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The Expert Witness Predicament: Determining “Reliable” Under the Gatekeeping Test of *Daubert*, *Kumho*, and Proposed Amended Rule 702 of the Federal Rules of Evidence

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The United States Supreme Court has declared that the trial court has a gatekeeping obligation to determine whether the explanative theory underlying every expert witness’s testimony is “reliable,” regardless of whether it is based on scientific, technical or other specialized knowledge. A proposed amendment to Federal Rule of Evidence 702 purports to reflect the foregoing by requiring the trial judge to determine that the expert’s testimony “is the product of reliable principles and methods,” *before* the expert is permitted to testify. This article explores the meaning of “reliable” and concludes that the trial court should not be required to determine whether the explanative theory actually works, either as a general matter or as actually applied, i.e., produces a correct, accurate, truthful, valid conclusion. Rather, the trial court should determine whether there are sufficient assurances present so that the expert witness’s explanative theory, as actually applied in the matter at hand to facts, data, or opinions sufficiently established to exist, produces an accurate result to warrant jury acceptance.

I. THE *DAUBERT* DILEMMA

When “scientific” evidence is offered as substantive “evidence” or as forming the basis of an expert’s opinion, the “reliability” of the scientific fact derived from a scientific principle generally depends on the following factors: (1) the reliability of the underlying scientific principle; (2) the reliability of the technique or process that applies the principle; (3) the condition of any instrumentation used in the process; (4) adherence to proper procedures; (5) the qualifications of the person who performs the test; and (6) the qualifications of the person who interprets the results.¹ With respect to the first two criteria, the predominant common-law test in the United States for determining that evidence is suffi-

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1. See P. GIANNELLI & E. IMWINKELRIED, CRIMINAL EVIDENCE 83-90 (1979).

ciently reliable to be admitted was first enunciated in 1923 in *Frye v. United States*.² The test is based on the general acceptance of the scientific principle:

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 the 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.³

In 1993, the United States Supreme Court, in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,⁴ an opinion not binding on state courts, declared that *Frye* "general acceptance" test did not survive adoption of the Federal Rules of Evidence. At the same time, the Supreme Court imposed a requirement that with respect to scientific evidence, the trial judge must act as a gatekeeper and screen scientific evidence to ensure reliability under Rules 702 and 104(a).

In interpreting the legislatively enacted Federal Rules of Evidence as a statute, the Supreme Court not only observed that nothing in the text of Rule 702 incorporates the general acceptance test of *Frye*, it also opined that the test is at odds with the "liberal thrust" of the Federal Rules of Evidence and their "general approach of relaxing the traditional barriers to 'opinion' testimony."⁵ The Supreme Court concluded that *Frye* is "incompatible with the Federal Rules of Evidence [and] should not be applied in federal trials."⁶

2. 293 F. 1013 (D.C. Cir. 1923).

3. *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

4. 509 U.S. 579 (1993).

5. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 588 (1993).

6. *Id.* at 595-96. As to the argument that abandonment of the "general acceptance" test would result in a "free-for-all" in which befuddled juries are confronted by absurd and irrational pseudoscientific assertions," the Supreme Court emphasized its faith in the adversary system and the capabilities of juries. *Id.* With respect to "scientific" testimony that satisfies the reliability-validity assessment mandated by Rule 702 made by the trial judge pursuant to Rule 104(a):

[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence. *See Rock v. Arkansas*, 483 U.S. 44, 61 (1987). Additionally, in the event the trial court concludes that the scintilla of evidence presented supporting a position is insufficient to allow a reasonable juror to conclude that the position more likely than not is true, the court remains free to direct a judgment, Fed.Rule Civ.Proc. 50(a), and likewise to grant summary judgment, Fed.Rule Civ.Proc. 56.

Id. at 596. Similarly found unpersuasive was the contention that "recognition of a screening role for the judge that allows for the exclusion of "invalid" evidence will sanction a stifling and repressive scientific orthodoxy and will be inimical to the search for truth." *Id.*

Although *Frye* was displaced by the Federal Rules of Evidence, the Supreme Court held that the trial judge must screen scientific evidence to ensure reliability.⁷ The requirement in Rule 702 that the expert's testimony pertain to "scientific knowledge" establishes a standard of evidentiary reliability or scientific validity. In addition, Rule 702 requires that the evidence offered "assist the trier of fact to understand the evidence or to determine a fact in issue," a condition that goes primarily to relevance.⁸ The *Daubert* Court said:

Faced with a proffer of expert scientific testimony, then, the trial judge must determine at the outset, pursuant to Rule 104(a), whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. This entails a preliminary assessment of whether . . . that reasoning or methodology properly can be applied to the facts in issue.⁹

While declining to set out a definitive checklist or test, the Supreme Court provided a series of factors that will assist the trier of fact when determining whether a theory, technique, reasoning, methodology, etc. (collectively referred to as an "explanative theory") is scientific knowledge. The Supreme Court initially suggested that a key question is whether the theory or technique can be (and has been) tested. The importance of testability speaks to the very nature of scientific methodology: "Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified; indeed, this methodology is what distinguishes science from other fields of human inquiry."¹⁰

The Supreme Court then suggested that another important consideration is peer review (but expressly notes that publication is not a *sine qua non* of admissibility).¹¹ In fact, the Supreme Court explained:

Publication . . . does not necessarily correlate with reliability, and in some instances well-grounded but innovative theories will not have been published. Some propositions, moreover, are too particular, too new, or of too limited interest to be published. But submission to the scrutiny of the scientific community is a component of "good science," in part because it increases the likelihood that substantive

7. *Daubert*, 509 U.S. at 589.

8. *Id.* at 591.

9. *Id.* at 592-93.

10. *Id.* at 593 (citing Green, *Expert Witnesses and Sufficiency of Evidence in Toxic Substances Litigation: The Legacy of Agent Orange and Bendectin Litigation*, 86 Nw. U. L. REV. 643, 645 (1992)); see also C. HEMPEL, *PHILOSOPHY OF NATURAL SCIENCE* 49 (1966) ("[T]he statements constituting a scientific explanation must be capable of empirical test"); K. POPPER, *CONJECTURES AND REFUTATIONS: THE GROWTH OF SCIENTIFIC KNOWLEDGE* 37 (5th ed. 1989) ("[T]he criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.").

11. *Daubert*, 509 U.S. at 593.

flaws in methodology will be detected. The fact of publication (or lack thereof) in a peer reviewed journal thus will be a relevant, though not dispositive, consideration in assessing the scientific validity of a particular technique or methodology on which an opinion is premised.¹²

The third factor appropriately considered is the known or potential rate of error, while the fourth factor is the existence and maintenance of standards controlling the technique's operation.¹³ The fifth and final factor was subtly developed by the Supreme Court:

Finally, "general acceptance" can yet have a bearing on the inquiry. A "reliability assessment does not require, although it does permit, explicit identification of a relevant scientific community and an express determination of a particular degree of acceptance within that community." Widespread acceptance can be an important factor in ruling particular evidence admissible, and "a known technique that has been able to attract only minimal support within the community," may properly be viewed with skepticism.

The inquiry envisioned by Rule 702 is, we emphasize, a flexible one. Its overarching subject is the scientific validity—and thus the evidentiary relevance and reliability—of the principles that underlie a proposed submission. The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate.

Throughout, a judge assessing a proffer of expert scientific testimony under Rule 702 should also be mindful of other applicable rules. Rule 703 provides that expert opinions based on otherwise inadmissible hearsay are to be admitted only if the facts or data are "of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject." Rule 706 allows the court at its discretion to procure the assistance of an expert of its own choosing. Finally, Rule 403 permits the exclusion of relevant evidence "if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury. . . ." Judge Weinstein has explained: "Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay witnesses."¹⁴

12. *Id.* at 593-94 (internal citations omitted).

13. *Id.* at 594.

14. *Id.* at 594-95 (internal citations omitted); see generally FED. R. EVID. 702 (proposed advisory committee's note ("*Daubert* set forth a non-exclusive checklist for trial courts to use in assessing the reliability of scientific expert testimony. The specific factors explicated by the *Daubert* Court are (1) whether the expert's technique or theory can be or has been tested — that is, whether the expert's theory can be challenged in some objective sense, or whether it is instead simply a subjective, conclusory approach that cannot reasonably be assessed for reliability; (2) whether the technique or theory has been subject to peer review and publication; (3) the known or

Attempting to understand the application of *Daubert* by trial and appellate courts in the years that immediately followed can be frustrating. *Daubert* is a very incomplete case, if not a very bad decision. It did not, in any way, accomplish what it was meant to, *i.e.*, encourage more liberal admissibility of expert witness evidence. Rather, it created a more stringent test for expert evidence admissibility, especially in civil cases. What resulted, was a series of conflicting and confusing opinions.

The difficulties with *Daubert* are many. Most significant is that while eradicating the *Frye* test for all cases, *Daubert* only explicitly provided a standard for admissibility of "scientific" evidence under Federal Rule of Evidence 702,¹⁵ making it unclear whether the gatekeeping role applied to "technical or other specialized knowledge." Moreover, the *Daubert* Court stated that the requirements of Rule 702 applied to all "scientific" evidence and not "specially or exclusively to unconventional evidence," *i.e.*, "'novel' scientific techniques."¹⁶ In short, *Daubert*, on its face did not apply "gatekeeping" to "technical or other specialized knowledge," while holding that Rule 702 required all "scientific" evidence be subjected to gatekeeping.¹⁷

The fact that *Daubert* resulted in substantial confusion is not surprising. For example, what happens when expert witnesses testify based on experience acquired by "technical or other specialized knowledge," referred to as "skilled experts," or when other expert witnesses testify based on "technical or other specialized knowledge" in product liability cases? Is an expert engineer or person with thirty years of practical experience testifying as to "scientific" knowledge when opining as to how a product could be made safer, or is it "technical or other specialized knowledge"? If the former and the five *Daubert* factors are rigorously applied, the chances of such experts being able to opine that the product could have been made safer by doing X and Y is problematic. Satisfaction of the five *Daubert* factors would very often, at a minimum, require the construction and testing of the alternative design beyond the financial capacity of the party or the litigation.

Moreover, if something is not "scientific" under *Daubert*, is judicial gatekeeping nevertheless mandated? Is it in fact already incorporated in Rule 702? If so, how should the court go about deciding

potential rate of error of the technique or theory when applied; (4) the existence and maintenance of standards and controls; and (5) whether the technique or theory has been generally accepted in the scientific community. The Court in *Kumho* held that these factors might also be applicable in assessing the reliability of non-scientific expert testimony, depending upon 'the particular circumstances of the particular case at issue.' 119 S.Ct. at 1175.").

15. See 28 U.S.C.A. art. VII, Rule 702 (1999)

16. *Daubert*, 509 U.S. at 593 n.11.

17. See *id.* at 590 n.8.

whether an opinion of an expert skilled witness based on experience or another type of expert, such as a university professor testifying as to “technical or other specialized knowledge,” is based on a sufficiently trustworthy explanative theory? In short, are *Daubert*’s five factors to be applied to “technical or other specialized knowledge” as well, is a different, probably more inclusive list of factors to be considered, or is a more generalized search for assurance of evidentiary reliability to be conducted?

Historically, as a practical matter, *Frye* was applied solely in criminal cases to “new and novel” explanative theories. Almost all such cases involved forensic evidence offered by the government. *Frye* was not applied in product liability cases. If a qualified expert was called to opine, assuming a recognized field of expertise clearly existed and an adequate factual basis was established, the expert was permitted to testify. The only objection available to the opponent was that the explanative theory was “speculative and conjectural.” In other words, it was so untrustworthy as to flunk the laugh test. For example, an expert testifying that a piece of falling glass caused the cancer later observed in the area struck by the glass—*post hoc ergo propter hoc*—was considered “speculative and conjectural.”¹⁸

Now *Daubert* was to be applied to a variety of situations, including those to which *Frye* was never applicable. The main problem is that the language in *Daubert* permitted several interpretations, each of which gave a different result. Some courts, relying on the gatekeeper language of *Daubert* or Rule 702, held all explanative theories must be shown to be reliable.¹⁹ Some of these courts reached that holding by applying the

18. See *Black v. Food Lion, Inc.*, 171 F.3d 308, 313-14 (5th Cir. 1999) (“This analysis amounts to saying that because Dr. Reyna thought she had eliminated other possible causes of fibromyalgia, even though she does not know the real ‘cause,’ it had to be the fall at Food Lion. This is not an exercise in scientific logic but in the fallacy of *post-hoc propter-hoc* reasoning, which is as unacceptable in science as in law. By the same ‘logic,’ Dr. Reyna could have concluded that if Black had gone on a trip to Disney World and been jostled in a ride, that event could have contributed to the onset of fibromyalgia. See, e.g., *Allen v. Pennsylvania Eng’g Corp.*, 102 F.3d 194, 195-96 (5th Cir. 1996) (expert evidence suggesting connection between exposure to ethylene oxide and brain cancer insufficient under *Daubert*.); *Provident Life & Accident Ins. Co. v. Fleischer*, 26 F. Supp. 1220, 1225 n. 5 (C.D.Cal. 1998) (“In this case, Dr. Long’s report is of no value in assisting the court to determine the cause or onset of Fleischer’s mental disability that occurred four years earlier. First, Fleischer’s two treating physicians diagnosed him with depression during the relevant time period. Second, as the *Goomar* court unequivocally stated, ‘[r]etrospective expert testimony regarding the existence or onset of a mental illness is inadmissible speculation.’ *Goomar*, 855 F.Supp. at 326. Thus, the Court declines to consider Dr. Long’s report.”).

19. See *United States v. Jones*, 107 F.3d 1147, 1156 (6th Cir.), cert. denied, 117 S.Ct. 2527 (1997) (“In analyzing *Daubert*, we have stated that ‘although “*Daubert* dealt with scientific experts, its language relative to the ‘gatekeeper’ function of federal judges is applicable to all expert testimony offered under Rule 702.”’ *United States v. Thomas*, 74 F.3d 676, 681 (6th Cir.),

Daubert five factors to assess "technical or other specialized knowledge."²⁰ Others interpreted *Daubert* as a means to develop a more inclusive list of appropriate factors to be considered and a method to evaluate such factors in the context of the litigation when "scientific" evidence is not involved.²¹ Still other courts concluded that gatekeeping, in the sense of a threshold reliability screening, is required—while specifically declining to mandate the five *Daubert* factors or an expanded version thereof.²² Finally, other courts concluded that gatekeeping in any sense is mandated only as to "scientific" evidence,²³ leaving the explanative

cert. denied, 517 U.S. 1162 (1996) (quoting *Berry v. City of Detroit*, 25 F.3d 1342, 1350 (6th Cir.1994), *cert. denied*, 513 U.S. 1111 (1995)). It is thus clear that a district court has the duty to decide not only whether evidence is relevant but also whether it is reliable. *See id.* But this conclusion does not come from the *Daubert* opinion itself; rather, it comes from the Federal Rules of Evidence:

That these requirements [of relevance and reliability] are embodied in Rule 702 is not surprising. Unlike an ordinary witness, see Rule 701, an expert is permitted wide latitude to offer opinions, including those that are not based on first-hand knowledge or observation. See Rules 702 and 703. Presumably, this relaxation of the usual requirement of firsthand knowledge—a rule which represents "a "most pervasive manifestation" of the common law insistence upon "the most reliable sources of information." Advisory Committee's Notes on Fed. R.ule Evid. 602, 28 U.S.C.App., p. 755 (citation omitted)—is premised on an assumption that the expert's opinion will have a reliable basis in the knowledge and experience of his discipline.

Daubert, 509 U.S. at 592.

20. *See generally* MICHAEL H. GRAHAM, HANDBOOK OF FEDERAL EVIDENCE § 702.5 (4th ed. 1996 & Supp. 2000).

21. *See, e.g.*, FED. R. EVID. 702 (proposed) advisory committee's note, *infra* note 56.

22. *See* *United States v. Hall*, 974 F. Supp. 1198, 1201 (C.D.Ill. 1997) ("A number of courts have recognized these distinctions and have refused to apply the [five] factors specified in *Daubert* to expert testimony which is not easily subjected to the experimental method of the 'hard' sciences. *See, e.g.*, *Jones*, 107 F.3d at 1157-58 (handwriting analysis); *Tyus v. Urban Search Mgmt.*, 102 F.3d 256, 263-64 (7th Cir. 1996), *cert. denied*, — U.S. —, 117 S.Ct. 2409, 138 L.Ed.2d 175 (U.S. 1997) (impact of advertisements upon viewers of different races); *Roback v. V.I.P. Transp. Inc.*, 90 F.3d 1207, 1215-16 (7th Cir. 1996) (measurement of truck performance taken by expert's self-designed equipment); *United States v. Williams*, 81 F.3d 1434, 1441-42 (7th Cir. 1996) (translation of gang code); *United States v. Sinclair*, 74 F.3d 753, 757 (7th Cir. 1996) (legal expert); *United States v. Velasquez*, 64 F.3d 753, 757 (7th Cir. 1996) (legal expert); *United States v. Velasquez*, 64, F.3d 844, 850 (3d Cir. 1995) (applying *Daubert* to handwriting analysis only as 'an exercise in caution'); *Iacobelli Constr., Inc. v. County of Monroe*, 32 F.3d 19, 25 (2d Cir. 1994) (geotechnical and underground construction experts); *Waitek v. Dalkon Shield Claimants Trust*, 934 F.Supp. 1068, 1087 n. 10 (N.D.Iowa 1996) (medical testimony about problems with contraceptive device), *aff'd*, 114 F.3d 117 (8th Cir. 1997) (per curiam); *United States v. Starzeczpyzel*, 880 F.Supp. 1027, 1039-41 (S.D.N.Y. 1995) (handwriting analysis); *Nations v. State*, 944 S.W.2d at 800-01 (eyewitness identifications).")

23. *See, e.g.*, *Desrosiers v. Flight Int'l of Fla., Inc.*, 156 F.3d 952, 960 (9th Cir. 1998) ("[R]ecent decisions in this circuit have called into question whether *Daubert* should apply to *technical*, as opposed to *scientific* expertise. In *Webb*, 115 F.3d at 716, this court held that the *Daubert* standards of admission did not apply to expert testimony regarding law enforcement, because the testimony did not involve *scientific* knowledge. More recent, in *McKendall*, 122 F.3d

theory underlying “technical and other specialized knowledge” subject only to the requirements applicable to expert testimony generally.

Daubert boxed the lower courts into working within a structure not properly anticipated by the Supreme Court. More importantly, *Daubert* did not function well at all. The Supreme Court sought to encourage liberal admissibility.²⁴ It believed it was abolishing a strict *Frye* test in favor of a more liberal factor balancing analysis. But instead of liberal admissibility, the direct opposite occurred. First, all “scientific” evidence was now subject to *Daubert*’s five factor analysis, including scientific evidence in civil cases never previously exposed to significant gatekeeping. When a gatekeeping test is applied where one was not before, less expert witness testimony is admissible, which is hardly a liberalization. In situations where *Frye* previously had been applied,²⁵ while probably not resulting in many expert opinions being excluded where previously admitted, *Daubert* hardly significantly liberalized admissibility. Very little, if anything, is admitted in the federal courts using *Daubert* that is excluded in state courts still following *Frye*.²⁶

Second, *Frye* was not applied to “technical or other specialized knowledge” except for social science explanative theories,²⁷ such as eyewitness identification, hypnotic recollection, post traumatic stress disorder, battered wife syndrome, child sexual abuse syndrome, etc. When *Daubert* gatekeeping is applied in these social science areas, admissibility is more difficult, especially if the five *Daubert* factors are employed rigorously. Of course, controlled study falsifiability does not comport well with social science—we correctly refuse to abuse a child for the sake of research. Once again, there is no liberalization here. Finally, with respect to other “technical or other specialized knowledge” experts, such as skilled experts and university professors used in product

at 806, this court noted that “[t]he Ninth Circuit has recognized that *Daubert* is confined to the evaluation of “scientific” expert testimony.”).

24. See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

25. See FED. R. EVID. 702 (proposed) advisory committee’s note:

A review of the caselaw after *Daubert* shows that the rejection of expert testimony is the exception rather than the rule. *Daubert* did not work a ‘seachange over federal evidence law,’ and ‘the trial court’s role as gatekeeper is not intended to serve as a replacement for the adversary system.’ *United States v. 14.38 Acres of Land Situated in Leflore County, Mississippi*, 80 F.3d 1074, 1078 (5th Cir.1996). As the Court in *Daubert* stated: ‘Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.’ 509 U.S. at 595.

26. See generally GRAHAM, *supra* note 20.

27. This assumes that such social sciences explanative theories are not considered “scientific” under *Daubert*.

liability cases, application of *Daubert* is more restrictive because *Frye* was never previously applied in these matters.

Generally, federal courts were unable to legitimately fight their way out of the *Daubert* five factor analysis gatekeeping box. "New or novel" was not a distinction,²⁸ and no other limitation was suggested by *Daubert*.

Confronted with this frustrating gatekeeping box, federal courts, on occasion, have attempted to avoid *Daubert* at the cost of distorting the clear understanding of how the evidence rules operate with respect to expert witnesses. Two illegitimate avoidance approaches were undertaken. First, it was asserted, albeit incorrectly, that as long as the witness has personal knowledge of the factual basis for her opinion (e.g., reliance on business records and industry experience) that was not acquired for purposes of the litigation, the witness may testify as a lay witness.²⁹ Under these circumstances, a witness can only be classified as an expert if she either reasonably relies upon information furnished by others (Rule 703), or acquires information forming the factual basis of an opinion for purposes of litigation.³⁰ Second, it was also incorrectly

28. See *Daubert*, 509 U.S. at 593 n.11 ("Although the *Frye* decision itself focused exclusively on 'novel' scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence. Of course, well-established propositions are less likely to be challenged than those that are novel, and they are more handily defended. Indeed, theories that are so firmly established as to have attained the status of scientific law, such as the laws of thermodynamics, properly are subject to judicial notice under Federal Rule of Evidence 201.").

29. See generally GRAHAM, *supra* note 20.

30. See *Hartzell Mfg. v. American Chem. Tech.*, 899 F.Supp. 405, 408-09 (D.Minn. 1995) ("From these fairly modest beginnings, Rule 701 has been interpreted expansively so as to permit the admission of an opinion, if it is based upon 'relevant historical or narrative facts that the witness has perceived,' *United States v. Oliver*, 908 F.2d 260, 263 (8th Cir. 1990), quoting *Teen-Ed, Inc. v. Kimball Intern, Inc.*, 620 F.2d 399, 403 (3d Cir. 1980), and 'if it would help the factfinder determine a matter in issue.' *United States v. Oliver*, *supra* at 263, quoting *Hurst v. United States*, 882 F.2d 306, 312 (8th Cir. 1989). This broadening of Rule 701's application arises from the grafting of Rule 602's prohibition against the admission of 'testimony concerning matters the witness did not observe or had no opportunity to observe.' *United States v. Oliver*, *supra* at 263. Indeed, our Court of Appeals has concluded that '[p]ersonal knowledge or perception acquired through review of records prepared in the ordinary course of business, or perceptions based on industry experience, is a sufficient foundation for lay opinion testimony.' *Burlington Northern R. Co. v. State of Neb.*, 802 F.2d 994, 1004 (8th Cir. 1986), citing *Farner v. Paccar, Inc.*, 562 F.2d 518, 520 (8th Cir. 1977), and *Gravely v. Providence Partnership*, 549 F.2d 958, 961 (4th Cir. 1977). Moreover, the mere fact that the witness, by virtue of his education, training or experience, is capable of being qualified as an expert, does not serve as a valid objection to his expression of lay opinion testimony. *Farner v. Paccar, Inc.*, *supra* at 529. In view of this 'modern trend favor[ing] the admission of opinion testimony,' some of the former distinctions, between Rule 701 and Rule 702's expert testimony, may tend to blur somewhat. *Teen-Ed, Inc. v. Kimball Intern., Inc.*, *supra* at 403. Nevertheless, as recognized by the Court of Appeals for the Third Circuit, certain clear distinctions still exist: "The essential difference, however is that a qualified expert may answer hypothetical questions. * * * Thus, an expert witness may not only testify from 'facts or data * * * perceived by him,' but also from what is 'made known to him at or before the hearing.'" *Fed.R.Evid. 703.*" Where the lay witness's

testimony is based upon perceptions, which are insufficient to allow the formation of an opinion that would be helpful to an understanding of the facts of the case but, instead, merely expresses the witness's beliefs, then the opinion testimony should be excluded. *United States v. Cortez*, 935 F.2d 135, 139-40 (8th Cir. 1991), *cert. denied*, 502 U.S. 1062, 112 S.Ct. 945, 117 L.Ed 2d 114 (1992).")

In *Asplundh Manufacturing Division v. Benton Harbor Engineering*, 57 F.3d 1190, 1199 (3d Cir. 1995), the court recognized that some decisions have permitted lay witnesses to testify to opinions in areas "in which it would ordinarily be expected that only an expert qualified under Rule 702 could give such testimony, such as whether a product design was defective or whether certain factors (e.g., a product defect) caused an accident." It then proceeded to sanction lay witness testimony "as to technical matters such as product defect or causation," while imposing a requirement that a lay witness "with first hand knowledge can offer an opinion akin to expert testimony in most cases, so long as the trial judge determines that the witness possesses sufficient and relevant specialized knowledge and experience to offer the opinion," referring to Rule 702 and *Daubert*. *Id.* at 1201-02. It is suggested that rather than impose expert witness admissibility requirements upon a so-called technical lay witness, it would be much easier and more in accord with the text of Rules 701 and 702 to treat such witnesses as experts under Rule 702, i.e., if it looks like a duck, etc., it's a duck.

The Fifth Circuit acknowledged that it has "allowed lay witnesses opinions that required specialized knowledge," if the opinions are "straightforward conclusion from observations inferred by his own experience." *United States v. Riddle*, 103 F.3d 423, 428-29 (5th Cir. 1997). For example, a court could permit a lay witness to provide an overview of banking regulations and practices, while refusing to extend lay witness testimony to include an experienced bank examiner. *Id.* at 429. The Fifth Circuit is in support of permitting lay witnesses to express opinions that require specialized knowledge characterizes Rule 701 as permitting a lay witness based upon personal perception to opine if the opinion is "one that a normal person would form from those perceptions." *Id.* at 428. Rule 701 in fact states that if the witness is not testifying as an expert the witness may testify in the form of an opinion if the opinion is "rationally based on the perception of the witness." Rule 701 thus provides that the opinion must be able to be drawn by any person possessing a generally present background upon observation; it does not provide for admissibility of opinions a normal person possessing specialized knowledge would be able to draw from the same observation.

A proposed amendment to Rule 701 working its way to Congress pursuant to the Rules Enabling Act, for which the earliest possible effective date is December 1, 2000, would bring an end once and for all to this avoidance tactic. That proposed rule is as follows:

Rule 701. Opinion Testimony by Lay Witnesses

If the witness is not testifying as an expert, the witness' testimony in the form of opinions or inferences is limited to those opinions or inferences which are (a) rationally based on the perception of the witness, (b) helpful to a clear understanding of the witness' testimony or the determination of a fact in issue+ and (c) not based on scientific, technical or other specialized knowledge within the scope of Rule 702.

Proposed Advisory Committee's Note

Rule 701 has been amended to eliminate the risk that the reliability requirements set forth in Rule 702 will be evaded through the simple expedient of proffering an expert in lay witness clothing. Under the amendment, a witness' testimony must be scrutinized under the rules regulating expert opinion to the extent that the witness is providing scientific, technical, or other specialized knowledge within the scope of Rule 702. *See generally* *Asplundh Mfg. Div. v. Benton Harbor Eng'g*, 57 F.3d 1190 (3d Cir. 1995). By channeling testimony that is actually expert testimony to Rule 702, the amendment also ensures that a party will not evade the expert witness disclosure requirements set forth in F.R.C.P. 26 and Fed.R.Crim.P.16 by simply calling an expert witness in the guise of a layperson. *See* Joseph,

asserted that an expert testifying whether a product is defectively designed is not subject to *Daubert* gatekeeping if the expert's testimony is based upon general scientific principles and years of practical experience, since it is "not based on any particular methodology or technique."³¹ To conclude that "no methodology or technique," (*i.e.*,

Emerging Expert Issues Under the 1993 Disclosure Amendments to the Federal Rules of Civil Procedure, 164 F.R.D. 97, 108 (1996) (noting that "there is no good reason to allow what is essentially surprise expert testimony," and that "the Court should be vigilant to preclude manipulative conduct designed to thwart the expert disclosure and discovery process"). See also *United States v. Figueroa-Lopez*, 125 F.3d 1241, 1246 (9th Cir. 1997) (law enforcement agents testifying that the defendant's conduct was consistent with that of a drug trafficker could not testify as lay witnesses; to permit such testimony under Rule 701 "subverts the requirements of Federal Rule of Criminal Procedure 16(a)(1)(E)").

31. *Compton v. Subaru of Am., Inc.*, 82 F.3d 1513, 1519 (10th Cir. 1996); accord *McKendall v. Crown Control Corp.*, 122 F.3d 803, 807-08 (9th Cir. 1997):

Although we have not previously confronted this issue in the context of a products liability case, the Tenth Circuit faced a factual situation similar to this case in *Compton*. *Compton v. Subaru of America, Inc.*, 82 F.3d 1513, 1515 (10th Cir.), *cert. denied*, — U.S. —, 117 S.Ct. 611, 136 L.Ed.2d 536 (1996). We find *Compton* instructive. *Compton* involved a plaintiff who brought a products liability action against the manufacturer of an automobile. The plaintiff alleged that the vehicle was defectively designed because there was excessive intrusion of the roof and side of the automobile into the passenger compartment during rollover. *Id.* at 1516. The plaintiff's expert was a mechanical engineer who proffered testimony that the car was defectively designed because it permitted excessive roof crush. *Id.* He testified that to correct the alleged defect, he would design the vehicle to allow only two to three inches of roof crush. *Id.* Like Siegel, the expert here, the expert in *Compton*, examined the allegedly defective product and read relevant literature but did not provide a model or test his proposed design. *Id.* at 1516-17.

The district court allowed the expert to testify, relying in part on *Daubert*, for its rationale. The Tenth Circuit, on appeal, upheld the admission of the testimony but concluded that *Daubert* did not apply to the proffered testimony. The court noted that "application of the *Daubert* factors is unwarranted in cases where expert testimony is based solely upon experience or training In such cases, Rule 702 merely requires the trial court to make a preliminary finding that proffered expert testimony is both relevant and reliable while taking into account '[t]he inquiry envisioned by Rule 702 is . . . a flexible one.'" *Id.* at 1518-19. (citations omitted). In language particularly relevant here, the court concluded:

In sum, we do not believe *Daubert* completely changes our traditional analysis under Rule 702. Instead *Daubert* sets out additional factors the trial court should consider under Rule 702 if an expert witness offers testimony based upon a particular methodology or technique.

. . . [I]t is unnecessary to reach the question whether *Daubert* mandates a further inquiry into [the expert's] "scientific, technical, or other specialized knowledge" under Rule 702 because we find his testimony was not based on any particular methodology or technique. Rather, [the expert] reached his expert conclusions by drawing upon general engineering principles and his twenty-two years of experience as an automotive engineer.

Id. at 1519. The *Compton* court affirmed the district court's reasoning that the expert's testimony was "facially helpful and relevant," and thus admissible under Rule 702. *Id.*

explanative theory) is involved regarding opinion testimony on “scientific, technical or other specialized knowledge,” is simply untenable.³²

Similarly, we conclude that Siegel’s testimony, based on his engineering experience and his having investigated hundreds of fork lift cases over the past thirty years, that a safety device is feasible, is both “facially helpful and relevant” and seemingly reliable. *See id.* Crown will have every opportunity on cross-examination to point out that Siegel has not created or tested the safety device which he suggests would have prevented the accident. The district court erred in excluding Siegel’s testimony based on *Daubert*.

32. As the court in *Watkins v. Telsmith, Inc.*, 121 F.3d 984, 990-92 (5th Cir.1997) found:

We agree for the reasons stated by the Seventh and Eighth Circuits that the *Daubert* analysis applies to the type of expert testimony presented by Williams. Not every guidepost outlined in *Daubert* will necessarily apply to expert testimony based on engineering principles and practical experience, but the district court’s “preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue” is no less important. *Daubert*, 509 U.S. at 592-93, 113 S.Ct. at 2796. We cannot agree with the *Compton* court’s conclusion that *Daubert* only applies when “unique, untested or controversial methodologies or techniques” are relied on by the expert. 82 F.3d at 1518. *Daubert* expressly denies that the precepts of Rule 702 apply only to unconventional evidence. 509 U.S. at 592 n. 11, 113 S.Ct. at 2796 n. 11. And while *Daubert* dealt with expert scientific evidence, 509 U.S. at 590 n. 8, 113 S.Ct. at 2795 n. 8, the decision’s focus on a standard of evidentiary reliability and the requirement that proposed expert testimony must be appropriately validated are criteria equally applicable to “technical, or other specialized knowledge. . . .” Fed. Rule of Evid. 702. Moreover, the nonexclusive list of factors relevant under *Daubert* to assessing scientific methodology—testing, peer review, and “general acceptance”—are also relevant to assessing other types of expert evidence. Whether the expert would opine on economic valuation, advertising psychology, or engineering, application of the *Daubert* factors is germane to evaluating whether the expert is a hired gun or a person whose opinion in the courtroom will withstand the same scrutiny that it would among his professional peers.

Compton also suffers from the vagueness of the line it draws between “methodology” and other scientific or technical knowledge. As one of our district judges aptly observed:

An alternative design is by definition a different method of configuring the product. In the *Compton* case, for example, the expert was clearly proposing that the vehicles be constructed by some other method that would embody his proposed standards.

Tassin v. Sears, Roebuck and Co., 946 F.Supp. 1241, 1247 (M.D.La.1996). Alternative designs by definition include elements of science, technology, and methodology. Further, it seems exactly backwards that experts who purport to rely on general engineering principles and practical experience might escape screening by the district court simply by stating that their conclusions were not reached by any particular method or technique. The moral of this approach would be, the less factual support for an expert’s opinion, the better. *Compton’s* view of the admissibility of expert evidence is untenable.

The foregoing avoidance tactic was declared improper in *Kumho Tire Company, Ltd. v. Carmichael*, 119 S.Ct. 1167, 1175 (1999):

At the same time, and contrary to the Court of Appeals’ view, some of *Daubert’s* questions can help to evaluate the reliability even of experience-based testimony. In certain cases, it will be appropriate for the trial judge to ask, for example, how often

an engineering expert's experience-based methodology has produced erroneous results, or whether such a method is generally accepted in the relevant engineering community. Likewise, it will at times be useful to ask even of a witness whose expertise is based purely on experience, say, a perfume tester able to distinguish among 140 odors at a sniff, whether his preparation is of a kind that others in the field would recognize as acceptable.

We must therefore disagree with the Eleventh Circuit's holding that a trial judge may ask questions of the sort *Daubert* mentioned only where an expert "relies on the application of scientific principles," but not where an expert relies "on skill- or experience-based observation." 131 F.3d, at 1435. We do not believe that Rule 702 creates a schematism that segregates expertise by type while mapping certain kinds of questions to certain kinds of experts. Life and the legal cases that it generates are too complex to warrant so definitive a match.

A proposed amendment to Rule 702 working its way to Congress pursuant to the Rules Enabling Act, for which the earliest possible effective date is December 1, 2000, would clarify that the rule is to the same effect.

Rule 702. Testimony By Experts

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise; *if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.*

Proposed Advisory Committee's Note

As stated earlier, the amendment does not distinguish between scientific and other forms of expert testimony. The trial court's gatekeeping function applies to testimony by any expert. See *Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167, 1171 (1999) ("We conclude that *Daubert's* general holding—setting forth the trial judge's general 'gatekeeping' obligation—applies not only to testimony based on 'scientific knowledge', but also to testimony based on 'technical' and 'other specialized' knowledge."). While the relevant factors for determining reliability will vary from expertise to expertise, the amendment rejects the premise that an expert's testimony should be treated more permissively simply because it is outside the realm of science. An opinion from an expert who is not a scientist should receive the same degree of scrutiny for reliability as an opinion from an expert who purports to be a scientist. See *Watkins v. TelSmith, Inc.*, 121 F.3d 984, 991 (5th Cir. 1997) ("[I]t seems exactly backwards that experts who purport to rely on general engineering principles and practical experience might escape screening by the district court simply by stating that their conclusions were not reached by any particular method or technique."). Some types of expert testimony will be more objectively verifiable, and subject to the expectations of falsifiability, peer review, and publication, than others. Some types of expert testimony will not rely on anything like a scientific method, and so will have to be evaluated by reference to other standard principles attendant to the particular area of expertise. The trial judge in all cases of proffered expert testimony must find that it is properly grounded, well-reasoned, and not speculative before it can be admitted. The expert's testimony must be grounded in an accepted body of learning or experience in the expert's field, and the expert must explain how the conclusion is so grounded. See, e.g., American College of Trial Lawyers, *Standards and Procedures for Determining the Admissibility of Expert Testimony after Daubert*, 157 F.R.D. 571, 579 (1994) ("[W]hether the testimony concerns economic principles, accounting standards, property valuation or other

State supreme courts applying *Frye* have similarly sought to limit the gatekeeping role of the trial court in one of two ways.³³ First, courts have limited *Frye* to “new or novel” explanative theories.³⁴ Such a limitation assumes that traditional explanative theories are sufficiently accepted under *Frye* to be valid and reliable, without the need to intro-

non-scientific subjects, it should be evaluated by reference to the ‘knowledge and experience’ of that particular field.”).

The amendment requires that the testimony must be the product of reliable principles and methods that are reliably applied to the facts of the case. While the terms “principles” and “methods” may convey one impression when applied to scientific knowledge, they remain relevant when applied to testimony based on technical or other specialized knowledge. For example, when 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.

Nothing in this amendment is intended to suggest that experience alone — or experience in conjunction with other knowledge, skill, training or education — may not provide a sufficient foundation for expert testimony. To the contrary, the text of Rule 702 expressly contemplates that an expert may be qualified on the basis of experience. In certain fields, experience is the predominant, if not sole, basis for a great deal of reliable expert testimony. See, e.g., *United States v. Jones*, 107 F.3d 1147 (6th Cir. 1997) (no abuse of discretion in admitting the testimony of a handwriting examiner who had years of practical experience and extensive training, and who explained his methodology in detail); *Tassin v. Sears Roebuck*, 946 F.Supp. 1241, 1248 (M.D.La. 1996) (design engineer’s testimony can be admissible when the expert’s opinions “are based on facts, a reasonable investigation, and traditional technical/mechanical expertise, and he provides a reasonable link between the information and procedures he uses and the conclusions he reaches”). See also *Kumho Tire Co., v. Carmichael*, 119 S.Ct. 1167, 1178 (1999) (stating that “no one denies that an expert might draw a conclusion from a set of observations based on extensive and specialized experience.”).

If the witness is relying solely or primarily on experience, then the witness must explain how that experience leads to the conclusion reached, why that experience is a sufficient basis for the opinion, and how that experience is reliably applied to the facts. The trial court’s gatekeeping function requires more than simply “taking the expert’s word for it.” See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1319 (9th Cir. 1995) (“We’ve been presented with only the experts’ qualifications, their conclusions and their assurances of reliability. Under *Daubert*, that’s not enough.”). The more subjective and controversial the expert’s inquiry, the more likely the testimony should be excluded as unreliable. See *O’Conner v. Commonwealth Edison Co.*, 13 F.3d 1090 (7th Cir. 1994) (expert testimony based on a completely subjective methodology held properly excluded). See also *Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167, 1176 (1999) (“[I]t will at times be useful to ask even of a witness whose expertise is based purely on experience, say, a perfume tester able to distinguish among 140 odors at a sniff, whether his preparation is of a kind that others in the field would recognize as acceptable.”).

33. Full description and critique of *Frye* limitation devices is clearly beyond the scope of the caution. See, e.g., MENDEZ, CALIFORNIA EVIDENCE § 16.04 (1998 Supp.).

34. See generally GRAHAM, *supra* note 20.

duce foundational proof. Second, even when the explanative technique is "new or novel," some state courts have attempted to further limit application of the *Frye* test.³⁵ This limitation focuses on the perceived capacity of the trier of fact to properly evaluate the testimony of the expert. For example, courts may inquire as to whether a "new or novel" explanative theory is pure opinion, not relying on a machine, sometimes called a little black box. If it is pure opinion, the argument is the jury can evaluate the testimony adequately and will not be overwhelmed by an aura of scientific certainty. The jury is presumed to be sufficiently skeptical of pure opinion testimony. On the other hand, if the expert testimony employs a "new or novel" explanative theory that appears to create an accurate result (such as when a black box is involved), it is asserted that the aura of scientific certainty may overwhelm the trier of fact. Under *Frye*, the trial court must assess the trustworthiness of an expert witness's theory by applying the general acceptance test *before* it allows the jury to hear the testimony of the expert witness. Therefore, if the jury is likely to uncritically buy into the expert's evidence, the courts must exercise a gatekeeping role to assure what is uncritically accepted actually works.

Of course, the lines drawn in the foregoing set of limitations are fuzzy at best. What is pure opinion? When is something a technique or procedure, and when is it pure opinion? Are all "new and novel" machines to be treated the same? Assuming these criteria are capable of being applied in practice, what is the justification for the court concluding they distinguish between expert testimony incorporating a "new and novel" explanative theory that can be reasonably assessed by the jury, from those explanative theories likely to be uncritically accepted by the jury as trustworthy? *Daubert*, in practice, permitted none of the forms of limitation employed under *Frye* and, not surprisingly, federal courts by and large sought not to introduce any on their own.³⁶

35. See generally *id.*

36. Also not surprisingly given the mess created by *Daubert*, in spite of the specific position to the contrary in *Daubert*, see note 16 *supra*, some resort to "novel" has been undertaken in federal court. See, e.g., *Masayeva on Behalf of Hopi Indian Tribe v. Hale*, 118 F.3d 1371, 1379 (9th Cir.1997) ("The Navajo's reliance on *Daubert* is misplaced because Dr. Workman's testimony derives from his relatively straightforward application of range economics, rather than on a novel scientific theory"); *Jugle v. Volkswagen of Am., Inc.*, 975 F.Supp. 576, 580 (D.Vt.1997) ("However, some courts, including the Second Circuit, have commented that *Daubert's* focus was on the admissibility of novel or unorthodox scientific evidence under Rule 702. See, e.g., *Iacobelli Constr. Inc. v. County of Monroe*, 32 F.3d 19, 25 (2d Cir.1994) (affidavits of geotechnical consultants regarding construction site conditions, contract, and construction results based on analysis of bid documents, geotechnical data, and geotechnical interpretive reports 'do not present the kind of "junk science" problem that *Daubert* means to address'); *Lappe v. American Honda Motor Co.*, 857 F.Supp. 222, 228 (N.D.N.Y.1994) ('*Daubert's* narrow focus is on the admissibility of 'novel scientific evidence' under Fed.R.Evid.

In summary, after *Daubert*, questions remained unanswered: *Daubert* either does or does not impose a gatekeeping requirement to “technical or other specialized knowledge”? And if it does, how is this gatekeeping to be performed?

II. THE *KUMHO* CLARIFICATION

In 1999, the Supreme Court answered both questions in *Kumho Tire Company, Ltd. v. Carmichael*.³⁷ It held that the *Daubert* “gatekeeping” obligation applies to both testimony based on “scientific” knowledge, as well as that based on “technical” and “other specialized” knowledge.³⁸ In making the “gatekeeping” determination, the trial court

702. . . . *Daubert* only prescribes judicial intervention for expert testimony approaching the outer boundaries of traditional scientific and technological knowledge’), aff’d, 101 F.3d 682 (2d Cir.1996); see also *Golod v. La Roache*, 964 F.Supp. 841, 848 (S.D.N.Y.1997) (quoting *Lappe*).”).

37. 119 S.Ct. 1167 (1999).

38. *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1167, 1171 (1999). The opinion continues:

In *Daubert*, this Court held that Federal Rule of Evidence 702 imposes a special obligation upon a trial judge to “ensure that any and all scientific testimony . . . is not only relevant, but reliable.” 509 U.S., at 589, 113 S.Ct. 2786. The initial question before us is whether this basic gatekeeping obligation applies only to “scientific” testimony or to all expert testimony. We, like the parties, believe that it applies to all expert testimony. See Brief for Petitioners 19; Brief for Respondents 17.

For one thing, Rule 702 itself says:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

This language makes no relevant distinction between “scientific” knowledge and “technical” or “other specialized” knowledge. It makes clear that any such knowledge might become the subject of expert testimony. 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.” 509 U.S., at 589-590, 113 S.Ct. 2786. Hence, as a matter of language, the Rule applies its reliability standard to all “scientific,” “technical,” or “other specialized” matters within its scope. We concede that the Court in *Daubert* referred only to “scientific” knowledge. But as the Court there said, it referred to “scientific” testimony “because that [wa]s the nature of the expertise” at issue. *Id.*, at 590, n. 8, 113 S.Ct. 2786.

Neither is the evidentiary rationale that underlay the Court’s basic *Daubert* “gatekeeping” determination limited to “scientific” knowledge. *Daubert* pointed out that Federal Rules 702 and 703 grant expert witnesses testimonial latitude unavailable to other witnesses on the “assumption that the expert’s opinion will have a reliable basis in the knowledge and experience of his discipline.” *Id.*, at 592, 113 S.Ct. 2786 (pointing out that experts may testify to opinions, including those that are not based on firsthand knowledge or observation). The Rules grant that latitude to all experts, not just to “scientific” ones.

Finally, it would prove difficult, if not impossible, for judges to administer evidentiary rules under which a gatekeeping obligation depended upon a distinction

"may" consider one or more of the five specific *Daubert* factors if it will help ascertain whether the testimony is "reliable."³⁹ Overall, *Kumho* found that the test for "reliable" is "flexible" and that "*Daubert*'s list of specific factors neither necessarily nor exclusively applies to all experts in every case."⁴⁰ "Rather the law grants a district court the same broad

between "scientific" knowledge and "technical" or "other specialized" knowledge. There is no clear line that divides the one from the others. Disciplines such as engineering rest upon scientific knowledge. Pure scientific theory itself may depend for its development upon observation and properly engineered machinery. And conceptual efforts to distinguish the two are unlikely to produce clear legal lines capable of application in particular cases. Cf. Brief for National Academy of Engineering as Amicus Curiae 9 (scientist seeks to understand nature while the engineer seeks nature's modification); Brief for Rubber Manufacturers Association as Amicus Curiae 14- 16 (engineering, as an "applied science," relies on "scientific reasoning and methodology"); Brief for John Allen et al. as Amici Curiae 6 (engineering relies upon "scientific knowledge and methods").

Neither is there a convincing need to make such distinctions. Experts of all kinds tie observations to conclusions through the use of what Judge Learned Hand called "general truths derived from . . . specialized experience." Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 Harv. L.Rev. 40, 54 (1901). And whether the specific expert testimony focuses upon specialized observations, the specialized translation of those observations into theory, a specialized theory itself, or the application of such a theory in a particular case, the expert's testimony often will rest "upon an experience confessedly foreign in kind to [the jury's] own." *Ibid.* The trial judge's effort to assure that the specialized testimony is reliable and relevant can help the jury evaluate that foreign experience, whether the testimony reflects scientific, technical, or other specialized knowledge.

We conclude that *Daubert*'s general principles apply to the expert matters described in Rule 702. The Rule, in respect to all such matters, "establishes a standard of evidentiary reliability." 509 U.S. at 590, 113 S.Ct. 2786. It "requires a valid . . . connection to the pertinent inquiry as a precondition to admissibility." *Id.*, at 592, 113 S.Ct. 2786. And where such testimony's factual basis, data, principles, methods, or their application are called sufficiently into question, see Part III, *infra*, the trial judge must determine whether the testimony has "a reliable basis in the knowledge and experience of [the relevant] discipline." 509 U.S. at 592, 113 S.Ct. 2786.

Id. at 1174-76.

39. See *Kumho*, 119 S.Ct. at 1176.

40. *Id.* at 1171. The opinion continues:

The petitioners ask more specifically whether a trial judge determining the "admissibility of an engineering expert's testimony" may consider several more specific factors that *Daubert* said might "bear on" a judge's gate-keeping determination. These factors include:

- Whether a "theory or technique . . . can be (and has been) tested";
- Whether it "has been subjected to peer review and publication";
- Whether, in respect to a particular technique, there is a high "known or potential rate of error" and whether there are "standards controlling the technique's operation"; and
- Whether the theory or technique enjoys "general acceptance" within a "relevant scientific community." 509 U.S., at 592-594, 113 S.Ct. 2786.

Emphasizing the word "may" in the question, we answer that question yes.

Engineering testimony rests upon scientific foundations, the reliability of which will be at issue in some cases. See, e.g., Brief for Stephen Bobo et al. as

Amici Curiae 23 (stressing the scientific bases of engineering disciplines). In other cases, the relevant reliability concerns may focus upon personal knowledge or experience. 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). Our emphasis on the word "may" thus reflects *Daubert's* description of the Rule 702 inquiry as "a flexible one." 509 U.S., at 594, 113 S.Ct. 2786. *Daubert* makes clear that the factors it mentions do not constitute a "definitive checklist or test." *Id.*, at 593, 113 S.Ct. 2786. And *Daubert* adds that the gatekeeping inquiry must be " 'tied to the facts' " of a particular "case." *Id.*, at 591, 113 S.Ct. 2786 (quoting *United States v. Downing*, 753 F.2d 1224, 1242 (C.A.3 1985)). 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." Brief for United States as Amicus Curiae 19. The conclusion, in our view, 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.

Daubert itself is not to the contrary. It made clear that its list of factors was meant to be helpful, not definitive. Indeed, those factors do not all necessarily apply even in every instance in which the reliability of scientific testimony is challenged. It might not be surprising in a particular case, for example, that a claim made by a scientific witness has never been the subject of peer review, for the particular application at issue may never previously have interested any scientist. Nor, on the other hand, does the presence of *Daubert's* general acceptance factor help show that an expert's testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy.

At the same time, and contrary to the Court of Appeals' view, some of *Daubert's* questions can help to evaluate the reliability even of experience-based testimony. In certain cases, it will be appropriate for the trial judge to ask, for example, how often an engineering expert's experience-based methodology has produced erroneous results, or whether such a method is generally accepted in the relevant engineering community. Likewise, it will at times be useful to ask even of a witness whose expertise is based purely on experience, say, a perfume tester able to distinguish among 140 odors at a sniff, whether his preparation is of a kind that others in the field would recognize as acceptable.

We must therefore disagree with the Eleventh Circuit's holding that a trial judge may ask questions of the sort *Daubert* mentioned only where an expert "relies on the application of scientific principles," but not where an expert relies "on skill- or experience-based observation." 131 F.3d, at 1435. We do not believe that Rule 702 creates a schematism that segregates expertise by type while mapping certain kinds of questions to certain kinds of experts. Life and the legal cases that it generates are too complex to warrant so definitive a match.

To say this is not to deny the importance of *Daubert's* gatekeeping requirement. The objective of that requirement is to ensure the reliability and relevancy of expert testimony. It is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field. Nor do we deny that, as stated in *Daubert*, the particular questions that it mentioned will often be appropriate for use in determining the reliability of challenged expert testimony. Rather, we conclude that the trial judge

latitude when it decides how to determine reliability as it enjoys in respect of its ultimate reliability determination."⁴¹

Whether *Kumho*'s mandate of a flexible approach in determining the "reliability" of the explanative theory underlying an expert witness's testimony will significantly assist the trial courts in fulfilling their role as "gatekeeper" can only be judged over time. While there is reason for optimism, there is also reason for pessimism. Which direction the

must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable. That is to say, a trial court should consider the specific factors identified in *Daubert* where they are reasonable measures of the reliability of expert testimony.

Id. at 1175-76.

41. *Id.* at 1171. *Kumho* found:

The trial court must have the same kind of latitude in deciding how to test an expert's reliability, and to decide whether or when special briefing or other proceedings are needed to investigate reliability, as it enjoys when it decides whether or not that expert's relevant testimony is reliable. Our opinion in *Joiner* makes clear that a court of appeals is to apply an abuse-of-discretion standard when it "review[s] a trial court's decision to admit or exclude expert testimony." 522 U.S., at 138-139, 118 S.Ct. 512. That standard applies as much to the trial court's decisions about how to determine reliability as to its ultimate conclusion. Otherwise, the trial judge would lack the discretionary authority needed both to avoid unnecessary "reliability" proceedings in ordinary cases where the reliability of an expert's methods is properly taken for granted, and to require appropriate proceedings in the less usual or more complex cases where cause for questioning the expert's reliability arises. Indeed, the Rules seek to avoid "unjustifiable expense and delay" as part of their search for "truth" and the "jus[t] determin[ation]" of proceedings. Fed. Rule Evid. 102. Thus, whether *Daubert*'s specific factors are, or are not, reasonable measures of reliability in a particular case is a matter that the law grants the trial judge broad latitude to determine. See *Joiner*, supra, at 143, 118 S.Ct. 512. And the Eleventh Circuit erred insofar as it held to the contrary.

The "reliable" determination is governed by Rule 104(a). See Advisory Committee's Note to proposed Rule 702 ("Rule 702 has been amended in response to *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), and to the many cases applying *Daubert*, including *Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167 (1999). In *Daubert* the Court charged trial judges with the responsibility of acting as gatekeepers to exclude unreliable expert testimony, and the Court in *Kumho* clarified that this gatekeeper function applies to all expert testimony, not just testimony based in science. See also *Kumho*, 119 S.Ct. at 1178 (citing the Committee Note to the proposed amendment to Rule 702, which had been released for public comment before the date of the *Kumho* decision. The amendment affirms the trial court's role as gatekeeper and provides some general standards that the trial court must use to assess the reliability and helpfulness of proffered expert testimony. Consistently with *Kumho*, the Rule as amended provides that all types of expert testimony present questions of admissibility for the trial court in deciding whether the evidence is reliable and helpful. Consequently, the admissibility of all expert testimony is governed by the principles of Rule 104(a). Under that Rule, the proponent has the burden of establishing that the pertinent admissibility requirements are met by a preponderance of the evidence. See *Bourjaily v. United States*, 483 U.S. 171 (1987).").

Id. at 1176.

“gatekeeping” determination will take depends primarily on how the courts come to view the concept of “reliable.”

III. DEFINING “RELIABLE”

A. *The Supreme Court*

As employed in *Daubert*, *Kumho* and elsewhere, “reliable” appears to be given two meanings at the same time. On the one hand, “reliable” is taken to mean that the explanative theory actually works, *i.e.*, produces a correct, accurate, truthful, or valid conclusion.⁴² On the other hand, “reliable” refers to meriting confidence worthy of dependence or reliance, *i.e.*, possesses sufficient assurance of correctness to warrant acceptance by the trier of fact. The latter is the dictionary definition⁴³ – it also represents the underlying approach of the now rejected *Frye* test.⁴⁴ These definitions, once applied, result in two separate analyses by the trial court: in the first, the court must determine that the explanative theory “works,” while in the second, only a determination is necessary that there exists sufficient assurances the explanative theory “works” to warrant acceptance by the trier of fact.⁴⁵

What makes *Daubert* confusing is that it utilizes both meanings of “reliable.” The thrust of the opinion, including the listing of factors to be considered, supports a conclusion that “gatekeeping” is a determination of whether the explanative theory works. The opinion even states

42. See *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1167 (1999); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

43. See WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 1917 (1981).

44. See *supra* note 3.

45. The proposed amendment to Rule 702 displays little appreciation of the importance of understanding what is conveyed by the word “reliable.” In the initially circulated draft, the following was proposed to be tacked on to the end of current Rule 702: “provided that (1) the testimony is sufficiently based upon reliable facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.” The current proposal uses the word “reliable” only twice: “if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.”

What pray tell is the meaning of the word reliable in “reliable” facts or data, the product of “reliable” principles and methods, and the witness has applied the principles and methods “reliably” to the facts of the case? The removal of the first “reliable” is clearly an improvement as the court has no function in judging the “accuracy”, “correctness” of the facts or data constituting the expert’s bases. The third use of “reliably” would be better expressed by stating that the witness has “properly” applied the principles, etc., *i.e.*, he or she followed called for procedures, protocol, etc. The use of the term “reliable” in the phrase “product of reliable principles and methods” is on its face ambiguous as to which of the two usages of “reliable” is intended as is the overall tenor of the Advisory Committee’s Note. Support for the “sufficient assurances of correctness” definition of “reliable” can, however, clearly be found in the portions of the Advisory Committee’s Note quoted at note 32, *supra* and 56, *infra*.

its confidence in federal judges to make a "preliminary assessment of whether the reasoning and methodology underlying the testimony is scientifically valid."⁴⁶ That is, "the principal support[s] what it purports to show"⁴⁷ [in other words, it works], and "evidentiary reliability will be based upon *scientific validity*."⁴⁸ At the same time, however, *Daubert* states Rule 702 requires that an "expert's opinion will have a reliable basis in the knowledge and experience of his discipline,"⁴⁹ which is a reference to sufficient assurances the explanative theory works. At one point in the opinion, *Daubert* appears to speak of both meanings at once:

The inquiry envisioned by Rule 702 is, we emphasize, a flexible one. Its overarching subject is the scientific validity and thus the evidentiary relevance and reliability—of the principles that underlie a proposed submission. The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate.⁵⁰

This last sentence is subject to interpretation. In *General Electric Co. v. Joiner*, the Supreme Court was forced to acknowledge that "conclusions and methodology are not entirely distinct from one another."⁵¹

Kumho, for its part, is no better. The discussion of the "flexibility" of factors to be considered in determining "the reliability of expert testimony" implies a search for correctness, accuracy, etc.—that the explanative theory "works."⁵² Moreover, in Part III of the opinion, Justice Breyer provides an illustration of what he believes to be the proper application of the flexible *Daubert-Kumho* factor approach, concluding the "relevant issue was whether the expert could reliably determine the cause of this tire's separation."⁵³ More simply stated, does the explanative theory as actually applied to the particular facts presented produce a correct, accurate, valid result? *Kumho* also references reliability as requiring sufficient assurances that the explanative theory works. It quotes *Daubert* for the proposition that "the trial judge must determine whether the testimony has 'a reliable basis in the knowledge and experience of [the relevant] discipline.'"⁵⁴ Most significantly, *Kumho* further states that the trial court's responsibility "is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor

46. *Daubert*, 509 U.S. at 592-93.

47. *Id.* at 590 n. 9.

48. *Id.*

49. *Id.* at 592.

50. *Id.* at 594-95.

51. 552 U.S. 136, 146 (1997); see also *infra*, note 83 (discussing the relationship between the explanative theory and the conclusions reached from its application).

52. See *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1176 (1999).

53. *Id.*

54. *Id.* at 1174; see also text accompanying *infra* note 63.

that characterizes the 'practice' of an expert in the relevant field."⁵⁵

B. Trial and Appellate Courts

Numerous questions of interpretation arise when one seeks to determine whether an explanative theory "works." Applying even the five *Daubert* factors in a consistent and rational manner is not an easy task. The flexible approach of *Kumho*, at least according to the Advisory Committee's Note to proposed amended Rule 702,⁵⁶ will put additional

55. *Id.* at 1176.

56. The proposed text is as follows:

Proposed Advisory Committee's Note to Rule 702

* * *

Courts both before and after *Daubert* have found other factors relevant in determining whether expert testimony is sufficiently reliable to be considered by the trier of fact. These factors include:

(1) Whether experts are "proposing to testify about matters growing naturally and directly out of research they have conducted independent of the litigation, or whether they have developed their opinions expressly for purposes of testifying." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1317 (9th Cir. 1995).

(2) Whether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion. See *General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) (noting that in some cases a trial court "may conclude that there is simply too great an analytical gap between the data and the opinion proffered").

(3) Whether the expert has adequately accounted for obvious alternative explanations. See *Clair v. Burlington N.R.R.*, 29 F.3d 499 (9th Cir. 1994) (testimony excluded where the expert failed to consider other obvious causes for the plaintiff's condition). Compare *Ambrosini v. Labarraque*, 101 F.3d 129 (D.C.Cir. 1996) (the possibility of some uneliminated causes presents a question of weight, so long as the most obvious causes have been considered and reasonably ruled out by the expert).

(4) Whether the expert "is being as careful as he would be in his regular professional work outside his paid litigation consulting." *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997). See *Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167, 1175 (1999) (*Daubert* requires the trial court to assure itself that the expert "employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field").

(5) Whether the field of expertise claimed by the expert is known to reach reliable results for the type of opinion the expert would give. See *Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167, 1175 (1999) (*Daubert's* general acceptance factor does not "help show that an expert's testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy."); *Moore v. Ashland Chemical, Inc.*, 151 F.3d 269 (5th Cir.1998) (en banc) (clinical doctor was properly precluded from testifying to the toxicological cause of the plaintiff's respiratory problem, where the opinion was not sufficiently grounded in scientific methodology); *Sterling v. Velsicol Chem. Corp.*, 855 F.2d 1188 (6th Cir.1988) (rejecting testimony based on "clinical ecology" as unfounded and unreliable).

All of these factors remain relevant to the determination of the reliability of expert testimony under the Rule as amended. Other factors remain relevant. See *Kumho*, 119 S.Ct. 1167, 1176 ("[W]e conclude 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."). Yet no single factor is necessarily dispositive of the reliability of a particular expert's testimony. See, e.g., *Heller v. Shaw Industries, Inc.*, 167 F.3d 146, 155 (3d Cir.1999) ("not only must each stage of the

factors on the table, further complicating the process. As more factors are created, the harder it becomes for the non-expert trial judge to determine whether an explanative theory "works."⁵⁷ It is respectfully suggested that the reluctance of trial and appellate judges to make this decision, thereby becoming amateur experts themselves,⁵⁸ led several courts to develop and sanction the two avoidance techniques discussed above, and in some instances, to limit the application of *Daubert* solely to scientific knowledge.⁵⁹

On the other hand, trial and appellate judges appear to favor the "sufficient assurances of correctness" approach.⁶⁰ According to this method, which is supported by both *Daubert* and *Kumho*, an explanative theory used by an expert to support his or her testimony is sufficiently "reliable" when sufficient assurances are present to warrant jury acceptance that the theory, as actually applied to the facts at hand, produces a correct result.

IV. DETERMINING "SUFFICIENT ASSURANCES OF CORRECTNESS"

Ordinarily, sufficient assurances of correctness can be established

expert's testimony be reliable, but each stage must be evaluated practically and flexibly without bright-line exclusionary (or inclusionary) rules."); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1317 n.5 (9th Cir.1995) (noting that some expert disciplines "have the courtroom as a principal theatre of operations" and as to these disciplines "the fact that the expert has developed an expertise principally for purposes of litigation will obviously not be a substantial consideration.").

57. Hopefully all trial courts, consistent with *Kumho*, and recent practice under *Daubert*, will simply consider whatever is relevant in performing their gatekeeping obligation, (however ultimately interpreted), rather than proceed one by one through a list of factors to be considered as occurred in many of the early decisions applying the five *Daubert* factors.

58. Reluctance by appellate judges to get too deeply involved in determining what is scientific knowledge was expressed in *De-Paep v. General Motors Corp.*, 141 F.3d 715, 719-20 (7th Cir. 1998) ("GM's lawyers lampoon the methods Syson used to test the sun visor and to reach conclusions about the engineering compromises that would optimize a sun visor's performance in light of the risks involved. But their *cri de coeur* is not backed up by references to any body of scientific knowledge. What tests *do* engineers use to resolve questions of the kind Syson addressed? What tests should he have performed? What data did he overlook? Counsel apparently want appellate judges to make a priori judgments about how scientific inquiry should be conducted. That way quackery lies. A profession resolves questions of method in the same way it reaches conclusions about other empirical issues; which method is best is a question itself subject to scientific inquiry. See KENNETH R. FOSTER & PETER W. HUBER, *JUDGING SCIENCE: SCIENTIFIC KNOWLEDGE AND THE FEDERAL COURTS* 137-62 (1997). For all this record reveals, Syson performed the tests that GM's staff engineers or the faculty of MIT use to reach conclusions. (Syson was a design engineer at GM earlier in his career.) A litigant that wants a court of appeals to set aside a district judge's decision to admit expert testimony has to do more than appeal to a lawyer's sense of how science should be done. That is all GM has done, and we therefore lack any basis on which to upset the district judge's decision, whether or not that decision was correct as an independent matter.").

59. See generally GRAHAM, *supra* note 20.

60. See *id.*

by showing the explanative theory, as applied, has gained widespread acceptance in the particular field to which it belongs.⁶¹ In the alternative, the explanative theory can be shown to possess sufficient assurances of correctness by proof that the explanative theory, as actually applied, possesses particularized earmarks of trustworthiness. Generally speaking, particularized earmarks of trustworthiness can be established

61. Of course, reliance on "widespread acceptance" is subject to the limitation that the entire field to which the explanative theory belongs does not itself simply "lack[] reliability." *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1167, 1175 (1999) ("Nor, on the other hand, does the presence of Daubert's general acceptance factor help show that an expert's testimony is reliable where the discipline itself lacks reliability, as, for example, do theories grounded in any so-called generally accepted principles of astrology or necromancy.").

Other courts have relied on widespread acceptance as a sufficient alternative test. *See United States v. Vitek Supply Corp.*, 144 F.3d 476, 485 (7th Cir. 1998) ("We first address the contention that the district judge failed to determine whether the techniques used to ascertain the content of Vitek's premixes are generally accepted. All the chemical testing took place at a FDA laboratory, where analysts performed four procedures—fourier transform infrared spectrometry, gas chromatography/mass spectrometry, high performance liquid chromatography and electropray liquid chromatography tandem mass spectrometry. Each of these procedures reveals a substance's 'spectrum' or 'fragmentation pattern'—a sort of chemical fingerprint. Analysts then identify a substance by comparing its spectrum with spectra from known standard samples or from a computer library. These procedures, and the tools used to perform them, are widely used and generally accepted in the fields of analytical and forensic chemistry."); *Scott v. Ross*, 140 F.3d 1275, 1286 (9th Cir. 1998) ("Dr. Shupe's testimony conformed to a generally accepted explanatory theory, as indicated by his citation to other authors, primarily collaborators, who have discussed theories consistent with his."); *Concord Boat Corp. v. Brunswick Corp.* 21 F.Supp.2d 923, 934 (E.D. Ark. 1998) ("Plaintiffs have amply demonstrated the soundness of the Cournot model as a fundamental, time-tested economic tool that has been widely accepted for years by reputable economists. Indeed, the Cournot model provides the theoretical underpinnings for the Department of Justice's Horizontal Merger Guidelines and the widely used Herfindahl-Hirschman Index (the 'HHI').").

The practical utility of the alternative test of widespread acceptance was recognized in *Kumho*. The court found that "The trial court must have the same kind of latitude in deciding how to test an expert's reliability, and to decide whether or when special briefing or other proceedings are needed to investigate reliability, as it enjoys when it decides whether or not that expert's relevant testimony is reliable. Our opinion in *Joiner* makes clear that a court of appeals is to apply an abuse-of-discretion standard when it 'review[s] a trial court's decision to admit or exclude expert testimony.' That standard applies as much to the trial court's decisions about how to determine reliability as to its ultimate conclusion. Otherwise, the trial judge would lack the discretionary authority needed both to avoid unnecessary 'reliability' proceedings in ordinary cases where the reliability of an expert's methods is properly taken for granted, and to require appropriate proceedings in the less usual or more complex cases where cause for questioning the expert's reliability arises. Indeed, the Rules seek to avoid 'unjustifiable expense and delay' as part of their search for 'truth' and the 'jus[t] determin[ation]' of proceedings. Thus, whether *Daubert's* specific factors are, or are not, reasonable measures of reliability in a particular case is a matter that the law grants the trial judge broad latitude to determine." *See also* FED. R. EVID. 702 (proposed) advisory committee's note ("Likewise, this amendment is not intended to provide an excuse for an automatic challenge to the testimony of every expert. *See Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167, 1176 (1999) (noting that the trial judge has the discretion 'both to avoid unnecessary "reliability" proceedings in ordinary cases where the reliability of an expert's methods is properly taken for granted, and to require appropriate proceedings in the less usual or more complex cases where cause for questioning the expert's reliability arises.').").

if the expert's explanative theory is shown to have been derived and employed in a manner consistent with processes customarily employed by experts in the particular field. In other words, stated in the alternative, the explanative theory must: (1) adhere to the same standards for intellectual rigor demanded in the expert's professional work, (2) conform to applicable professional standards employed outside the courtroom, (3) possess the aura of proper expert methodology, or (4) be soundly grounded in the principles and methodology of the particular field.⁶² *Clearly, several courts have already moved considerably toward adopting the foregoing reasoning.*⁶³

62. The foregoing focuses attention upon the general question as to whether development of the explanative theory exhibits the aura of proper scientific methodology, i.e., "employs in the courtroom the same level of intellectual rigor that characterizes the practice of the expert in the relevant field," thus making the explanative theory sufficiently "reliable" for the trier of fact to evaluate. *Kumho*, 119 S.Ct. at 1176. Focusing on whether the explanative theory sufficiently possesses the aura of proper scientific methodology for the trier of fact to consider rather than requiring the trial judge to decide whether the explanative theory in fact "works" also comports with *Daubert's* assertion that "vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking *shaky but admissible evidence*." *Daubert v. Merrell Don Pharmaceuticals, Inc.*, 509 U.S. 579, 596 (1993) (emphasis added).

63. *See, e.g.*, *United States v. Hall*, 165 F.3d 1095, 1102 (7th Cir. 1999) ("First, when faced with a proffer of expert scientific testimony, the district court must 'consider whether the testimony has been subjected to the scientific method; it must rule out 'subjective belief or unsupported speculation.' ' *Porter*, 9 F.3d at 614 (citation omitted). This step requires that the district court determine 'whether the reasoning or methodology underlying the testimony is scientifically valid.' *Daubert*, 509 U.S. at 592-93, 113 S.Ct. 2786."); *Ruiz-Troche v. Pepsi Cola of Puerto Rico*, 161 F.3d 77, 85 (1st Cir.1998) ("*Daubert* does not require that a party who proffers expert testimony carry the burden of proving to the judge that the expert's assessment of the situation is correct. As long as an expert's scientific testimony rests upon 'good grounds, based on what is known,' *Daubert*, 509 U.S. at 590, 113 S.Ct. 2786 (internal quotation marks omitted), it should be tested by the adversary process—competing expert testimony and active cross-examination—rather than excluded from jurors' scrutiny for fear that they will not grasp its complexities or satisfactorily weigh its inadequacies, see *id.* at 596, 113 S.Ct. 2786. In short, *Daubert* neither requires nor empowers trial courts to determine which of several competing scientific theories has the best provenance. It demands only that the proponent of the evidence show that the expert's conclusion has been arrived at in a scientifically sound and methodologically reliable fashion. See *Kannankeril v. Terminix Int'l, Inc.*, 128 F.3d 802, 806 (3d Cir.1997); *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 744 (3d Cir.1994)."); *Moore v. Ashland Chemical Inc.*, 151 F.3d 269, 276 (5th Cir.1998) ("Thus, the party seeking to have the district court admit expert testimony must demonstrate that the expert's findings and conclusions are based on the scientific method, and, therefore, are reliable. This requires some objective, independent validation of the expert's methodology. The expert's assurances that he has utilized generally accepted scientific methodology is insufficient. See *Daubert v. Merrell-Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1316 (9th Cir.1995) (on remand). The proponent need not prove to the judge that the expert's testimony is correct, but she must prove by a preponderance of the evidence that the testimony is reliable."); *Kannankeril v. Terminix International, Inc.*, 128 F.3d 802, 806 (3d Cir.1997) ("In order for the expert testimony to be 'reliable,' we have required that the testimony be based on the 'methods and procedures of science,' rather than on 'subjective belief or unsupported speculation.' *Paoli*, 35 F.3d at 744."); *Moore v. Ashland Chemical, Inc.*, 126 F.3d 679, 682 (5th Cir.1997) ("[A] trial judge assessing the reliability of the proffer of a

clinical physician's expert testimony based on clinical medical knowledge should determine whether it is soundly grounded in the knowledge, principles and methodology of clinical medicine; the 'Daubert factors,' which are techniques derived from hard science methodology, are, as a general rule, inappropriate for use in making the reliability assessment of expert clinical medical testimony."); Wintz by and through Wintz v. Northrop Corp., 110 F.3d 508, 512 (7th Cir.1997) ("Our case law interpreting *Daubert* has established that, when evaluating the admissibility of proffered expert testimony, district courts are to undertake a two-step methodology. First, the district court must 'consider whether the testimony has been subjected to the scientific method; it must rule out "subjective belief or unsupported speculation." ' Deimer v. Cincinnati Sub-Zero Products, Inc., 58 F.3d 341, 344 (7th Cir.1995) (quoting *Porter*, 9 F.3d at 614). Second, the district court must "determine whether the evidence or testimony assists the trier of fact in understanding the evidence or in determining a fact in issue." ' *Id.*"); *Iacobelli Construction, Inc. v. County of Monroe*, 32 F.3d 19, 25 (2d Cir.1994) ("[T]hey rely upon the type of methodology and data typically used and accepted in construction-litigation cases. Given the inherently voluminous and highly technical nature of the data in such cases, the parties in a construction-contract dispute usually must retain experts to summarize and interpret that data. See, e.g., *Foster Constr.*, 435 F.2d at 884-86; *North Slope*, 14 Cl.Ct. at 253-61; *Shank-Artukovich v. United States*, 13 Cl.Ct. 346, 352-55 (1987), *aff'd*, 848 F.2d 1245 (Fed. Cir.1988). This case is no different. After reviewing the bid documents, geotechnical data, and geotechnical interpretive reports, Heuer and Eller each presented his own summary and analysis of the Jay-Arnett tunnel site, *Iacobelli's* contract, and the construction results."); *In re Executive Telecard, Ltd. Securities Litigation*, 979 F.Supp. 1021, 1024 (S.D.N.Y.1997) ("The valuation of damages in a securities class action such as this does not appear to be the sort of 'hard science' that requires application of the specific factors set forth by *Daubert*. We are guided, nonetheless, by the *Daubert* Court's more general instruction that '[t]he inquiry envisioned by rule 702 is . . . a flexible one. Its overarching subject is the scientific validity and thus the evidentiary relevance and reliability—of the principles that underlie a proposed submission. The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate.' 509 U.S. at 594-95, 113 S.Ct. at 2797. In other words, an expert's opinion should at least 'have a reliable basis in the knowledge and experience' of the particular 'discipline' involved. 509 U.S. at 592, 113 S.Ct. at 2796."); *Karlin v. Foust*, 975 F.Supp. 1177, 1215 (W.D.Wis.1997) ("The methods an expert employs to reach his opinion must be at least as precise as the methods his profession would require for out-of-court research. *People Who Care*, 111 F.3d at 536; see also *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir.1997) (expert must be as careful in testimony to court as she would be in regular professional work).").

For cases illustrating the exclusion of expert testimony not buttressed by an explanative theory meeting the foregoing test, see *Weisgram v. Marley Co.*, 169 F.3d 514, 520-21 (8th Cir. 1999):

The metallurgist Dolence contacted was Sandy Lazarowicz. Dolence told Lazarowicz his theory of the fire and asked him to take a look at the Weisgram heater. Lazarowicz examined the thermostat contacts and the high limit control contacts from the heater and studied the same components in the Ferguson heater. He was qualified as an expert in the properties of metals. Admittedly, however, he was not an expert in fire cause and origin, in baseboard heater operation, or in the design or testing of contacts in such a unit. See Trial Tr. of May 27, 1997 (testimony of Sandy Lazarowicz), at 16-17, 64.

He testified that the thermostat contacts were defectively designed because they were serrated. The rough surfaces caused arcing and material transfer between the contacts. He theorized that "the continual usage and build up of defects on the surface" of the contacts must have caused them to weld, and that they could not then pull apart (at least not until the heat from the fire in the home softened the weld). *Id.* at 81. Thus, he said, there was a closed circuit, the heater did not shut off, and that is why the unit overheated. He formulated his theory knowing practically nothing about the Weisgram heater, or any other baseboard heater for that matter.

For example, when he formed his opinions he was unaware of the heater's wattage or the amperage it drew, and therefore could not say if the thermostat contacts could have reached a high enough temperature to melt the metal and to form a weld before the fire. See *id.* at 69-71, 73. He performed no tests to determine whether it was even theoretically possible that the contacts could get sufficiently hot to weld during operation of the heater. In fact, in his first deposition, Lazarowicz was unable to say for certain that the contacts actually had welded, notwithstanding his examination of them under an electron microscope. Only after closer examination of the contacts from the Ferguson exemplar was he able to see the evidence of welding in the Weisgram contacts. We think the District Court abused its discretion when it permitted this testimony from Lazarowicz.

Further, as we have explained, the heater had a backup system that would prevent it from dangerously overheating even if the heater ran amok because the thermostat failed to shut it off: the high limit control. In order for the heater to be defective in the way the plaintiffs theorize, the high limit control had to fail to shut off the electrical current to the heater at the very same time that the thermostat was failing. Lazarowicz testified that the high limit contacts did not open when the unit was energized (receiving current), but opened only after the fire was well underway. He theorized that this failure may have occurred because the high limit control's temperature sensing mechanism was placed within the unit in a location where it could not detect the actual temperature of the heater. He had metallurgic evidence for the opinion that the contacts did not open while electricity was flowing through the heater (and, in fact, other witnesses noted the same evidence). But he had no metallurgic reason for his conclusion that the device was not properly sensing the temperature, because, of course, that is not a metallurgic issue. Lazarowicz testified that he had performed no tests on the Ferguson exemplar to see if its high limit switch functioned properly, or to determine if in fact there was a defect (in design) in that similar heater. He did not have the necessary experience—either from his work as a metallurgist or from tests performed in connection with this case—to be qualified as an expert who could testify that the high limit control failed because it was defectively designed or manufactured.

Lazarowicz's opinions amount to no more than "subjective belief or unsupported speculation." *Daubert*, 509 U.S. at 590, 113 S.Ct. 2786. We conclude that the nexus between his observations of the contacts and his conclusion that the heater was defective is not scientifically sound. He admittedly had very limited experience with electrical contacts in small appliances and no experience with how contacts function in baseboard heaters. "[T]here is simply too great an analytical gap between the data and the opinion proffered." *General Elec. Co. v. Joiner*, 522 U.S. 136, 118 S.Ct. 512, 519, 139 L.Ed.2d 508 (1997).

Therefore, his testimony was unreliable and it was an abuse of discretion to allow it.

Cabrera v. Cordis Corp., 134 F.3d 1418, 1422 (9th Cir.1998):

Aristo Vojdani holds a Ph.D. in immunology. Cabrera wanted Vojdani to testify that he had tested a sample of her blood in August 1993, and found the presence of silicone antibodies. Those antibodies would support Cabrera's contention that she was undergoing an autoimmune response to silicone. Cordis opposed the admission of his testimony because Vojdani's test for silicone antibodies was not scientifically reliable as required by *Daubert*. The district court agreed that the test did not satisfy *Daubert*.

First, the court noted that only Vojdani used the test he had performed on Cabrera's blood, and there is no generally accepted blood test for silicone antibodies. Cabrera counters that two other labs perform a similar test. At the hearing, however, the district judge sustained Cordis' objection to the introduction of test results from another laboratory, and Vojdani testified only that several other labora-

atories perform silicone antibody tests, although he did not know if they performed the same test he uses. Vojdani also testified that his test had never been peer-reviewed. Vojdani had no documentation of even his own development of the test, as his records were destroyed in an earthquake. Further (although this is not dispositive), the Federal Drug Administration does not recognize any silicone antibody test at all.

The district court was within its discretion in excluding Vojdani's testimony. Vojdani provided no explanation of "precisely how [he] went about reaching his conclusions" regarding the accuracy of his testing measure, and could not "point to some objective source . . . to show that [he has] followed the scientific method, as it is practiced by (at least) a recognized minority of scientists in [his] field." *Lust*, 89 F.3d at 597 (quoting *Daubert II*, 43 F.3d at 1317). Although Cabrera argues that the test results should have been admitted because the test was conducted with no connection to the litigation, that argument does not substitute for the lack of foundation for the test itself. The district court properly considered the methodology Vojdani used, rather than the test results, and did not abuse its discretion by finding it lacking in reliability.

Kumho Tire Co., Ltd. v. Carmichael, 119 S.Ct. 1167, 1176 (1999), speaks favorably of the approach:

To say this is not to deny the importance of *Daubert's* gatekeeping requirement. The objective of that requirement is to ensure the reliability and relevancy of expert testimony. *It is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field.* Nor do we deny that, as stated in *Daubert*, the particular questions that it mentioned will often be appropriate for use in determining the reliability of challenged expert testimony. Rather, we conclude 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. That is to say, a trial court should consider the specific factors identified in *Daubert* where they are reasonable measures of the reliability of expert testimony. (emphasis added).

The foregoing approach continues to be applied after *Kumho*. See, e.g., *Tanner v. Westbrook*, 174 F.3d 542, 547-48 (5th Cir. 1999):

Our review of the admissibility issue is, of course, guided by *Daubert*, the cases applying it, and *Kumho Tire*. In *Daubert*, the Supreme Court provided a list of factors, such as testing, peer review, error rates, and acceptance of the opinion in the relevant scientific community, that a court may choose to use in determining the reliability of an expert's testimony. See *Daubert*, 509 U.S. at 593-94, 113 S.Ct. 2786; see also *Kumho Tire*, — U.S. at —, 119 S.Ct. at 1175 (emphasizing that the list of factors was not exclusive and that the factors may not always apply to the testimony at issue). The test of reliability is flexible and bends according to the particular circumstances of the testimony at issue. See *Kumho Tire*, — U.S. at —, 119 S.Ct. at 1175; see also *Black v. Food Lion, Inc.*, 171 F.3d 308, 311 (5th Cir.1999) (advising that courts should use the traditional *Daubert* factors as a starting point for evaluating proffered expert testimony). Whatever the test employed, the objective is to ensure the reliability and relevance of the expert testimony. See *id.*

"The proponent [of the expert testimony] need not prove to the judge that the expert's testimony is correct, but she must prove by a preponderance of the evidence that the testimony is reliable." *Moore*, 151 F.3d at 276. The theory of the Tanners' case was that Jennifer Tanner's cerebral palsy was caused by birth asphyxia that the defendants improperly treated in the hours immediately following her birth. The Tanners' experts, Drs. St. Amant and Nestrud, supported this theory at trial by stating generally that birth asphyxia is a cause of cerebral palsy. The doctors made this

statement based on their personal knowledge and training and supported it with medical literature. The doctors also opined, based on their experience in the fields of obstetrics and neonatology, that Jennifer suffered from birth asphyxia and that, through proper treatment of this condition, Jennifer's cerebral palsy could have been avoided.

BMH, on the other hand, insists that the cerebral palsy-causing incident occurred some time before Jennifer Tanner was born. BMH asserts that the major insult suffered by Jennifer prior to her birth caused a difficult labor and delivery, during which, as a result of this difficulty, she suffered birth asphyxia. That is, BMH agrees with the Tanners that Jennifer Tanner suffered from asphyxia at birth; BMH does not agree, however, that birth asphyxia or the hospital's treatment of it caused Jennifer Tanner's cerebral palsy.

BMH supported its theory by submitting with its motion for an FRE 104 hearing an expert's affidavit and scientific literature pointing out that Jennifer's condition is not indicative of cerebral palsy caused by birth asphyxia. The medical literature states that birth asphyxia is rarely a cause of cerebral palsy and that a large proportion of cases of cerebral palsy remains unexplained. See Karin B. Nelson & Jonas H. Ellenperg, *Antecedents of Cerebral Palsy*, *NEW ENGLAND J. MED.*, July 10, 1986, at 85-86. The medical literature also indicates that when birth asphyxia is severe enough to cause cerebral palsy, there is usually evidence of corresponding major organ damage. See Richard L. Naeye et al., *Origins of Cerebral Palsy*, 143 *AM. J. DISEASES CHILDREN* 1160 (1989). The organ damage is caused by preferential perfusion, a phenomenon triggered by asphyxia in which there is a redistribution of blood flow, with increased flow to the head and heart and decreased flow to non-vital organs. See AVROY A. FANAROFF & RICHARD J. MARTIN, *NEONATAL-PERINATAL MEDICINE* (5th ed.). Jennifer Tanner did not suffer from major organ damage in conjunction with her cerebral palsy. Furthermore, the literature maintains that many of Jennifer's symptoms in the hours after her birth support the conclusion that she suffered from congenital defects which, rather than asphyxia, probably triggered her cerebral palsy. See Naeye et al., *supra*, at 1159. Moreover, one study specifically stated that "[a] failure of medical personnel to react to evidence of . . . asphyxia was followed by a greater-than-expected frequency of neonatal apnea and seizures, but not CP." *Id.*

In response to BMH's FRE 104 motion materials, the Tanners provided copies of their experts' deposition testimony and supporting medical literature. These materials addressed BMH's contention that Jennifer's cerebral palsy was likely caused by some congenital defect, rather than birth asphyxia. The affidavits of both Dr. St. Amant and Dr. Nestrud state that there was no evidence of a congenital defect and that, as a result, they eliminated that explanation for her resulting condition. The doctors also opined that the lack of damage to Jennifer's nonvital organs was "consistent with [their] opinions that most of Jennifer's asphyxial damage occurred following her birth, and not in utero. . . ." The Tanners, however, provided no medical literature supporting their experts' claims that Jennifer's symptoms—including the absence of nonvital organ damage—were consistent with their theory of causation. Further, in his deposition, Dr. Nestrud testified that he was not aware of any genetic causes for Jennifer's cerebral palsy, but, in order to rule out genetic causes, "a good physical examination by a qualified physician" was necessary; Dr. Nestrud had neither conducted such an exam nor reviewed the results of such an exam when he testified at his deposition.

The trial judge could have correctly concluded, based on the FRE 104 motion materials, that Dr. Nestrud had sufficient expertise, based on his experience and training, to testify about the standard of care to be given to a baby suffering from asphyxia. His ability to testify reliably about the cause of Jennifer's cerebral palsy, however, hinges on the validity of his opinion linking the post-birth asphyxia to

These dual tests for assessing “scientific, technical or other specialized knowledge” returns the trial judge to the familiar and “doable” role of determining whether an explanative theory is sufficiently trustworthy to present to the trier of fact, by examining the theory in the context of the particular field in which it belongs. The trial judge’s task would be to ascertain if the particular explanative theory is accepted or rejected by experts in its particular field.⁶⁴ If acceptance or rejection of the explanative theory has not yet occurred, or the “widespread acceptance” test does not comply with the way the explanative theory is derived in the particular case, such as is generally true in product liability litigation and sometimes with respect to medical clinical diagnosis and causation issues, the court looks to particularized earmarks of trustworthiness, which requires the judge to ascertain whether the given explanative theory was derived in a manner consistent with the processes customarily used by experts in the field.⁶⁵ In either case, the trial court is looking to experts in the particular field for assistance in assessing whether the explanative theory is sufficiently trustworthy (*i.e.*, sufficient assurances of correctness are present to warrant jury acceptance).⁶⁶ *Daubert* and

Jennifer Tanner’s cerebral palsy—specifically the depth of his knowledge of a complicated, specialized medical subject matter. He has no background in studying the causes of cerebral palsy. He bases his opinion on causation in part upon articles which state that asphyxia causes cerebral palsy. This fact is not disputed. What is in dispute is whether it is more likely than not that a baby with Jennifer Tanner’s symptoms developed cerebral palsy as a result of the hospital’s negligent treatment of her birth asphyxia. “[T]he question before the trial court was specific, not general. The trial court had to decide whether this particular expert had sufficient specialized knowledge to assist the jurors in deciding the particular issues in this case.” *Kumho Tire*, — U.S. at —, 119 S.Ct. at 1178 (internal quotation marks and citations omitted). Based on the materials before the trial judge, Dr. Nestrud did not have the kind of specialized knowledge required to testify regarding causation, nor did he rely upon medical literature directly addressing the causation issue in this case. This deficiency rendered his expert testimony as to a critical issue in the case—causation—unreliable. Thus, admitting the testimony, based on the materials submitted in support of its validity, was an abuse of discretion.

64. The expert’s assertion alone is obviously insufficient. See *Aldridge v. Goodyear Tire & Rubber Co.*, 34 F.Supp.2d 1010, 1023 (D.Md.1999) (“To be properly admissible under Rule 702, expert testimony ‘requires some objective, independent validation of the expert’s methodology. The expert’s assurances that he has utilized generally accepted scientific methodology is insufficient.’ *Moore v. Ashland Chem. Co.*, 151 F.3d 269, 276 (5th Cir.1998); see also *Cavallo v. Star Enterprise*, 892 F.Supp. 756, 760-61 (E.D.Va.1995), *aff’d in part*, 100 F.3d 1150, 1159 (4th Cir.1996).”).

65. In determining whether the explanative theory has been sufficiently shown to possess particularized earmarks of trustworthiness, the trial court may, but is not required to, consider, amongst others, the five *Daubert* factors, see note 14 *supra*, as well as other factors set forth in the Advisory Committee’s Note at note 56 *supra*. As stated in *Kumho*, note 37 *supra*, “the law grants a district court the same broad latitude when it decides how to determine reliability as it enjoys in respect of its ultimate reliability determination.” See note 63 *supra* for illustrative applications.

66. The following alternative amendment to Rule 702 is suggested:

Testimony providing scientific, technical or other specialized information, in

Kumho, so interpreted, would remove the trial judge from becoming an amateur scientist. Instead, the trial judge would look to the particular field the explanative theory belongs to guide the court as to whether the theory is sufficiently trustworthy to present to the jury for its consideration. The ultimate decision whether the explanative theory is sufficiently trustworthy, as actually applied, must, of course, remain with the trial judge.⁶⁷ In drawing upon the guidance of the field of expertise, the trial judge possesses broad discretion. The trial court, as established by *Kumho*, has the flexibility to consider whatever factors are relevant, whether or not an original *Daubert* factor, when determining the trustworthiness of an explanative theory.

V. UNDERSTANDING PROPOSED AMENDED RULE 702

A proposed amendment to Rule 702 of the Federal Rules of Evidence is working its way to Congress pursuant to the Rules Enabling Act, for which the earliest possible effective date is December 1, 2000. It states:

Rule 702. Testimony By Experts

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experi-

the form of an opinion, or otherwise, may be permitted only if (1) the information is based upon adequate underlying facts, data or opinions, (2) the information is based upon an explanative theory either (a) established to have gained widespread acceptance in the particular field to which the explanative theory belongs or (b) shown to possess particularized earmarks of trustworthiness, (3) the explanative theory was applied in accordance with proper procedure, (4) the witness is qualified as an expert by knowledge, skill, experience, training or education to provide such information, and (5) the information will substantially assist the trier of fact to understand the evidence or to determine a fact in issue.

67. As to the procedural requirements with respect to the gatekeeping determination, see advisory committee's note FED. R. EVID. 702 (proposed):

The amendment makes no attempt to set forth procedural requirements for exercising the trial court's gatekeeping function over expert testimony. See Daniel J. Capra, *The Daubert Puzzle*, 38 Ga.L.Rev. 699, 766 (1998) ("Trial courts should be allowed substantial discretion in dealing with *Daubert* questions; any attempt to codify procedures will likely give rise to unnecessary changes in practice and create difficult questions for appellate review."). Courts have shown considerable ingenuity and flexibility in considering challenges to expert testimony under *Daubert*, and it is contemplated that this will continue under the amended Rule. See, e.g., *Cortes-Irizarry v. Corporacion Insular*, 111 F.3d 184 (1st Cir. 1997) (discussing the application of *Daubert* in ruling on a motion for summary judgment); *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 736, 739 (3d Cir. 1994) (discussing the use of in limine hearings); *Claar v. Burlington N.R.R.*, 29 F.3d 499, 502-05 (9th Cir. 1994) (discussing the trial court's technique of ordering experts to submit serial affidavits explaining the reasoning and methods underlying their conclusions).

ence, training, or education, may testify thereto in the form of an opinion or otherwise^[68]; if (1) the testimony is based upon sufficient facts or data,^[69] (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.⁷⁰

The Advisory Committee's Note maintains that proposed amended Rule 702 is consistent with *Kumho's* interpretation of *Daubert*.⁷¹

68. An expert may testify as to general principles without ever offering an opinion. See FED. R. EVID. 702 (proposed) advisory committee's note. ("If the expert purports to apply principles and methods to the facts of the case, it is important that this application be conducted reliably. Yet it might also be important in some cases for an expert to educate the factfinder about general principles, without ever attempting to apply these principles to the specific facts of the case. For example, experts might instruct the factfinder on the principles of thermodynamics, or bloodclotting, or on how financial markets respond to corporate reports, without ever knowing about or trying to tie their testimony into the facts of the case. The amendment does not alter the venerable practice of using expert testimony to educate the factfinder on general principles. For this kind of generalized testimony, Rule 702 simply requires that: (1) the expert be qualified; (2) the testimony address a subject matter on which the factfinder can be assisted by an expert; (3) the testimony be reliable; and (4) the testimony 'fit' the facts of the case.")

69. The trial judge is not permitted to decide among sufficiently established facts, data, or opinions. See FED. R. EVID. 702 (proposed) advisory committee's note:

Subpart (1) of Rule 702 calls for a quantitative rather than qualitative analysis.

The amendment requires that expert testimony be based on sufficient underlying "facts or data" The term "data" is intended to encompass the reliable opinions of other experts. See the original Advisory Committee Note to Rule 703. The language "facts or data" is broad enough to allow an expert to rely on hypothetical facts that are supported by the evidence. *Id.*

When facts are in dispute, experts sometimes reach different conclusions based on competing versions of the facts. The emphasis in the amendment on "sufficient facts or data" is not intended to authorize a trial court to exclude an expert's testimony on the ground that the court believes one version of the facts and not the other.

There has been some confusion over the relationship between Rules 702 and 703. The amendment makes clear that the sufficiency of the basis of an expert's testimony is to be decided under Rule 702. Rule 702 sets forth the overarching requirement of reliability, and an analysis of the sufficiency of the expert's basis cannot be divorced from the ultimate reliability of the expert's opinion. In contrast, the "reasonable reliance" requirement of Rule 703 is a relatively narrow inquiry. When an expert relies on inadmissible information, Rule 703 requires the trial court to determine whether that information is of a type reasonably relied on by other experts in the field. If so, the expert can rely on the information in reaching an opinion. However, the question whether the expert is relying on a *sufficient* basis of information — whether admissible information or not — is governed by the requirements of Rule 702.

70. FED. R. EVID. 702 (proposed draft).

71. The text of that note is as follows:

Proposed Advisory Committee's Note

Rule 702 has been amended in response to *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), and to the many cases applying *Daubert*, including *Kumho Tire Co. v. Carmichael*, 119 S.Ct. 1167 (1999). In *Daubert* the Court charged trial judges with the responsibility of acting as gatekeepers to exclude unreliable expert testimony, and the Court in *Kumho*

The structure of the proposed rule, as evidenced by its three-prong proviso, implies that each of the three requirements is separate and distinct. It seems to require a court to declare that each prong is satisfied, or that one or more have not been sufficiently established, when determining the admissibility of expert witness testimony.

In practice, the dividing line between the three requirements is often at best incredibly unclear. More importantly, all three prongs are part and parcel of a single determination. For example, in *Kumho Tire Company, Ltd. v. Carmichael*,⁷² the Supreme Court explored all three requirements in applying its "flexible" approach for determining whether the plaintiff's expert witness's testimony was "reliable." The requirements were discussed more or less together, with the court mov-

clarified that this gatekeeper function applies to all expert testimony, not just testimony based in science. See also *Kumho*, 119 S.Ct. at 1176 (citing the Committee Note to the proposed amendment to Rule 702, which had been released for public comment before the date of the *Kumho* decision). The amendment affirms the trial court's role as gatekeeper and provides some general standards that the trial court must use to assess the reliability and helpfulness of proffered expert testimony. Consistently with *Kumho*, the Rule as amended provides that all types of expert testimony present questions of admissibility for the trial court in deciding whether the evidence is reliable and helpful. Consequently, the admissibility of all expert testimony is governed by the principles of Rule 104(a). Under that Rule, the proponent has the burden of establishing that the pertinent admissibility requirements are met by a preponderance of the evidence. See *Bourjaily v. United States*, 483 U.S. 171 (1987).

Daubert set forth a non-exclusive checklist for trial courts to use in assessing the reliability of scientific expert testimony. The specific factors explicated by the *Daubert* Court are (1) whether the expert's technique or theory can be or has been tested—that is, whether the expert's theory can be challenged in some objective sense, or whether it is instead simply a subjective, conclusory approach that cannot reasonably be assessed for reliability; (2) whether the technique or theory has been subject to peer review and publication; (3) the known or potential rate of error of the technique or theory when applied; (4) the existence and maintenance of standards and controls; and (5) whether the technique or theory has been generally accepted in the scientific community. The Court in *Kumho* held that these factors might also be applicable in assessing the reliability of non-scientific expert testimony, depending upon "the particular circumstances of the particular case at issue." 119 S.Ct. at 1175.

No attempt has been made to "codify" these specific factors. *Daubert* itself emphasized that the factors were neither exclusive nor dispositive. Other cases have recognized that not all of the specific *Daubert* factors can apply to every type of expert testimony. In addition to *Kumho*, 119 S.Ct. at 1175, see *Tyus v. Urban Search Management*, 102 F.3d 256 (7th Cir.1996) (noting that the factors mentioned by the Court in *Daubert* do not neatly apply to expert testimony from a sociologist). See also *Kannankeril v. Terminix Int'l, Inc.*, 128 F.3d 802, 809 (3d Cir.1997) (holding that lack of peer review or publication was not dispositive where the expert's opinion was supported by "widely accepted scientific knowledge"). The standards set forth in the amendment are broad enough to require consideration of any or all of the specific *Daubert* factors where appropriate.

72. 119 S.Ct. 1167 (1999).

ing between the three prongs of proposed Rule 702 freely without even identifying them in any manner.

In *Kumho*, the expert witness for the plaintiff opined that the tire blow out that caused the plaintiff's injury was due to a separation in the tire.⁷³ This separation resulted from a defect in the tire, and was not caused by over-deflection (*i.e.*, either overloading or under-inflation).⁷⁴ The expert testified that in the absence of at least two of four signs of abuse, observed through visual and tactile inspection,⁷⁵ the separation was caused by a defect.⁷⁶

At the reliable explanative theory level, that is, proposed Rule 702(2) above, the Supreme Court concluded there was no indication in the record that other experts in the industry used this two-factor test⁷⁷ or that other experts "normally made the very fine distinctions, say, the symmetry of comparatively greater shoulder tread wear that were necessary"⁷⁸ for the expert to support his own theory. It also found no indication in the record that the expert, if still working for a tire manufacturer, "would have concluded in a report to his employer that a similar tire was similarly defective on grounds identical to those upon which he rested his conclusion."⁷⁹ In the same vein, the Court noted that the trial court:

could reasonably have wondered about the reliability of a method of visual and tactile inspection sufficiently precise to ascertain with some certainty the abuse-related significance of minute shoulder/center relative tread wear differences, but insufficiently precise to tell 'with any certainty' from the tread wear whether a tire had traveled less than 10,000 or more than 50,000 miles.⁸⁰

As to whether the facts, data, or opinions relied upon as the basis of the experts opinion were sufficiently established, that is, proposed Rule 702(1) above, the record indicated that while the expert asserted that the tire tread remaining had a depth of 3/32 inch, "the opposing expert's (apparently undisputed) measurements indicate that the tread depth taken at various positions around the tire actually ranged from .5/32 of an inch to 4/32 of an inch, with the tire apparently showing greater wear along both shoulders than along the center."⁸¹

73. See *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1167 1172 (1999).

74. See *id.* at 1173.

75. The four signs of abuse are: (1) proportionately great tread wear on the shoulder; (2) signs of grooves caused by the beads; (3) discolored sidewalks; or, (4) marks on the rim flange. See *id.* at 1172.

76. See *id.*

77. See *id.* at 1178.

78. *Id.*

79. *Id.* at 1179.

80. *Id.* at 1177.

81. *Id.* at 1178.

Regarding proper application, that is, proposed Rule 702(3) above, the expert testified, with respect to the sign of abuse known as bead grooving, "that most tires have some bead groove pattern, that where there is reason to suspect an abnormal bead groove he would ideally 'look at a lot of [similar] tires' to know the grooving's significance, and that he had not looked at many tires similar to the one at issue."⁸²

In short, the Supreme Court in *Kumho* did what should be done in all cases – it looked at all three requirements as if there were one requirement:

For one thing, and contrary to respondents' suggestion, the specific issue before the court was not the reasonableness in general of a tire expert's use of a visual and tactile inspection to determine whether over-deflection 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.*⁸³

In fact, the best way to assess an expert witness's explanative theory is to combine the three requirements of proposed Rule 702, and ask, "As actually applied in the matter at hand to facts, data, or opinions sufficiently established to exist, are there sufficient assurances present that the expert witness' explanative theory produces a correct result to warrant jury acceptance?"⁸⁴

82. *Id.* at 1178

83. *Id.* at 1177 (emphasis added).

84. Formulating the gatekeeping determination in a single question eliminates the apparent uncertainty displayed by the Supreme Court with respect to the relationship between the explanative theory and the conclusion reached from its application. In *Daubert*, the Supreme Court stated that the "focus, of course, must be solely on principles and methodology [i.e., explanative theory], not on the conclusions that they generate." 509 U.S. at 595, 113 S.Ct. at 2797. But in *Joiner*, the Supreme Court opined that "conclusions and methodology [i.e., explanative theory] are not entirely distinct from one another." — U.S. at —, 118 S.Ct. at 519. Finally, in *Kumho* the Supreme Court observes that the focus is not in fact upon the "reasonableness" of the explanative theory itself but rather upon "the reasonableness of using such an approach . . . to draw a conclusion regarding the particular matter which the expert testimony was directly relevant." — U.S. at —, 119 S.Ct. at 1177.

Kumho's approach of asking a unified question—as actually applied in the matter at hand to facts, data, or opinions sufficiently established to exist, are there sufficient assurances present that the expert witness's explanative theory produces an accurate result to warrant jury acceptance?—clarifies that the explanative theory of the expert and the conclusion of the expert are not distinct at all but rather simply two elements of a single question. This is not, of course, equivalent to saying that whether the explanative theory is "reliable" and the actual correctness of the expert's conclusion as testified to in court are not separate issues. For example another expert may apply the same or a different explanative theory to the same or a different basis and reach a different conclusion. If the second expert's testimony also passes *Kumho* gatekeeping, the trier of fact would be charged with deciding which conclusion, if either, to accept.

Focusing on the presence of sufficient assurances that the explanative theory produces an accurate result to warrant jury acceptance avoids the dilemma that could be faced by the court if a

The above approach, which was employed in *Kumho*, avoids problems in analysis which may arise if each of the three requirements were treated as separate. In *Kumho* itself, visual and tactile observation was assumed to be a reliable method of determining why the tire tread separated from its steel-belted carcass.⁸⁵ However, if we assume that visual and tactile inspection employing a four sign approach is shown to possess sufficient assurances of correctness (*i.e.*, “reliable”) to warrant jury acceptance, and that such explanative theory requires the presence of all four signs for a conclusion of defect to be reached, then what happens if the evidence indicates that only three of the four signs are present to the required extent?

If the three requirements specified in proposed amended Rule 702 are treated separately, even though there is an explanative theory that is the product of reliable principles and methods (702(2)), there is an inadequate basis of facts, data or opinions to support the theory (702(1)) because the fourth sign has not been established. Arguably, then, the testimony should be excluded because it is not “based upon sufficient

determination was made that the explanative theory actually “works”. What if two competing explanative theories applied to the *same* facts, data or opinions resulted in opposite conclusions? If the court, under Rule 104(a), was to determine that it is more probably true than not that one of the two explanative theories produced an accurate result when properly applied, then the other explanative theory, of course, could not do so also. In short, under such circumstances the court would be required in theory to permit one explanative theory to be heard by the jury but not the other. On the other hand, if the trial court’s determination focused on sufficient assurances of a correct result, both explanative theories could in theory be presented to the jury, a result clearly favored by *Daubert*. ACCORD FED. R. EVID. 702 (proposed) advisory committee’s note to proposed Rule 702 (“When a trial court, applying this amendment, rules that an expert’s testimony is reliable, this does not necessarily mean that contradictory expert testimony is unreliable. The amendment is broad enough to permit testimony that is the product of competing principles or methods in the same field of expertise. See, e.g., *Heller v. Shaw Industries, Inc.*, 167 F.3d 146, 160 (3d Cir.1999) (expert testimony cannot be excluded simply because the expert uses one test rather than another, when both tests are accepted in the field and both reach reliable results). As the court stated in *In re Paoli R.R. Yard PCB Litigation*, 35 F.3d 717, 744 (3d Cir.1994), proponents ‘do not have to demonstrate to the judge by a preponderance of the evidence that the assessments of their experts are correct, they only have to demonstrate by a preponderance of evidence that their opinions are reliable. . . . The evidentiary requirement of reliability is lower than the merits standard of correctness.’ See also *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 43 F.3d 1311, 1318 (9th Cir.1995) (scientific experts might be permitted to testify if they could show that the methods they used were also employed by ‘a recognized minority of scientists in their field.’); *Ruiz-Troche v. Pepsi Cola*, 161 F.3d 77, 85 (1st Cir.1998) (*‘Daubert* neither requires nor empowers trial courts to determine which of several competing scientific theories has the best provenance.’”).

85. See *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1167, 1178 (1999) (“Respondents now argue to us, as they did to the District Court, that a method of tire failure analysis that employs a visual/tactile inspection is a reliable method, and they point both to its use by other experts and to Carlson’s long experience working for Michelin as sufficient indication that that is so. But no one denies that an expert might draw a conclusion from a set of observations based on extensive and specialized experience. Nor does anyone deny that, as a general matter, tire abuse may often be identified by qualified experts through visual or tactile inspection of the tire.”).

facts, [] data [, or opinions]."⁸⁶ Alternatively, an expert's testimony may not be the product of reliable principles and methods (702(2)) because an explanative theory employing only three signs has not been established to possess sufficient assurances of correctness to warrant acceptance. Lastly, if an explanative theory requiring the presence of four signs is applied when only three signs are present, or if the determination of the presence of one or more of the four signs was not done in applying that aspect of the explanative theory in accordance with proper procedure,⁸⁷ then arguably the explanative theory is not being applied in accordance with proper procedures (702(3)).

The foregoing arguments demonstrate that *Kumho* is correct in viewing the determination of the presence of sufficient assurances of correctness in the explanative theory as a single issue. This method of determining admissibility of an expert witness's opinion using an explanative theory in any area of scientific, technical, or specialized knowledge was further illustrated in *Blue Dane Simmental v. American Simmental Association*.⁸⁸ *Blue Dane* involved the effect of introducing 19 cattle (known as Risinger animals) that were only 97% pure breed Simmental to a total cattle market of 138,169 pure simmental cattle.⁸⁹ The plaintiff's economist's position was:

Dr. Baquet was to testify that the introduction of the nineteen Risinger animals into the fullblood Simmental market in the United States caused the market value of all American Simmentals to drop substantially. To support this testimony, he noted that prior to the introduction of the Risinger animals, both the Canadian and Ameri-

86. FED. R. EVID. 702 (proposed draft).

87. See FED. R. EVID. 702 (proposed) advisory committee's note:

The Court in *Daubert* declared that the "focus, of course, must be solely on principles and methodology, not on the conclusions they generate." 509 U.S. at 595. Yet as the Court later recognized, "conclusions and methodology are not entirely distinct from one another." *General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997). Under the amendment, as under *Daubert*, when an expert purports to apply principles and methods in accordance with professional standards, and yet reaches a conclusion that other experts in the field would not reach, the trial court may fairly suspect that the principles and methods have not been faithfully applied. See *Lust v. Merrell Dow Pharmaceuticals, Inc.*, 89 F.3d 594, 598 (9th Cir.1996). The amendment specifically provides that the trial court must scrutinize not only the principles and methods used by the expert, but also whether those principles and methods have been properly applied to the facts of the case. As the court noted in *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir.1994), "any step that renders the analysis unreliable . . . renders the expert's testimony inadmissible. *This is true whether the step completely changes a reliable methodology or merely misapplies that methodology.*"

88. 178 F.3d 1035 (8th Cir. 1999).

89. See *Blue Dane Simmental v. American Simmental Association*, 178 F.3d 1035, 1039 (8th Cir. 1999).

can Simmental markets were dropping. Following the introduction of these animals, the United States market dropped another 53%, while the Canadian market dropped only 26%. Dr. Baquet attributed this 27% difference in market price to the introduction of the Risinger Simmentals.⁹⁰

Dr. Baquet admitted during his deposition

that various factors contribute to particular cattle breeds losing market value. He stated that generally an economist would attempt to identify and evaluate all of the independent variables significantly affecting changes in the value of a breed. Dr. Baquet acknowledged that he had neglected to consider any variables other than the introduction of the Risinger fullbloods.⁹¹

The Eighth Circuit upheld the trial court's decision to exclude Dr. Baquet's testimony primarily on the basis that Dr. Baquet used a method of analysis – the before and after method – “without considering all independent variables that could affect the conclusion.”⁹² Therefore, sufficient assurances of correctness to warrant jury acceptance (*i.e.*, reliability) had not been established with respect to the particular method of analyzing data actually employed by the expert to draw the conclusion that the 27% difference in United States Simmental cattle prices during the relevant period was the result of the introduction of the Risinger cattle.⁹³

If viewed as three separate requirements, which requirement or requirements are not satisfied? Is before-and-after analysis an explanative theory that is the “product of reliable principles and methods” when applied after considering all independent variables significantly affecting changes in the value of a breed? “Probably yes,” although the court stated, “We find no evidence in the record that other economists use before-and-after modeling to support conclusions of causes of market fluctuation.”⁹⁴ But Dr. Baquet had not considered all such variables. Thus, with respect to the explanative theory actually employed where only the introduction of the 19 Risinger animals was considered as a possible cause in market fluctuation, the answer as to sufficient assurances of correctness is clearly, “No.”

Which view is intended? It appears that the former question is being asked. That is, is there “an” explanative theory employing before and after analyses that possesses sufficient assurances of correctness? The answer is, “probably yes.”

90. *Id.* at 1040.

91. *Id.*

92. *Id.* at 1041.

93. *See id.* at 1040.

94. *Id.* at 1041.

But what about the requirement that the testimony be based upon sufficient facts, data, or opinions? Clearly this requirement is not satisfied if the explanative theory requirement as stated above is inquiring whether there is an explanative theory that can work. The explanative theory that has sufficient assurances of correctness requires consideration of all independent variables that significantly affect changes in the market price.

Finally, the expert must have applied the explanative theory "reliably," *i.e.*, properly, to the facts, data, or opinions sufficiently established to exist. What does this mean in the context of *Blue Dane*? If you fail to consider relevant variables, can it be said that the explanative theory has been properly applied? "No" if the explanative theory requires consideration of all independent significant variables but "Yes" if the explanative theory examines solely the introduction of the 19 Risinger animals. In the latter case, the testimony fails for absence of sufficient assurances that the explanative theory works, not because of basis or application, since the theory only requires consideration of the one variable constituting the basis. This single-fact basis had been sufficiently established and was properly considered in *Blue Dane*.

Thus, once again as instructed by *Kumho*, as stated in *Blue Dane*, [I]t was not the general acceptance of the methodology that was relevant, "[r]ather, it was the reasonableness of using such an approach, along with [the expert'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.*"⁹⁵

As developed above, if each of the three requirements is treated as separate "general acceptance of the methodology" becomes, in fact, a "relevant" question. Asking such a question is not necessary, although sometimes helpful, since the only question that must be answered is whether there exist sufficient assurances of correctness of the explanative theory to warrant jury acceptance as actually applied to facts, data, or opinions in the case.

In summary, both *Kumho* and *Blue Dane* illustrate that the proper application of the proposed amended Rule 702 is as a single question. Treating each requirement independently would lead to an unnecessary determination whether "an" explanative theory possessing sufficient assurances of correctness exists generally in the matter at hand. Focusing on such a determination requires two additional questions to be asked: "Has a sufficient basis been established?," and "Was the explanative theory applied properly to such basis?" Instead, the more helpful way to state the entire issue, as done in *Kumho* and *Blue Dane*, is to

95. *Id.* at 1040 (quoting *Kumho Tire Co., Ltd. v. Carmichael*, 119 S.Ct. 1167, 1177 (1999)).

simply ask, "Has the explanative theory as actually applied to facts, data or opinions sufficiently established to exist been shown to possess sufficient assurances of correctness to warrant jury acceptance?"

VI. CONCLUSION

With *Kumho's* interpretation of *Daubert* clarifying that the gatekeeping obligation of explanative theory "reliability" screening is applicable to all expert witness testimony regardless of whether scientific, technical, or other specialized knowledge, deciding what is meant by "reliable" takes on great importance. Determining whether an explanative theory actually works is neither appropriate nor wise. Obviously, the role of the trial judge as "gatekeeper" is to prevent the trier of fact from relying upon expert testimony that does not warrant acceptance, not to decide which explanative theories produce "the" correct result. Trial courts are poorly equipped by training, education, and experience to make such a determination, not to mention uncomfortable in deciding whether an explanative theory actually works. As evidenced by reported decisions, judges believe that their proper role, one they undertake frequently, is to determine if sufficient assurances of correctness have been established to warrant jury acceptance of the results of the actual application of the explanative theory in the matter at hand to sufficiently established facts, data, or opinions.⁹⁶

While proposed amended Rule 702 of the Federal Rules of Evidence is not entirely clear as to what is meant by "reliable," the "sufficient assurance of correctness" interpretation is certainly consistent with the text of the rule and relevant segments of the Advisory Committee's Note; compatible with *Kumho*; and favored by judicial opinions speaking to the issue. As we enter the new millennium, it should be reconfirmed that trial judges are not amateur scientists, but rather they should be expected to look to the particular area of expertise for guidance in the form of the widespread acceptance test. Where such guidance is not forthcoming, the trial judges should determine whether sufficient assurances of correctness have been established by focusing on the existence, or lack thereof, of particularized earmarks of trustworthiness. The focus is on whether the explanative theory was derived and employed in a manner consistent with processes customarily used by experts in the particular field. In making this decision, the flexible approach to factor analysis of *Kumho* comes into play.

Confirming the traditional role of the trial judge as a gatekeeper who seeks sufficient assurances of correctness rather than as a determi-

96. See generally GRAHAM, *supra* note 20.

nator of correctness will put trial judges in the position of being asked to do what they are familiar with, and very well equipped to do. At the same time, it will enhance the "liberal thrust" to admissibility of expert witness testimony that was favored by *Daubert*.