693 published opinions by appellate courts.⁸⁹ They identified both the appellate rulings and the trial court rulings mentioned in the appellate opinions:

At the trial court level, prosecution experts were admitted 95.8% ($n = 497$) of the time, and defendant-appellant experts were admitted only 7.8% ($n = 13$)

80. FED. R. EVID. 702.

81. *See id.*

82. Kim, *supra* note 14, at 1196.

83. *See* Jennifer L. Groscup, Steven D. Penrod, Christina A. Studebaker, Matthew T. Huss & Kevin M. O’Neil, *The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases*, 8 PSYCHOL., PUB. POL’Y, & L. 339 (2002). *See infra* Part II.A.1 for further discussion of this study.

84. *See* D. Michael Risinger, *Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?*, 64 ALB. L. REV. 99 (2000) [hereinafter Risinger, *Navigating Expert Reliability*]. *See infra* Part II.A.2 for further discussion of this study.

85. Groscup et al., *supra* note 83, at 342.

86. *See* Risinger, *Navigating Expert Reliability*, *supra* note 84, at 102–04.

87. Kim, *supra* note 14, at 1196 (citing Groscup et al., *supra* note 83, at 346).

88. Groscup et al., *supra* note 83, at 342.

89. *Id.* at 344–46.

of the total number of times they were offered. This pattern was slightly less pronounced at the appellate level, with prosecution experts admitted 85.1% ($n = 434$) of the time and defense experts admitted 18.8% ($n = 30$) of the total number of times they were offered.⁹⁰

There are two caveats to Inspector Kim's generalization concerning trial court *Daubert* rulings. First, the generalization rests on a very small sample: only thirteen rulings are reflected in the appellate opinions that the researchers surveyed.⁹¹ Second, and more importantly, the complete data set consists solely of appellate opinions.⁹² As Professor Groscup and her colleagues acknowledge, in the vast majority of cases only the defense may appeal from a trial court judgment in a criminal case.⁹³ If a trial results in an acquittal, double jeopardy precludes a government appeal.⁹⁴ If a trial judge's very liberal ruling on defense expert testimony or very strict ruling on prosecution expert testimony contributed to an acquittal, that trial court decision would not be reflected in this study. In short, due to this selection bias, the Groscup study could overstate both the strictness of the trial court standard for defense testimony and the liberality of the trial court standard for prosecution testimony.⁹⁵

2. The Risinger Study

The Groscup study, however, is not the only support cited by Inspector Kim. Inspector Kim also points to a very substantial study by a leading evidence commentator, Professor D. Michael Risinger.⁹⁶ Inspector Kim characterizes the pertinent findings by Professor Risinger in the following fashion: "For criminal cases in federal district courts, he found that two-thirds of the prosecution challenges to defense proffers were accepted (28/42), but only 8% of defense challenges to prosecution proffers were accepted (1/11). [Professor] Risinger also noted that '[e]vidence from state courts does not reveal a greatly dissimilar pattern.'"⁹⁷

As this passage in Inspector Kim's article suggests, the Risinger study differs from the Groscup study in two important respects. To begin with, the overall size of the Risinger study is larger than that of the Groscup study. A major part of Professor Risinger's analysis consisted of a review of nearly sixteen hundred citations in published opinions to the *Daubert* decision.⁹⁸ Moreover, unlike the Groscup study, Professor Risinger's study directly analyzed trial court opinions by federal district court judges as

90. *Id.* at 346.

91. *See id.*

92. *Id.* at 342.

93. *Id.* at 364.

94. *See, e.g.,* State v. Roberts, 259 P.3d 691 (Kan. 2011); Commonwealth v. Huffman, 608 A.2d 1118 (Pa. Commw. Ct. 1992); RONALD L. CARLSON & EDWARD J. IMWINKELRIED, DYNAMICS OF TRIAL PRACTICE: PROBLEMS AND MATERIALS § 6.2 (6th ed. 2020).

95. *See* Groscup et al., *supra* note 83, at 369 (discussing selection bias as a limitation of the research presented).

96. Kim, *supra* note 14, at 1196; *see also* Risinger, *Navigating Expert Reliability*, *supra* note 84.

97. Kim, *supra* note 14, at 1196 (second alteration in original) (quoting Risinger, *Navigating Expert Reliability*, *supra* note 84, at 109–10).

98. *See* Risinger, *Navigating Expert Reliability*, *supra* note 84, at 102–03.

well as opinions by federal courts of appeal.⁹⁹ Most of the district court decisions citing *Daubert* were civil cases.¹⁰⁰ There were sixty-five criminal cases in that portion of the data set, but only fifty-four “dealt with dependability issues in a guilt-or-innocence context.”¹⁰¹ In twelve cases, there were defense challenges to prosecution expert evidence; in the remaining forty-two cases, there were prosecution challenges to defense expert evidence.¹⁰² In the case of the twelve defense challenges, the prosecution evidence was “fully admitted” in eleven instances; in the remaining instance, the prosecution testimony was “admitted with restrictions.”¹⁰³ In the case of the prosecution challenges to defense evidence, the prosecution prevailed two-thirds of time—that is, in twenty-eight of forty-two instances.¹⁰⁴

Although he did not limit his study to appellate opinions, Professor Risinger considered a subset of courts of appeals decisions as well as the district court opinions.¹⁰⁵ He identified sixty-seven federal appellate opinions dealing with defense challenges to prosecution expert testimony.¹⁰⁶ In sixty-one of those instances, the prosecution prevailed.¹⁰⁷ In only one of the remaining six cases did the defense obtain a reversal on appeal.¹⁰⁸ The appellate opinions reviewed fifty-four prosecution challenges to defense expert testimony.¹⁰⁹ The defense prevailed in only ten instances;¹¹⁰ in seven of those ten cases, the appellate court found the error was the trial judge’s procedural failure to conduct a *Daubert* inquiry¹¹¹—not a substantive error, such as excluding reliable defense expert testimony that satisfies *Daubert*.

Professor Risinger supplemented his analysis of federal trial court and appellate decisions with a review of state court appellate opinions.¹¹² There he discovered 211 defense challenges to prosecution expert testimony and seventy prosecution challenges to defense testimony.¹¹³ In the former 211 cases, the prosecution prevailed 161 times; in the latter seventy cases, the prosecution succeeded three-quarters of the time.¹¹⁴

B. *The Reasons for Disparate Treatment*

After considering the Groscup and Risinger studies, Inspector Kim became convinced that the disparate treatment of prosecution and defense expert testimony

99. *See id.* at 104–10.

100. *See id.* at 109.

101. *Id.*

102. *Id.*

103. *Id.*

104. *Id.* at 110.

105. *See id.* at 104–10.

106. *Id.* at 105.

107. *Id.*

108. *Id.*

109. *Id.*

110. *Id.* at 106.

111. *Id.* at 107.

112. *See id.* at 110–12.

113. *Id.* at 111.

114. *Id.*

demonstrates a judicial bias against the defense.¹¹⁵ He concluded that, “whether consciously or unconsciously,” courts apply the *Daubert* standard in an “unfair” manner to proffers of expert testimony by the defense.¹¹⁶ That conclusion explains why he believes that an asymmetric standard, explicitly applying a more lenient standard to defense evidence, is necessary.¹¹⁷ Some passages in the Groscup study lend support to that conclusion. Although Groscup and her colleagues did not employ pejorative terminology such as “unfair,” they did report that their objective data demonstrated that

admissibility depends on the party offering the testimony. The party for whom the key expert testified was significantly related to admission at both the trial court, . . . and the appellate court levels At both adjudicative levels, experts proffered by the prosecution were more likely to be admitted than experts proffered by defendants.¹¹⁸

For his part, though, Professor Risinger cautioned against leaping from the data reflecting disparate treatment to the conclusion that the courts have a conscious or subconscious bias against criminal defendants and their experts.¹¹⁹ Indeed, he goes on record as generally approving of the decisions rejecting defense challenges to prosecution DNA evidence and those sustaining prosecution challenges to polygraph evidence.¹²⁰ He states that “when you subtract out those cases the apparent relative advantage of the prosecution begins to diminish, though it does not disappear” entirely.¹²¹

Furthermore, he submits that there is an alternative explanation for the disparity that is at least as plausible as the existence of a general judicial bias against the defense:

When I first started looking at these post-*Daubert* cases, I expected to find records of multiple well-litigated attacks on the weakest kinds of common prosecution-proffered expertise, with any system bias coming from judicial decisions. What I found was an apparent systematic failure to seriously litigate these issues on the part of the criminal defense bar.¹²²

As one illustration of his point, Professor Risinger noted that although the prosecution offered bitemark evidence in tens of cases, “[i]n only four or five of those cases [was] there any indication that the foundational reliability of such evidence was challenged.”¹²³ Professor Risinger listed many of the major weaknesses that render bitemark opinions suspect but which the defense bar had neglected to exploit in an effort to bar such opinions.¹²⁴ He used questioned document testimony as a second illustration of his point.¹²⁵ As in the case of bitemark analysis, there are nagging questions about the

115. See Kim, *supra* note 14, at 1196–97.

116. *Id.* at 1197.

117. *Id.* at 1208–09.

118. Groscup et al., *supra* note 83, at 346.

119. See Risinger, *Navigating Expert Reliability*, *supra* note 84, at 108.

120. *Id.* at 131.

121. *Id.*

122. *Id.* at 135.

123. *Id.*

124. See *id.* at 136–39.

125. See *id.* at 139–42.

reliability of the expertise.¹²⁶ Yet, although questioned document testimony was presented in approximately three hundred opinions, there was a challenge to the expertise “[i]n only one reported state case.”¹²⁷ In the final analysis, Professor Risinger concluded that while a general judicial bias against defense expert testimony is a credible explanation for the disparate treatment, the disparity may be due “at least as much to the criminal defense bar’s failure to construct sophisticated” evidentiary challenges and arguments.¹²⁸

III. THE SPECIFIC LIBERAL ADMISSIBILITY STANDARDS ALREADY GOVERNING THE VARIOUS TYPES OF DEFENSE REBUTTAL EXPERT TESTIMONY

To borrow Professor Risinger’s terminology, this Section identifies specific, more “sophisticated” evidentiary arguments that the defense bar should employ to justify the admission of rebuttal evidence when attacking prosecution expert testimony. Although there are some indications that many courts are generally inclined to apply strict standards to defense rebuttal expert testimony, on close scrutiny, the courts are already obliged to apply different, more liberal standards to the various types of defense rebuttal testimony.

As the Introduction suggested, there are three distinct lines of argument available to the defense. In the first category, *Daubert* and Rule 702 are wholly inapplicable to the defense evidence.¹²⁹ In the second category, *Daubert* applies, but the prosecution cannot challenge the foundational validity of the defense expert’s methodology because the defense expert is using the same methodology as the prosecution expert.¹³⁰ And still, in the third category, *Daubert* governs, but it applies in a very different manner since defense expert opinions proffered to generate reasonable doubt need not be nearly as definite as prosecution expert opinions proffered to establish proof beyond a reasonable doubt.¹³¹ The balance of this Section catalogues the varieties of defense rebuttal testimony and demonstrates that, in each case, one of three basic arguments is available.

A. *Situations in Which Daubert and Rule 702 Are Inapplicable to Defense Rebuttal Expert Testimony*

Several situations fall into this category. This Part explains that the admissibility of the defense rebuttal evidence can sometimes be rationalized under established impeachment doctrines, such as the prior inconsistent statement technique governed by Federal Rule of Evidence 613¹³² or the specific contradiction technique.¹³³ In other cases, there is no need for the defense to lay a Rule 702 or *Daubert* foundation because the

126. *See id.*

127. *Id.* at 139–40.

128. *Id.* at 143.

129. *See infra* Part III.A.

130. *See infra* Part III.B.

131. *See infra* Part III.C.

132. *See infra* Part III.A.1.

133. *See infra* Part III.A.2.

defense expert is merely critiquing the manner in which the prosecution expert applied a methodology that the prosecution has already laid a foundation for.¹³⁴

1. The Prosecution Expert Misstated Her Own Prior Research or Neglected To Mention Aspects of Her Research that Are Favorable to the Defense

Suppose that in an attempt to validate the methodology that she employed in the case, the prosecution expert mentions certain aspects of a research project that she conducted or participated in herself. Further assume that during this testimony, the prosecution expert either makes an inconsistent statement about the research or omits a salient aspect of the research.

a. *An Inconsistency*

The defense discovered that the prosecution expert misstated the false-positive rate found in the research project. The rate reported in the published article that described the project was sixteen percent, but on direct examination the prosecution expert testified that the rate was only eight percent. Under Rule 613, the defense counsel could cross-examine the prosecution expert to elicit the inconsistent statement in the prior published writing.¹³⁵ For that matter, if there was no written report of the research project but the witness had made an earlier oral statement that the false-positive rate was sixteen percent, the prior oral statement would still be provable; without distinguishing between written and oral statements, Rule 613(a) refers generally to a “prior [inconsistent] statement.”¹³⁶

b. *An Omission*

Alternatively, assume that in describing her research, the prosecution expert omitted an aspect of the research that would be helpful to the defense. In this instance, Federal Rule of Evidence 106 and the common law rule of completeness come into play. Rule 106 controls when the proponent introduces one part of “a writing or recorded statement,” but there exists a second part of that statement that is so closely related to the first that “in fairness [the two parts] ought to be considered at the same time.”¹³⁷ Some courts have extended the same principle to oral evidence by invoking their discretionary control “over the mode and order of examining witnesses” under Federal Rule of Evidence 611(a).¹³⁸ This doctrine empowers the trial judge to take the dramatic step of ordering the proponent to expand the scope of the witness’s direct examination to include

134. See *infra* Part III.B.

135. FED. R. EVID. 613.

136. FED. R. EVID. 613(a).

137. FED. R. EVID. 106.

138. FED. R. EVID. 611(a); see, e.g., *United States v. Li*, 55 F.3d 325, 329 (7th Cir. 1995) (“[Rule] 611(a) grants district courts the same authority regarding oral statements which [Rule] 106 grants regarding written and recorded statements.”); *United States v. Alvarado*, 882 F.2d 645, 650 n.5 (2d Cir. 1989) (“This rule is stated as to writings in [Rule] 106, but [Rule] 611(a) renders it substantially applicable to oral testimony, as well.”); *United States v. Bauzo-Santiago*, 49 F. Supp. 3d 155, 158 (D.P.R. 2014) (stating that “[c]ourts have discretion pursuant to Federal Rule of Evidence 611(a) to apply the rule of completeness to oral statements”), *aff’d*, 867 F.3d 13 (1st Cir. 2017).

the part that the proponent had omitted.¹³⁹ Given the drastic nature of such an order, it is understandable that there is a high threshold for triggering this doctrine. More specifically, in order to trigger this doctrine, the two parts must be so closely connected that the presentation of the “first part, standing alone, would be misleading—in essence, a half-truth.”¹⁴⁰

Suppose that the trial judge is not persuaded that the two parts of the research project are so closely tied that the second part furnishes necessary context for the first part. In that situation, Rule 106 does not apply, but the defense can still invoke the common law doctrine of completeness. In *Beech Aircraft Corp. v. Rainey*,¹⁴¹ the Court distinguished between the common law completeness doctrine and the codification in Rule 106.¹⁴² As the Court noted, the common law doctrine has a more limited effect: the opponent cannot force the proponent to expand the scope of the proponent’s direct examination but is entitled to introduce the omitted part during the ensuing cross-examination.¹⁴³ Since the common law doctrine has a less drastic impact than Rule 106, the threshold for invoking the common law doctrine is lower.¹⁴⁴

The common law doctrine is simply a particular application of the procedural rules governing the normal scope of the phases of the examination of a witness.¹⁴⁵ To be admissible during cross-examination, the omitted part merely needs to be relevant to the part mentioned on direct examination.¹⁴⁶ In *Beech Aircraft*, the Court held that the common law doctrine survived the enactment of the Federal Rules.¹⁴⁷ Even considering Rule 402, the Federal Rules are a self-contained set of substantive evidentiary rules that do not comprehensively regulate related procedures, such as the scope of the various examinations of witnesses or even the scope of the cases-in-chief.¹⁴⁸ For example, the Federal Rules do not mention the scope of the major phases of the trial, such as cases-in-chief, or other examination phases of a single witness, such as redirect and recross. The upshot is that so long as the defense wanted to cross-examine the prosecution expert about another relevant part of the witness’s research, the defense would be entitled to do so.

In neither situation—an inconsistency or an omission—is the defense offering any expert opinion. The limited purpose of the cross-examination is impeachment under Rule 613, Rule 106, or the common law completeness doctrine. This limited type of defense rebuttal is not subject to the strictures of *Daubert* or Rule 702, which are applicable to the prosecution expert’s direct examination. Consequently, the defense counsel does not need to lay any *Daubert* or Rule 702 foundation to justify admitting this type of rebuttal testimony.

139. 1 EDWARD J. IMWINKELRIED, PAUL C. GIANNELLI, FRANCIS A. GILLIGAN, FREDERIC I. LEDERER & LIESA RICHTER, *COURTROOM CRIMINAL EVIDENCE* § 112 (6th ed. 2016).

140. *Id.*

141. 488 U.S. 153 (1988).

142. *See Beech Aircraft*, 488 U.S. at 171–72.

143. *See id.* at 170–73; *see also* 1 IMWINKELRIED ET AL., *supra* note 139, § 112, at n.126.

144. 1 IMWINKELRIED ET AL., *supra* note 139, § 112.

145. *See id.*

146. *See id.*

147. *See Beech Aircraft*, 488 U.S. at 171–72.

148. *See* FED. R. EVID. 402 advisory committee’s note on 1972 proposed rules.

2. The Prosecution Expert Misstated Another Scientist's Research or Neglected To Mention Aspects of Another Scientist's Research that Are Favorable to the Defense

Suppose that the problem arises during the prosecution witness's description of another scientist's research rather than her own research. In this situation, when the problem takes the form of an omission, the analysis is the same as in the case of a witness's failure to mention a relevant part of her own research.

The analysis, however, changes when the prosecution witness misstates another scientist's research. In this situation, the defense cannot rely on Rule 613 because a publication by the other scientist is not a statement by the prosecution witness. However, the defense can resort to another impeachment method—namely, specific contradiction, a traditional common law impeachment technique.¹⁴⁹ It is true that while Article VI of the Federal Rules, entitled “Witnesses,” lists several impeachment techniques such as proof of a witness's prior inconsistent statement¹⁵⁰ and conviction,¹⁵¹ Article VI makes no mention of specific contradiction impeachment. Rule 408(a), however, does refer to this impeachment technique.¹⁵² Even absent the reference in Rule 408(a), specific contradiction impeachment would remain a permissible method of impeachment in federal practice.¹⁵³

The very existence of Article VI, which mentions several impeachment methods, reflects that when a witness takes the stand, her credibility becomes a fact of consequence under Federal Rule of Evidence 401.¹⁵⁴ As the *Daubert* Court noted, by virtue of Rule 402, evidence that is logically relevant to a fact of consequence is admissible unless it can be excluded under a source of law such as the Constitution or an act of Congress.¹⁵⁵ In its 1984 *United States v. Abel* decision,¹⁵⁶ the Supreme Court resolved the question of whether Article VI's omission of any mention of bias impeachment precludes litigants from using the specific contradiction impeachment technique.¹⁵⁷ The Court held that Rule 402 was the only statutory authorization needed for the continued use of bias impeachment in federal practice.¹⁵⁸ The same reasoning applies here. If after one witness testifies to *A*, a second witness specifically contradicts the first witness by testifying to

149. See 1 KENNETH S. BROUN, GEORGE E. DIX, EDWARD J. IMWINKELRIED, DAVID H. KAYE, ROBERT P. MOSTELLER & ELEANOR SWIFT, MCCORMICK ON EVIDENCE § 45 (8th ed. 2020) (defining and explaining specific contradiction impeachment).

150. FED. R. EVID. 613.

151. FED. R. EVID. 609.

152. FED. R. EVID. 408(a).

153. BROUN ET AL., *supra* note 149, § 45.

154. *Id.*; see also FED. R. EVID. 401.

155. See *supra* notes 47–51 and accompanying text for a summary of *Daubert*'s discussion of Rule 402.

156. 469 U.S. 45 (1984).

157. See *Abel*, 469 U.S. at 49–51. Amazingly, although the case made it all the way to the Supreme Court, no one evidently noticed that there is an express mention of bias impeachment in Federal Rule of Evidence 411. See FED. R. EVID. 411 (stating that federal courts may admit evidence of a witness's liability insurance in order to impeach “a witness's bias or prejudice”).

158. *Abel*, 469 U.S. at 49–51.

non-*A*, the second witness's testimony raises some question about the first witness's credibility and is presumptively admissible under Rule 402.¹⁵⁹

The specific contradiction impeachment technique comes into play when, on direct examination, a prosecution expert makes a misstatement about a third-party scientist's research and the defense counsel wants to expose the misstatement on cross-examination or call a defense expert for that purpose.¹⁶⁰ In this situation as well, the defense is not proffering any expert opinion that would necessitate a foundation satisfying *Daubert* and Rule 702. The trial judge could apply *Daubert* and Rule 702 to bar or restrict the direct testimony of the prosecution expert, but the judge could not rely on them as a basis for precluding the defense rebuttal evidence that specifically contradicts the prosecution expert's testimony about the third-party's research. Here, as a practical matter, the defense rebuttal testimony is more liberally admissible than the prosecution testimony that the defense testimony is intended to rebut.

3. The Defense Expert Offers Testimony that Explains the Prosecution Expert Erred in Applying the Methodology that Is the Basis of the Prosecution Expert's Opinion

As Section I noted, Federal Rule of Evidence 702(d) now provides that the proponent of expert testimony must establish that the proponent's "expert has reliably applied the principles and methods to the facts of the case."¹⁶¹ Given that provision, if the opponent persuades the judge that the prosecution expert has significantly deviated from proper test procedure, the judge may exclude the prosecution expert's testimony.¹⁶² Suppose, though, that a deviation does not strike the judge as egregious enough to warrant barring the prosecution testimony. Nevertheless, in order to attack the weight of the prosecution testimony, the defense might attempt to rebut the prosecution testimony by cross-examining the expert about the deviation or offering extrinsic evidence of the deviation.

There are several sources the defense can consult to identify applicable standards and guidelines that the prosecution expert should have followed. Numerous international and national organizations promulgate standards for conducting forensic and industrial

159. See BROWN ET AL., *supra* note 149, § 45.

160. The common law generally prohibited the use of extrinsic evidence—such as the testimony of a later witness—to specifically contradict a prior witness on a "collateral" matter. *Id.* Federal Rule of Evidence 608(b) partially codified the collateral restriction on evidence of specific untruthful acts offered to show the witness's character trait for untruthfulness. By its terms, that rule provides in part that "extrinsic evidence is not admissible to prove specific instances of a witness's conduct in order to attack . . . the witness's character for truthfulness." FED. R. EVID. 608(b). However, the Federal Rules do not codify a general version of the collateral limitation. Rather, for other impeachment techniques, such as specific contradiction, the admissibility of extrinsic evidence is entrusted to the trial judge's discretion under Rules 402 and 403. See BROWN ET AL., *supra* note 149, § 45. The judge makes a practical judgment on whether the fact being specifically contradicted is important enough in the context of the case to warrant the expenditure of the additional court time entailed in the later presentation of extrinsic evidence. See *id.*

161. FED. R. EVID. 702(d).

162. See 1 GIANNELLI ET AL., *supra* note 41, § 1.12[b].

procedures. The list includes the International Standardization Organization,¹⁶³ the American Society for Testing and Materials International,¹⁶⁴ the Federal Bureau of Investigation's (FBI) former Technical Working Groups,¹⁶⁵ the FBI's former Scientific Working Groups,¹⁶⁶ and the current Organization of Scientific Area Committees operating under the aegis of the National Institute of Standards and Technology.¹⁶⁷

In addition, manufacturers typically provide operators' manuals for their instrumentation.¹⁶⁸ What foundation would the defense have to lay to introduce a standard that the prosecution expert had violated? Because several entities create scientific standards, could the prosecution bar the rebuttal evidence on the ground that the defense could not authenticate the standard? In most cases, the answer is no.

Rule 902 governs self-authentication—that is, situations in which the proponent does not need live, sponsoring testimony.¹⁶⁹ Rule 902(5) renders the following self-authenticating: “[a] book, pamphlet, or other publication purporting to be issued by a public authority.”¹⁷⁰ Purported Technical Working Group, Scientific Working Group, or Organization of Scientific Area Committee publications would fall within 902(5). Rule 902(7) treats as self-authenticating “[a]n inscription, sign, tag, or label purporting to have been affixed in the course of business and indicating origin, ownership, or control.”¹⁷¹ An operators' manual purportedly issued by Hewlett-Packard Company would qualify under that provision.

Alternatively, could the prosecution successfully object to the defense rebuttal evidence on hearsay grounds? Assertive parts of the standard or manual would constitute hearsay under Federal Rule of Evidence 801,¹⁷² but in this hypothetical, the defense counsel would be interested in only the parts of the standard or manual that prescribe the required or recommended procedures for conducting the test. Requirements are strong imperative sentences while recommendations are weak imperative sentences, but both types of sentences are imperative, not declarative, in character.¹⁷³ It is well settled that

163. See, e.g., *Forensic Sciences—Part 1: Terms and Definitions*, INT'L STANDARDS ORG., <http://www.iso.org/obp/ui/#iso:std:iso:21043:-1:ed-1:v1:en> [https://perma.cc/LQN4-6HHZ] (last visited Nov. 1, 2020).

164. See, e.g., AM. SOC'Y FOR TESTING & MATERIALS INT'L, *BASIC RUBBER TESTING: SELECTING METHODS FOR A RUBBER TEST PROGRAM* (John Dick ed., 2003).

165. See, e.g., TECHNICAL WORKING GRP. ON CRIME SCENE INVESTIGATION, FED. BUREAU OF INVESTIGATIONS, *CRIME SCENE INVESTIGATION: A GUIDE FOR LAW ENFORCEMENT* (2000).

166. See, e.g., SCI. WORKING GRP. ON DIGITAL EVIDENCE, FED. BUREAU OF INVESTIGATIONS, *DIGITAL EVIDENCE: STANDARDS AND PRINCIPLES* (1999), reprinted in *FORENSIC SCI. COMM.*, Apr. 2000, <http://archives.fbi.gov/archives/about-us/lab/forensic-science-communications/fsc/april2000/swgde.htm> [https://perma.cc/X63J-JLJF].

167. See, e.g., ANSI/ASB STANDARD 022, *STANDARD FOR FORENSIC DNA ANALYSIS TRAINING PROGRAMS* (AAFS STANDARDS BD. 2019).

168. See, e.g., *USER GUIDE*, HEWLETT-PACKARD (4th ed. 2019), <http://h10032.www1.hp.com/ctg/Manual/c06366166> [https://perma.cc/G6FA-65VZ].

169. FED. R. EVID. 902.

170. FED. R. EVID. 902(5).

171. FED. R. EVID. 902(7).

172. See FED. R. EVID. 801(a) (“‘Statement’ means a person’s oral assertion, written assertion, or nonverbal conduct, if the person intended it as an assertion.”).

173. Cf. 1 IMWINKELRIED ET AL., *supra* note 139, § 1003 (explaining that imperatives are not “realistically testable by cross-examination”).

imperatives,¹⁷⁴ including commands,¹⁷⁵ orders,¹⁷⁶ instructions,¹⁷⁷ and requests,¹⁷⁸ are nonhearsay. Simply stated, imperatives do not make any assertions about facts or events that can be true or false.

Would the defense be obliged to lay a foundation for their rebuttal evidence under *Daubert* or Rule 702? Again, the answer is no. The defense rebuttal evidence does not require an Article VII foundation.¹⁷⁹ If the defense decided to limit its rebuttal evidence to cross-examination, the defense would elicit only the fact that the prosecution expert deviated from a required or recommended procedure. If the defense called its own expert for the limited purpose of establishing the deviation, the defense expert's only "opinion" would be that the prosecution expert had neglected to follow the required or recommended procedure. The defense expert is not invoking any scientific methodology and is not offering any expert opinion related to the historical merits of the case.

The upshot is that, in all three of the above situations, the defense can rely on specific evidentiary doctrines other than *Daubert* and Rule 702 as the justification for introducing its rebuttal testimony. Those foundational requirements apply with full force to the prosecution expert's direct testimony, but there would be no occasion for the trial judge to apply *Daubert* or Rule 702 to the defense testimony.

B. The Situation in Which the Prosecution Cannot Mount a Daubert or Rule 702 Challenge to the Foundational Validity of the Defense Expert's Methodology Because the Defense Expert Has Employed the Same Methodology as the Prosecution Expert

In the previous situations, there was no need for the defense to lay a Rule 702 or *Daubert* foundation to justify the introduction of its rebuttal testimony because other doctrines such as impeachment techniques were an adequate basis for the admission of the evidence. In this last situation, there is no need because the defense can rely on the foundation that the prosecution has already laid.¹⁸⁰

1. The Defense Does Not Need To Lay a *Daubert* Foundation

Suppose that the prosecution expert is a fingerprint examiner. Unless the judge is willing to judicially notice the general reliability of fingerprint analysis,¹⁸¹ the prosecutor would have to lay a foundation to establish the foundational validity of the fingerprint

174. See, e.g., *United States v. Waters*, 627 F.3d 345, 358 (9th Cir.2010) (stating that imperatives are not assertions of fact and therefore do not fall within the meaning of "statement" under Rule 801).

175. See, e.g., *Ruhl v. Hardy*, 743 F.3d 1083, 1099 (7th Cir. 2014); *United States v. Rodriguez-Lopez*, 565 F.3d 312, 314–15 (6th Cir. 2009); *United States v. Thurman*, 915 F. Supp. 2d 836, 863 (W.D. Ky. 2013).

176. See, e.g., *Waters*, 627 F.3d at 358; *Thornburg v. Mullin*, 422 F.3d 1113, 1128 (10th Cir. 2005); *United States v. Dandy*, 998 F.2d 1344, 1350 (6th Cir. 1993).

177. See, e.g., *United States v. Tann*, 532 F.3d 868, 871–72 (D.C. Cir. 2008); *United States v. Aspinall*, 389 F.3d 332, 340–41 (2d Cir. 2004); *United States v. Balthazard*, 360 F.3d 309, 318 (1st Cir. 2004); *United States v. Reilly*, 33 F.3d 1396, 1410 (3d Cir. 1994).

178. See, e.g., *United States v. Robinzine*, 80 F.3d 246, 252 (7th Cir. 1996).

179. See FED. R. EVID. 902(5).

180. See *infra* notes 190–191 and accompanying text.

181. To impress the trier of fact, the prosecutor might present such testimony even when the trial judge is willing to judicially notice the general trustworthiness of this forensic technique.

analysis at the outset of the witness's direct examination.¹⁸² The prosecutor might invite the expert to describe the validation studies that the PCAST report deemed sufficient to demonstrate the foundational validity of fingerprint analysis.¹⁸³ The expert could then testify about her use of the popular Analysis Comparison Evaluation Verification (ACE-V) methodology to compare the crime scene latent fingerprint to known fingerprints of the defendant in a law enforcement database.¹⁸⁴

In the current state of fingerprint examination, the analysis includes a good deal of subjective judgment.¹⁸⁵ For instance, there is no consensus that the examiner must find a certain number of common points of similarity before declaring a match between the latent and the known fingerprints.¹⁸⁶ Moreover, in contrast to DNA analysis, in fingerprint examination the analysts do not have population frequency data for various combinations of minutiae.¹⁸⁷ Hence, in deciding whether the combination of minutiae is rare or common, the examiner must draw on her personal experience.¹⁸⁸ In any event, assume that at the conclusion of her analysis the prosecution expert opines that she "would not expect to see the same arrangement of features repeated in an impression that came from a different source."¹⁸⁹

During the defense case-in-chief, the defense then calls its own fingerprint examiner. Prior to trial, the trial judge exempted the defense examiner from the sequestration order in the case under Federal Rule of Evidence 615.¹⁹⁰ At the outset of her testimony, the defense examiner states that she was present in court during the prosecution examiner's testimony; she had examined the same fingerprints that the prosecution examiner described in her testimony; and then, like the prosecution examiner, she employed the ACE-V methodology.

At that point, would the defense have to lay a foundation showing the validity of fingerprint analysis? Practically and formally, the answer is no. Practically, the prosecution is hardly in a position to challenge the foundational validity of the methodology used by the defense examiner since the prosecution's own examiner relied

182. See generally 2 GIANNELLI ET AL., *supra* note 41, § 16.10 (providing an overview of the admissibility of fingerprint evidence).

183. See PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., *supra* note 4, at 91–98.

184. See generally 2 GIANNELLI ET AL., *supra* note 41, § 16.07.

185. See *id.*

186. *Id.* §§ 16.07[a], 16.10[d].

187. See *id.* § 16.07[a].

188. *Id.*

189. That is the language that federal fingerprint examiners are permitted to use under the Department of Justice's *Uniform Language for Testimony and Reports*. See *id.* § 16.10([d]) (quoting U.S. DEP'T. OF JUSTICE, UNIFORM LANGUAGE FOR TESTIMONY AND REPORTS FOR THE FORENSIC LATENT PRINT DISCIPLINE 2 (Aug. 15, 2020), <http://www.justice.gov/olp/page/file/1284786/download> [<https://perma.cc/R4PV-GEEA>]).

190. See FED. R. EVID. 615(c). Prior to trial, the defense counsel argued that the key issue in the case was identity and that the jury's resolution of the identity issue was likely to turn on the fingerprint testimony in the case. The defense counsel contended that she needed an "at the elbow expert" during the trial to evaluate the prosecution's fingerprint testimony on the spot. See CARLSON ET AL., *supra* note 42, at 59 (noting that courts disagree on whether counsel has the right to have their "at the elbow expert" hear testimony in order to assist the party in preparing for cross-examination). The judge agreed and found that, in the words of Rule 615(c), the defense examiner's presence was "essential to presenting the [defendant's identity] defense." See FED. R. EVID. 615(c).

on the identical methodology. Formally, if the trial judge judicially noticed the general reliability of the methodology under Rule 201(b)(2), like the prosecution, the defense is entitled to take advantage of the judicially noticed proposition.¹⁹¹ If the prosecution expert laid the proper foundation during her live testimony, the testimony is already on the record and the defense counsel may point to the prosecution's testimony as part of the foundation for the defense examiner's opinion. Thus, while the prosecution might have to lay a full *Daubert* foundation, there is no need for the defense to present any foundational testimony when the two witnesses employ the same methodology.

2. The Defense Expert's Testimony Can Be Far More Indefinite than the Prosecution Expert's Testimony

There is another situation in which the burden for the defense counsel's expert testimony is lighter than that of the prosecution. Under the Supreme Court's 1979 decision in *Jackson v. Virginia*,¹⁹² if the defense moves to challenge the legal sufficiency of the prosecution's case, the trial judge must find—before submitting the case to the jury—that on its face the prosecution expert's opinion is so powerful that it is independently capable of demonstrating the defendant's identity as the perpetrator beyond a reasonable doubt.¹⁹³ If its fingerprint examiner's testimony is the only prosecution evidence on the crucial identity issue, the prosecution examiner's opinion must be stated in terms that are so definite that, without more, the opinion is capable of establishing the defendant's identity beyond a reasonable doubt.¹⁹⁴

The defense is in a very different position. Assume that in this situation, the defense examiner testified that (1) she agrees with the prosecution examiner that the defendant cannot be excluded as the source of the latent print found at the crime scene; (2) it is certainly possible that the defendant deposited that fingerprint at the crime scene; but, (3) drawing on her experience in the field, many of the minutiae in question are relatively common, and it is thus only a "distinct possibility" that the defendant is the source.

The prosecutor objects that the defense examiner's opinion is so uncertain that the judge ought to exclude it under Federal Rule of Evidence 403, which allows the trial judge to exclude logically relevant evidence when the probative dangers attending the evidence substantially outweigh its probative value.¹⁹⁵ The trial judge should overrule that objection because the relative probative value of prosecution and defense expert evidence must be evaluated by different standards.¹⁹⁶ In an extreme case in which the expert testimony is the litigant's only evidence on an ultimate issue in the case, the prosecution opinion evidence must be definite enough to prove guilt beyond a reasonable doubt; but the defense expert's opinion, derived by using the very same methodology as

191. See FED. R. EVID. 201(b)(2).

192. 443 U.S. 307 (1979).

193. See *Jackson*, 443 U.S. at 318–19.

194. See *id.*

195. See FED. R. EVID. 403.

196. See *Jackson*, 443 U.S. at 318–19; *In re Winship*, 397 U.S. 358, 361 (1970) (announcing that the Constitution mandates that the prosecution meet the proof beyond a reasonable doubt standard in a criminal case).

the prosecution expert employed, need be only definite enough to raise reasonable doubt.¹⁹⁷

In a 1970s survey described in *United States v. Fatico*,¹⁹⁸ then-Judge Jack Weinstein asked federal district court judges in the Eastern District of New York about their practical understanding of the various burdens of proof.¹⁹⁹ The survey asked, in a rough sense, what level of probability does each measure of the burden of proof equate with?²⁰⁰ In the survey, ten judges assigned numerical probabilities to the beyond a reasonable doubt measure of proof.²⁰¹ One judge estimated that such proof requires a 95% probability, two cited 90%, four estimated 85%, one designated 80%, and a final judge cited 76%.²⁰² Thus, the majority of the estimates were 85% or higher, and the mode was also 85%.²⁰³ In that light, to deny a defense motion for a judgment of acquittal as a matter of law, the judge would have to find that the prosecution opinion was roughly equivalent to a probability that high.

Referring back to the fingerprint analysis hypothetical, although it is debatable whether the prosecution expert's language, "would not expect to see the same arrangement of features,"²⁰⁴ independently satisfies the government's burden, assume *arguendo* that the judge finds that the wording is sufficiently strong. Again, the prosecution expert opined that she would not expect to see the same arrangement of features repeated in an impression that came from a different source.²⁰⁵ In contrast, the defense expert's opinion is certainly sufficient to generate reasonable doubt. If there is only "a distinct possibility" that the defendant is the source of the fingerprint, that probability falls far short of 85%, much less of 90% or 95%.

Thus, in this variation of the record, the standard for defense expert testimony is more relaxed in two salient respects. First, since the defense expert employs the same methodology as the prosecution expert, there is no need for the defense to lay a *Daubert* foundation. Second, the defense expert's opinion can be far more indefinite than that of the prosecution expert. Even a strongly worded prosecution expert opinion could be insufficient to satisfy the elevated beyond a reasonable doubt standard of proof, while a somewhat weakly worded defense opinion could be more than ample to generate reasonable doubt. Part III.C will soon explain that a less definite defense opinion qualifies for admission regardless of whether the defense expert is using the same methodology as the prosecution expert.

197. See *Jackson*, 443 U.S. at 318–19; *Winship*, 397 U.S. at 361.

198. 458 F. Supp. 388, 409–10 (E.D.N.Y. 1978), *aff'd*, 603 F.2d 1053 (2d Cir. 1979). It would be erroneous for a trial judge to specify a certain probability for proof beyond a reasonable doubt in the jury instructions. However, the survey in *Fatico* wanted judges to draw on their experience, including in jury trials, to gain a rough sense of the level of probability that proof beyond a reasonable doubt equates with.

199. See *Fatico*, 458 F. Supp. at 410.

200. See *id.*

201. *Id.*

202. *Id.*

203. *Id.*

204. See *supra* notes 181–189 and accompanying text.

205. See *supra* notes 181–189 and accompanying text.

C. Situations in Which the Prosecution Can Mount a Daubert or Rule 702 Challenge to the Foundational Validity of the Defense Expert's Methodology, but the Defense May Introduce a More Indefinite Expert Opinion than the Prosecution Expert Opinion

At this point, Section III has analyzed two situations where, by advancing specific, “sophisticated” evidentiary arguments, the defense should have little difficulty persuading the trial judge to admit defense expert testimony that rebuts prior prosecution expert testimony. In the first situation, *Daubert* and Rule 702 were wholly inapplicable to the defense’s rebuttal evidence.²⁰⁶ In the second situation, the challenge facing the defense was a bit more difficult. *Daubert* and Rule 702 were undeniably applicable to the defense rebuttal evidence.²⁰⁷ However, since the defense expert employed the same basic methodology as the prosecution expert, the prosecution was in no position to mount a *Daubert* challenge.

This Part now turns to a third category of more nuanced situations: instances in which *Daubert* applies to the defense rebuttal evidence, and the defense expert has resorted to a methodology other than the one used by the prosecution expert. This Part will explain that even with this record, the defense has a powerful argument that the judge must apply *Daubert* and Rule 702 to the defense rebuttal evidence in a fundamentally different, more relaxed manner than it applies to prosecution expert testimony. That argument can be available to the defense in three situations: when the expert uses a different methodology to simply negate the prosecution expert’s opinion,²⁰⁸ when the defense uses a different methodology in an affirmative attempt to develop an alternative to the prosecution theory on an essential element of the crime,²⁰⁹ or even when the defense offers its expert’s opinion to establish a defense on which the defense has the ultimate burden of proof.²¹⁰

1. The Defense Expert Employs a Different Methodology To Negate the Prosecution Expert’s Opinion

Perhaps the classic illustration of this type of case is an infanticide prosecution in which the prosecution relies on Shaken Baby Syndrome (SBS). Many pediatricians and some pathologists have long subscribed to the theory that even if an infant’s head does not strike any object during a shaking episode, shaking alone can generate enough force to cause fatal brain injuries.²¹¹ In particular, many believe that a triad of

206. See *supra* Part III.A.

207. See *supra* Part III.B.

208. See *infra* Part III.C.1.

209. See *infra* Part III.C.2.

210. See *infra* Part III.C.3.

211. See generally RANDY PAPETTI, THE FORENSIC UNRELIABILITY OF THE SHAKEN BABY SYNDROME (2018) (discussing the acceptance and inadequate validation of the shaking hypothesis and other SBS concerns); Edward Imwinkelried, *Shaken Baby Syndrome: A Genuine Battle of the Scientific (and Non-Scientific) Experts*, 46 CRIM. L. BULL. 156 (2010) (describing the widespread medical and legal acceptance of SBS, providing an overview of the history of SBS, and reviewing existing empirical data); Edward Imwinkelried, *The Legal Sufficiency Analysis of Genuine Battles of the Experts in Criminal Trials: The Unrealized Potential of the Supreme Court’s Landmark Decision in Jackson v. Virginia*, 54 CRIM. L. BULL. 1243 (2018) (describing the basic parameters of the SBS controversy).

symptoms—brain swelling, subdural bleeding, and retinal hemorrhages—are diagnostic for SBS.²¹² As support for this theory, they point to tens of cases in which an infant that displayed these symptoms died or where the infant died after they had been shaken, but where there was no solid evidence of striking in the case.²¹³ This Part will explain that more recent research calls into question the validity of this theory.²¹⁴ However, it is fair to say that even today the majority of American pediatricians adhere to the theory.²¹⁵ Historically, the majority of courts have admitted SBS testimony as substantive evidence that shaking was the cause of the infant's death.²¹⁶

More recently, however, the defense has submitted a different type of rebuttal evidence to attack SBS. In a number of experiments, biomechanical experts have used primates and anthropomorphic models of infant heads and necks to test whether shaking alone—without striking—can generate enough force to cause the sorts of brain injuries discovered during the infants' autopsies.²¹⁷ These researchers have identified what they think is the minimum force threshold for causing such injuries and uniformly concluded that without more, shaking by a human being cannot reach the threshold.²¹⁸ Based on this biomechanical research, a number of courts have granted post-conviction relief to defendants who were convicted on the basis of the traditional SBS theory.²¹⁹

As previously stated, cases in this category pose a greater challenge for the defense than those in the second category, where the defense expert uses the same methodology as the prosecution expert.²²⁰ In the latter category, formally and practically the prosecution cannot object to the foundational validity of the defense expert's methodology.²²¹ In contrast, in this variation of the record the defense expert uses a different methodology (biomechanical studies) than the methodology relied on by the prosecution SBS expert. Now the prosecution has a right to demand that the defense lay a *Daubert* foundation for its biomechanical rebuttal testimony.²²² However, the point is

212. Mark Hansen, *Why Are Iowa's Babies Dying?*, 84 A.B.A. J. 74, 78 (1998).

213. Mark Hansen, *Unsettling Science: After Decades of Prosecuting Suspect Infant Deaths, Experts Are Still Debating Whether Shaken Baby Syndrome Exists*, 97 A.B.A. J. 49, 53–54 (2011) [hereinafter Hansen, *Unsettling Science*] (“Dr. Robert Block, president of the American Academy of Pediatrics, says there are now decades of ever-accumulating research, clinical observations, individual case reports and other data showing that babies can be injured through shaking, impact or a combination of the two.”).

214. See generally DEBORAH TUERKHEIMER, *FLAWED CONVICTIONS: “SHAKEN BABY SYNDROME” AND THE INERTIA OF INJUSTICE* (2014); Hansen, *Unsettling Science*, *supra* note 213; Elizabeth A. Walker, *Shaken Baby Syndrome: Daubert and MRE 702's Failure to Exclude Unreliable Scientific Evidence and the Need for Reform*, 210 MIL. L. REV. 1 (2011); Keith Findley & Barry Scheck, *Shaken Baby Syndrome on Trial*, 29 CRIM. JUST. 45 (2014) (reviewing TUERKHEIMER, *supra*).

215. See PAPETTI, *supra* note 211, at 4, 172–73, 199, 301–02.

216. See 2 GIANNELLI ET AL., *supra* note 41, § 19.05[a].

217. *Id.* at n.238.

218. *Id.*

219. Keith A. Findley & D. Michael Risinger, *The Science and Law Underlying Post-Conviction Challenges to Shaken Baby Syndrome Convictions: A Response to Professor Imwinkelried*, 48 SETON HALL L. REV. 1209, 1225 n.57 (2018) (providing a compilation of cases in which courts have granted post-conviction relief to defendants convicted under traditional SBS theory); see also *People v. Bailey*, 999 N.Y.S. 2d 713, 727 (N.Y. Crim. Ct., Monroe Cty. 2014).

220. See *supra* Part III.B.

221. See *supra* Part III.B.

222. See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 147–48 (1999).

that once again *Daubert* applies differently because the defense's methodology does not have to yield an opinion as definite as the sort of expert opinion that the prosecution needs.

In this respect, the present SBS controversy is potentially misleading. The primary finding of the biomechanical research is the absolutist claim that shaking alone can *never* generate the quantum of force necessary to cause such fatal injuries to an infant brain.²²³ That finding completely negates the prosecution pediatrician's hypothesis that shaking can generate the necessary force. The SBS controversy can be misleading in the sense that the defense expert's hypothesis is far more absolute and definite than it typically needs to be to give rise to reasonable doubt.

Think back again to the survey of federal judges in New York that was referenced in the *Fatico* case.²²⁴ Assume that the biomechanical research yielded a far less definite finding: shaking alone can sometimes cause such injuries—in, perhaps, 40% of the cases. Even if the jury accepted the 40% figure, they would still be far from the 85% probability equivalent to proof beyond a reasonable doubt.²²⁵ For that matter, assume that the biomechanical research indicated that shaking might cause such injuries in 55% of the cases. Once again, the remaining 45% figure would suffice to generate reasonable doubt about causation in the instant case. The basic thrust of the defense rebuttal evidence is a negative denial that the SBS theory proves causation beyond a reasonable doubt, and in both variations of the biomechanical testimony—40% or even 55% of the cases—the biomechanical evidence supports that denial.

2. The Defense Expert Employs a Different Methodology in an Affirmative Attempt To Develop an Alternative to the Prosecution's Theory on an Essential Element of the Crime, Such as Causation

In this instance, once again the defense expert employs a different methodology that is indisputably subject to *Daubert*.²²⁶ However, now the defense is not content with negatively disproving the prosecution expert's opinion. Instead, the defense takes the next step and endeavors to affirmatively establish an alternative theory on an essential element of the crime, such as causation. Assume a different version of the SBS hypothetical. In the prior version of that hypothetical, the defense presented biomechanical expert testimony to negate the prosecution contention that SBS can establish causation beyond a reasonable doubt.²²⁷ The defense did not offer an affirmative causation account; the defense merely wanted to negate the hypothesis that shaking caused the death of the infant beyond a reasonable doubt.²²⁸

223. 2 GIANNELLI ET AL., *supra* note 41, § 19.05[a], at nn.237–38.

224. See *supra* notes 198–205 and accompanying text for a discussion of *United States v. Fatico*, 458 F. Supp. 388 (E.D.N.Y. 1978), *aff'd* 603 F.2d 1053 (2d. Cir. 1979), and the survey of federal judges discussed in therein.

225. See *Fatico*, 458 F. Supp. at 410.

226. See, e.g., *Kumho*, 526 U.S. at 151–52.

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

228. See generally 2 GIANNELLI ET AL., *supra* note 41, § 19.05[a] (discussing evidentiary issues and scientific data related to the shaking hypothesis and SBS generally).

Suppose that the testimony in the case indicated that shortly before her death, the infant had suffered a relatively short free fall from a play structure onto concrete. In recent years, there has been a growing body of research strongly suggesting that contrary to prior beliefs, even short falls can cause fatal brain injuries to infants.²²⁹ Assume that after the prosecution pediatrician testifies about SBS, the defense calls a pathologist to describe this line of research about falls. The defense expert's hypothesis is that even short free falls can cause the set of injuries normally treated as proof of SBS. Like the prosecution pediatrician's SBS hypothesis, the defense pathologist's short fall hypothesis will have to pass muster under *Daubert*.²³⁰ Moreover, the defense is not offering a mere negative denial of the prosecution hypothesis; rather, the defense is biting off more and advancing its own affirmative, alternative hypothesis as to causation.

Although both the prosecution and the defense experts are propounding alternative theories, the validation of the prosecution theory must yield a much more definite opinion than that of the defense theory.²³¹ While the extent of the validation of the prosecution theory must support an opinion proving causation beyond a reasonable doubt, the defense theory must merely support an opinion that raises reasonable doubt about causation.²³² The defense is advancing an affirmative theory, but throughout the trial the burden of proof on the ultimate issue of causation remains on the prosecution.²³³

More specifically, assume that methodologically sound research studies, accounting for the variations in infant physiology, show that, in roughly 35% of the cases, a short free fall onto a concrete surface can cause the set of symptoms that in the past were treated as diagnostic for SBS. The defense theory falls short of showing causation in even half of the cases of short falls, but the research does not need to yield that finding in order to generate reasonable doubt.

In *Fatico*, the majority of the respondent judges were of the view that proof beyond a reasonable doubt requires a probability of at least 85%.²³⁴ If the case included testimony that the decedent-infant had suffered a short fall and well-designed pathological studies found that such a fall will cause the triad of SBS symptoms 35% of the time, there is

229. Patrick Barnes, *Child Abuse—Nonaccidental Injury (NAI) and Abusive Head Trauma (AHT)—Medical Imaging: Issues and Controversies in the Era of Evidence-Based Medicine*, 50 U. MICH. J.L. REFORM 679, 680, 686–87 (2017); Richard J. Reimann, *Fundamental Limits of Shaking a Baby*, 63 J. FORENSIC SCI. 1864, 1864 (2018) (“First-order mathematical considerations applied to a 6-month-old infant determine an angular velocity limit for head rotation around 75 rad/s and maximum angular acceleration less than 1600 rad/s² without impact. By comparison, results from a low-level fall of 0.76 m (30 inches) yield values of 83 rad/s and 13,000 rad/s² in a practical worst-case scenario.”); Samantha K. Rowbotham, Soren Blau, Jacqueline Hislop-Jambrich & Victoria Francis, *Skeletal Trauma Resulting From Fatal Low (<3m) Free Falls: An Analysis of Fracture Patterns and Morphologies*, 63 J. FORENSIC SCI. 1010, 1015 (2017) (“Results show that the skeletal trauma resulting from a low free fall may be extensive and can occur in almost any region of the skeleton.”); Waney Squier, *Shaken Baby Syndrome and Abusive Head Trauma*, in FORENSIC SCIENCE REFORM: PROTECTING THE INNOCENT 107, 118–19 (Wendy J. Koen & C. Michael Bowers eds., 2017).

230. See, e.g., *Kumho*, 526 U.S. at 156–57 (explaining that an expert witness's alternative approach to tire failure analysis remains subject to the logic of *Daubert*).

231. See *Jackson v. Virginia*, 443 U.S. 307, 318–19 (1979); *In re Winship*, 397 U.S. 358, 364 (1970).

232. See *supra* notes 192–197 and accompanying text for a discussion of the case law that announced the level of definiteness required to satisfy the defense and prosecution burdens of proof in criminal cases.

233. See *supra* notes 192–197 and accompanying text.

234. *United States v. Fatico*, 458 F. Supp. 388, 410 (E.D.N.Y. 1978), *aff'd* 603 F.2d 1053 (2d. Cir. 1979).

ample ground for reasonable doubt. If the prosecution evidence established only a 35% probability of causation, under *Jackson v. Virginia*, many, if not most, trial judges would find the prosecution's case legally insufficient and direct a verdict of not guilty.²³⁵ But even when the defense proposes an affirmative, alternative theory, the ultimate burden usually rests on the prosecution.²³⁶ So long as the defense's pathological studies are methodologically sound, a trial judge would risk reversal by excluding testimony about studies lending that much support to the theory that the short fall—and not SBS—had caused the infant's death.²³⁷

3. The Defense Offers Expert Testimony To Establish a Defense in Which, Under the Jurisdiction's Law, the Defense Bears the Ultimate Burden of Proof

As Section III has worked its way through the different variations of defense rebuttal evidence, the defense's burden has become increasingly weighty. Section III began with situations in which the defense merely wanted to correct a prosecution expert's misstatements about that expert's own research or the research of a third-party scientist.²³⁸ In those initial situations, while *Daubert* applied to the prosecution testimony being rebutted, the defense rebuttal testimony was wholly exempt from *Daubert*.²³⁹ In the last situation, the defense went to the length of advancing an affirmative, alternative theory on an essential element of the crime.²⁴⁰ There, *Daubert* applied to the defense expert's alternative hypothesis, but since the ultimate burden of proof never shifted to the defense, the defense testimony was admissible even if it rested on research yielding a relatively weak finding or opinion—so long as the opinion was definite enough to create reasonable doubt.²⁴¹

In this final situation, assume the exceptional case in which the defense is proffering expert testimony to support a true affirmative defense on which, under the jurisdiction's law, the defense—not the prosecution—bears the ultimate burden. In evidence law, there

235. See *Jackson*, 443 U.S. at 319–20.

236. See 2 IMWINKELRIED ET AL., *supra* note 139, § 2915.

237. In *Holmes v. South Carolina*, 547 U.S. 319 (2006), the Court found constitutional error. The defendant was accused of murder, sexual assault, burglary, and robbery during an in-home invasion of an eighty-six-year-old woman's residence. *Id.* at 321–22. Although there was seemingly strong forensic evidence of guilt, the defendant claimed that that evidence had been contaminated or fabricated. *Id.* at 322–23. As another part of his defense, the defendant attempted to introduce evidence that another man was seen in the area and had, in fact, admitted to committing the crimes. *Id.* at 323. The state courts excluded the evidence of the third party's potential guilt. *Id.* The state supreme court ruled that given the “strong forensic evidence” of the defendant's guilt, the testimony about the third-party perpetrator was too weak to “raise a reasonable inference as to the appellant's own innocence.” *State v. Holmes*, 605 S.E.2d 19, 24 (S.C. 2004), *vacated by* 547 U.S. 319. The Supreme Court held that the state courts erred in accepting the forensic evidence at face value. See *Holmes v. South Carolina*, 547 U.S. at 329. The Court emphasized that the defense has a constitutional right to present exculpatory evidence capable of raising a reasonable doubt in a juror's mind. *Id.* at 327. For a general discussion of the reliability threshold for defense evidence triggering the accused's constitutional right to present exculpatory evidence, see EDWARD J. IMWINKELRIED & NORMAN M. GARLAND, *EXCULPATORY EVIDENCE: THE ACCUSED'S CONSTITUTIONAL RIGHT TO INTRODUCE FAVORABLE EVIDENCE* § 2-4a(2) (4th ed. 2015).

238. See *supra* Part III.A.

239. See *supra* Part III.A.

240. See *supra* Part III.C.2.

241. See *supra* Part III.C.2.

are two burdens: (1) the initial burden of production or going forward, and (2) the ultimate burden of proof or risk of non-persuasion.²⁴²

The initial burden of production is a duty owed to the trial judge to persuade her that the case is legally sufficient to be submitted to the jury.²⁴³ In passing on the question of whether a litigant has sustained her initial burden, the trial judge does not pass on the credibility of the litigant's evidence; rather, the judge accepts the evidence at face value.²⁴⁴ The judge makes a limited inquiry, resolving only this question: If the jury elects to find the evidence credible and believe it, does the evidence possess sufficient cumulative probative value to enable the jury to rationally make a finding in the litigant's favor?²⁴⁵ If a prosecutor or plaintiff fails to sustain her burden on an essential element of the crime or cause of action, the judge makes a peremptory ruling in the defense's favor, entering a judgment of acquittal or no liability.²⁴⁶ If the defense fails to sustain her burden of an essential element of a defense, the judge withdraws the affirmative defense from the jury and will not even mention the defense in the final set of jury instructions.²⁴⁷

In contrast, the ultimate burden of proof is a duty owed to the trier of fact to persuade the trier both that the evidence should be believed and that the evidence is factually sufficient to sustain a verdict in the litigant's favor.²⁴⁸ In passing on the question of the factual sufficiency of a litigant's case, the trier may consider the credibility of the evidence.²⁴⁹ After determining which of the litigant's items of evidence are credible, the trier turns to the question of whether those items in combination possess adequate probative value to prove the proposition by the specified measure—for example, by a preponderance of the evidence, by clear and convincing proof, or beyond a reasonable doubt.²⁵⁰ When the jury finds that a prosecutor or plaintiff has failed to sustain the ultimate burden by the required measure on an essential element of a crime or cause of action, the jury finds for the defense.²⁵¹ If the jury finds that the defense has failed to meet the burden on an essential element of a defense, the jury rejects the defense, and if the prosecutor or plaintiff has sustained its burden of the crime or cause of action, the jury returns a verdict for the prosecutor or plaintiff.²⁵²

When courts say that the criminal defense has “the burden” on a defense, more often than not the court means that term only in the loose sense that the defense has the initial burden of production on the defense.²⁵³ If the defense fails to sustain that burden, the

242. See generally 2 BROWN ET AL., *supra* note 149, § 336 (providing an overview of the burden of proof and burden of persuasion); 2 IMWINKELRIED ET AL., *supra* note 139, §§ 2903, 2914 (discussing generally the initial and ultimate burdens).

243. 2 IMWINKELRIED ET AL., *supra* note 139, § 2903.

244. *Id.*

245. *Id.*

246. *Id.*

247. *Id.*

248. See *id.* § 2914.

249. See *id.*

250. See *id.* § 2916.

251. See *id.*

252. See *id.* § 2915.

253. *Id.* § 2903.

judge will not instruct the jury on the defense.²⁵⁴ The prosecution need not anticipate every conceivable defense during its presentation to the jury.²⁵⁵ If the defense fails to sustain the initial burden on a conceivable defense, the prosecution need not present any evidence rebutting that defense.²⁵⁶ The ultimate burden shifts to the prosecution on that defense after the defense sustains its initial burden. At that point, the prosecution will have to submit sufficient evidence to the jury to disprove the defense beyond a reasonable doubt.²⁵⁷

However, there are rare cases in which, in some jurisdictions, the criminal law assigns the defendant the ultimate burden of proof on a defense. For example, in some jurisdictions the defense must prove insanity by a preponderance of the evidence.²⁵⁸ In even fewer instances, the defense must establish a defense by clear and convincing evidence.²⁵⁹ By way of example, some jurisdictions that recognize the expanded “stand your ground” version of self-defense require the party trying to overcome the defense to disprove the elements by clear and convincing evidence.²⁶⁰ In an exceedingly rare case, a jurisdiction may even require the accused to establish a true affirmative defense by proof beyond a reasonable doubt.²⁶¹

If the defense offers expert testimony to sustain a burden of proof beyond a reasonable doubt, the defense is in exactly the same position as the prosecution normally is under *Daubert*—it will need to introduce a very definite opinion to eliminate any reasonable doubt in the jurors’ minds.²⁶² However, suppose that although the defense has the ultimate burden, the measure is a reduced one—either a preponderance of the evidence or clear and convincing proof. Once more, the survey discussed in *Fatico* is relevant.²⁶³ Judge Weinstein asked the other judges to provide a probability equivalent for the remaining burdens of proof: preponderance of the evidence and clear and convincing evidence.²⁶⁴ In the survey, two judges equated a preponderance with a 51% probability while eight described it as a 50+% probability.²⁶⁵ In the case of clear and convincing evidence, the judges’ estimates ranged from a low of 60% to a high of 75%.²⁶⁶

Suppose that the jurisdiction has assigned the defense the ultimate burden of proof on an issue such as insanity. In a realistic, procedural sense, although the defense has the ultimate burden, the defense testimony may appear as rebuttal evidence to the jury. In

254. *Id.*

255. *See id.*

256. *See id.* § 2905.

257. *See id.* § 2915.

258. *See id.*

259. *See id.* § 2915–16.

260. *See, e.g., Love v. State*, 286 So. 3d 177, 180 (Fla. 2019) (discussing Florida’s “stand your ground” version of self-defense implemented by FLA. STAT. ANN. § 776.032(4) (West 2017)).

261. *See Leland v. Oregon*, 343 U.S. 790, 798 (1952).

262. *See 2 IMWINKELRIED ET AL., supra* note 139, § 2916.

263. *See supra* notes 198–202 and accompanying text.

264. *See United States v. Fatico*, 458 F. Supp. 388, 410 (E.D.N.Y. 1978), *aff’d* 603 F.2d 1053 (2d. Cir. 1979).

265. *Id.*

266. *Id.* There is a variation of this verbal formula: clear, convincing, and unequivocal. Here, the estimates ranged from a low of 65–75% to 90%. *Id.*

many jurisdictions, the scope of the prosecution case-in-chief includes testimony relevant to the defenses in the case as well as evidence relevant to the charged offenses.²⁶⁷ In such a jurisdiction, in its case-in-chief the prosecution can anticipate an insanity defense and present psychiatric testimony attacking it even before the defense presents its psychiatric evidence.²⁶⁸ In this situation, the jury will hear the defense expert testimony after the prosecution expert testimony. As in the prior varieties of defense attacks on prosecution expert testimony, given the timing, the defense testimony may strike the jurors as rebuttal evidence.

Further, suppose that the jurisdiction's criminal law has assigned the defense the burden of proving insanity by a preponderance of the evidence. The question is how definite must the defense expert testimony be in order to sustain that defense. In the previous hypothetical involving fingerprint examination, defense testimony as to "only a distinct possibility" might well suffice to generate reasonable doubt on the issue of identity.²⁶⁹ However, in that hypothetical, the ultimate burden of proof on the issue of identity rested on the prosecution.²⁷⁰

If, as most judges responded in Judge Weinstein's survey, preponderance requires a 50+% probability, defense psychiatric testimony of the identical tenor—"a distinct possibility" of mental illness—would fall short of establishing insanity by a preponderance. If that testimony were the only defense evidence that the defendant was insane at the time of the actus reus, the judge could withdraw the defense from the jury and refuse to include an insanity instruction in the final jury charge.²⁷¹

However, it would be a different matter if the judge concluded that the research cited by the defense psychiatrist justified the psychiatrist using stronger language such as "probably" or "likely." That language would not satisfy the enhanced standard of proof beyond a reasonable doubt, but in this hypothetical, the measure of the defense's burden on insanity is a mere preponderance of the evidence. As such, the language should satisfy the relaxed preponderance standard.

What if the jurisdiction not only assigns the ultimate burden to the defense but also requires the defense to shoulder the burden by the intermediate standard of clear and convincing evidence? It can be difficult to precisely draw a line between the preponderance standard and the clear and convincing evidence standard. In instructions explaining the latter standard to the jury, judges often use the phrasing "high degree of probability."²⁷² Given this understanding, a defense expert opinion couched in terms such as "very probably" or "highly likely" might satisfy the clear and convincing evidence standard. Even in this rare situation, though, the defense opinion would not need to be as definite as a prosecution expert opinion proffered to satisfy the most stringent measure of proof beyond a reasonable doubt.

267. See 1 IMWINKELRIED ET AL., *supra* note 139, § 102.

268. See *id.*

269. See *supra* Part III.B.1.

270. See *supra* Part III.B.1.

271. See 2 IMWINKELRIED ET AL., *supra* note 139, §§ 2914, 2916.

272. See *id.*, § 2916, n.80 (collecting cases in which judges use the phrasing "a high degree of probability").

CONCLUSION

Inspector Kim's analysis is correct in several respects. First, as the 2009 NRC and 2016 PCAST reports convincingly demonstrate, the reliability of many forensic disciplines should be markedly upgraded.²⁷³ The reforms urged by the two reports would represent major steps forward, enhancing the accuracy of the criminal justice system's factfinding processes.²⁷⁴ Second, Inspector Kim contributed the valuable insight that, unless the courts are more receptive to defense testimony attacking suspicious prosecution expert testimony, neither district attorneys' offices nor police crime laboratories will have a significant incentive to invest in funding the empirical research essential to the upgrade.

As discussed, Inspector Kim also argued that the best approach to liberalizing the admissibility of defense rebuttal testimony would be to attempt to persuade the courts or legislatures to adopt an explicitly lower admissibility standard for the rebuttal testimony than they apply to the prosecution expert testimony being attacked.²⁷⁵ Inspector Kim believes that approach is necessary because, presently, most courts unfairly apply a more demanding standard to defense rebuttal testimony than they do to the prosecution evidence.²⁷⁶

Albeit well-intentioned, that approach is misguided. First, as Inspector Kim virtually conceded, at least in the short term it is unrealistic to think that there is enough political support for such a major step.²⁷⁷ Inspector Kim acknowledged that the proposal would prompt a sharp outcry from prosecutors, a constituency with considerable influence in many legislatures.²⁷⁸ He conceded that the NRC report prompted "huge political debates" and determined that opposition from some criminal justice groups accounts for the minimal progress to date in implementing the NRC and PCAST recommendations.²⁷⁹ He frankly anticipates that prosecution forces will protest that they already have "a high burden of proof" and that their protest will make it "challenging" for his proposal to "win[] public approval."²⁸⁰ He stated that his proposal can be "framed [in a] way" that the public "would be open to" it, but the tempered nature of his statement indicates that the statement represents long-term hope, not short-term prediction.²⁸¹

Second, and perhaps more importantly, Inspector Kim's approach shifted the defense bar away from what ought to be their focus. It is a mistake for the defense bar to focus on the high-level, generalized question of whether in the future the admissibility standard for defense rebuttal evidence ought to be lower than the standard for the prosecution expert testimony being attacked. Rather, its focus should be on pressing the contention that, on a close scrutiny of specific evidentiary doctrines applicable to the various types of defense rebuttal evidence, the standard for defense rebuttal is *already*

273. See *supra* notes 6–16 and accompanying text.

274. See Kim, *supra* note 14, at 1175–76.

275. *Id.* at 1176–77.

276. *Id.* at 1195–96.

277. See *id.* at 1205.

278. See *id.*

279. *Id.* at 1180.

280. *Id.* at 1205.

281. *Id.* at 1206.

lower than the standard governing the admissibility of the prosecution evidence being rebutted.

As Professor Risinger reflected after surveying his research, the status quo is “attributable . . . at least as much to the criminal defense bar’s failure to construct sophisticated” evidentiary admissibility arguments for its rebuttal testimony.²⁸² This Article intended to detail those arguments for all the major variations of defense rebuttal testimony. In essence, this Article aimed to arm the defense bar with the evidentiary tools necessary to create what Inspector Kim is essentially calling for: meaningful “incentives for improving the reliability of forensic evidence” in the United States.²⁸³

282. Risinger, *Navigating Expert Reliability*, *supra* note 84, at 143.

283. See Kim, *supra* note 14, at 1176.