Daubert's Gatekeeper: The Role of the District Court Judge in Admitting Expert Testimony

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DAUBERT'S GATEKEEPER: THE ROLE OF THE DISTRICT JUDGE IN ADMITTING EXPERT TESTIMONY

LINDA SANDSTROM SIMARD* AND WILLIAM G. YOUNG**

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I. INTRODUCTION

In Daubert v. Merrell Dow Pharmaceuticals, Inc.,¹ the Supreme Court held that the common-law "general acceptance" test for admitting scientific opinion evidence² did not survive the codification of federal evidentiary law in the Federal Rules of Evidence.³ The Court concluded that, under Federal Rule of Evidence 702, judges may admit expert testimony which is not yet generally accepted if it is reliable and relevant.⁴ Those commentators who see Daubert as inviting a vast expansion of opinion testimony in

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1. 113 S. Ct. 2786 (1993).
2. See Frye v. United States, 293 F. 1013 (D.C. Cir. 1923). To be admitted in evidence, the Frye test required expert testimony to be grounded in theories generally accepted by experts in the field. See id. at 1014.
3. Daubert, 113 S. Ct. at 2794.
4. Id. at 2794-95.
federal trials, however, are likely to be disappointed. The *Daubert* Court firmly established district court judges as "gatekeepers" of expert opinion testimony—charging them with the duty to determine whether such testimony is reliable enough to be admitted for the jury's consideration. A majority of the Supreme Court in *Daubert* then delineated criteria for determining the reliability of scientific testimony. However, the Court provided no guidance for determining the reliability of other types of expert testimony allowed by Rule 702.

Federal Rule of Evidence 702 is not self-explanatory, and any approach that depends on the district court judges acting as gatekeepers necessarily runs the risk of idiosyncratic approaches to admissibility. This risk is magnified by the complexity of the hypotheses on which a large portion of expert testimony rests. Thus, the future success of Rule 702 as an intelligible, evenly applied evidentiary standard depends on the cultivation of a common judicial understanding of its mandate and the development of a uniform methodology for analysis.

This Article embarks on that effort. Part II analyzes the special challenge faced by the trial judge in considering the admissibility of expert testimony. Part III discusses the impact of *Daubert* on the role of Federal Rule of Evidence 702 (Rule 702 or the Rule) in federal trials. Part IV considers the different types of knowledge embodied in the Rule and dissects the process of common-law codification to present a unified interpretation of the Rule that is sensitive to the specific nature of the underlying data. Part V suggests a theoretical approach to the crucial determination of reliability in instances in which the hypotheses offered may not be generally accepted. Uniform application of this approach to admissibility will have the beneficial effect of reducing disparity in evidentiary rulings and promoting predictability in the law, while accommodating new ideas and technologies that may assist a jury in the factfinding process.


7. *See id.* at 2796-98. The dissenting Justices saw no need to identify the criteria for admissibility of such testimony. *See id.* at 2799-2800 (Rehnquist, C.J., dissenting).
II. THE DIFFICULTY IN EVALUATING EXPERT TESTIMONY: SEPARATING THE WHEAT FROM THE CHAFF

Under the Federal Rules of Evidence, a lay witness may testify only with respect to matters within her personal knowledge—typically, events perceived by the witness through the exercise of the five senses. At the close of a trial, the jury, not the witness, must present its opinion of the truth of the matter being tried. Thus, it is not surprising that, under the Federal Rules of Evidence, opinion testimony of lay witnesses generally is excluded from the evidence at trial, because it is considered unnecessary, irrelevant, and likely to prejudice the jury's opinion.

Expert testimony, on the other hand, is admissible in the form of an opinion. Under Rule 702, "scientific, technical, or other specialized knowledge" in the form of an opinion is admissible if the court determines that it will "assist" the jury in deciding the issues of the case. An expert is allowed to present an opinion of the evidence because the expert is "possessed of special or peculiar training, experience, or observation in respect of the subject under investigation.'"

For a number of reasons, experts have an extraordinary opportunity to influence the jury. First, the expert's appearance of
“apparent objectivity” carries “undue weight” in the eyes of the jury. Additionally, because the basis of an expert’s opinion is beyond the common knowledge of the jury, the jury is less equipped to evaluate the merit of the expert’s opinion. Thus, despite their renown ability for discerning credibility, jurors do not, by definition, have the substantive skills to separate the wheat from the chaff in trying to evaluate the reliability of expert testimony. As such, “trial courts must be wary lest the expert become nothing more than an advocate of policy before the jury.”

A. Determining the Reliability of Lay Testimony

Faced with the duty of determining the reliability of lay testimony, the jury must consider (1) the reliability of the source of the witness’s knowledge, and (2) the witness’s credibility. The first consideration—the source of the lay witness’s knowledge—is uniformly delimited by the Federal Rules of Evidence. The Federal Rules attempt to ensure that the source of a lay witness’s knowledge is reliable, or at least subject to rational evaluation by the jury, by requiring witnesses to have personal knowledge of the event about which they will testify. Litigants must present foundation evidence during trial to show that the witnesses had an “opportunity to observe” and did “actually observe” the event with their own senses. A lay witness, therefore, must acquire knowledge of the event through percipient observation. As jurors can readily understand and evaluate the sources of information derived through the five senses, they need not involve themselves in the epistemology of the witness’s knowledge.

Instead, the primary focus of the jury’s factfinding function with regard to lay testimony is frequently the witness’s credibility. In assessing credibility, members of the jury will draw on their own common sense, judgment, and experience.
of the jury are equipped to judge issues of credibility because they regularly perform such judgments in their daily lives.24

B. Determining the Reliability of Expert Testimony

Theoretically, determining the reliability of expert opinion testimony is no different from determining the reliability of lay testimony. The jury still must evaluate (1) the reliability of the source of the expert’s knowledge, and (2) the expert’s credibility.25 In analyzing the expert’s credibility, the members of the jury will draw on common sense, judgment, and experience in the same manner they do with lay testimony. In other words, even if an expert’s qualifications are impeccable and the expert’s theory is reliably grounded in what passes for scientific “truth,” a jury may choose to disregard the expert’s testimony if its members believe the expert is biased or otherwise not credible.26

In addition to assessing the expert’s credibility, the jury must necessarily consider, either implicitly or explicitly, the reliability of the expert’s theory.27 The problem presented by expert testi-

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Id. 24. See, e.g., Brown v. Darcy, 783 F.2d 1389, 1396 (9th Cir. 1986) (“Our adversary system is built on the premise that the jury reviews testimony and determines which version of events it believes.”); United States v. Alexander, 526 F.2d 161, 168 (8th Cir. 1975) (‘The most important function served by a jury is in bringing its accumulated experience to bear upon witnesses testifying before it, in order to distinguish truth from falsity.’” (quoting United States v. Stromberg, 179 F. Supp. 278, 280 (S.D.N.Y. 1959))).

25. See infra notes 26-32 and accompanying text.

26. See supra notes 23-24 and accompanying text.

27. See Giannelli, supra note 14, at 1200-04 (analyzing the components of reliability). An evaluation of reliability includes an examination of (1) the validity of the underlying principle, (2) the validity of the technique used to apply the principle, and (3) the accurate application of the technique on the particular occasion. Id. Once the jury gains a basic understanding of the principle and technique, some courts hold that the jury members, aided by cross examination, should be able to consider intelligently whether the technique was applied correctly on a particular occasion. Id. at 1202-03; see also United States v. Jakobetz, 955 F.2d 786, 800 (2d Cir.) (“The district court should focus on whether accepted protocol was adequately followed in a specific case, but the court, in exercising its discretion, should be mindful that this issue should go more to the weight than to the admissibility of the evidence. Rarely should such a factual determination be excluded from jury consideration.”), cert. denied, 113 S. Ct. 104 (1992). But see United States v. Martinez, 3 F.3d 1191, 1197-98 (8th Cir. 1993) (holding that the court should inquire about an expert’s application of technique on a particular occasion and, on finding an error in the application that is sufficient to negate the basis for the reliability of the principle itself, the testimony should be excluded), cert. denied, 114 S. Ct. 734 (1994).
mony is that the jury has no basis for adequately evaluating the theory. Expert testimony only is admissible if it is beyond the common knowledge of the jury. Yet, ironically, because the expert testimony is beyond the common knowledge of the jury, the jury has no criteria by which to evaluate it. If courts "simply toss[ ] [expert testimony] off to the jury under a 'let it all in' philosophy," unreliable expert testimony may "assume a posture of mystic infallibility in the eyes of a jury of laymen." Thus, it is up to the courts to make a preliminary evaluation of the reliability of an expert's theory; otherwise, "[t]he charisma of the expert, rather than the logic of his explanation, may . . . become paramount, allowing experts to function like oath-helpers of old in a manner antithetical to notions of rational proof."

III. Federal Rule of Evidence 702 as Written and Interpreted

In our adversarial system of dispute resolution, for justice we turn to the lay jury: "[T]hat vital expression of direct democracy which charges the entire judicial structure with its moral force." To allow the jury to perform this important role, we must have a predictable evidentiary rule for admitting expert testimony that will equip and empower lay jurors to exercise their "common sense" in a rational and just fashion—a rule that will accommodate cutting-edge technology and the frontiers of scientific discovery but exclude the charlatan. Federal Rule of Evidence 702 seeks to accommodate these diverse goals. Rule 702 provides: "If scien-

29. See Hand, supra note 8, at 54.
30. Eymard v. Pan Am. World Airways (In re Air Crash Disaster), 795 F.2d 1230, 1234 (5th Cir. 1986).
33. See U.S. Const. amends. VI, VII.
35. Hand, supra note 8, at 52 n.1.
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.\textsuperscript{36}

This rule became effective on July 1, 1975 as part of the general promulgation of the Federal Rules of Evidence.\textsuperscript{37} The rule was enacted against a backdrop of federal and state common law dominated by the "general acceptance" test articulated in \textit{Frye v. United States}.\textsuperscript{38} Although Rule 702 makes no mention of "general acceptance" as a limiting condition on expert testimony derived from "scientific, technical, or other specialized knowledge," courts nonetheless have been sharply divided on whether general acceptance continues to be the governing standard; some courts have questioned this standard, while others have affirmed the vitality of the \textit{Frye} rule.\textsuperscript{39}

In \textit{Daubert v. Merrell Dow Pharmaceuticals, Inc.},\textsuperscript{40} the Supreme Court addressed this longstanding debate.\textsuperscript{41} Applying traditional rules of statutory interpretation, the Court noted that neither the text nor the legislative history of the Federal Rules of Evidence—specifically Rule 702, which speaks directly to the issue of admissibility of expert testimony—mentions \textit{Frye} or a rigid "general acceptance" requirement.\textsuperscript{42} In fact, the Court reasoned that making "general acceptance" the exclusive test for admitting expert testimony, as required by \textit{Frye}, is contrary to the "liberal thrust" of the rules and their "general approach of relaxing the traditional barriers to 'opinion' testimony."\textsuperscript{43} Thus, the Court held that the Federal Rules of Evidence supersede the "austere standard" for admission of expert testimony espoused in \textit{Frye}.\textsuperscript{44}

\textsuperscript{36} FED. R. EvD. 702.
\textsuperscript{38} See Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923). Under the \textit{Frye} test, a court was not permitted to receive expert opinion testimony in evidence unless the underlying theory of knowledge and the principles of analysis explicating that area of endeavor had been "generally accepted" by others who were considered experts in that field. \textit{Id.}
\textsuperscript{39} See Daubert v. Merrell Dow Pharmaceuticals, Inc., 113 S. Ct. 2786, 2793 n.5 (1993) (citing cases having treated the \textit{Frye} rule).
\textsuperscript{40} 113 S. Ct. 2786 (1993).
\textsuperscript{41} See \textit{id.} at 2793-98.
\textsuperscript{42} \textit{id.} at 2793-94.
\textsuperscript{43} \textit{id.} at 2794 (quoting Beech Aircraft Corp. v. Rainey, 488 U.S. 153, 169 (1988)).
\textsuperscript{44} \textit{id.}
Although Rule 702 offers greater flexibility for allowing expert testimony, it also confers on judges a duty to "ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable."\(^{45}\) To explain the nature and source of this duty, the Court drew primarily from the text of Rule 702.\(^{46}\) The Rule permits an expert to testify in the areas of "scientific, technical, or other specialized knowledge" if the testimony will "assist" the trier of fact in determining a fact at issue.\(^{47}\) The reliability component of a judge's duty requires the judge to determine whether proposed expert testimony is sufficiently reliable to be deemed "scientific, technical, or other specialized knowledge."\(^{48}\) Limiting its discussion to scientific knowledge, the Court stated that a judge must ensure that proposed expert testimony is "derived by the scientific method" and is "supported by appropriate validation" or based on "good grounds," that is, actual knowledge as opposed to subjective belief or unsupported speculation.\(^{49}\) "In short, the requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability."\(^{50}\)

The relevance component of a judge's duty requires the judge to determine whether an expert's testimony will assist the trier of fact in determining a fact at issue.\(^{51}\) Although the Court refers to relevance and reliability as two separate conditions, the two are in fact closely related. Indeed, during oral argument in the *Daubert* case, the Court noted that, "if [expert testimony] isn't reliable, it can't assist the trier of fact."\(^{52}\) Thus, the relevance condition requires that a court determine whether "a valid scientific connection" exists between the expert's testimony and an issue in the case.\(^{53}\)

To facilitate the judicial task of ensuring that expert scientific testimony is both relevant and reliable, the Court offered several "general observations."\(^{54}\) The Court noted that "a key question" will be "whether [the theory or technique] can be (and has been)

\(^{45}\) Id. at 2795.
\(^{46}\) Id. at 2793-94.
\(^{47}\) FED. R. EVID. 702.
\(^{48}\) *Daubert*, 113 S. Ct. at 2796-98.
\(^{49}\) Id. at 2795.
\(^{50}\) Id.
\(^{51}\) Id. at 2795-96.
\(^{53}\) *Daubert*, 113 S. Ct. at 2796.
\(^{54}\) See id. at 2796-98.
tested.” Judges should consider the “known or potential” error rate of the technique, as well as “the existence and maintenance of standards controlling the technique’s operation.” Additionally, judges should consider whether the theory has been subjected to peer review and publication. Finally, although it rejected “general acceptance” as the exclusive test for admissibility of expert testimony, the Court recognized that “general acceptance” can yet have a bearing on the inquiry. Notwithstanding the guidance provided by its “general observations,” the Court emphasized that “[m]any factors will bear on the inquiry” of whether expert scientific testimony meets the relevance and reliability requirements of Rule 702.

The Supreme Court in Daubert resolved two long-debated issues: (1) the “general acceptance” rule espoused in Frye is not the authoritative standard for the admissibility of expert testimony in federal court; and (2) federal judges have a gatekeeping function pursuant to which they “must ensure” that expert testimony is both relevant and reliable before it is admitted in evidence. Yet there is considerable uncertainty as to how judges are to determine whether expert testimony is relevant and reliable. This uncertainty exists because the observations offered by the Daubert Court are vague and because the Court’s focus on scientific evidence leaves courts to speculate on how to address other types of expert testimony.

Where do we go from here? As this Article will show, the Daubert opinion not only contains direct guidance to district judges on how to be gatekeepers of scientific testimony, but also lays the groundwork for extrapolating these principles to “technical and other specialized knowledge.”

IV. WHAT DOES THE PHRASE “SCIENTIFIC, TECHNICAL, OR OTHER SPECIALIZED KNOWLEDGE” MEAN?

The Supreme Court in Daubert dissected the phrase “scientific, technical, or other specialized knowledge” and limited its
discussion to the scientific context because the specific expert testimony offered in the case was scientific in nature. 63 To gain a complete understanding of Rule 702, however, one must consider the meaning of each component of the phrase "scientific, technical, or other specialized knowledge."

It is well established that "[t]he starting point in every case involving construction of a statute is the language itself." 64 Ordinarily, unambiguous statutory language is regarded as conclusive because a strong presumption exists that Congress expresses its intent through the statutory language it chooses. 65 When statutory language is unambiguous, legislative history is relevant only to the extent that there is a "clearly expressed legislative intention" contrary to the plain meaning of the language. 66

Here, the analysis must begin with the plain meaning of the words "scientific," "technical," and "specialized." With regard to the adjective "scientific," the Daubert Court stated that "'scientific' implies a grounding in the methods and procedures of science." 67 The definition of "science" refers to "systematic knowledge of the physical or material world gained through observation and experimentation." 68 Thus, the word "scientific" in Rule 702 appears to refer to knowledge garnered from observation and experimentation, such as the epidemiological studies, in vitro and in vivo animal studies, and pharmacological chemical studies offered as evidence in Daubert. 69

Technical knowledge, on the other hand, appears to refer primarily to the mechanical and industrial arts and applied sciences. "Technic" is defined as "the study or science of an art or of arts in general, [especially] the mechanical or industrial arts." 70 At least

63. See Daubert, 113 S. Ct. at 2795 n.8 (explaining that the facts of the case narrowed the analysis to "scientific" knowledge). In Daubert, the litigants offered expert testimony on whether Bendectin, an antinausea drug, was the cause of birth defects in children born to mothers who took the drug during pregnancy. Id. at 2791. The proposed expert testimony was based upon published and unpublished epidemiological studies, in vivo and in vitro animal studies, and pharmacological studies. Id. at 2791-92.


66. Cardoza-Fonseca, 480 U.S. at 432 n.12.

67. Daubert, 113 S. Ct. at 2795; see supra note 63.

68. RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE 1716 (2d ed. 1987) [hereinafter RANDOM HOUSE DICTIONARY].

69. See Daubert, 113 S. Ct. at 2791-92.

70. RANDOM HOUSE DICTIONARY, supra note 68, at 1950.
one definition of "technical" refers to anything "pertaining to or connected with the mechanical or industrial arts and the applied sciences." Thus, technical knowledge may refer to an economist's opinion of damages based on a lost profit or going concern theory, an engineer's testimony regarding the safe design of equipment, or a financial expert's testimony regarding projected cash flows.

The final descriptive word, "specialized," is more general than the words "scientific" and "technical." Specialized knowledge refers to any knowledge focused on a particular area of study, profession, or experience. Specialized knowledge thus might include such diverse topics as a government agent's testimony regarding the cause of an explosion, a witness' knowledge of a foreign culture, a lawyer's experience in real estate closings, an interpreter's proficiency in Spanish, or a federal agent's knowledge of and experience with the communication methods of narcotics dealers.

71. Id.
72. See Kingsport Motors, Inc. v. Chrysler Motors Corp., 644 F.2d 566, 569 (6th Cir. 1981) (finding expert witnesses possessed technical knowledge that would assist the jury in understanding evidence).
73. See Wheeler v. John Deere Co., 935 F.2d 1090, 1100-01 (10th Cir. 1991) (allowing testimony of an engineer who possessed technical knowledge that would shed light on the evidence); see also McGowan v. Cooper Indus., 863 F.2d 1266, 1270-71 (6th Cir. 1988) (finding that the trial court erred in refusing to admit expert testimony on factory representative's duties).
75. RANDOM HOUSE DICTIONARY, supra note 68, at 1831. A "specialist" is one "who devotes himself or herself to one subject or to one particular branch of subject or pursuit." Id. Similarly, one who "specializes" pursues "some special line of study, work, etc." Id.
76. See United States v. Metzger, 778 F.2d 1195, 1204-05 (6th Cir. 1985) (deeming a government agent to have specialized knowledge of explosives), cert. denied, 477 U.S. 906 (1986).
77. See Dang Vang v. Vang Xiong X. Toyed, 944 F.2d 476, 480-83 (9th Cir. 1991) (considering witness's knowledge of Hmong culture and the role of women in that culture to be specialized knowledge).
78. See United States v. Heath, 970 F.2d 1397, 1405 (5th Cir. 1992) (finding that the trial court erred in limiting testimony of a lawyer with special knowledge in real estate closings), cert. denied, 113 S. Ct. 1643 (1993).
79. See United States v. Taren-Palma, 997 F.2d 525, 531 (9th Cir. 1993) (finding that the testimony of an interpreter fluent in Spanish was properly admitted).
80. See United States v. Nersesian, 824 F.2d 1294, 1307 (2d Cir.) (finding that a DEA agent was qualified to testify as an expert on drug codes used by narcotics traffickers), cert. denied, 484 U.S. 958 (1987); see also United States v. Boykin, 986 F.2d 270, 275 (8th Cir.)
Generally, when words of a statute are connected in the disjunctive by "or," as they are in Rule 702, the basic tenets of construction accord each of the descriptive words a separate meaning. Because "scientific" and "technical" describe two different categories of knowledge, this rule of construction poses no ambiguity when applied to either of these terms. However, because the definition of "specialized" does not point to a particular category of knowledge, it is unclear whether the phrase "other specialized knowledge" is modified by the words "scientific" and "technical," thereby limiting the phrase to scientific or technical "specialized" knowledge, or whether "other specialized knowledge" is intended to extend beyond scientific and technical knowledge.

Under the principle ejusdem generis, "where general words follow an enumeration of specific terms, the general words are read to apply only to other items like those specifically enumerated." However, "[w]here the list of objects that precedes the 'or other' phrase is dissimilar, ejusdem generis does not apply," and the phrase "or other" is interpreted as a catch-all phrase extending beyond the previously listed objects. Accordingly, because the words "scientific" and "technical" in Rule 702 describe two dissimilar categories of knowledge, the ejusdem generis rule does not apply, and the phrase "other specialized knowledge" should be interpreted as a catch-all phrase extending beyond the categories of knowledge described as scientific and technical. This interpretation is supported by the legislative history surrounding Rule 702.

During the hearings that preceded the adoption of the Federal Rules of Evidence, Rule 702 did not evoke much attention or discussion. Indeed, the first draft of Rule 702 was very similar to the text of the rule that Congress ultimately adopted.

Rule 702, as included in the March 1969 Preliminary Draft of Proposed Rules of Evidence, stated: "If scientific, technical, or other specialized knowledge will assist the trier of fact to under-
stand the evidence or to determine a fact in issue, a witness qualified as an expert by special knowledge, skill, experience, training, or education, may testify thereto." The Proposed Rule drew on the language contained in both the Model Code of Evidence and the Uniform Rules of Evidence requiring an expert to be qualified by "special knowledge, skill, experience or training." Additionally, the Rule required that the expert's testimony be based on "scientific, technical, or other specialized knowledge." The Advisory Committee's Note (the Note) following the Draft Rule contains no discussion of the intended meaning of the phrase "scientific, technical, or other specialized knowledge."

Few changes were made to the text of Rule 702 after the initial 1969 draft. In the Revised Draft of Proposed Rules of Evidence, the Advisory Committee (the Committee) deleted the word "special" before the phrase "knowledge, skill, experience, training, or education." Additionally, the Committee amended its Note to include the following passage:


88. See Model Code of Evid. Rule 402 (1942), reprinted in 1 Bailey & Trelles, supra note 37, document 1, at 202. The Model Code defined an expert witness as a witness who is qualified by "special knowledge, skill, experience or training." Id. Similarly, the Uniform Rules of Evidence provided that expert testimony in the form of an opinion was limited to opinions "within the scope of the special knowledge, skill, experience or training possessed by the witness." Unif. R. Evid. 56 (1953) (amended 1974), reprinted in 1 Bailey & Trelles, supra note 37, document 2, at 193.


90. Id.


92. Id. Rule 702, reprinted in 2 Bailey & Trelles, supra note 37, document 6, at 89. The Rule continued to require the subject of the expert's testimony be "scientific, technical or other specialized knowledge." Id.

The New York Trial Lawyers Committee on the Proposed Federal Rules of Evidence and the American College of Trial Lawyers suggested that the word "special," which preceded the second "knowledge" in the first draft, be deleted to "avoid unnecessary debate over . . . meaning." 3 Jack B. Weinstein & Margaret A. Berger, Weinstein's Evidence ¶ 702[01], at 702-7 n.1 (1993). The deletion of the word "special" implies that an expert qualified by "general" knowledge, skill, experience, training, or education would meet the requirements of the Rule as long as the subject of the testimony is "scientific, technical, or other specialized knowledge." Cf. id. ¶ 702[04], at 702-45 (explaining that the word "special" was removed because it is too restrictive to require special knowledge, and that qualification by reason of knowledge is sufficient). In the absence of legislative history explaining the deletion, how-
The fields of knowledge which may be drawn upon are not limited to merely the "scientific" and "technical" but extend to all "specialized" knowledge. Similarly, the expert is viewed, not in a narrow sense, but as a person qualified by "knowledge, skill, experience, training, or education." Thus within the scope of the rule are not only experts in the strictest sense of the word, e.g. physicians, physicists, and architects, but also the large group sometimes called "skilled" witnesses, such as bankers or landowners testifying to land values.

The first sentence of this portion of the Note supports the interpretation of "other specialized knowledge" previously discussed. Specifically, by separately referring to scientific and technical knowledge, the Note reinforces the plain meaning of the words as referring to separate and distinct categories of knowledge. Additionally, by stating that the phrase is not "limited" to scientific and technical knowledge but "extends" to "all" specialized knowledge, the Note supports a broad interpretation of "other specialized" knowledge.

V. DETERMINING IF AN EXPERT'S THEORY IS "KNOWLEDGE"

Rule 702 states that expert testimony must be based on "scientific, technical, or other specialized knowledge." Reasoning that knowledge is more than "subjective belief or unsupported speculation," the Daubert Court stated that to be considered knowledge, an expert's theory must be reliable. The question then arises: How are federal judges to determine if an expert's theory is sufficiently reliable to qualify as knowledge? Anticipating this question, the Daubert Court offered several "general observations" to guide federal judges in determining the reliability of scientific knowledge.

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ever, it is speculative to infer any particular intent from the change. See Hearings on Proposed Rules of Evidence Before the Subcomm. on Criminal Justice (Formerly Designated as Special Subcomm. on Reform of Federal Criminal Laws) of the House Comm. on the Judiciary, 93d Cong., 1st Sess. (1973), reprinted in 3 BAILEY & TREILLES, supra note 37, document 12, at 230 n.6 ("The deletion of so special a word as 'special' seems to call for some explanation, but none is given, leaving the 'legislative history' of Rule 702 muddy at best.").

93. REVISED DRAFT OF PROPOSED RULES, supra note 91, Rule 702 & advisory committee's note, reprinted in 2 BAILEY & TREILLES, supra note 37, document 6, at 89.

94. See FED. R. EVID. 702 & advisory committee's note.

95. See id.

96. Id. 702.


98. Id.

99. Id. at 2796-98; see supra notes 54-59 and accompanying text. Questioning the future implications of the Court's "general observations," the dissent queried, "Does all of this
This Article submits that because expert testimony must be based on knowledge—the antecedent of which is reliability—the district courts have a duty to ensure reliability, whether the theory is categorized as scientific, technical, or specialized. Although the specific factors noted by the Daubert Court may indicate the reliability of scientific knowledge, however, they might not offer probative evidence of reliability for all types of expert testimony. Recognizing the futility of attempting to compile a checklist of reliability factors that will apply to other categories of knowledge, this Article instead suggests a method by which judges can determine appropriate measures of reliability on a case-by-case basis. Specifically, by considering the epistemology of an expert’s theory, that is, its “origin, nature, methods, and limits,” judges may gain significant insight into the reliability of the theory.

Such an epistemological analysis begins by clearly identifying the theory on which the expert proposes to base her testimony. In accordance with Rule 702, an expert’s theory is only admissible if it qualifies as knowledge. Knowledge may be comprised of “known facts or . . . ideas inferred from such facts or accepted as truths on good grounds.” Where an expert’s theory is so firmly established among members of the field that it is considered a known fact or accepted truth—such as the theories that undergird the physical laws of the universe in the field of physics or chemistry, the methods of quantitative analysis employed in mathematics or statistics, the fundamentals of anatomy and physiology that inform the medical sciences, or the principles of weather patterns applied in meteorology—a court may take judicial notice of the reliability of the theory.

On the other hand, when an expert proposes to testify to a theory that is not so well established that it may be considered accepted truth, a judge should require a clear articulation of the theory and its fundamental underpinnings. Once articulated, the

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*dicta* apply to an expert seeking to testify on the basis of "technical or other specialized knowledge" . . . or are the 'general observations' limited only to 'scientific knowledge'? *Id.* at 2800 (Rehnquist, C.J., dissenting).

100. RANDOM HOUSE DICTIONARY, supra note 68, at 654. Epistemology is the “branch of philosophy that investigates the origin, nature, methods, and limits of human knowledge.” *Id.*

101. FED. R. EVID. 702.

102. Daubert, 113 S. Ct. at 2795 (quoting WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE 1252 (Philip B. Gove ed., 1986)).

103. See *id.* at 2796 n.11.

104. See *id.* at 2796-97. In considering the admissibility of novel scientific evidence, a DNA profiling analysis, the Second Circuit recently stated, “A general understanding of the
court should consider whether the theory is logically sound. A judge may consider whether the theory is internally consistent, whether it provides an intelligible explanation for an observed phenomenon (a "purely tautological hypothesis" is of little or no explanatory value), and whether the theory is consistent with other theories that are accepted as fact within the particular field of endeavor. These considerations will assist judges in determining the reliability of any type of theory, whether scientific, technical, or specialized.

Courts should also consider the theory's origin and evolution. Knowledge, whether categorized as scientific, technical, or specialized, evolves from the validation of a theory or hypothesis—an idea. The processes that transform particular ideas into validated knowledge may vary. But each process, as different as it may be from another, can be characterized as an evolutionary continuum along which an idea travels in its quest for validation. The scientific theories and procedures involved is necessary to understand the legal and practical impact of such evidence.” United States v. Jakobetz, 955 F.2d 786, 791 (2d Cir.), cert. denied, 113 S. Ct. 104 (1992). The court then proceeded to conduct a detailed, three-page analysis of the nature and origins of DNA profiling generally and the application of such principles by the particular expert in the case. See id. at 791-93; see also Deluca v. Merrell Dow Pharmaceuticals, Inc., 911 F.2d 941, 945 (3d Cir. 1990) (“To competently analyze the legal issues presented by this appeal, an understanding of the relevant scientific principles, albeit necessarily a rudimentary one... is essential.

Some expert theories may be easily disqualified if the expert is unable to articulate the specific theory on which her testimony is based and the factual or accepted theoretical underpinnings that justify the theory. For example, an astrologist or a ouija board operator will likely not be able to articulate a factual or accepted theoretical basis for her theory.


106. See Jakobetz, 955 F.2d at 786, 797-98 (identifying factors that may bear on the reliability of expert testimony, including “the clarity with which the technique may be explained” and “the novelty of the technique and its relationship to more established areas of scientific analysis”); United States v. Downing, 753 F.2d 1224, 1238-39 (3d Cir. 1985) (citing, among other things, the novelty of the technique as shown through its relationship to more established modes of analysis); see also 3 WEINSTEIN & BERGER, supra note 92, ¶ 702[03], at 702-41 to 702-42 (noting a variety of factors that the court should consider as indicators of reliability, including the “novelty of the new invention”).

Each of these sources cites additional factors that may have bearing on reliability, such as the qualifications and professional stature of the expert, the existence of specialized publications, the rate of error of the theory, and the “non-judicial” uses to which the technique is put. See Jakobetz, 955 F.2d at 797-98; Downing, 753 F.2d at 1238-39; 3 WEINSTEIN & BERGER, supra note 92, ¶ 702[03], at 702-41 to 702-42. This Article suggests, however, that although these factors are relevant in determining the reliability of certain types of knowledge, courts should focus on the nature and origin of the theory to decipher the most appropriate indicia of reliability on a case-by-case basis.

107. See Ayala & Black, supra note 105, at 29.
distance an idea has traveled along this continuum provides evidence of its reliability.

The *Daubert* Court, while not explicitly identifying an evolutionary continuum, observed that the reliability of scientific evidence may be gauged by looking to the factors that trace the evolution of scientific knowledge, such as tests, peer-reviewed publications, and acceptance among the relevant scientific community.\(^{108}\) The Court first noted that "[s]cientific methodology . . . is based on generating hypotheses and testing them to see if they can be falsified."\(^ {109}\) Once a theory has been tested,\(^ {110}\) it may be subjected to the scrutiny of other members of the field through publication and peer review.\(^ {111}\) Ultimately, the theory may become known within the relevant scientific community and attract widespread acceptance.\(^ {112}\)

Although the particular factors of reliability described by the Court in *Daubert* may not be relevant to determining the reliability of all types of knowledge, this Article submits that the method by which the Court elicited those factors may be helpful in determining the reliability of other areas of expertise. Specifically, by tracing the process through which an idea becomes knowledge, a court may identify factors relevant to determining the reliability of the theory involved.

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110. When test results are available, courts should obtain specific information regarding each study or test conducted by the expert or others, including (1) testing conditions; (2) the size of the population studied; (3) the methodology applied; (4) the number of studies completed; (5) the method of recording data; (6) the results of each study; and (7) the margin of error. For a case considering several of these factors, see *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307, 311-13 (5th Cir. 1989), cert. denied, 494 U.S. 1046 (1990).

111. *See Daubert*, 113 S. Ct. at 2797. When an opportunity exists to validate the theory through peer review and the expert has not submitted the theory for external scrutiny, courts may become skeptical of the expert's own confidence in the validity of the theory. *See Eymard v. Pan Am. World Airways (In re Air Crash Disaster)*, 795 F.2d 1230, 1234 (5th Cir. 1986).

Many experts are members of the academic community who supplement their teaching salaries with consulting work. We know from our judicial experience that many such able persons present studies and express opinions that they might not be willing to express in an article submitted to a refereed journal of their discipline or in other contexts subject to peer review. We think that is one important signal, along with many others, that ought to be considered in deciding whether to accept expert testimony.

*Id.*

112. *See Daubert*, 113 S. Ct. at 2797.
Given the broad spectrum of knowledge that may be the subject of expert testimony, one can assume that the epistemology of individual theories will vary significantly. Many theories will not evolve from hypothesis to knowledge through formal observation and experimentation. For example, some theories may evolve from the application of an expert's "knowledge, skill, experience, training, or education" to a particular problem or situation.\textsuperscript{113} When a theory originates in such an informal manner, testing and specialized journals are not viable avenues for validating the theory or subjecting it to the critical scrutiny of the relevant community. Rather, the practical uses, particularly nonjudicial uses, to which the theory has been put by the expert or others will provide evidence of external scrutiny and validation (or invalidation).\textsuperscript{114} Also, the expert's qualifications and professional stature will be factors bearing on the reliability of the theory.\textsuperscript{115} Thus, although Daubert's "general observations" may not be directly applicable to all types of knowledge, tracing the development of the knowledge at issue—as the Daubert Court did—may be a useful tool in identifying appropriate indicia of reliability on a case-by-case basis.

VI. CONCLUSION

If a jury understands the subject matter through its common experience, expert opinion is not admissible because it will not assist the trier of fact.\textsuperscript{116} It is only when neither judge nor jury can make sense of the underlying data that expert opinion evidence is admissible.\textsuperscript{117} Federal Rule of Evidence 702 governs the determination by district judges to receive such evidence. In the wake of Daubert's carefully reasoned mandate, this determination will depend on the trial court's understanding of the meaning of the

\textsuperscript{113} FED. R. EVID. 702.
\textsuperscript{114} See, e.g., United States v. Carswell, 922 F.2d 876, 878-79 (D.C. Cir. 1991) (stating fact that witness or others relied on the theory "in a context independent of courtroom" provides some indicia of reliability); United States v. Downing, 753 F.2d 1224, 1239 (3d Cir. 1985) (stating that nonjudicial uses to which the theory has been applied may be a factor bearing upon the reliability of the theory); 3 WEINSTEIN & BERGER, supra note 92, ¶ 702[03], at 702-41 (citing "the use which has been made of the new technique" as evidence of reliability).
\textsuperscript{115} See United States v. Jakobetz, 955 F.2d 786, 797 (2d Cir.), cert. denied, 113 S. Ct. 104 (1992) (stating that an expert's qualifications and stature are relevant considerations in determining reliability of a theory); Downing, 753 F.2d at 1239 (stating that an expert's qualifications and stature offer circumstantial evidence that the technique is reliable); 3 WEINSTEIN & BERGER, supra note 92, ¶ 702[03], at 702-41 (same).
\textsuperscript{116} See supra note 28 and accompanying text.
\textsuperscript{117} See supra note 28 and accompanying text.
Rule as explicated by the case law. Since the Rule posits a series of different if overlapping bases for expert opinion—scientific, technical, or other specialized knowledge—the specific factors tending to show reliability are likely to vary depending on the basis of the proferred knowledge.

The Daubert Court, in its well-considered dictum, offered substantial guidance for determining whether purported expert scientific evidence is based on knowledge and is thus reliable.\(^{118}\) By tracing the phases through which scientific ideas progress to become accepted knowledge, the Court identified factors that may provide indicia of the reliability of scientific theories.\(^{119}\) Although these particular factors may not be altogether relevant in determining the reliability of technical or other specialized knowledge, the reasoning employed by the Daubert Court may be applied to other types of knowledge. Specifically, courts may gain significant insight into the reliability of a theory by conducting an epistemological analysis, first assessing whether the theory is soundly grounded in logical reasoning, and then examining the theory's progress along the evolutionary continuum that leads to validation or recognition of the theory as knowledge.


\(^{119}\) See id.; see also supra notes 54-59 and accompanying text.