

THE MEANING OF “APPROPRIATE VALIDATION” IN
*DAUBERT V. MERRELL DOW PHARMACEUTICALS,
 INC.*, INTERPRETED IN LIGHT OF THE BROADER
 RATIONALIST TRADITION, NOT THE NARROW
 SCIENTIFIC TRADITION

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[W]e have cast off the naive doctrine that all science is necessarily true and that all true knowledge is necessarily scientific¹

The Supreme Court has rendered a trilogy of cases explicating the standards governing the admissibility of expert testimony under *Federal Rule of Evidence* 702. In 1993, in the watershed case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,² the Court initially held that the traditional common law, general acceptance admissibility standard for scientific evidence is no longer good law. The Court remarked that the “rigid ‘general acceptance’ requirement [was] at odds with the ‘liberal thrust’ of the Federal Rules and their ‘general approach of relaxing the traditional barriers to opinion testimony.’”³

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1. JOHN ZIMAN, *RELIABLE KNOWLEDGE: AN EXPLORATION OF THE GROUNDS FOR BELIEF IN SCIENCE* 2 (1978) (emphasis omitted).

2. 509 U.S. 579 (1993).

3. *Id.* at 588 (quoting *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 169 (1988)).

The Court noted that Article VII of the Federal Rules, governing opinion testimony, omitted any language that could reasonably bear the construction that it codified a “general acceptance” requirement. In the Court’s words, “[g]iven the Rules’ permissive backdrop,”⁴ that omission had the effect of abolishing the traditional requirement.

Then the *Daubert* Court proceeded to derive a new standard from the statutory text of Rule 702.⁵ Justice Blackmun pointed out that the statute refers to “scientific . . . knowledge,” and opted for a methodological definition of “scientific knowledge.”⁶ He ruled that, to be sufficiently reliable to be admissible, a purportedly scientific proposition must be supported by “appropriate validation.”⁷ To provide guidance to trial judges, Justice Blackmun listed several factors that trial judges may weigh in evaluating the soundness of the underlying scientific methodology, including such considerations as whether the expert’s hypothesis has been tested;⁸ whether the theory has been subjected to peer review;⁹ “the known or potential rate of error”;¹⁰ and “the existence and maintenance of standards controlling the technique’s operation.”¹¹ However, the Justice emphasized both that the list was not “definitive”¹² and that “[t]he inquiry envisioned by Rule 702 is . . . a flexible one.”¹³

In 1997, the Court revisited the topic of scientific testimony and handed down its decision in *General Electric Co. v. Joiner*.¹⁴ The formal holding in *Joiner* is that on appeal, the proper scope of review of a trial judge’s ruling is whether the judge abused his or her discretion.¹⁵ The Court took the occasion to amplify on the validation standard enunciated in *Daubert*. In the lead opinion in *Joiner*, Chief Justice Rehnquist asserted:

[N]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the *ipse dixit* of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered.¹⁶

4. *Id.* at 589.

5. FED. R. EVID. 702.

6. *Daubert*, 509 U.S. at 593, 593-95; see *Werner v. Pittway Corp.*, 90 F. Supp. 2d 1018, 1031 (W.D. Wis. 2000) (“At its essence, science is methods.”) (emphasis omitted).

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

8. *Id.* at 593.

9. *Id.*

10. *Id.* at 594.

11. *Id.*

12. *Id.* at 593.

13. *Id.* at 594.

14. 522 U.S. 136 (1997).

15. *Id.* at 143.

16. *Id.* at 146.

In 1999, the Court completed the trilogy by deciding *Kumho Tire Co. v. Carmichael*.¹⁷ While the proponents of the testimony in *Daubert* and *Joiner* characterized their evidence as "scientific" in nature, in *Kumho* the proponents argued that their testimony qualified as non-scientific expert evidence. As they correctly pointed out, Rule 702 refers in the alternative to "scientific, technical or other specialized knowledge."¹⁸ The question posed was the degree, if any, to which *Daubert* extended to non-scientific expertise. On the one hand, Justice Breyer, writing for the majority, acknowledged that it would be unduly rigid to mandate that the trial judge assess the admissibility of non-scientific expertise solely in terms of the factors listed in *Daubert*.¹⁹ After all, that list had been devised with scientific methodology in mind. The species of non-scientific expertise are so variegated that the Court could "neither rule out, nor rule in, for all cases and for all time the applicability of the factors mentioned in *Daubert*."²⁰ On the other hand, the Court forcefully rejected any suggestion that non-scientific expertise is wholly exempt from "*Daubert*-style scrutiny"²¹ of its reliability. Justice Breyer explained:

In *Daubert*, the Court specified that it is the Rule's word "knowledge," not the words (like "scientific") that modify that word, that "establishes a standard of evidentiary reliability." Hence, as a matter of language, . . . Rule [702] applies its reliability standard to all "scientific," "technical," or "other specialized" matters within its scope.²²

The Court reiterated its position in *Joiner* that the trial judge should not accept *ipse dixit* from an expert.²³ While *Joiner* recognized that the trial judge enjoys discretion in applying the *Daubert* factors to gauge the admissibility of scientific testimony, *Kumho* accorded the judge a second, deeper type of discretion—a latitude²⁴ to select factors which strike the judge as "reasonable measures of the reliability" of the non-scientific expertise in question.²⁵

One would think that the Court's rendition of three opinions in this doctrinal area in such a short period of time would have brought exceptional clarity to the area and settled many, if not most, of the controversies. Moreover, the scholarly commentary in this area has

17. 526 U.S. 137 (1999).

18. FED. R. EVID. 702.

19. *Kumho*, 526 U.S. at 145-46.

20. *Id.* at 150.

21. *Id.* at 158.

22. *Id.* at 147 (quoting *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 589-90 (1993)) (citation omitted).

23. *Id.* at 157.

24. *Id.* at 152.

25. *Id.* at 150-52.

been extensive and often insightful.²⁶ However, despite the volume of commentary and the Court's frequent pronouncements in this area, there are still large areas of uncertainties. The uncertainties relate to two basic issues: *What* must be validated, and *how* can it be validated?

On both issues, the opinions include passages that are susceptible to the interpretation that the Court has established onerous requirements for introducing expert testimony. For example, on the first issue, *Kumho* contains language implying that, at least in some cases, the trial judge should pass on the "globa[l]"²⁷ question of the reliability of the expert discipline itself. In his opinion in *Kumho*, Justice Breyer mentioned a category of cases in which "the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology and necromancy."²⁸

To compound the proponent's burden, on the second issue—how it must be validated—the *Daubert* opinion implies that "experimental" validation is a "canonical" requirement for demonstrating the reliability of expert testimony.²⁹ The majority approvingly quoted the late Sir Karl Popper's assertion that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or [empirical] testability."³⁰ It is no accident that at the very beginning of his list of relevant factors, Justice Blackmun observed that:

Ordinarily, a key question to be answered in determining whether a theory or technique is [reliable] scientific knowledge . . . will be whether it can be (and has been) tested [empirically].³¹

Considered together, the placement of that factor at the head of the list and the Justice's stress on that factor indicate that that consideration may be more than a mere factor. The empirical testing of the proposition is arguably a full-fledged requirement for admissibility under *Daubert*.³²

26. *E.g.*, DAVID L. FAIGMAN ET AL., SCIENCE IN THE LAW: STANDARDS, STATISTICS AND RESEARCH ISSUES Ch. 1 (2002); D. Michael Risinger, *Defining the "Task at Hand": Non-Science Forensic Science After Kumho Tire Co. v. Carmichael*, 57 WASH. & LEE L. REV. 767 (2000).

27. Risinger, *supra* note 26, at 773.

28. *Kumho*, 526 U.S. at 151.

29. Sheila Jasanoff, *Judging Science: Issues, Assumptions, Models*, in ROSCOE POUND FOUND., SCIENTIFIC EVIDENCE IN THE COURTS: CONCEPTS AND CONTROVERSIES 9, 11-12 (1997); Adina Schwartz, *A "Dogma of Empiricism" Revisited: Daubert v. Merrell Dow Pharmaceuticals, Inc. and the Need to Resurrect the Philosophical Insight of Frye v. United States*, 10 HARV. J.L. & TECH. 149 (1997); *see also* David Crump, *The Trouble with Daubert-Kumho: Reconsidering the Supreme Court's Philosophy of Science*, 68 MO. L. REV. 1 (forthcoming Apr. 2003).

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

31. *Id.* at 593.

32. *See sources cited supra* note 29.

While the opinions in the trilogy are susceptible to the interpretation that they carry these two implications, this Article argues that both implications are unsound. Part I of the Article advances the negative contention that the trilogy of cases should not be construed as endorsing either implication.

Part II of the Article turns to the more difficult, positive task of identifying the proper interpretation of the trilogy on the two fundamental questions of "what" and "how." Subpart II.A advocates the position taken recently by Professor D. Michael Risinger,³³ that the thing that must be validated is the hypothesis that the expert can perform the specific "task at hand" involved—not, for example, the broad question of whether forensic document examination is a valid discipline, but instead the narrower issue of a document examiner's claimed ability to identify the author of hand-printed Japanese characters.³⁴ Rather than being required to demonstrate the validity of the field that the expert practices in, the proponent's only obligation is to show that the theory or technique in question enables the expert to accurately make the determination that the expert proposes testifying to.

Subpart II.B then contends that it would be wrongminded for the courts to place exclusive or even primary emphasis on empirical testing as a validation method. The courts should be open to a variety of validation techniques, including, but not limited to, empirical induction and mathematical deduction. Adopting the attitude of a skeptical rationalist, the judge ought to inquire whether the results of the use of the technique in question demonstrate that the technique "works"; that is, whether the technique enables the expert to accurately perform the specific task at hand. As the task itself varies, as when the expert puts the technique to different uses and applications, the required validation must also change.

Thus, this Article conceives of "appropriate validation" as a flexible, relative concept. There is no invariable requirement that the proponent of expert testimony demonstrate that the expert's theory has been validated by empirical testing and induction. Modernly, rationalist, skeptical decisionmakers commonly rely on other modes of validation. Those modes should also be acceptable in the courtroom. Further, there is a close relationship between the "how" and the "what" issues. The judge cannot intelligently decide which modes of validation are acceptable until the judge focuses on the precise claim made by the expert. The judge cannot determine which types of vali-

33. Risinger, *supra* note 26.

34. *Id.* at 798-800 (discussing *United States v. Fujii*, No. OO CR 17, slip op. at 3-4 (N.D. Ill. Sept. 25, 2000)). The official citation for *Fujii* is 152 F. Supp. 2d 939 (N.D. Ill. 2000).

dation are apropos until the judge has identified the precise claim and task that must be validated.

I. WHAT THE TRILOGY DOES NOT STAND FOR: SPURIOUS CLAIMS ABOUT THE MEANING OF *DAUBERT*, *JOINER*, AND *KUMHO*

As previously stated, one passage in *Kumho* implies that the proponent has the burden of establishing the general reliability of the proffered expert's discipline.³⁵ In his lead opinion, Justice Breyer commented that sometimes "the discipline itself lacks reliability."³⁶ The Justice cited two examples, namely, astrology and necromancy.³⁷ However, the trilogy contains other language pointing to the more sensible conclusion that the proponent need demonstrate only that the expert's theory or technique can enable the expert to accurately make the specific determination which he or she proposes to testify about.³⁸

A. *The Language of the Opinions in the Trilogy*

As Professor Risinger has emphasized,³⁹ in the formal summary at the end of his opinion in *Daubert*, Justice Blackmun stated that the proponent's foundation must convince the trial judge that the expert's theory or technique is sufficiently "reliable" to perform "the task at hand."⁴⁰ Earlier in the opinion, in the process of explaining the requirement that the theory or technique "fit" the case,⁴¹ the Justice added that the theory or technique needs "a valid scientific connection to the pertinent inquiry."⁴²

*Joiner*⁴³ lends itself to the same interpretation as *Daubert*. In *Joiner*, Chief Justice Rehnquist analyzed the question of whether the animal studies cited by the plaintiff were an adequate basis for the expert's opinion as to the cause of Joiner's small-cell lung cancer. The Chief Justice initially listed the criticisms of the animal studies.⁴⁴ The Chief Justice then wrote:

35. See *supra* notes 21 & 22.

36. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 151 (1999).

37. *Id.*

38. See generally D. Michael Risinger, *Preliminary Thoughts on a Functional Taxonomy of Expertise for the Post-Kumho World*, in *SCIENCE IN THE LAW*, *supra* note 26, § 2-4.0, at 88 [hereinafter Risinger, *Preliminary Thoughts*]; Risinger, *supra* note 26; D. Michael Risinger et al., *The Daubert/Kumho Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CAL. L. REV. 3, 4 (2002); see also *Teska v. Potlatch Corp.*, 184 F. Supp. 2d 913, 920 (D. Minn. 2002) ("The threshold issue before us is 'specific not general' . . .") (citing *Kumho*, 526 U.S. at 156).

39. Risinger, *supra* note 26, at 772.

40. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 597 (1993).

41. *Id.* at 591-92.

42. *Id.* at 592.

43. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 144 (1997).

44. *Id.*

Respondent [plaintiff] failed to reply to this criticism. Rather than explaining how and why the experts could have extrapolated their opinions from these seemingly far-removed animal studies, respondent chose "to proceed as if the only issue [was] whether animal studies can ever be a proper foundation for an expert's opinion." 864 F. Supp., at 1324. Of course, whether animal studies can ever be a proper foundation for an expert's opinion was not the issue. The issue was whether *these* experts' opinions were sufficiently supported by the animal studies on which they purported to rely.⁴⁵

Significantly, the emphasis indicated by the italics appeared in the Chief Justice's original opinion.

The *Kumho* opinion is cast in the same mold.⁴⁶ To begin with, *Kumho* echoes some of the key language in *Daubert*. For instance, the *Kumho* Court refers to "the task at hand"⁴⁷ and the need for a demonstrated connection between the expert's theory and "the pertinent inquiry."⁴⁸ More importantly, though, in reviewing the foundation laid by the plaintiffs for Carlson's expert opinion, Justice Breyer engaged in a highly particularized analysis:

[C]ontrary to [plaintiffs'] suggestion, the specific issue before the [trial] court was not the reasonableness *in general* of a tire expert's use of a visual and tactile inspection to determine whether overdeflection had caused the tire's tread to separate from its steel-belted carcass. Rather, it was the reasonableness of using such an approach, along with Carlson's particular method of analyzing the data thereby obtained, to draw a conclusion regarding *the particular matter to which the expert testimony was directly relevant*.⁴⁹

Again, the emphasis is in Justice Breyer's own text. The Justice acknowledged that "as a general matter, tire abuse may often be identified . . . through visual or tactile inspection of the tire."⁵⁰ However, Carlson claimed to have developed a more "particular" method—namely, a theory that there are four characteristic signs of tire abuse and that the absence of at least two of the signs indicates that the accident was caused by a manufacturing defect in the tire.⁵¹ A bit later in the opinion, the Justice emphasized that Carlson had not rested his opinion simply on the general theory that, in the absence of evidence of abuse, a defect will normally have caused a tire's separation. Rather, the expert employed a more specific theory to establish the

45. *Id.*; see also *Bourne ex rel. Bourne v. E.I. DuPont De Nemours & Co.*, 189 F. Supp. 2d 482, 496-97 (S.D. W. Va. 2002).

46. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

47. *Id.* at 141.

48. *Id.* at 149.

49. *Id.* at 153-54.

50. *Id.* at 156.

51. *Id.* at 154.

existence (or absence) of such abuse.⁵²

Still later, Justice Breyer underscored that “the question before the trial court was specific, not general.”⁵³ In the next paragraph, the Justice stated that “[t]he particular issue in this case concerned” the reliability of the specific theory that Carlson had employed.⁵⁴

B. Generally Held Epistemological Views

Restricting the validation requirement to the specific theory or technique the expert relies on is not only consistent with most of the language in the opinions forming the trilogy, but is also in accord with epistemological views generally held in our society. Any other interpretation of the trilogy would lead to the admission of junk expertise as well as to the exclusion of demonstrably reliable evidence.

Assume, for example, that the expert belongs to an established field of science in which there is a huge body of literature documenting quality experimentation validating many of the propositions circulating in the field. Yet, at any given time, the discourse in the field will undoubtedly include a spectrum of types of propositions. In some cases, the propositions have such substantial supporting data that we can be relatively confident that we “know” the proposition to be true, at least as a working assumption in everyday life and industry. However, the discourse is also likely to include unsubstantiated conjectures, and worse still, speculations that will later be exposed as invalid.⁵⁵ At one extreme, it would be premature to permit testimony about any theory circulating in the field simply because many, if not most, of the propositions being discussed in the field’s discourse have passed the muster of empirical validation. Inferring the truth of one proposition in the field from the truth of another proposition in the same field can be a *non sequitur*. Consider, for example, the discipline of forensic pathology. It is true that the courts routinely accept pathologists’ testimony on a wide range of subjects.⁵⁶ Judicial receptivity to pathologists’ opinions on many subjects, such as the estimation of stature from skeletal remains, is justifiable, since there is a substantial body of research investigating the reliability of those estimations.⁵⁷ However, the literature in the pathology field also includes discussions of many novel conjectures, especially with respect to the determination of time of death.⁵⁸ Despite the respected status

52. *Id.*

53. *Id.* at 156.

54. *Id.* at 157.

55. ZIMAN, *supra* note 1, at 130-33.

56. 2 PAUL C. GIANNELLI & EDWARD J. IMWINKELRIED, SCIENTIFIC EVIDENCE § 19-10(B) (3d ed. 1999).

57. *Id.* § 19-4(B), at 103.

58. *Id.* § 19-8(A).

of the field of forensic pathology, it would be fallacious to leap to the conclusion that pathologists should be allowed to testify about any theory that has garnered a measure of attention in the field. By the same token, even if one posits the general reliability of the field of questioned document examination, that assumption does not dictate the admissibility of proffered testimony identifying the author of handwritten Japanese characters.⁵⁹

At the other extreme, it is equally foolish to bar all testimony even about such maligned fields as astrology—one of the areas of claimed expertise that Justice Breyer cited in *Kumho* as a classic example of a discipline that “itself lacks reliability.”⁶⁰ Suppose that a testator left a substantial bequest to an institute for the express purpose of “fostering the study of astrology.” The law of wills allows testamentary gifts for the purpose of promoting any lawful activity.⁶¹ Although most Americans may have no faith in astrological predictions,⁶² the study of astrology is perfectly lawful. Assume further that at some point after the testator’s death, the heirs bring a challenge, alleging that the institute is no longer using the bequeathed funds for the purpose specified in the decedent’s will. In addition to hearing testimony about the manner in which the institute was spending the funds, the court could undoubtedly accept testimony from experienced astrologers as to whether the funded activities related to “astrology,” as that term is generally understood by its avowed practitioners. To adjudicate the dispute, there is no need for the court to make a global judgment about the scientific reliability of astrologers’ predictions. Rather, the “task at hand” is deciding whether the proffered witness is familiar enough with the state of the discipline to determine whether the funded activities in any way relate to the discipline.

The upshot is that despite Justice Breyer’s disparaging comments about astrology and necromancy in *Kumho*, it is neither necessary nor sufficient for a judge passing on the admissibility of an expert’s testimony to make a global judgment about the general reliability of the expert’s discipline. Even if the field has amassed a huge body of research verifying many of the propositions relied on by experts in the field, the proponent should be required to lay a foundation demonstrating the reliability of the specific technique the expert proposes to use to perform the “task at hand.” Conversely, even when the field

59. Risinger, *supra* note 26, at 798-800 (discussing *United States v. Fujii*, 152 F. Supp. 2d 939 (N.D. Ill. 2000)).

60. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 151 (1999).

61. 79 AM. JUR. 2D *Wills* § 65 (1975); 95 C.J.S. *Wills* § 72 (2001).

62. ROPER CENTER FOR PUBLIC OPINION RESEARCH, Question ID: USGALLUP.96SEP3 R04H 1999 (stating that only 25% of the respondents expressed belief in astrology) (on file with author).

has little or no research to validate its leading tenets, the judge cannot substitute bias for an analysis of the question of whether the proponent has laid a foundation demonstrating the reliability of the expert's use of a specific theory or technique to make a particular determination. In short, the judge's focus ought to be narrow and precise when the judge defines what must be validated.

II. HOW IT MUST BE VALIDATED: THE TRILOGY SHOULD NOT BE CONSTRUED AS CONFINING THE PROONENT TO EMPIRICAL TESTING AND INDUCTION AS THE METHOD OF VALIDATION

As in the case of the question of what must be validated, the trilogy contains passages implying that the proponent has a heavy burden on the second question. The passages suggest that the required—or at least preferred—method of validation is empirical testing.⁶³ Justice Blackmun began his list of relevant factors by highlighting the “key question . . . [of] . . . whether it can be (and has been) tested.”⁶⁴ In the course of explaining that factor, the Justice cited several authorities indicating that he meant testing in the sense of controlled, empirical experiments. One citation was to Hempel, asserting that the “statements constituting a scientific explanation must be capable of empirical test.”⁶⁵ The very next citation is to Popper's declaration that the “criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.”⁶⁶ In his separate opinion, the Chief Justice made it clear that he assumed that Justice Blackmun was referring to “empirical testing.”⁶⁷

A. *The Language of the Opinions in the Trilogy*

However, the parallel to the trilogy's treatment of what must be validated continues. Once again, the trilogy contains other language making it reasonably clear that the Court is not mandating the use of controlled empirical testing as the sole or even primary method of validating expert testimony.

Rather than naively lauding the scientific technique of empirical testing, the *Daubert* Court acknowledged the limits of the scientific enterprise.⁶⁸ The Court rejected the myth of the infallibility of science

63. Crump, *supra* note 29; Jasanoff, *supra* note 29, at 9, 11-12.

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

65. *Id.* (citing CARL G. HEMPEL, *PHILOSOPHY OF NATURAL SCIENCE* 49 (Elizabeth & Monroe Beardsley eds., 1966)).

66. *Id.* (citing KARL POPPER, *CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE* 37 (5th ed. 1989)).

67. *Id.* at 600 (Rehnquist, C.J., concurring in part and dissenting in part).

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

and asserted that "arguably, there are no certainties in science."⁶⁹ Empirical induction cannot yield absolute certainty; even when a large number of experiments yield observations consistent with the truth of an hypothesis, the hypothesis can be accepted only provisionally because there are always other conceivable experiments that could be devised.⁷⁰ The possibility of another experiment raises the possibility of subsequent falsification. It would be anomalous if the Court demanded reliance on empirical induction in the same opinion in which it frankly confronted the limits of that methodology. That demand would also be inconsistent with Justice Blackmun's caution that "[t]he inquiry envisioned by Rule 702 is, we emphasize, a flexible one."⁷¹ The Court insisted on "appropriate validation,"⁷² not controlled experimental validation.

The *Kumho* opinion undercuts any contention that empirical testing and induction are the mandatory or preferred means of validating expert theories and techniques. Near the beginning of his opinion, Justice Breyer echoes *Daubert* by reading it as holding that "the test of reliability is 'flexible.'"⁷³ In a later part of the opinion, the Justice appeared to concur with the Solicitor General when stating:

As the Solicitor General points out, there are many different kinds of experts, and many different kinds of expertise. See Brief for United States as *Amicus Curiae* 18-19, and n. 5 (citing cases involving experts in drug terms, handwriting analysis, criminal *modus operandi*, land valuation, agricultural practices, railroad procedures, attorney's fee valuation, and others).⁷⁴

Although some of the propositions in these disciplines, such as handwriting analysis, can certainly be tested by systematic scientific experiments,⁷⁵ other propositions related to such topics as drug trafficking argot,⁷⁶ criminal *modus operandi*,⁷⁷ and attorney fee valuation

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

70. Sean O'Connor, *The Supreme Court's Philosophy of Science: Will the Real Karl Popper Please Stand Up?*, 35 JURIMETRICS J. 263, 270, 272 (1995).

71. *Daubert*, 509 U.S. at 594.

72. *Id.* at 590.

73. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141 (1999).

74. *Id.* at 150.

75. SCIENCE AND THE LAW, *supra* note 26, § 4-1.2; see also *United States v. White Horse*, 177 F. Supp. 2d 973 (D.S.D. 2001) (discussing the inadequate testing of parts of the Abel Assessment for Sexual Interest).

76. Ralph V. Seep, Annotation, *Admissibility of Expert Evidence Concerning Meaning of Narcotics Code Language in Federal Prosecutions for Narcotics Dealing—Modern Cases*, 104 A.L.R. FED. 230 (1991).

77. Phyllis Skloot Bamberger, *The Dangerous Expert Witness*, 52 BROOK. L. REV. 855 (1986); Edward J. Imwinkelried & Ephraim Margolin, *The Case for the Admissibility of Defense Testimony About Customary Political Practices in Official Corruption Prosecutions*, 29 AM. CRIM. L. REV. 1, 17-21 (1991); Note, *Criteria for Admissibility of Expert Opinion Testimony on Criminal Modus Operandi*, 1978 UTAH L. REV. 547.

do not lend themselves to that mode of validation.⁷⁸ As the Advisory Committee's Note accompanying the December 1, 2002 amendment to *Federal Rule of Evidence* 702 observes, "[s]ome types of expert testimony will not rely on anything like a scientific method"⁷⁹ Active drug dealers are highly unlikely to knowingly participate in controlled studies of their jargon or *modus operandi*, and researchers conducting any such studies could run the risk of criminal responsibility for misprision of felony.⁸⁰

B. Generally Held Epistemological Views

This broad view of the modes of permissible validation is not only consistent with most of the language in the opinions forming the trilogy—as in the case of narrowing the scope of the validation requirement to the specific theory or technique the expert relies on—but this view is also in accord with widely held epistemological notions. To be sure, in some cases empirical testing and induction are an appropriate and adequate means of validation. Suppose that a DNA typing laboratory is attempting to determine how much difference can be expected in measurements of the length of different DNA sample fragments from the same source—the so-called “match window.”⁸¹ That question cannot be answered *a priori* or by deduction. Rather, to validate the match window for its equipment and procedures, the laboratory must engage in empirical testing⁸² and rely on Baconian, inductive reasoning.

However, that type of reasoning is only one of the recognized branches of logic.⁸³ To determine the sum of the degrees in all the corners of a square, a person could resort to empirical testing and, after measuring the degrees in a large number of squares, induce the answer.⁸⁴ Alternatively, though, the person could turn to geometric deduction to find the answer. In this situation, mathematical deduction is not only a viable option, but in some respects, it is superior to empirical testing. Standing alone, the latter cannot yield certainty. Since there is always the possibility of invalidation in a subsequent test,⁸⁵ induction can yield only probability.⁸⁶ In contrast, if a proposi-

78. Michael C. Mason, Comment, *The Scientific Evidence Problem: A Philosophical Approach*, 33 ARIZ. ST. L.J. 887, 901 (2001) (“[E]mpirical testing is impossible for many types of [expertise].”).

79. FED. R. EVID. 702 advisory committee's note.

80. WAYNE R. LAFAYE, CRIMINAL LAW § 6.9(b) (3d ed. 2000).

81. 2 GIANNELLI & IMWINKELRIED, *supra* note 56, § 18-4(B), at 30-31.

82. *Id.* § 18-4(B), at 30.

83. SCIENCE IN THE LAW, *supra* note 26, § 4-1.0.

84. ZIMAN, *supra* note 1, at 163-64.

85. O'Connor, *supra* note 70, at 270, 272.

tion is deduced by strict mathematic logic,⁸⁷ the proposition may be regarded as demonstrated or proven.⁸⁸

In other cases, especially in the medical field, extensive, collective clinical experience⁸⁹ can suffice to validate a proposition even when the experience cannot be precisely quantified. If tens of physicians give the same course of treatment to hundreds of patients suffering from similar symptoms and then observe that the symptoms disappear, there is a reasonable inference that the treatment is an effective cure for the illness evidenced by that constellation of symptoms.⁹⁰ Concededly, unlike some of the phenomena studied in fields such as physics, the behavior of patients cannot be reduced to "a precise logico-mathematical language."⁹¹ In clinical experience with patients, variables cannot be controlled to the same extent as in a classic chemistry experiment.⁹² Yet, as Popper himself noted, the inductive empirical method is essentially "commonsense writ large."⁹³ Common sense strongly suggests that extensive clinical experience involving a wide range of patients can produce a reliable generalization as to the efficacy of a treatment.

Furthermore, widespread, collective experience can be an epistemologically sound basis for validating an expert proposition, even when the experience is compiled by persons lacking formal scientific or medical training. The examples abound. In *Kumho*, Justice Breyer appeared to approve of the Solicitor General's position that testimony by undercover police officers about the meaning of drug terms is sufficiently reliable non-scientific expertise.⁹⁴ The Advisory Committee's Note to the recent amendment to Rule 702 also indicates that the courts should be receptive to that type of non-scientific expert testimony.⁹⁵ Testimony by automobile mechanics provides a further ex-

86. ALBUREY CASTELL, AN INTRODUCTION TO MODERN PHILOSOPHY 197 (2d ed. 1963) (discussing the work of David Hume); see also *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 590 (1993) ("[A]rguably, there are no certainties in science.").

87. ZIMAN, *supra* note 1, at 150, 163.

88. CASTELL, *supra* note 86, at 176 (discussing the epistemology of John Locke).

89. Kevin Patterson, *What Doctors Don't Know (Almost Everything)*, N.Y. TIMES MAG., May 5, 2002, at 74 (discussing the reliance on clinical experience in developing the medical state of the art).

90. Before the American Psychiatric Association released the latest version of its diagnostic criteria in the current version of *The Diagnostic and Statistical Manual of Mental Disorders*, the A.P.A. subjected many of the criteria to field trials involving more than 7,000 subjects at eighty-eight universities and research institutions. William D. Weitzel, *Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV)*, ADVOCATE, AUG. 1994, at 25-26.

91. ZIMAN, *supra* note 1, at 160.

92. *Id.* at 166-68.

93. *Id.* at 135 (quoting KARL POPPER, *THE LOGIC OF SCIENTIFIC DISCOVERY* 22 (1959) (emphasis omitted)).

94. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999).

95. FED. R. EVID. 702 advisory committee's note:

ample. The Note to the amendment to Rule 702 asserts that the judge may weigh the consideration that “the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give.”⁹⁶ For decades, we have relied on automobile mechanics to diagnose engine malfunctions.⁹⁷ Mechanics have rendered diagnostic and repair services that the public has found useful—in innumerable instances, mechanics have “fixed” the problems that prompted the customer to bring the car to the mechanic. There is a common sense inference from this extensive, successful experience, even though most of both the mechanics diagnosing and the lay customers relying on the diagnoses lack engineering degrees.

In summary, the cases forming the trilogy do not require that the trial judge demand that the proponent use empirical testing and induction as the sole, or even primary, mode of validation. Any such requirement would fly in the face of the general social consensus that there are modes of verifying propositions other than controlled scientific experimentation. However, having said that, the challenge remains: developing an affirmative understanding of the meaning of “appropriate validation”⁹⁸ for the proponent’s claim that the expert can perform “the task at hand,”⁹⁹ the specific determination that the expert claims to be able to make. That challenge leads us to Part II. We recur to the same two questions we began with: What must be validated, and how can it be validated?

[W]hen a law enforcement agent testifies regarding the use of code words in a drug transaction, the principle used by the agent is that participants in such transactions regularly use code words to conceal the nature of their activities. The method used by the agent is the application of extensive experience to analyze the meaning of the conversations. So long as the principles and methods are reliable and applied reliably to the facts of the case, this type of testimony should be admitted.

See also Mark Hansen, *Dr. Cop on the Stand*, 88 A.B.A. J., May 2000, at 30, 34 (Professor David Faigman expressing disappointment at the courts’ willingness to routinely permit this type of testimony by “police officers, who have little research or data to support their opinions.” Professor Faigman “call[s] for a more discriminating analysis of the scientific methods and techniques underlying such testimony. At the very least, he says, the courts should inquire into the nature and extent of a police officer’s asserted expertise.”). In this regard, Professor Faigman is certainly correct. The trial judge should not presume that every police officer has the requisite experience. For that matter, it should not suffice for the officer to simply assert that he or she has experience as an undercover agent in illegal drug transactions. Rather, the officer should be required to establish that in several such drug transactions, he or she has encountered the use of the same or similar code words. The question is the witness’s possession of significant, similar experience, not the witness’s status as an undercover police officer.

96. FED. R. EVID. 702 advisory committee’s note.

97. Edward J. Imwinkelried, *Evaluating the Reliability of Nonscientific Expert Testimony: A Partial Answer to the Questions Left Unresolved by Kumho Tire Co. v. Carmichael*, 52 ME. L. REV. 19, 35, 40 (2000).

98. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 590 (1993).

99. *Id.* at 597.

In order to intelligently answer the question of "appropriate validation" in sequence, the judge must pose the two questions of *what* and *how*.

III. WHAT MUST BE VALIDATED: THE TRIAL JUDGE SHOULD NOT ONLY FOCUS ON THE SPECIFIC CLAIM BEING MADE BY THE EXPERT; THE JUDGE SHOULD ALSO DISTINGUISH BETWEEN PURELY DESCRIPTIVE AND INFERENTIAL CLAIMS

Professor Risinger has helped clarify this area of law with his proposal that the trilogy be interpreted as requiring the judge to focus on the specific theory or technique the expert is relying on, rather than a global judgment about the reliability of the expert's field or discipline.¹⁰⁰ However, one further refinement is necessary: the courts must also identify the particular use to which the expert proposes to put the theory or technique. What is the specific determination that the expert claims that use of the theory or technique will enable the expert to make?

A. *The Required Foundation as a Variable of the Proponent's Claim*

In many areas of evidence law other than expert opinion, the courts have long recognized that the required foundation depends not only on what item of evidence the proponent is offering, but also on the purpose for which the item is proffered.

The authentication area is illustrative of this. An accused is charged with murder but claims self-defense. At trial, the defense attorney contemplates introducing the accused's testimony that just before his encounter with the alleged victim, the accused received a threatening letter purportedly written by the victim.¹⁰¹ Suppose that the defense attorney offered the testimony for the limited purpose of showing that the accused had an honest fear of the victim. On that theory of logical relevance, it would suffice for the accused to identify the letter as one he received. The accused would not have to establish that the alleged victim actually wrote the letter. The purpose of the evidence is to show the accused's state of mind.¹⁰² Even if the letter is a forgery and the accused's belief about its authorship is mistaken, the accused's receipt of the letter is relevant to substantiate the subjective element of his self-defense claim.

However, assume that the defense attorney wants to put the same evidence to another use. Now the defense counsel wants to treat the letter as evidence that the alleged victim hated the accused and was

100. Risinger, *supra* note 26.

101. Edward J. Imwinkelried, *Expert Witness: Beyond 'One Size'*, NAT'L L.J., Aug. 28, 2000, at A18.

102. *Id.*

more likely to have started the fight. Although the defense is still offering the same exhibit, the defense would have to lay a quite different foundation. The defense will have to establish the victim's authorship of the letter.¹⁰³ "The prior foundation is adequate relative to the claim about the defendant's state of mind, but insufficient relative to the claim about the alleged victim's state of mind and conduct."¹⁰⁴

In addition, consider the hearsay area. Assume, for example, that the plaintiff has filed a personal injury action against the defendant. The plaintiff pedestrian alleges that she was injured on March 1, 2002, when the brakes on the defendant's car failed, and the car struck the plaintiff. The plaintiff's complaint seeks both compensatory and punitive damages. As the basis for the punitive damages claim, the plaintiff alleges that the defendant was driving recklessly in conscious disregard of the risk that his brakes would fail. The plaintiff avers that on February 1, 2002, the defendant learned that his brakes were defective.

At trial, the plaintiff offers an exhibit into evidence. The exhibit purports to be a report given to the defendant by an automobile mechanic. The report, dated February 1, 2002, explicitly states that the brakes on the defendant's car are "dangerously thin and in need of immediate replacement." The plaintiff could offer the exhibit on her punitive damages claim. If the plaintiff proffers this exhibit for the limited purpose of establishing the defendant's notice of the existence of the dangerous condition, the exhibit would be nonhearsay.¹⁰⁵ The plaintiff would be offering the exhibit only to show the effect of the contents of the exhibit on the state of mind of the reader; namely, putting the defendant on notice of the brake problem.¹⁰⁶ If so, the only necessary foundation would be proof that the exhibit is a document that the mechanic handed the defendant. Alternatively, though, the plaintiff might offer the exhibit on her compensatory damage claim. If she did so, she would have to establish the truth of the report's assertion that the defendant's brakes were defective. On that theory, the exhibit constitutes hearsay,¹⁰⁷ and the plaintiff would have to lay a very different foundation to bring the exhibit within the business entry hearsay exception.¹⁰⁸ In short, the foundation depends both on what item of evidence the proponent offers and on which theory of logical relevance the proponent relies.

103. *Id.*

104. *Id.* at A18.

105. FED. R. EVID. 801(c).

106. EDWARD J. IMWINKELRIED, EVIDENTIARY FOUNDATIONS § 10.02[3][a] (5th ed. 2002).

107. FED. R. EVID. 801(c).

108. IMWINKELRIED, *supra* note 106, § 10.05.

The same holds true in the character evidence area. Change the facts in the prior hypothetical. Assume that rather than suing the driver, the plaintiff sues the driver's employer. Once again, her complaint seeks both compensatory and punitive damages. She alleges that she was injured as a result of the employee's careless driving in the scope of his employment. Moreover, to support her punitive damage claim, she alleges negligent entrustment. She avers that when the defendant hired the employee, the defendant knew or should have known that the employee is an habitually careless driver.

At trial, during her case-in-chief, the plaintiff calls the driver's former employer. The plaintiff seeks to elicit the former employer's testimony about a number of serious traffic accidents caused by the driver while he was in this witness's employ. If the plaintiff offers this testimony solely to show that the driver is a careless driver, the only required foundation will be the witness's personal knowledge that the driver caused the prior accidents.¹⁰⁹ Given the negligent entrustment claim, the employee's character trait for careless driving is in issue,¹¹⁰ and the employee's prior, specific acts of careless driving are admissible to prove that character trait.¹¹¹

However, assume that the plaintiff wants to offer the identical testimony on her punitive damage claim in order to prove that when the defendant hired the employee, the defendant knew of the employee's propensity. If the plaintiff offers the testimony for that purpose, an additional foundation is necessary; that is, proof that the employee's former employer communicated the information to the defendant before the defendant hired the employee. Again, the nature of the required foundation turns on which theory of logical relevance the proponent advances, as well as on the content of the proffered testimony.

B. *The Varying Nature of Expert Claims*

As in the case of the authentication, hearsay, and character rules, the requisite foundation for expert testimony ought to vary with the purpose for which the evidence is being offered.¹¹² In the past, there

109. FED. R. EVID. 602.

110. *Id.* at 405(b).

111. James W. McElhaney, *Don't Be Locked Out: The Right Strategy Can Open Doors to Evidence That Might Otherwise Be Inadmissible at Trial*, 85 A.B.A. J., May 1999, at 64:

Sue a trucking company for its driver's negligent injury of a pedestrian, and the driver's bad record for speeding and reckless driving is not admissible in evidence. But change your pleadings to add a count of negligent entrustment of a truck to someone the company should have known was a terrible driver, and the driver's record is admissible.

112. Edward J. Imwinkelried, *The Escape Hatches From Frye and Daubert: Sometimes You Don't Need to Lay Either Foundation In Order to Introduce Expert Testimony!*, 23 AM.

has been an unfortunate tendency to lump together the various uses of expert testimony:

[c]ourts and commentators have tended to refer to a “*Daubert* foundation” as though one size predicate fit all. However, the use of the proposed expert testimony at trial determines the proponent’s claim about the expertise. In turn, the claim determines the required validation.¹¹³

The expert’s potential claims about his or her theory or technique fall into at least¹¹⁴ two broad categories: descriptive and inferential claims. In some cases, the expert merely describes or summarizes¹¹⁵ experience within his or her field. Suppose, for instance, that in a contract lawsuit, there is a dispute over the meaning of a term in the written agreement.¹¹⁶ To support her interpretation of the term, the plaintiff calls an experienced member of the industry as an expert witness. The witness proposes to testify that within the industry, there is a trade custom or usage as to the meaning of that term. The expert’s specific theory is that the usage exists within the industry. So long as the witness testifies that he or she has been a member of the industry for a certain period of time and has encountered that usage of the term on several occasions by industry members, the foundation ought to be deemed adequate.¹¹⁷ Standing alone, that experience suffices.

The same rationale explains the approving mentions of police testimony about drug argot in both Justice Breyer’s *Kumho* opinion¹¹⁸ and the 2000 Advisory Committee’s Note to Federal Rule 702.¹¹⁹ That

J. TRIAL ADVOC. 1, 3-4 (1999); see *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 591 (1993):

The study of the phases of the moon . . . may provide valid scientific “knowledge” about whether a certain night was dark, and if darkness is a fact in issue, the knowledge will assist the trier of fact. However (absent creditable grounds supporting such a link), evidence that the moon was full on a certain night will not assist the trier of fact in determining whether an individual was unusually likely to have behaved irrationally on that night.

See also FED. R. EVID. 702 advisory committee’s note (stating the judge should consider whether the theory or technique “reach[es] reliable results for the type of opinion the expert would give”).

113. Imwinkelried, *supra* note 101, at A18.

114. Another potential category is normative expert testimony. Risinger, *Preliminary Thoughts*, *supra* note 38, § 2-2.4. However, such testimony is rarely admitted. See generally Richard Delgado & Peter McAllen, *The Moralist as Expert Witness*, 62 B.U. L. REV. 869 (1982).

115. Risinger, *Preliminary Thoughts*, *supra* note 38, § 2-2.2.6.

116. *E.g.*, *Frigalment Importing Co. v. B.N.S. Int’l Sales Corp.*, 190 F. Supp. 116 (S.D.N.Y. 1960).

117. Imwinkelried, *supra* note 101.

118. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999) (“[E]xperts in drug terms.”).

119. FED. R. EVID. 702 advisory committee’s note:

testimony is a variation of the evidence described in the preceding paragraph. Drug trafficking is a business. Just as a term can acquire a specialized meaning for members of a lawful commercial trade, a term can take on a peculiar significance for criminal drug traffickers. Hence, just as a veteran member of the meat scrap industry could testify as to the meaning of "50% protein" in a lawful contract between two industry members,¹²⁰ an experienced undercover officer may testify as to the meaning of "lid" in an unlawful agreement for the purchase of a contraband drug. As the Advisory Committee's Note states, in this situation "experience alone . . . may . . . provide a sufficient foundation for expert testimony."¹²¹

However, in other cases the proponent of the expert testimony wants the witness to do far more than merely recite or summarize experience as to fact *A*.¹²² Instead, the proponent contemplates inviting the expert to draw an inference from the witness's experience. The expert evaluates the experience and draws a further inference as to fact *B*. Consider the possible uses, for example, of testimony by a psychologist about rape trauma syndrome (RTS).¹²³

The proponent could conceivably use such testimony for purely descriptive purposes. Assume, for example, that a medical board's certification examination included a number of questions about RTS. The board gave a particular applicant a failing grade on the examination and denied him certification. The applicant later filed suit to challenge the examination. In particular, he disputed the accuracy of the board's proposed answer to a question about whether a certain phobia is commonly regarded as a symptom of RTS. At the trial of that lawsuit, the applicant should be permitted to use the psychologist's testimony for descriptive purposes. The psychologist might testify: He has been a practicing psychologist for twenty years; during that time, he has closely followed the RTS literature; and that literature generally indicates that the phobia in question is not symptomatic of RTS. The witness is merely relating or summarizing his experience within the field. The witness's specific theory is that there is

[W]hen a law enforcement agent testifies regarding the use of code words in a drug transaction, the principle used by the agent is that participants in such transactions regularly use code words to conceal the nature of their activities. The method used by the agent is the application of extensive experience to analyze the meaning of the conversations. So long as the principles and methods are reliable and applied reliably to the facts of the case, this type of testimony should be admitted.

120. *Hurst v. W.J. Lake & Co.*, 16 P.2d 627, 631 (1932).

121. FED. R. EVID. 702 advisory committee's note.

122. Risinger, *Preliminary Thoughts*, *supra* note 38, § 2-2.3. For instance, some experts translate and illuminate the significance of facts for the trier of fact; "the bulk of expert witnesses are called upon to perform some form of translational function." *Id.*

123. 1 GIANNELLI & IMWINKELRIED, *supra* note 56, § 9-4.

a certain belief, custom, or practice in a field, and the witness's experience validates that hypothesis.¹²⁴

However, the proponent could put RTS testimony to radically different uses. Suppose, for instance, that the proponent wants to use the testimony as credibility evidence.¹²⁵ The plaintiff files a premises liability action against a hotel. The plaintiff alleges that while staying in one of the defendant's rooms, the plaintiff was raped due to lax hotel security. However, the plaintiff did not report the alleged offense to the police until seventy-two hours after the alleged incident. On cross-examination, the defense attorney forces the plaintiff to concede the delay in reporting the claimed rape; the suggestion is that the delay is pretrial conduct inconsistent with her trial testimony of a rape.¹²⁶ Later in the plaintiff's case, the plaintiff calls the psychologist to rehabilitate the plaintiff's credibility. The plaintiff's attorney wants to elicit the witness's testimony that because of the social stigma attached to sexual assault, many rape victims delay reporting the offense.

Is the prior foundation still adequate for the further credibility inference? The answer is no. The proponent no longer is offering the testimony for purely descriptive purposes. The question is not whether the RTS profile exists within psychological circles. Rather, the proponent wants the witness to draw a credibility inference as to a connection between certain conduct (the delay) and a state of mind (the person's honest belief that she has been raped). The prior foundation does not validate the existence of the connection. The expert's specific theory is that if an alleged victim delays reporting a rape but otherwise matches the RTS profile, the match strengthens the infer-

124. Notice that the witness has testified to more than his or her membership in the discipline or field. The witness has added that he has had extensive experience reviewing the RTS literature. Without more, a witness's testimony that he or she is a member of the pertinent field would not suffice. Even if he or she is a practitioner of a certain discipline, he or she may not have had any encounters with the relevant belief, custom, or practice. The key question is whether the witness has had a significant number of experiences similar to the experience involved in the litigation. See Edward J. Imwinkelried, *The Next Step After Daubert: Developing a Similarly Epistemological Approach to Ensuring the Reliability of Nonscientific Expert Testimony*, 15 CARDOZO L. REV. 2271, 2290-94 (1994) (discussing the quantitative and qualitative dimensions of the witness's experience).

There is a similar doctrine with respect to reputation character evidence. If a witness proposes testifying about a person's reputation for a character trait, it is not enough that the witness is a member of the same community as the person. In addition, the witness must vouch that he or she is familiar with the reputation. IMWINKELRIED, *supra* note 106, § 6.02[2]. Standing alone, membership in the person's community does not guarantee that the witness has heard any discussions or mention of the person's character.

125. 1 GIANNELLI & IMWINKELRIED, *supra* note 56, § 9-4(B).

126. 1 EDWARD J. IMWINKELRIED ET AL., COURTROOM CRIMINAL EVIDENCE § 712, at 267 (3d ed., Lexis Law Publ'g 1998) ("Like prior inconsistent statements, prior inconsistent acts are admissible to impeach.").

ence¹²⁷ that the victim honestly believes she had been raped. It no longer suffices to show that many or most psychologists subscribe to the theory that the RTS profile includes certain conduct.

Suppose, however, that the witness added the following testimony:

[I]n his experience and that of other rape counselors, many self-described rape victims delay reporting the offense [for the stated reason of] a sense of embarrassment. Furthermore, when these women were treated as rape victims, in most cases their mental health improved.¹²⁸

It is true that the inference from this collective experience is not indisputable; some of the self-described rape victims might have been lying.¹²⁹ However, this successful clinical experience with the therapy¹³⁰ is highly probative: "[I]f there are numerous reports and an evident improvement in the reporter's mental health in many cases, there is a plausible inference that most reporters were subjectively truthful."¹³¹ Given this foundation, the testimony is rehabilitative; it demonstrates that even many women who subjectively believe that they have been raped engage in the seemingly impeaching conduct of delayed reporting.

Change the facts again. Assume that in the same premises liability case, the plaintiff's attorney calls the psychologist to provide substantive corroboration that there was a rape. The attorney wants to argue that the fact that the plaintiff matches the profile is evidence on the merits that a rape occurred.

Once again, the original foundation would be inadequate. As in the case of the expert drawing the credibility inference, this witness proposes to do more than describe his experience that practitioners in his specialty accept RTS. Again, the expert's underlying theory is not merely that a certain belief, custom, or practice—the RTS profile—exists within the specialty. This expert contemplates drawing a substantive inference as to a connection between certain symptoms and the prior occurrence of a particular type of historical event, that is, a rape. In this variation, the expert's specific theory is that if the

127. The expert is not claiming that without more, the match either supports an inference of truthfulness or dictates such an inference. Testimony of the former type would rest on the specific theory that if the alleged victim delayed reporting the rape but otherwise matched the profile, the match is adequate to prove that the victim honestly believes that she was raped. Testimony of the latter sort would be based on the theory that if the alleged victim delayed reporting but otherwise matched the profile, the match certainly proved that the witness honestly believed that she had been raped. Since the underlying theories differ, different—in these cases, additional—validation would be required.

128. Imwinkelried, *supra* note 101, at A18.

129. *Id.*

130. *State v. Saldana*, 324 N.W.2d 227, 230 (Minn. 1982).

131. Imwinkelried, *supra* note 101, at A18.

alleged victim delayed reporting but otherwise matched the RTS profile, the match strengthens the inference that there was a rape. The original foundation falls even shorter here.

Even the foundation, embellished with testimony about numerous successful clinical interventions based on the RTS diagnosis, would be inadequate. Together with evidence of such clinical success, a large database consisting of self-reports of claimed rape victims can support the credibility inference. However, to establish that a syndrome extracted from the database is an accurate profile of rape victims, there must be some showing of the truth of the reports included in the database—emergency room reports that the reporters displayed physical signs of violent sexual assault, police reports that post-report investigations led to confessions of sexual assault, or perhaps convictions on rape charges prompted by the reports. The clinical successes may justify the credibility inference; but in the clinical mental health context, treatment often depends on the patient's beliefs “even though [the patient's subjective] beliefs about her illness [or the precipitating events] are entirely erroneous.”¹³² Here, though, the plaintiff's attorney wants to use the profile substantively as “a fact-finding tool.”¹³³ The attorney should be permitted to do so only if the expert can demonstrate that the reports used to generate the RTS profile are in fact based on rapes. Relative to this substantive claim, even the embellished foundation is lacking.

IV. HOW MUST IT BE VALIDATED?: IN THE CASE OF INFERENTIAL CLAIMS, THE TRIAL JUDGE SHOULD ASK WHETHER THE PROPONENT'S FOUNDATIONAL SHOWING OF THE RESULTS OF USING THE EXPERT'S THEORY OR TECHNIQUE WOULD CONVINCE A SKEPTICAL RATIONALIST THAT ITS USE ENABLES THE EXPERT TO ACCURATELY MAKE THE SPECIFIC DETERMINATION TO WHICH THE EXPERT PROPOSES TESTIFYING

As we have seen, the validation of purely descriptive expert claims is a relatively straightforward matter. As the 2002 Advisory Committee's Note points out, “experience alone” can be adequate validation for this type of claim.¹³⁴ If the witness has had a large¹³⁵ number of similar¹³⁶ experiences as to fact *A*, the witness ought to be permitted to describe or summarize that body of experience for the jury.

132. Eugene E. Levitt, *The Use of Hypnosis to 'Freshen' the Memory of Witnesses or Victims*, 17 TRIAL 56, 58 (1981).

133. *Saldana*, 324 N.W.2d at 230.

134. FED. R. EVID. 702 advisory committee's note.

135. Imwinkelried, *supra* note 124, at 2290-92 (discussing Hume's insistence upon “a repetition of similar” experiences).

136. *Id.* at 2292-94.

However, as Section III.A indicated, the foundational hurdle is higher when the expert wants to do more than vouch for the existence of a belief, custom, or practice within the discipline or field. For example, when a psychologist proposes relying on the RTS profile as the basis for a further inference as to credibility or historical events, a different foundation is necessary. How should a trial judge assess the adequacy of such a foundation under the trilogy?

A. *A Proposed Standard for Inferential Claims*

It is submitted that to assess the adequacy of the foundation, the trial judge should demand a showing of the results of the use of the expert's theory or technique and then inquire whether a skeptical rationalist would consider that showing sufficient to demonstrate that the theory or technique "works," namely, that it enables the expert to accurately make the inference the expert proposes to draw on the witness stand.

To begin with, the judge should adopt the stance of a skeptic. By that, I do not mean a total skeptic who believes as a matter of epistemology that we cannot be confident that we know anything.¹³⁷ Rather, I mean a person with a critical mind, who does not accept assertions at face value. That has long been the mindset of the law of evidence. "In the everyday affairs of business and social life," if you receive a letter purporting to come from a particular sender, you typically assume that the purported author is the sender.¹³⁸ In contrast, both the common law of evidence¹³⁹ and modern evidence statutes such as the Federal Rules¹⁴⁰ adopt a different approach, requiring an affirmative showing of the authenticity of the letter. The very existence of the authentication requirement is perhaps the best evidence that "the common law [of evidence is] imbued with a spirit of skepticism."¹⁴¹

The trilogy reflects that skeptical attitude. For its part, *Daubert* rejects the traditional, general acceptance test.¹⁴² The *Daubert* court took the position that even if the entire specialty community vouches for a theory or technique, the collective *ipse dixit* is insufficient; according to *Daubert*, the trial judge can and should demand more by way of validation. *Joiner* applies the same questioning attitude to the individual expert. As previously stated, the *Joiner* Court declared that "nothing in either *Daubert* or the Federal Rules of Evidence re-

137. ZIMAN, *supra* note 1, at 109.

138. 2 MCCORMICK, EVIDENCE § 218, at 37 (5th ed. 1999).

139. *Id.*

140. FED. R. EVID. 104(b), 901(a).

141. CARLSON ET AL., EVIDENCE: TEACHING MATERIALS FOR AN AGE OF SCIENCE AND STATUTES 187 (5th ed. 2002).

142. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 585-89 (1993).

quires a district court to admit opinion evidence that is connected to . . . data only by the *ipse dixit* of the [individual] expert¹⁴³—a statement reiterated in *Kumho*.¹⁴⁴ Neither the word of the individual expert nor even the collective word of his or her colleagues is adequate for the skeptical mind.

In the grand scheme of American evidence law, the judge ruling on admissibility is not only a skeptic, he or she is also a rationalist in the tradition of empiricism founded by John Locke, the seventeenth century English philosopher.¹⁴⁵ Enlightenment Rationalism had a profound effect on British and then American evidence law.¹⁴⁶ In particular, Locke's empirical epistemology influenced many of the most important writers on evidence doctrine, including Gilbert,¹⁴⁷ Bentham,¹⁴⁸ Wills,¹⁴⁹ and Best.¹⁵⁰ To one degree or another, nearly all the leading Anglo-American writers on evidence have embraced these basic epistemological views.¹⁵¹ Their writings and the judicial opinions influenced by their writings gave birth to the celebrated Rationalist Tradition in evidence law.¹⁵²

The essence of Lockean empiricism¹⁵³ was his belief, stated in the *Essay Concerning Human Understanding*, that all our knowledge is founded in experience.¹⁵⁴ The tradition determines which modes of reasoning are considered valid.¹⁵⁵ For instance, in Book I of his essay, Locke repudiated the notion that certain ideas are innate to the human mind.¹⁵⁶ Instead, as Locke explained in Book II,¹⁵⁷ knowledge had to be derived directly or indirectly from experience.¹⁵⁸ As a result of experience, we directly gain "sheer data"¹⁵⁹ in the form of sensations. Upon careful reflection,¹⁶⁰ we can draw indirect, reliable inferences from the sheer data.¹⁶¹ However, in Locke's view empirical inference encompassed more than strictly scientific experiments.¹⁶²

143. Gen. Elec. Co. v. Joiner, 522 U.S. 136, 146 (1997).

144. Kumho Tire Co. v. Carmichael, 526 U.S. 137, 157 (1999).

145. WILLIAM TWINING, RETHINKING EVIDENCE: EXPLORATORY ESSAYS 71-72 (1990).

146. *Id.* at 74.

147. *Id.* at 35.

148. *Id.* at 38.

149. *Id.* at 47.

150. *Id.* at 48.

151. *Id.* at 40.

152. *Id.* at 32-91.

153. *Id.* at 83 n.26.

154. CASTELL, *supra* note 86, at 170-71.

155. *Id.* at 178; *see also* TWINING, *supra* note 145, at 80.

156. CASTELL, *supra* note 86, at 170-71.

157. *Id.* at 183-84.

158. *Id.* at 175-77.

159. *Id.* at 176.

160. *Id.* at 175.

161. *Id.* at 176.

162. *Id.* at 171.

Both experts and laypersons are viewed as possessing the cognitive competence to draw trustworthy inferences from experiential data.¹⁶³

In gauging the adequacy of the proponent's foundation, what question should this skeptical, rationalist decision-maker ask? The skeptical, rationalist judge must demand proof that the expert's specific theory or technique works; that is, the use of the theory or technique enables the expert to accurately make the inferential determination that the expert contemplates testifying to. As one of the leading commentators on expert testimony, Professor Paul Giannelli, has pointed out, when the concern is the "validity" of a theory or technique, the essential question is whether the theory or technique enables the expert to determine what he or she claims that it helps determine—"its accuracy."¹⁶⁴ The wording of *Federal Rule of Evidence* 901 is instructive. Subdivision 901(a) codifies the general requirement that proponents authenticate their evidence. In the words of the statute, "The requirement of authentication . . . as a condition precedent to admissibility is satisfied by evidence sufficient to support a finding that the matter in question is what its proponent claims."¹⁶⁵ Subdivision 901(b)(9) expressly extends the requirement to "[e]vidence describing a process or system used to produce a result and showing that the process or system produces an accurate result."¹⁶⁶ The accompanying Advisory Committee's Note gives two scientific instruments, X-rays and computers, as illustrations of the reach of (b)(9).¹⁶⁷ As the statute and Note indicate, the mark that the theory or technique must hit is accuracy.

What evidence should the trial judge weigh in resolving the crucial question of whether the theory or technique enables the expert to accurately make the inferential determination? Consistently with the mindset of empiricism, the judge ought to focus on the evidence of the results of the use of the theory or technique. In the macrocosm of society, why do we place faith in science? We do so in large part because there is an "immense body of results"¹⁶⁸ proving "its worth in the realm of material technique."¹⁶⁹ Those concrete results—science's many practical,¹⁷⁰ successful applications¹⁷¹ and technological

163. TWINING, *supra* note 145, at 80.

164. Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197, 1201 n.20 (1980); *see also* United States v. Plaza, 188 F. Supp. 2d 549, 553 (E.D. Pa. 2002) (exploring the accuracy of the fingerprinting technique).

165. FED. R. EVID. 901(a).

166. *Id.* at 901(b)(9).

167. *Id.* at 901 advisory committee's note; *see* Edward J. Imwinkelried, *Judge Versus Jury: Who Should Decide Questions of Preliminary Facts Conditioning the Admissibility of Scientific Evidence?*, 25 WM. & MARY L. REV. 577, 607-10 (1984).

168. ZIMAN, *supra* note 1, at 6-7.

169. *Id.* at 2.

170. *Id.* at 127.

achievements¹⁷²—are the pragmatic¹⁷³ basis for the belief in the validity of systematic experimental testing and induction.

In the microcosm of the courtroom as well, the focus should be on results. The Supreme Court reflected that focus in the trilogy. In his list of factors in *Daubert*, Justice Blackmun stated that “the court ordinarily should consider the known or potential rate of error.”¹⁷⁴ Of course, the only way to ascertain that rate is to use the theory or technique and then to observe the results of that use. In *Kumho*, Justice Breyer asserted that in evaluating the reliability of an expert’s methodology, the judge should consider “how often an . . . expert’s . . . methodology has produced erroneous results.”¹⁷⁵ Moreover, the 2000 Advisory Committee’s Note to amended Rule 702 states that a pertinent consideration is the “results” reached when the theory or technique is utilized.¹⁷⁶

B. *Illustrative Applications of the Proposed Standard*

Under this proposed standard, how should a judge rule on the following states of the record?

The proponent’s foundation consists of only the expert’s personal voucher that the theory or technique is valid. *Joiner* and *Kumho* supply the answer here. *Joiner* teaches that the trial judge need not accept the “*ipse dixit*” of an individual expert,¹⁷⁷ and *Kumho* reaffirms that teaching.¹⁷⁸ That teaching is in accord with the skeptical spirit of American evidence law. The trial judge should not simply take the expert’s word for the validity of the theory or technique.¹⁷⁹

Suppose that the proponent supplements the foundation with additional testimony that the vast majority of the specialists in the field believe that the theory or technique is valid. Now *Daubert* controls. There Justice Blackmun rejected general acceptance within the relevant specialist discipline as a dispositive consideration.¹⁸⁰ In *Kumho*, Justice Breyer indicated that even a collective voucher by the practitioners of either astrology or necromancy would not suffice.¹⁸¹ For its

171. *Id.* at 10.

172. *Id.* at 127.

173. *Id.* at 10.

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

175. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 151 (1999).

176. FED. R. EVID. 702 advisory committee’s note (“Whether the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give.”).

177. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

178. *Kumho*, 526 U.S. at 146.

179. *Daubert v. Merrell Dow Pharms., Inc.*, 43 F.3d 1311, 1319 (9th Cir. 1995) (approvingly quoted in FED. R. EVID. 702 advisory committee’s note).

180. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 585-89 (1993).

181. *Kumho*, 526 U.S. at 151.

part, the Advisory Committee's Note to the 2000 amendment to Rule 702 states that a general voucher by the practitioners of clinical ecology would be an inadequate foundation.¹⁸² That statement is also consistent with the skeptical attitude with which the trial judge should approach the proponent's foundation.

Assume that the proponent goes farther and offers at least some instances of results indicating that on occasion, reliance on the theory or technique has permitted an expert to accurately make the inferential determination that the witness proposes to draw on the stand. One or a few isolated anecdotes should not suffice.¹⁸³ While a handful of successful results may warrant a serious, larger-scale investigation into the validity of the theory or technique,¹⁸⁴ scanty anecdotal evidence is inadequate as a foundation. Empiricists, such as the eighteenth century Scottish philosopher David Hume, insisted upon a showing of "many instances"—a definite pattern of consistent outcomes—before they were willing to infer a relationship or connection.¹⁸⁵

Alternatively, suppose that the proponent can show that the theory or technique has been repeatedly used. Is that showing satisfactory as a foundation? The answer must be no when the expert is making an inferential claim. The longstanding use of the technique or theory is persuasive evidence that the members of that field accept the theory or technique, but general acceptance suffices only when the expert's claim is descriptive in nature. Before embracing an inferential claim about the theory or technique, an empiricist should demand proof of the results of its use.¹⁸⁶ Again, both *Daubert*¹⁸⁷ and *Kumho*¹⁸⁸ manifested concern about the results of reliance on the theory or technique. That concern is relevant in several forensic settings, including polygraphy and arson analysis. In some of the research cited in support of the admissibility of polygraph evidence, there were no follow-up studies to independently verify that the polygraphist's conclusion was correct.¹⁸⁹ Although the polygraph has

182. FED. R. EVID. 702 advisory committee's note (citing *Sterling v. Velsicol Chem. Corp.*, 855 F.2d 1188 (6th Cir. 1988) (rejecting testimony based on 'clinical ecology' as unfounded and unreliable)).

183. *Cavallo v. Star Enter.*, 100 F.3d 1150, 1158-59 (4th Cir. 1996).

184. Marc Sageman, *Challenging the Admissibility of Mental Expert Testimony*, 13 PRAC. LITIGATOR 7, 8 (2002).

185. CASTELL, *supra* note 86, at 191-93; *see also* FED. R. EVID. 702 advisory committee's note (stating that in assessing the adequacy of the proponent's foundation, the judge should consider whether "the expert has unjustifiably extrapolated").

186. ZIMAN, *supra* note 1, at 6, 10, 46, 75.

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

188. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 151 (1999).

189. Michael Abell, *Polygraph Evidence: The Case Against Admissibility in Federal Criminal Trials*, in SCIENTIFIC AND EXPERT EVIDENCE 825, 835-36 (Edward J. Imwinkelried ed., 2d ed. 1981); 1 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW

been used extensively for decades, an empiricist would not treat these studies as adequate validation without a showing of the accurate use of the technique, namely, the “ground truth”¹⁹⁰ of the examiners’ findings. Arson analysts’ opinions are vulnerable to the same type of doubt. Arson investigators rely on certain clues such as concrete “spalling”¹⁹¹ and char depth¹⁹² to determine the point of origin of a fire. These clues are plausible and widely accepted by fire department arson investigators.¹⁹³ The difficulty, though, is that there have been few “full-scale burns” of buildings to verify that such factors accurately identify the starting place of a fire.¹⁹⁴ To make matters worse, “[n]othing in the natural world ‘tests’ an arson investigator’s expertise. If an arson investigator is wrong, nothing runs aground or burns down.”¹⁹⁵ These clues are in widespread use, but there is little objective evidence that their use yields accurate results. Without any effort to detect error and evaluate the results of the use of the technique, the analysts might simply be repeating the same mistakes over and over again.

In the above states of the record, given the Supreme Court’s trilogy of decisions, without more the trial judge should rule the foundation inadequate. At the polar extreme, however, there are many foundational showings that the judge should rule sufficient.

In light of the *Daubert* Court’s emphasis on scientific testing, induction from empirical tests is certainly an acceptable method of validating an expert theory or technique. The ideal situation is one in which: The expert constructs a large database;¹⁹⁶ the database is representative of the relevant universe;¹⁹⁷ the test was conducted under conditions approximating those in the pending case;¹⁹⁸ and the error rate is negligible.¹⁹⁹ When the proponent’s foundation paints that impressive a picture of the state of the scientific research supporting the theory or technique, the judge ought to allow the proponent to submit the theory or technique to the trier of fact. The courts often

AND SCIENCE OF EXPERT TESTIMONY §§ 14-2.2.1, 14-3.2.3, 14-3.2.6, 14-3.3.2, 14-3.3.3 (1997); 1 GIANNELLI & IMWINKELRIED, *supra* note 56, § 8-3, at 378.

190. 1 FAIGMAN ET AL., *supra* note 189, § 14-3.3.2[3].

191. 2 GIANNELLI & IMWINKELRIED, *supra* note 56, § 26-4(A), at 557.

192. *Id.* § 26-4(A), at 556.

193. *Id.* § 26-4(A).

194. Vincent Brannigan & Jose Torero, *The Expert’s New Clothes: Arson ‘Science’ After Kumho Tire*, 43 FIRE CHIEF 60 (1999) (the authors are professors in the Department of Fire Protection Engineering at the University of Maryland).

195. *Id.* at 61.

196. EDWARD J. IMWINKELRIED, *THE METHODS OF ATTACKING SCIENTIFIC EVIDENCE* § 10-6(a) (3d ed., Lexis Law Publ’g 1997).

197. *Id.* § 10-6(b), at 297-98.

198. *Id.* § 10-6(b), at 298.

199. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 151 (1999); *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 594 (1993).

encounter such foundations for genetic marker analysis, such as DNA typing.²⁰⁰

Although the classic technique of experimental testing and induction is a permissible method of validation, that technique does not exhaust the possibilities. Members of the empirical school of epistemology recognized other valid modes of reasoning such as mathematical deduction.²⁰¹ If algebraic or geometric reasoning demonstrates the logical necessity of a proposition, that demonstration would be acceptable to an empirical epistemologist; and the same demonstration should be adequate as a foundation in court.

However, assume that the proponent calls neither a molecular biologist nor a mathematician as her expert witness. Rather, the proponent invites an automobile mechanic to testify as an expert on engine malfunctions. Although the mechanic's academic background might not be as impressive as that of the biologist or the statistician, this evidence should also be ruled admissible. There is far more than the bare fact that for decades, mechanics have used their techniques of automotive diagnosis and repair. In addition, during that period of time car owners have come to rely on mechanics to diagnose and repair engine malfunctions.²⁰² The point is that car owners have turned to mechanics for such a lengthy period of time precisely because they have generally been satisfied with the results of the mechanics' expert diagnosis and work. In a large number of cases, the mechanics succeeded in eliminating or reducing the problem that caused the owner to consult the mechanic in the first instance.²⁰³ The mechanics' lay customers themselves are not experts; but, as previously stated, rationalist epistemologists agree that laypersons also possess the cognitive competence to evaluate results and draw inferences from empirical observations.²⁰⁴

These two sets of hypotheticals represent polar extremes on the spectrum of cases that will be presented to judges. Under the standard proposed at the outset of this Subpart, the proper outcome in these hypotheticals is fairly clear cut. However, other fact situations will fall in the middle of the spectrum. These fact situations can pose difficult, close calls for the trial judge. *Joiner* was such a case. There the plaintiffs presented several, large polychlorinated biphenyl (PCB) studies.²⁰⁵ Yet, like the trial judge, the Court was concerned about

200. 2 GIANNELLI & IMWINKELRIED, *supra* note 56, § 18-3(C), at 21-22 (reviewing some of the research validating the short tandem repeat (STR) method of DNA typing).

201. ZIMAN, *supra* note 1, at 102, 136, 150, 163; *see also* CASTELL, *supra* note 86, at 171, 195; TWINING, *supra* note 145, at 80.

202. Imwinkelried, *supra* note 97, at 35.

203. *Id.*

204. TWINING, *supra* note 145, at 80.

205. *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 144-46 (1997).

the dissimilarities between the facts of the pending case and the test conditions in the studies: The plaintiff was an adult human being while the animal studies involved infant mice; the mice had received massive doses, but, relative to body size, the plaintiff's exposure was "far less";²⁰⁶ the plaintiff's exposure was dermal while the doses were injected into the mice; and the plaintiff developed a small-cell carcinoma, but the mice had alveologenic adenomas. Given those dissimilarities, the Court concluded that the trial judge did not abuse his discretion in barring the testimony. However, before sustaining the lower court ruling, the Court went to lengths to underscore that on review, the standard is abuse of discretion.²⁰⁷ Pointedly, concurring in part and dissenting in part, Justice Stevens added: "it bears emphasis that the Court has not held that it would have been an abuse of discretion to admit the expert testimony."²⁰⁸ The standard proposed in this Subpart should reduce the uncertainty in this area of law, but there will still be cases such as *Joiner*, presenting the courts with tough judgment calls.

V. CONCLUSION

Daubert is a landmark decision. Much of the attention for the decision has been devoted to the Court's formal holdings that the general acceptance test is no longer good law and that Rule 702 requires a validation foundation for scientific testimony. However, the real significance of the opinion may lie in the Court's frank recognition of the limits of the scientific enterprise.²⁰⁹ With the benefit of a number of amicus briefs filed by scientific organizations,²¹⁰ the Court moved beyond the flawed, popular notion that at least the hard sciences can yield absolute certainty.²¹¹ The Court confronted the reality that there are erratic phenomena that defy even the most meticulous application of the scientific method.²¹² Citing the amicus briefs, Justice Blackmun therefore wrote that "arguably, there are no certainties in science."²¹³ *Daubert* should help to disabuse the lower courts from a simplistic faith in the scientific method. It would be ironic if the trilogy, begun in *Daubert*, was interpreted as standing for the proposition that the scientific method is the only method of validating expert

206. *Id.* at 144.

207. *Id.* at 139, 141-43.

208. *Id.* at 150, 155 (Stevens, J., concurring in part and dissenting in part).

209. Imwinkelried, *supra* note 68.

210. *Id.* at 64-65. The amici included the American Association for the Advancement of Science, the National Academy of Sciences, the American Medical Association, and the Carnegie Commission on Science, Technology, and Government.

211. *Id.* at 59-60.

212. *Id.* at 60-63.

213. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 590 (1993).

testimony or even that there is a bias in favor of empirical testing and induction.

"[W]e have cast off the naive doctrine that all *science* is necessarily *true* . . ." ²¹⁴ It is silly to presume that at any given time, all the propositions circulating within the scientific community—or even the specialized scientific communities of biology, chemistry, or physics—are sufficiently validated. Quite to the contrary, the discourse in any scientific circle is likely to include a mix of long validated propositions, newly validated ones, conjectures, and propositions that have already been discredited. ²¹⁵ In that light, the answer to the question, "What must be validated?," should be clear. The focus must be on the specific theory or technique that the expert proposes to rely on to perform "the task at hand," ²¹⁶ the determination the expert contemplates testifying about.

We have also "cast off the [equally] naive doctrine that . . . all *true* knowledge is necessarily *scientific*." ²¹⁷ In the long term, perhaps the most important insight in *Daubert* is the Court's recognition of the fallibility and inherent limitations of scientific methodology. Anglo-American evidence law rests on empiricist epistemology. That school of epistemology recognizes the validity of modes of reasoning other than scientific induction. Mathematical deduction is also permissible, and even laypersons are viewed as possessing the cognitive competence to draw reliable inferences from sensory data. An answer to the question, "How must it be validated?," thus emerges. If the expert makes a limited, descriptive claim, there is adequate validation when the foundation demonstrates that the expert has had a large number of similar experiences. When the expert makes an inferential claim, the question becomes whether the proponent has made a showing of the results of the use of the theory or technique that would convince a skeptical rationalist that the theory or technique accurately does what the expert claims.

It would be a grave mistake to interpret the trilogy as if it mandated that the judge assess expert foundations from the narrow perspective of the scientific tradition. Rather, the trilogy should be read through the broader lens of the Rationalist Tradition of Anglo-American evidence law. ²¹⁸ Prescribing a scientific perspective might simplify the trial judge's task; in many cases, it will be perfectly clear that the proponent's foundation does not qualify as controlled, experimental verification. However, adopting that perspective will also result in the exclusion of a vast amount of evidence that satisfies

214. ZIMAN, *supra* note 1, at 2.

215. *Id.* at 130-33.

216. *Daubert*, 509 U.S. at 597.

217. ZIMAN, *supra* note 1, at 2.

218. TWINING, *supra* note 145, at 32-91.

empirical epistemology, as Locke conceived it. Ease of use makes a narrow scientific perspective tempting; but as Justice Breyer wisely cautioned in *Kumho*, “Too much depends upon the particular circumstances of the particular case at issue.”²¹⁹ Unlike dogmatic²²⁰ scientism, the Rationalist Tradition has the intellectual breadth and flexibility to accommodate those myriad circumstances.

219. *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 150 (1999).

220. Schwartz, *supra* note 29.