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Daubert v. Merrell Dow Pharmaceuticals: Pushing the Limits of Scientific Reliability--The Questionable Wisdom of Abandoning the Peer Review Standard for Admitting Expert Testimony

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Daubert v. Merrell Dow Pharmaceuticals:
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Review Standard for
Admitting Expert Testimony

I.	INTRODUCTION.....	1175
II.	LEGAL BACKGROUND—EXCLUDING UNRELIABLE EXPERT TESTIMONY BEFORE <i>DAUBERT</i>	1178
	A. <i>The General Acceptance Test: Frye v. United States</i>	1178
	B. <i>The Federal Rules of Evidence</i>	1181
	C. <i>A Split Among the Circuits</i>	1182
	1. The Coexistence of <i>Frye</i> and the Rules	1182
	2. The Minority Position: <i>Frye</i> and the Rules Are Mutually Exclusive.....	1183
III.	RECENT DEVELOPMENT: <i>DAUBERT V. MERRELL DOW PHARMACEUTICALS, INC.</i> —FEDERAL TRIAL JUDGES AS THE GATEKEEPERS OF RELIABILITY	1187
	A. <i>The Facts</i>	1188
	B. <i>The Majority Opinion</i>	1189
	C. <i>Chief Justice Rehnquist’s Dissent</i>	1193
IV.	ANALYSIS—THE POTENTIAL PITFALLS OF ABANDONING THE PEER REVIEW STANDARD.....	1195
	A. <i>Issues Unresolved by Daubert</i>	1195
	B. <i>Daubert’s Future Effect on Junk Science</i>	1196
	C. <i>The Failed Amendment to Rule 702</i>	1198
V.	CLARIFYING THE FEDERAL RULE ON EXPERT TESTIMONY	1199
VI.	CONCLUSION	1202

I. INTRODUCTION

Historically, trial courts have been cautious about allowing juries to hear testimony from scientific experts. When a testifying expert professes to have knowledge in a specialized field, juries often find sorting out issues of credibility and relevance difficult and confus-

ing.¹ Therefore, federal courts traditionally have attempted to exclude expert testimony if its basis has not yet gained a requisite degree of acceptance within a relevant community of experts.² The justification for this limitation is that those people who are in the best position to understand and evaluate this evidence—other experts—should make judgments about the reliability of scientific evidence.³ This contingent admissibility provides both advantages and disadvantages. It immediately ensures that admitted testimony will be sensible, probable, and rooted in principles of science accepted by a majority of experts in a field; at the same time, it arguably excludes potentially useful cutting-edge theories merely because they have not yet been subjected to sufficient peer review.⁴

Although any standard for the admissibility of expert testimony that is based on peer review is imperfect, the federal courts historically have preferred to accept this double-edged sword rather than relax the standard and confuse juries.⁵ In 1975, however, Congress enacted the Federal Rules of Evidence, which contain provisions specifically addressing the admissibility of expert testimony.⁶ The Rules' test of admissibility is broad and does not mention excluding testimony based on theories or techniques that are not generally

1. See *United States v. Baller*, 519 F.2d 463, 466 (4th Cir. 1975) (stating, "There are good reasons why not every ostensibly scientific technique should be recognized as the basis for expert testimony. Because of its apparent objectivity, an opinion that claims a scientific basis is apt to carry undue weight with the trier of fact.").

2. The court in *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923), first articulated the rule behind this general trend:

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

Id.

3. See *United States v. Addison*, 498 F.2d 741, 743-44 (D.C. Cir. 1974) (asserting that "[t]he requirement of general acceptance in the scientific community assures that those most qualified to assess the general validity of a scientific method will have the determinative voice").

4. For example, in the past, courts have excluded gunshot residue tests, *State v. Smith*, 50 Ohio App. 2d 183, 362 N.E.2d 1239 (1976), testimony based on voiceprints, *Reed v. State*, 283 Md. 374, 391 A.2d 364 (1978), tape recordings of sodium pentothal interviews, *Lindsey v. United States*, 237 F.2d 893 (9th Cir. 1956), and evidence derived from ion microprobioc analysis, *United States v. Brown*, 557 F.2d 541 (6th Cir. 1977), from trials for not having gained a requisite degree of general acceptance among experts. Arguably, some of this evidence could have enlightened jurors about facts in dispute in these cases.

5. See Part II.A.

6. Rule 702 covers the admission of testimony by experts. It states: "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." FRE 702.

accepted by a proposed expert's professional peers.⁷ Because the Rules theoretically establish a fairly complete integration of the criteria for admitting evidence in federal courts,⁸ commentators have debated the continued usefulness and vitality of a peer review standard.⁹

In the recent case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,¹⁰ the Supreme Court rejected the general acceptance standard as the litmus test of admissibility for expert testimony.¹¹ The Court held that a more complex inquiry must guide judges in applying the Rules' broad test of admissibility and that this more comprehensive standard had superseded the general acceptance requirement.¹² Litigators should not underestimate *Daubert's* potential impact on future litigation and should realize that the case threatens to have a number of negative ramifications.

Part II of this Recent Development describes the legal background in which *Daubert* was decided. It sets forth the traditional common-law standard for admitting expert testimony and explains how the enactment of the Federal Rules of Evidence brought the continued vitality of that standard into question. Part III describes the facts of *Daubert*, explains the Supreme Court's interpretation of the appropriate standard for admitting expert testimony under the Federal Rules of Evidence, and details Chief Justice Rehnquist's dissent. Part IV analyzes some of the issues unresolved by the Supreme Court's opinion in *Daubert* and describes some of the problems that *Daubert* may create. Part V then suggests that the

7. *Id.* See also Part II.B.

8. FRE 101 states the scope of the Federal Rules of Evidence: "These rules govern proceedings in the courts of the United States and before United States bankruptcy judges and United States magistrates . . ." FRE 101.

In *United States v. Abel*, 469 U.S. 45 (1984), the Supreme Court considered the pertinence of background common law in interpreting the Federal Rules of Evidence. *Abel* held that although the Rules occupy the field, consistent common law nevertheless could serve as an aid in their interpretation. The Court quoted Professor Cleary, the Rules' Reporter: "In principle, under the Federal Rules no common law of evidence remains. 'All relevant evidence is admissible, except as otherwise provided . . .' In reality, of course, the body of common law knowledge continues to exist, though in the somewhat altered form of a source of guidance in the exercise of delegated powers." *Id.* at 51-52.

9. See, for example, Jack B. Weinstein and Margaret A. Berger, 3 *Weinstein's Evidence* ¶ 702[03] at 702-36 (Bender, 1988) (arguing that the enactment of the Rules eliminated the traditional peer review standard); Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half Century Later*, 80 Colum. L. Rev. 1197, 1229 (1980) (arguing that the traditional peer review standard, in fact, may have survived the Rules' enactment). See also Stephen A. Saltzburg and Kenneth R. Redden, *Federal Rules of Evidence Manual* 452 (Michie, 3d ed. 1982) (arguing the same).

10. 113 S. Ct. 2786 (1993).

11. *Id.* at 2793.

12. See *id.* at 2794-95.

process of screening expert testimony could be improved and clarified by modifying Rule 702 to establish a more concrete legislative determination of the criteria required for the admission of this evidence.

II. LEGAL BACKGROUND—EXCLUDING UNRELIABLE EXPERT TESTIMONY BEFORE *DAUBERT*

A. *The General Acceptance Test: Frye v. United States*

For many years, the common-law general acceptance test first enunciated in *Frye v. United States*¹³ was the principal defense against unreliable scientific testimony in the federal courts.¹⁴ To prevent experts from confusing juries by presenting junk science theories that had relatively little scientific basis or merit, courts only admitted testimony derived from principles that were generally accepted in the appropriate scientific community.¹⁵ This simple head-counting standard,¹⁶ based on the value and merits of peer review and grounded in a realization that judges are limited in both their time and scientific knowledge, served federal courts fairly well. It established a bright-line procedure recognizing that a courtroom should not be a testing ground for novel scientific breakthroughs nor a stage for a battle of the experts.¹⁷ Occasionally, courts undoubtedly excluded valid

13. 293 F. 1013 (D.C. Cir. 1923).

14. See generally *Daubert*, 113 S. Ct. at 2792.

15. *Frye*, 293 F. at 1014. "Junk science" is a pejorative term describing novel scientific testimony that has only a weak grounding in established and well-tested principles or methods. It refers to evidence that is held out to the trier of fact as scientific but lacks the element of reliability normally associated with that type of information. Courts and commentators have recognized the danger presented by making this testimony available to juries, see note 1, but junk science nevertheless represents a growing problem in complex, modern litigation.

16. One potential weakness of the *Frye* test is that it contemplates that courts merely will need to make a head count of how many well-credentialed experts in the relevant field accept or support a certain method or theory, and how many do not. The general acceptance test requires some majority or preponderance of the experts to support the scientific foundation of the testimony in question. The *Frye* test does not require, however, that the court itself become substantively involved in the issue of testimonial reliability as does the newly created *Daubert* test.

17. One commentator noted:

Imposition of the *Frye* test serves to (1) insure that a minimal reserve of experts exists who can critically examine the validity of a scientific determination in a particular case, (2) promote a degree of uniformity of decision, (3) avoid the interjection of a time consuming and often misleading determination of the reliability of a scientific technique into the litigation, (4) assure that scientific evidence introduced will be reliable and relevant, (5) provide a preliminary screening to protect against the natural inclination of the jury to

theories, and in a few cases, perhaps justice was not well served by the *Frye* test.¹⁸ Despite these exclusions, the majority of federal cases conducted under *Frye* benefitted from three aspects of its test. First, the *Frye* test allowed juries to function without the confusion of conflicting scientific banter.¹⁹ Second, courts had a chance to clear their dockets by avoiding tricky, scientific questions normally foreign to judges. Finally, a proposed expert's peers, rather than an overworked and underinformed judge or an overtrusting and easily distracted jury, determined the expert's credibility and reliability.²⁰

Frye itself involved the appeal of a convicted murderer who had attempted to introduce at trial the testimony of an expert in systolic blood pressure deception tests.²¹ Prior to the trial, the defendant had taken this test, which indicated that he was truthful when claiming his innocence.²² At trial, the court did not permit *Frye*'s attorney to introduce the testimony of the scientist who had conducted the test,²³ nor did the court allow the expert to conduct a second test in front of the jury.²⁴ After his conviction, *Frye* appealed to the District of

assign significant weight to scientific techniques presented under circumstances in which the trier of fact is in a poor position to place an accurate evaluation upon reliability, and (6) impose a threshold standard of reliability in light of the fact that cross-examination by opposing counsel is unlikely to bring inaccuracies to the attention of the jury.

Michael H. Graham, *Handbook of Federal Evidence* §703.2 at 647 (West, 3d ed. 1991) (citing *Baller*, 519 F.2d at 466, and *Addison*, 498 F.2d at 743-44).

18. Of course, a time lag arises between the time at which a valid theory or method is discovered and when it becomes generally accepted. During this period, testimony based on novel scientific theories traditionally has been barred under *Frye*. Some of this barred testimony is later found to be based on valid scientific presumptions, and excluding the evidence could allow a jury to make decisions without having access to all relevant information.

19. See generally Graham, *Handbook of Federal Evidence* § 703.2 at 647 n.4 (cited in note 17).

20. See *Addison*, 498 F.2d at 743-44.

21. The systolic blood pressure deception test was a precursor to the modern lie detector test:

It is asserted that blood pressure is influenced by change in the emotions of the witness, and that the systolic blood pressure rises are brought about by nervous impulses sent to the sympathetic branch of the autemetic nervous system. Scientific experiments, it is claimed, have demonstrated that fear, rage, and pain always produce a rise of systelic blood pressure; and that conscious deception or falsehood, concealment of facts, or guilt of crime, accompanied by fear of detection when the person is under examination, raises the systolic blood pressure in a curve, which corresponds exactly to the struggle going on in the subject's mind, between fear and attempted control of that fear, as the examination touches the vital points in respect of which lie is attempting to deceive the examiner.

Frye, 293 F. at 1013-14.

22. *Id.* at 1014.

23. *Id.*

24. *Id.*

Columbia Circuit Court of Appeals, arguing that the district court's refusal to admit the expert's testimony was improper.²⁵

In affirming Frye's conviction, the D.C. Circuit established the rule that became the universal common-law test of admissibility for expert testimony: Courts will admit testimony deduced from scientific principles or discoveries, but the theory or technique on which the expert relies must be sufficiently established as to have gained general acceptance in the particular scientific field to which it belongs.²⁶ The *Frye* court recognized that the simplest way to ensure testimonial reliability was to require scientific testimony to pass the test of peer review. Thus, the court concluded that the systolic blood pressure deception test had not gained enough standing and recognition among physiological and psychological authorities to justify the admission of testimony deduced from its application.²⁷

Since its birth more than seventy years ago, the *Frye* test worked against the introduction of dubious scientific theories in federal courts.²⁸ Until the adoption of the Federal Rules of Evidence in 1975, *Frye* was clearly the prevailing standard in federal courts.²⁹ Its test has determined the admissibility of many types of scientific evidence, including voiceprints,³⁰ neutron activation,³¹ gunshot residue tests,³² bite-mark comparisons,³³ sodium pentothal,³⁴ ion microprobioc analyses,³⁵ and blood-grouping tests.³⁶ Even after the enactment of the Rules in 1975, ten of the thirteen federal circuits continued to apply the general acceptance test.³⁷ These courts allowed the test to coexist with Rule 702, which governs the admissibility of expert tes-

25. *Id.*

26. *Id.* See note 2 for the language used by the court.

27. *Id.*

28. As previously discussed, courts traditionally have recognized the importance of keeping testimony that could confuse a jury out of the courtroom, and have sought to eliminate the introduction of far-fetched ideas cloaked in an appearance of scientific authority. Lawmakers fear that juries may be tempted to take this testimony at face value, rather than second-guess a scientific expert. For this reason, many amici in *Daubert* strongly supported the rather restrictive *Frye* test. Junk science is a particular problem today in toxic tort and other complex litigation.

29. See the discussion in *United States v. Downing*, 753 F.2d 1224, 1234-35 (3d Cir. 1985).

30. See, for example, *Reed v. State*, 283 Md. 374, 391 A.2d 364, 381 (1978).

31. See, for example, *United States v. Stifel*, 433 F.2d 431, 436, 438, 441 (6th Cir. 1970).

32. See, for example, *State v. Smith*, 50 Ohio App. 2d 183, 362 N.E.2d 1239, 1246 (1976).

33. See, for example, *People v. Slone*, 76 Cal. App. 3d 611, 143 Cal. Rptr. 61, 68 (1978).

34. See, for example, *Lindsey v. United States*, 237 F.2d 893, 896 (9th Cir. 1956).

35. See, for example, *United States v. Brown*, 557 F.2d 541, 556-57, 558 (6th Cir. 1977).

36. See, for example, *People v. Alston*, 79 Misc. 2d 1077, 1085, 362 N.Y.S.2d 356, 362 (N.Y. Sup. Ct. 1974).

37. Timothy B. Dyk and Gregory A. Castanias, *Daubert Doesn't End Debate on Experts*, 15 Nat'l L. J. 17 (Aug. 2, 1993). Only the Second and Third Circuits expressly rejected *Frye* after 1975. See Part II.C.

timony.³⁸ In addition, *Frye* became the law in many of the states that adopted the Uniform Rules of Evidence, the model for the Federal Rules of Evidence.³⁹

B. *The Federal Rules of Evidence*

Rules 401, 402, 403, and 702 of the Federal Rules of Evidence are pertinent to the admissibility of expert testimony. Rule 401 defines "relevant evidence" as evidence having any tendency to make the existence of a material fact more or less probable.⁴⁰ Rule 402 states that all relevant evidence is generally admissible and that irrelevant evidence is not.⁴¹ Rule 403 allows courts to exclude evidence, although relevant, if its probative value is outweighed by considerations of prejudice, confusion, or wastefulness.⁴² Rule 702 establishes the specific standard for admitting expert testimony: "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."⁴³

38. FRE 702. One view holds that the key to reconciling the common-law *Frye* test with Rule 702 lies in Rule 403, which states: "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." FRE 403. Some proponents of retaining the *Frye* test in conjunction with the Federal Rules argue that when the Rules are silent regarding a common-law rule, the common-law rule should survive if it is consistent with the Rules. Accordingly, the *Frye* test should survive, because it excludes dubious scientific evidence (which has not gained general acceptance) for the same reasons that Rule 403 would exclude the evidence—this novel testimony may mislead, confuse, prejudice, or delay the jury. See Dyk and Castanias, 15 Nat'l L. J. at 18.

39. Dyk and Castanias, 15 Nat'l L. J. at 18 (cited in note 37).

40. "Relevant evidence" means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." FRE 401.

41. "All relevant evidence is admissible, except as otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by other rules prescribed by the Supreme Court pursuant to statutory authority. Evidence which is not relevant is not admissible." FRE 402.

42. "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." FRE 403.

43. FRE 702.

C. *A Split Among the Circuits*

The Federal Rules of Evidence do not invoke peer review as a prerequisite for admitting expert testimony.⁴⁴ Neither the Advisory Committee Notes regarding Rule 702,⁴⁵ the relevant congressional floor debates and hearings,⁴⁶ nor the relevant congressional committee reports⁴⁷ shed light on Congress's intent to perpetuate or eliminate *Frye*. After the enactment of the Rules, questions about the status of *Frye* lingered. Did the Rules' silence regarding *Frye* mean that courts should abandon the peer review standard, or could the common-law test continue to exist in conjunction with the Rules? Before *Daubert*, judges, scholars, and the federal circuit courts were divided on the issue.

1. The Coexistence of *Frye* and the Federal Rules

Before the Supreme Court's decision in *Daubert*, a majority of the federal circuit courts had held that the *Frye* test continued to impact the admissibility of expert testimony despite the enactment of the Rules.⁴⁸ The Fifth Circuit held, for example, that the Rules, combined with *Frye*, provide the framework for trial judges struggling with proffered expert testimony.⁴⁹ The court offered four inquiries to help trial judges evaluate the admissibility of expert testimony: (1) whether the witness is qualified to express an expert opinion under Rule 702,⁵⁰ (2) whether the facts on which the expert relies are of the same type relied on by other experts in the field as required by Rule 703,⁵¹ (3) whether in reaching her conclusion the expert used a well-

44. See FRE 702.

45. See Advisory Committee's Notes at 56 F.R.D. 183 (1973).

46. See Proposed Rules of Evidence: Hearings Before the Special Subcommittee on Reform of Federal Criminal Laws of the House Committee on the Judiciary, 93d Cong., 1st Sess. (1973); Federal Rules of Evidence: Hearings on H.R. 5463 Before the Senate Committee on the Judiciary, 93d Cong., 2d Sess. (1974).

47. See H.R. Rep. No. 93-650, 93d Cong., 1st Sess. (1973); S. Rep. No. 93-1277, 93d Cong., 2d Sess. (1974); H.R. Conf. Rep. No. 93-1597, 93d Cong., 2d Sess. (1974).

48. Only the Second and Third Circuits explicitly proclaimed the end of the *Frye* test. See *U.S. v. Williams*, 583 F.2d 1194, 1198 (2d Cir. 1978); *U.S. v. Downing*, 753 F.2d 1224, 1232 (3d Cir. 1985). See also *U.S. v. Jakobetz*, 955 F.2d 786 (2d Cir. 1992). The Fourth Circuit turned away from *Frye* more subtly. See *Clinchfield R.R. Co. v. Lynch*, 784 F.2d 545, 553-54 (4th Cir. 1986) (not explicitly abandoning *Frye* yet significantly choosing not to apply *Frye* in a case in which an expert's technique was not generally accepted but seemed reliable).

49. *Christophersen v. Allied-Signal Corp.*, 939 F.2d 1106, 1110 (5th Cir. 1991).

50. *Id.*

51. *Id.* at 1110-11. Rule 703 provides:

The facts or data in the particular case upon which an expert bases an opinion or inference may be those perceived by or made known to the expert at or before the hearing. If

founded methodology as required by *Frye* (essentially a generally accepted methodology),⁵² and (4) whether the testimony's potential for unfair prejudice substantially outweighs its probative value as enunciated in Rule 403.⁵³

The Fifth Circuit noted that under the *Frye* test, an expert's opinion need not be generally accepted before it can be sufficiently reliable and probative to support a jury finding.⁵⁴ The *Frye* test focuses on an expert's methodology, which must pass the test of peer review, not on an expert's conclusions themselves.⁵⁵ When analyzing the reliability of an expert's methodology, a court must determine whether the methodology connects the facts to the conclusion in a scientifically valid, or generally accepted, way.⁵⁶ If the expert's methodology passes the test of peer review, the probative value or weight that the expert's opinion will be given is left to the sound judgment of the jury.⁵⁷ By making the *Frye* inquiry one of Rule 702's implicit requirements of admissibility, many federal courts found a way to continue to defer to the scientific community on the issue of reliability.

2. The Minority Position: *Frye* and the Rules Are Mutually Exclusive

At the time *Daubert* was decided, only the Second and Third Circuits expressly had abandoned the *Frye* test in favor of the Federal Rules of Evidence.⁵⁸ The Second Circuit was the first to do so, criticiz-

of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject, the facts or data need not be admissible in evidence.

FRE 703.

52. *Christophersen*, 939 F.2d at 1111.

53. *Id.* at 1112. See FRE 403.

54. *Christophersen*, 939 F.2d at 1111 (quoting *Osborn v. Anchor Laboratories, Inc.*, 825 F.2d 908, 915 (5th Cir. 1987)).

55. See generally Bert Black, *A Unified Theory of Scientific Evidence*, 56 *Fordham L. Rev.* 595 (1988).

56. *Christophersen*, 939 F.2d at 1115.

57. *Id.* at 1106.

58. The Second Circuit was the first to proclaim that *Frye* was dead. In *United States v. Williams*, 583 F.2d 1194 (2d Cir. 1978), the court stated that "[a] determination of reliability cannot rest solely on a process of 'counting (scientific) noses.' . . . In testing for admissibility of a particular type of scientific evidence, whatever the scientific 'voting' pattern may be, the courts cannot in any event surrender to scientists the responsibility for determining the reliability of that evidence." *Id.* at 1198. The Second Circuit reaffirmed its commitment to a flexible test of admissibility not limited by *Frye* in *United States v. Jakobetz*, 955 F.2d 786 (2d Cir. 1992).

The Third Circuit followed the Second Circuit's lead in *United States v. Downing*, 753 F.2d 1224 (3d Cir. 1985). In rejecting *Frye*, the Third Circuit described some of the strengths and weaknesses of *Frye*'s peer review standard before setting it aside in favor of a more flexible approach for determining reliability. *Downing* provided another model for the Supreme Court's decision in *Daubert*.

ing *Frye* for turning determinations of scientific credibility into simple nose counts of experts, instead of demanding that judges themselves focus on the issue of scientific reliability.⁵⁹ Rather than allow the admissibility of expert testimony to rely solely on the results of peer review, in *U.S. v. Williams*,⁶⁰ the Second Circuit envisioned a broader inquiry.⁶¹

The court focused its test of the reliability of scientific evidence on critical characteristics like the potential rate of error of any scientific techniques that the expert used,⁶² the existence and maintenance of standards controlling these techniques,⁶³ the care and concern with which the techniques had been employed,⁶⁴ and whether or not the techniques lend themselves to abuse.⁶⁵ This comprehensive, multifactor analysis was the forerunner to the one described by the Supreme Court's general observations in *Daubert*.⁶⁶ The Second Circuit's opinion, decided only three years after the enactment of the Rules, provided support for many critics of *Frye* who saw the enactment of the liberal Rules as the perfect opportunity to move away from the conservatism of the peer review standard.

In *United States v. Downing*,⁶⁷ the Third Circuit did not determine conclusively that the Rules automatically superseded *Frye* but held that the status of the *Frye* test under the Rules was somewhat uncertain.⁶⁸ In rejecting *Frye* for reasons of policy, the court gave a detailed explanation of its decision.⁶⁹ The *Downing* court first re-

While only the Second and Third Circuits purposefully had declared *Frye* dead, the Fourth Circuit joined them in spirit. See *Clinchfield RR. Co. v. Lynch*, 784 F.2d 543 (4th Cir. 1986) (rejecting *Frye* in not so many words).

59. *Williams*, 583 F.2d at 1198.

60. *Id.* at 1194.

61. *Id.* at 1198-99.

62. *Id.* at 1198.

63. *Id.*

64. *Id.* at 1199.

65. *Id.* at 1198-99.

66. Justice Blackmun invoked a similar analysis in *Daubert*, 113 S. Ct. at 2797.

67. 753 F.2d 1224 (3d Cir. 1985).

68. The Court noted:

[W]e can assume that the drafters of the Federal Rules of Evidence were aware that the *Frye* test was a judicial creation, and we find nothing in the language of the rules to suggest a disapproval of such interstitial judicial rulemaking. Therefore, although the codification of the rules of evidence may counsel in favor of a re-examination of the general acceptance standard, on balance we conclude that the Federal Rules of Evidence neither incorporate nor repudiate it.

Id. at 1235.

69. The Third Circuit's opinion in *Downing* is particularly relevant to an understanding of *Daubert* because it is a comprehensive opinion, discussing the strengths and weaknesses of *Frye*'s general acceptance-peer review standard and interpreting Rule 702. The Supreme Court in *Daubert* relied heavily on *Downing*, which, together with *Williams*, provided the basis for the Court's decision.

marked that because the *Frye* test was the dominant standard at the time the Rules were adopted, one might expect the Rules to address specifically the issue of whether *Frye* would survive.⁷⁰ Neither the text of the Rules nor the Advisory Committee Notes, however, articulated a clear standard for admitting expert testimony.⁷¹ The *Downing* court noted that although commentators had agreed that this legislative silence was significant, they disagreed about its meaning.⁷²

As previously discussed, one view was that the general acceptance test had survived the enactment of the Rules and should continue to determine the admissibility of expert testimony.⁷³ This view was rooted in the idea that Rule 702 does not set forth a completely integrated standard of admissibility but allows for some consideration of public policy in determining what testimony is relevant and what testimony courts should exclude. Accordingly, the continued application of *Frye* merely represented the way that federal courts had responded to policy concerns regarding the danger of allowing juries to hear novel scientific testimony.

The other view of Rule 702's silence regarding *Frye* maintained that courts should consider the silence to be a purposeful rejection of the general acceptance requirement.⁷⁴ Proponents of this view argued that the *Frye* test was inconsistent with the liberal policies behind the Rules.⁷⁵ In theory, the Rules were intended to allow more, not less, evidence to be admitted. Hence, a decision concerning the relevance of novel scientific testimony arguably should turn on more than just its position in the scientific community.⁷⁶ A rigid and narrow test of

70. *Downing*, 753 F.2d at 1234.

71. *Id.* See also Advisory Committee Notes at 56 F.R.D. 183 (1973).

72. *Downing*, 753 F.2d at 1233 (citing Saltzburg and Redden, *Federal Rules of Evidence Manual* at 452 (cited in note 9)); Giannelli, 80 Colum. L. Rev. at 1249-50 (cited in note 9).

73. See *Downing*, 753 F.2d at 1234 (citing David W. Louisell and Christopher B. Mueller, 1 *Federal Evidence* §105 at 818 (Law Co-op, 1977) (stating that "[p]robably the general scientific acceptance approach has survived the enactment of the Federal Rules, and will continue to be applied in determining the relevancy of such proof under Rule 401")); Saltzburg and Redden, *Federal Rules of Evidence Manual* at 452 (cited in note 9) (stating that "[i]t would be odd if the Advisory Committee and the Congress intended to overrule the vast majority of cases excluding such evidence as lie detectors without explicitly stating so"); Giannelli, 80 Colum. L. Rev. at 1228-29 (cited in note 9).

74. *Downing*, 753 F.2d at 1234 (citing Weinstein and Berger, 3 *Weinstein's Evidence* ¶ 702[03] at 702-16 (cited in note 9) (stating that "[t]he silence of rule [702] and its drafters should be regarded as tantamount to an abandonment of the general acceptance standard")). But see *State v. Williams*, 388 A.2d 500, 503 (Me. 1978) (interpreting the Maine Rules of Evidence, which are patterned after the Federal Rules, as not incorporating *Frye*).

75. *Downing*, 753 F.2d at 1234. See also *Daubert*, 113 S. Ct. at 2794.

76. *Downing*, 753 F.2d at 1235.

relevance would run contrary to the liberal intent of the Rules.⁷⁷ Eventually, the Supreme Court adopted this view when it finally addressed the fate of *Frye* in its *Daubert* decision.⁷⁸

The Third Circuit declined to join either side of the disagreement.⁷⁹ Instead, it held in *Downing* that the Rules neither incorporated nor repudiated *Frye*.⁸⁰ The court decided to make its own independent determination of whether the general acceptance test should survive under the Rules.⁸¹

The *Downing* court pointed out that *Frye's* principal strength was that it provided a method for courts to use when assessing the reliability of novel scientific evidence.⁸² The test guarded against the possible ill effects of admitting testimony derived from unproven methodology.⁸³ Despite these virtues, critics of the general acceptance requirement considered it vague and overly conservative.⁸⁴ *Frye's* vagueness arguably allows courts that wish to admit evidence to limit the impact of the test by defining the relevant scientific community as only those experts who customarily use the technique in question.⁸⁵ The *Downing* court noted that courts may interpret "general acceptance" as they please.⁸⁶ For instance, judicial definitions of "general acceptance" range from "widespread; prevalent; extensive though not

77. Some commentators have implied that Rule 702 independently provides almost no limits on admissibility that are not provided by the Rules as a whole. McCormick advocates the replacement of the strict, peer review threshold of *Frye* with an admissibility test based more on logical relevancy, as provided by Rule 401, and on probative value and lack of prejudice, as provided by Rule 403:

General scientific acceptance is a proper condition for taking judicial notice of scientific facts, but it is not a suitable criterion for the admissibility of scientific evidence. Any relevant conclusions supported by a qualified expert witness should be received unless there are distinct reasons for exclusion. These reasons are the familiar ones of prejudicing or misleading the jury or consuming undue amounts of time.

Edward W. Cleary, ed., *McCormick on Evidence* § 203 at 608 (West, 3d ed. 1984). The Supreme Court did not read the Rules as liberally. In *Daubert*, the Court held that Rule 702 incorporates its own somewhat heightened standards of reliability and relevance.

78. *Daubert*, 113 S. Ct. at 2794.

79. *Downing*, 753 F.2d at 1235.

80. *Id.*

81. *Id.*

82. *Id.* (citing *United States v. Addison*, 498 F.2d 741, 743-44 (D.C. Cir. 1974)).

83. *Downing*, 753 F.2d at 1235 (citing *United States v. Brown*, 557 F.2d 541, 556 (6th Cir. 1977)).

84. *Downing*, 753 F.2d at 1236 (citing *Louisell and Mueller*, 1 *Federal Evidence* § 105 at 821 (cited in note 73)); *Giannelli*, 80 Colum. L. Rev. at 1249-50 (cited in note 9).

85. *Downing*, 753 F.2d at 1236 (citing *People v. Williams*, 164 Cal. App. 2d Supp. 858, 331 P.2d 251, 254 (1958) (holding that the *Frye* test was satisfied by showing general acceptance by those who are expected to be familiar with the challenged technique despite the admission of the prosecution's own expert that the technique lacked acceptance within the medical profession as a whole)).

86. *Downing*, 753 F.2d at 1236.

universal"⁸⁷ to a "substantial section of the scientific community."⁸⁸ The court criticized other aspects of *Frye* as well, including courts' selectivity in applying the test, the inadequacy of expert testimony available concerning many specialized issues due to the use of the test, and the uncritical reliance on prior judicial, rather than scientific, determinations of reliability that the test encourages.⁸⁹

In the end, the Third Circuit chose to set the *Frye* test aside, applying only the Rules.⁹⁰ It stated that the *Frye* test had become too malleable to ensure orderly and uniform results.⁹¹ Additionally, in its original form, the general acceptance standard displays a conservatism that runs contrary to the spirit of the Rules.⁹² The *Downing* decision addressed many issues that the Supreme Court found compelling when it later decided the fate of *Frye* in *Daubert v. Merrell Dow Pharmaceuticals*.⁹³

III. RECENT DEVELOPMENT: *DAUBERT V. MERRELL DOW PHARMACEUTICALS, INC.*—FEDERAL TRIAL JUDGES AS THE GATEKEEPERS OF RELIABILITY

On June 28, 1993, the Supreme Court handed down its decision in *Daubert*.⁹⁴ The majority opinion settled the split among the circuits as to whether the liberal Rules should trump *Frye*'s strict, peer review test for admitting expert testimony.⁹⁵ In a seven-to-two decision, Justice Blackmun, writing for the majority, held that the Rules had displaced *Frye*.⁹⁶ In dicta, the majority also made general observations about the pertinent questions that a federal judge must ask when determining the admissibility of expert testimony under Rule 702.⁹⁷ This dicta has radically altered expectations of how federal trial judges will approach the admission of expert testimony.

87. *Id.* (citing *United States v. Zeiger*, 350 F. Supp. 685, 688 (D.D.C. 1972), rev'd, 475 F.2d 1280 (D.C. Cir. 1972)).

88. *Downing*, 753 F.2d at 1236 (quoting *United States v. Williams*, 443 F. Supp. 269, 273 (S.D.N.Y. 1977), aff'd, 583 F.2d 1194 (2d Cir. 1978)).

89. *Downing*, 753 F.2d at 1236 (citing Giannelli, 80 Colum. L. Rev. at 1208-21 (cited in note 9)); Louisell and Mueller, 1 *Federal Evidence* § 105 at 821 (cited in note 73).

90. *Downing*, 753 F.2d at 1237.

91. *Id.*

92. *Id.*

93. 113 S. Ct. 2786 (1993).

94. *Id.*

95. It was for this purpose that the Court granted certiorari. 113 S. Ct. at 2792.

96. *Id.* at 2794.

97. *Id.* at 2796.

A. *The Facts*

Daubert involved typical issues of causation in a products liability case. The plaintiffs were the parents of children who had been born with severe limb deformities.⁹⁸ They claimed that these birth defects were the result of the mothers' prescribed use of Bendectin, an anti-nausea drug manufactured by Merrell Dow Pharmaceuticals.⁹⁹ After removing the case to federal court, Merrell Dow moved for summary judgment, arguing that the plaintiffs had insufficient evidence to prove that Bendectin had caused the children's injuries.¹⁰⁰ To support its position, Merrell Dow presented an affidavit from an epidemiologist who was a recognized expert on the risks associated with exposure to certain chemical substances.¹⁰¹ The doctor had examined some thirty published studies of over 130,000 patients and concluded that no study indicated that Bendectin was capable of causing birth defects.¹⁰²

The plaintiffs responded by submitting the affidavits of eight other well-credentialed experts¹⁰³ who stated that Bendectin could cause birth defects.¹⁰⁴ The experts' conclusions were based on *in vitro* (test tube) and *in vivo* (live) animal studies of Bendectin, pharmacological studies of the drug, and the re-analysis of other published epidemiological (human statistical) studies.¹⁰⁵ Merrell Dow argued that this evidence was not admissible because the testimony of the plaintiffs' experts contradicted the weight of scientific authority.¹⁰⁶ The District Court for the Southern District of California granted Merrell Dow's motion for summary judgment, stating that it would

98. Id. at 2791-97.

99. Id.

100. Id.

101. Id. Dr. Lamm, the defendant's expert, received his M.D. from the University of Southern California and "served as a consultant in birth-defect epidemiology for the National Center for Health Statistics." Id. at 2791 n.1.

102. Id. at 2791.

103. The Court noted the experts' credentials:

For example, Shanna Helen Swan, who received a master's degree in biostatics from Columbia University and a doctorate in statistics from the University of California at Berkeley, is chief of the section of the California Department of Health and Services that determines causes of birth defects, and has served as a consultant to the World Health Organization, the Food and Drug Administration, and the National Institutes of Health. Stewart A. Newman, who received his master's and a doctorate in chemistry from Columbia University and the University of Chicago, respectively, is a professor at New York Medical College and has spent over a decade studying the effect of chemicals on limb development.

Id. at 2791 n.2 (citations omitted).

104. Id. at 2791.

105. Id. at 2791-92.

106. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 727 F. Supp. 570, 575 (S.D. Cal. 1989).

allow the scientific evidence to be admitted only if the principle from which it was derived was sufficiently established to have won general acceptance among experts in the field from which the evidence derived.¹⁰⁷ Given the epidemiological data available concerning Bendectin, the district court held that expert testimony not based on human studies was inadmissible.¹⁰⁸ The court also held that the plaintiffs' experts' opinions, based on recalculations of previously published data, were inadmissible partially because they had not been subjected to peer review.¹⁰⁹

The Ninth Circuit affirmed the district court's holding, citing *Frye*.¹¹⁰ It stated that expert testimony based on a scientific technique is admissible only if the technique is generally accepted by the scientific community and held that the plaintiffs' evidence did not pass this test.¹¹¹ It specifically noted that other federal circuit courts considering the risks of Bendectin also had refused to admit re-analyses of epidemiological studies not subjected to peer review.¹¹² These re-analyses, the court stated, were particularly problematic in light of the thirty published studies supporting Merrell Dow's position.¹¹³ Courts usually only accept re-analyses that have been subjected to verification and scrutiny by other experts in the scientific community.¹¹⁴ The Supreme Court granted certiorari to settle the sharp division among the federal circuit courts regarding the proper standard for the admission of expert testimony.¹¹⁵

B. The Majority Opinion

Justice Blackmun began the majority opinion in *Daubert* by acknowledging that the *Frye* test of admissibility had been the dominant standard for seventy years.¹¹⁶ He noted, however, that although

107. *Id.* at 572 (quoting *United States v. Kilgus*, 571 F.2d 508, 510 (9th Cir. 1978)).

108. *Daubert*, 727 F. Supp. at 575.

109. *Id.*

110. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 951 F.2d 1128, 1129 (9th Cir. 1991) (quoting *United States v. Solomon*, 753 F.2d 1522, 1526 (9th Cir. 1985) (citing *Frye*, 293 F. 1013)).

111. *Daubert*, 951 F.2d at 1131.

112. *Id.* at 1130-31 (citing *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 911 F.2d 941 (3d Cir. 1990)); *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307, modified, 884 F.2d 166 (5th Cir. 1989); *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823 (D.C. Cir. 1988); *Lynch v. Merrell-National Labs*, 830 F.2d 1190 (1st Cir. 1987).

113. *Daubert*, 951 F.2d at 1130.

114. *Id.* at 1131.

115. *Daubert*, 113 S. Ct. at 2792.

116. *Id.*

courts and commentators had debated the merits of *Frye*,¹¹⁷ the instant case was not concerned with its merits, but rather its continuing authority.¹¹⁸ The Court held that the enactment of the Rules indeed had displaced *Frye*.¹¹⁹

Justice Blackmun's analysis of the matter began with Rule 402, which provides that relevant evidence is admissible unless precluded by the Constitution, Congress, the other Federal Rules of Evidence, or the Supreme Court acting pursuant to statutory authority.¹²⁰ Relevant evidence, according to Rule 401, is defined as evidence having a tendency to make the existence of any material fact more or less probable.¹²¹ These broad statements led Justice Blackmun to interpret the Rules' standard of relevance very liberally.¹²²

The Federal Rules of Evidence occupy the field;¹²³ therefore, the Court held that only common-law authority consistent with the Rules could continue to apply.¹²⁴ Yet, in the case of the admissibility of expert testimony, a specific Rule governs.¹²⁵ The text of Rule 702 does not establish general acceptance as an explicit prerequisite to admissibility.¹²⁶ Justice Blackmun noted that the legislative history of the

117. *Id.* at 2793 (citing Michael D. 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 (1992); Edward R. Becker and Aviva Orenstein, *The Federal Rules of Evidence After Sixteen Years—The Effect of "Plain Meaning" Jurisprudence, The Need for an Advisory Committee on the Rules of Evidence, and Suggestions for Selective Revision of the Rules*, 60 Geo. Wash. L. Rev. 857, 876-85 (1992); Black, 56 Fordham L. Rev. 595 (cited in note 55); Edward J. Imwinkelried, *The "Bases" of Expert Testimony: The Syllogistic Structure of Scientific Testimony*, 67 N.C. L. Rev. 1 (1988); *Proposals for a Model Rule on the Admissibility of Scientific Evidence*, 26 Jurimetrics J. 235 (1986); Giannelli, 80 Colum. L. Rev. 1197 (cited in note 9); *The Supreme Court, 1986 Term: Leading Cases*, 101 Harv. L. Rev. 119, 125-27 (1987).

118. *Daubert*, 113 S. Ct. at 2793. Justice Blackmun noted that, like the question of *Frye*'s merits, the dispute over *Frye*'s survival also has divided courts and commentators. *Id.* at n.5. See, for example, *United States v. Williams*, 583 F.2d 1194 (2d Cir. 1978) (asserting that *Frye* is superseded by the Rules); *Christophersen v. Allied-Signal Corp.*, 939 F.2d 1106, 1115-16 (5th Cir. 1991) (stating that *Frye* and the Rules coexist); Weinstein and Berger, 3 *Weinstein's Evidence* ¶ 702[03] at 702-36 to 702-37 (cited in note 9) (asserting that *Frye* is dead); Graham, *Handbook of Federal Evidence* § 703.2 (cited in note 17) (arguing that *Frye* lives).

119. *Daubert*, 113 S. Ct. at 2793.

120. *Id.* at 2793-94 (citing FRE 402).

121. *Daubert*, 113 S. Ct. at 2794 (citing FRE 401).

122. *Daubert*, 113 S. Ct. at 2794.

123. *Id.* (citing *United States v. Abel*, 469 U.S. 45, 49 (1984)).

124. *Daubert*, 113 S. Ct. at 2794. In *Abel*, 469 U.S. 45 (1984), the Court held that a common-law rule of evidence was entirely consistent with Rule 402's general requirement of admissibility and considered it unlikely that the drafters of the Rules meant to change the common law. In *Bourjaily v. United States*, 483 U.S. 171 (1987), however, the Court was unable to find a particular common-law doctrine in the Rules and therefore held that the common law had been superseded.

125. See *Daubert*, 113 S. Ct. at 2794 (citing FRE 702).

126. *Daubert*, 113 S. Ct. at 2794.

Rules does not mention the *Frye* test,¹²⁷ and consistent with *Downing*, he stated that a rigid test like the *Frye* test would conflict with the liberal nature of the Rules and their general policy of relaxing the traditional rules barring opinion testimony.¹²⁸ He stated that the Rules' permissive thrust and the inclusion of a particular Rule governing expert testimony that does not invoke peer review make the idea that the Rules assimilated *Frye* unconvincing.¹²⁹

Justice Blackmun was quick to note, however, that, despite the abandonment of the *Frye* test, the Rules do place limits on expert testimony.¹³⁰ Under the Rules, trial judges must ensure that all scientific testimony is not only relevant but also reliable.¹³¹ Rather than simply rely on this theoretical explanation of Rule 702, the Court decided to detail the nature and source of the trial judge's duty as the gatekeeper of expert testimony.¹³²

Rule 702 contemplates some restriction of the subjects and theories about which an expert may testify.¹³³ Justice Blackmun stated that in the text of Rule 702, the word "scientific" implies that testimony must be grounded in the methods and procedures of science,¹³⁴ and the word "knowledge" connotes more than subjective belief and unsupported speculation.¹³⁵ He found that to be considered "scientific knowledge," an assertion must be derived from use of the scientific method.¹³⁶ Thus, Rule 702 requires expert testimony to possess a degree of evidentiary reliability.¹³⁷ The Rule further requires that admitted testimony be capable of assisting the trier of

127. *Id.*

128. *Id.* (quoting *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 169 (1988)). See also Jack B. Weinstein, *Rule 702 of the Federal Rules of Evidence Is Sound; It Should Not Be Amended*, 138 F.R.D. 631, 631 (1991) (stating that "[t]he Rules were designed to depend primarily upon lawyer-adversaries and sensible triers of fact to evaluate conflicts").

129. *Daubert*, 113 S. Ct. at 2794.

130. *Id.* at 2794-95.

131. *Id.* at 2795. Justice Blackmun criticized Chief Justice Rehnquist: "The Chief Justice 'do[es] not doubt that Rule 702 confides to the judge some gatekeeping responsibility,' . . . but would neither say how it does so, nor explain what that role entails. We believe the better course is to note the nature and source of the duty." *Id.* at 2795 n.7.

132. *Id.*

133. *Id.* at 2795.

134. *Id.*

135. *Id.* "The term 'applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds.'" *Id.* (quoting *Webster's Third New International Dictionary* 1252 (Merriam-Webster, 1986)).

136. *Daubert*, 113 S. Ct. at 2795.

137. *Id.* "We note that scientists typically distinguish between 'validity' (does the principle support what it purports to show?) and 'reliability' (does application of the principle produce consistent results?)." *Id.* (quoting Black, 56 *Fordham L. Rev.* at 599 (cited in note 55)).

fact to understand the evidence or determine a fact in issue.¹³⁸ Thus, admitted testimony also must be relevant.¹³⁹

These requirements of reliability and relevance are not surprising considering that experts are permitted wide latitude to offer opinions under Rule 702.¹⁴⁰ Trial judges must make a preliminary assessment about whether proffered testimony will (1) contain scientific knowledge, and (2) assist the trier of fact.¹⁴¹ Justice Blackmun and the *Daubert* majority realized that many factors will affect these inquiries, and concluded that some general observations were appropriate.¹⁴² Accordingly, the Court identified several relevant questions that trial courts must ask when assessing expert testimony.

The first pertinent question is whether the theory or technique can be tested.¹⁴³ This question is relevant to the status of the theory or technique as scientific knowledge.¹⁴⁴ Courts must then determine the degree to which the theory or technique has been scrutinized by peer review and publication.¹⁴⁵ This question is similar to the general acceptance question in *Frye* but is not outcome-determinative. Publication is no longer a *sine qua non* of admissibility; it does not always go hand-in-hand with reliability, and in some cases reliable but innovative theories will not yet have been published.¹⁴⁶ A trial court also

138. *Daubert*, 113 S. Ct. at 2795 (quoting FRE 702).

139. *Daubert*, 113 S. Ct. at 2795.

140. *Id.* at 2796. The Court observed:

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 first-hand knowledge—a rule which represents “a ‘most persuasive manifestation’ of the common law insistence upon ‘the most reliable sources of information,’” Advisory Committee’s Notes on Fed. Rule Evid. 602—is premised on an assumption that the expert’s opinion will have a reliable basis in the knowledge and experience of his discipline.

Id.

141. *Id.* The Court specifically stated that Rule 702’s requirements of reliability and relevance do not apply only to unconventional evidence but noted that “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 Fed. Rule Evid. 201.” *Id.* at 2796 n.7.

142. *Id.* at 2796.

143. *Id.* at 2797.

144. *Id.* “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.” Green, 86 Nw. U. L. Rev. at 645 (cited in note 117) (quoted in *Daubert*, 113 S. Ct. at 2796).

145. *Daubert*, 113 S. Ct. at 2797.

146. *Id.* (citing Sheila Jasanoff, *The Fifth Branch: Science Advisors as Policymakers* 61-76 (Harvard U., 1990), and David F. Horrobin, *The Philosophical Basis of Peer Review and the Suppression of Innovation*, 263 J.A.M.A. 1438 (1990)). The Court further stated, “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 flaws in methodology will be detected.” *Daubert*, 113 S. Ct. at 2797 (citing John M. Ziman, *Reliable Knowledge: An Exploration of the*

should consider the known or potential rate of error of any technique used, and the existence and maintenance of standards controlling the technique's operation.¹⁴⁷ Finally, the court may consider the degree of acceptance of the theory or technique.¹⁴⁸ Justice Blackmun interpreted the Third Circuit's opinion in *Downing* to say that an assessment of reliability does not require, though it does permit, the specific identification of a relevant expert community and an assessment of the degree of acceptance therein.¹⁴⁹

The *Daubert* majority emphasized that the inquiry envisioned by Rule 702 is a flexible one.¹⁵⁰ Throughout a judge's assessment of proffered testimony, he must keep in mind all of the Rules.¹⁵¹ Specifically, trial courts must remember Rule 403, which permits the exclusion of relevant evidence if its probative value is substantially outweighed by dangers of unfair prejudice, confusing the issues, or misleading the jury.¹⁵² The majority apparently was confident that federal judges will be capable gatekeepers of expert testimony armed only with these general guidelines and their own discretion and judgment.¹⁵³

C. Chief Justice Rehnquist's Dissent

Chief Justice Rehnquist, joined by Justice Stevens, concurred with the majority in part, and dissented in part.¹⁵⁴ He agreed that *Frye* did not survive the enactment of the Rules.¹⁵⁵ The Chief Justice disagreed, however, with the majority's desire to make general observations about the correct way to apply Rule 702.¹⁵⁶ He noted that general observations of the Supreme Court carry great weight with

Grounds for Belief in Science 130-33 (Cambridge U., 1978); Arnold S. Relman and Marcia Angell, *How Good Is Peer Review?*, 321 *New Eng. J. Med.* 827 (1989)).

147. *Daubert*, 113 S. Ct. at 2797.

148. *Id.*

149. *Id.* (quoting *Downing*, 753 F.2d at 1238).

150. *Daubert*, 113 S. Ct. at 2797.

151. *Id.*

152. *Id.* at 2798 (quoting FRE 403).

153. Justice Blackmun and the majority expressly addressed some of the important underlying concerns of the parties and amici in *Daubert*. Justice Blackmun dismissed fears that abandonment of the general acceptance test would lead to a "free-for-all" in which "befuddled juries [would be] confounded by absurd and irrational pseudoscientific assertions," stressing that these problems could be solved by vigorous cross-examination and careful instruction on the burden of proof—the traditional means of attacking shaky but admissible evidence. *Daubert*, 113 S. Ct. at 2798.

154. *Id.* at 2799 (Rehnquist, C.J., and Stevens, J., concurring in part and dissenting in part).

155. *Id.*

156. *Id.*

lower courts but suffer from the flaw of vagueness.¹⁵⁷ Therefore, the Court should proceed cautiously when commenting on the Rules, especially when, as here, issues of scientific method and validity are present, because these issues are well outside the expertise of judges.¹⁵⁸ The danger with expounding on these issues, according to Chief Justice Rehnquist, is that the Court's reach easily can exceed its grasp.¹⁵⁹

The Chief Justice also disagreed with the substance of the majority's observations.¹⁶⁰ The Rules clearly exclude evidence that is not relevant,¹⁶¹ but the *Daubert* majority read Rule 702 as also excluding evidence that is not reliable.¹⁶² The majority read Rule 702 as stating that any scientific knowledge imparted by an expert witness must be reliable because the Rule requires the knowledge to be derived from the scientific method.¹⁶³ The Chief Justice's first disagreement with this general observation was that the majority did not indicate clearly whether this dicta relates only to experts seeking to testify as to scientific knowledge, or whether it also applies to experts seeking to address technical or specialized knowledge, to which Rule 702 also applies.¹⁶⁴ Chief Justice Rehnquist astutely questioned the difference between scientific and technical knowledge, asking whether the drafters of Rule 702 actually contemplated that the phrase "scientific, technical, or other specialized knowledge" would be divided into several subspecies of expertise.¹⁶⁵ The Chief Justice also criticized the majority for asking too much of trial court judges.¹⁶⁶ He acknowledged that Rule 702 confides to trial judges some gatekeeping responsibility in determining the admissibility of expert testimony, but did not think that it imposes on them an obligation to become amateur scientists to make this determination.¹⁶⁷

157. *Id.*

158. *Id.*

159. *Id.*

160. *Id.* at 2800.

161. Chief Justice Rehnquist does not disagree with this basic reading of Rule 402. *Id.*

162. Justice Blackmun and the majority read Rule 702's admission of testimony based on scientific knowledge to require implicitly that evidence admitted under the Rule be reliable. *Id.*

163. *Id.*

164. *Id.* Rule 702 also applies to expert testimony regarding technical or specialized knowledge. See FRE 702.

165. *Daubert*, 113 S. Ct. at 2800.

166. The Chief Justice pointed to a passage of the majority opinion that states that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability." *Id.* at 2797. He then stated, "I defer to no one in my confidence in federal judges; but I am at a loss to know what is meant when it is said that the scientific status of a theory depends on its 'falsifiability,' and I suspect some of them will be, too." *Id.* at 2800.

167. *Id.*

IV. ANALYSIS—THE POTENTIAL PITFALLS OF ABANDONING THE PEER REVIEW STANDARD

A. *Issues Unresolved by Daubert*

Justice Blackmun's observations in *Daubert* failed to resolve some issues related to the new test replacing *Frye*. For instance, as Chief Justice Rehnquist noted, Justice Blackmun failed to define the scope of *Daubert's* dicta. Will the multifactor test that the majority attached to Rule 702 apply to the proposed testimony of technical and specialized experts as well as scientific experts? If so, application of the test will be awkward, if not impossible, in a nonscientific setting. After all, the majority's reading of a reliability requirement implicit in the text of Rule 702 is based directly on the concept of the scientific method.¹⁶⁸ If this reliability requirement is implicit in the words "scientific knowledge," should not some reliability requirement also attach to the words "technical knowledge" and "specialized knowledge"? Unfortunately, no easily identifiable technical or specialized equivalent to the scientific method exists. The majority's recommendations for district court judges do not enlighten them on how to deal with issues of nonscientific reliability.

What test of reliability can judges apply to technical and specialized testimony? Certainly not the *Frye* general acceptance test, for it traditionally has determined only the admissibility of scientific evidence,¹⁶⁹ and regardless of its historical application, Rule 702 has displaced it. Apparently, judges must examine technical and specialized testimony under Rule 702 alone, without the benefit of *Daubert's* general observations. This requirement seems strange because the text of Rule 702 does not clearly indicate that its drafters intended scientific experts to be treated differently than their technical and specialized counterparts. In fact, the grouping of all expert testimony

168. The *Daubert* majority read the words "scientific knowledge" to require that "an inference or assertion must be derived by the scientific method. . . . In short, the requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability." *Id.* at 2795. The Court observed, "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." *Id.* at 2796 (quoting Green, 86 Nw. U. L. Rev. at 645 (cited in note 117)).

169. The *Frye* decision speaks only in terms of scientific principles or discoveries. *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923).

under one rule suggests that courts should admit all experts under the same standard.

Another issue unresolved by *Daubert* concerns the standard of review of trial judges' decisions about admissibility made pursuant to *Daubert's* new, flexible inquiry. Will the standard of review of *Daubert* decisions be different than the de novo standard applied under *Frye*?¹⁷⁰ Under the *Frye* rule, appellate courts generally reviewed admissibility decisions de novo because the same information needed to reach a conclusion about general acceptance was equally available to the appellate court. Thus, the appellate court could take its own head count of experts and determine the extent to which a scientific method was accepted. Ordinarily, however, evidentiary rulings are reviewed only for an abuse of discretion¹⁷¹ because the trial court is usually in the best position to make credibility determinations and to balance the probative value of proffered evidence against the danger of unfair prejudice, confusion, or delay.¹⁷² The multifactor judgment that *Daubert* requires is exactly the type of balancing decision that normally is reviewed only for an abuse of discretion. If *Daubert* decisions are reviewed with this deference, inconsistent decisions concerning the admissibility of novel scientific testimony may go unchecked from jurisdiction to jurisdiction and from judge to judge. This inconsistent standard of review inevitably may lead to more forum shopping in toxic tort and other complex litigation and confound efforts to provide uniformity under the Rules.

B. *Daubert's Future Effect on Junk Science*

Supporters of *Daubert* believe that the Court's new guidance on how to apply Rule 702 will provide a better test of admissibility than the *Frye* test.¹⁷³ Although *Daubert* may allow courts to admit some scientific evidence that they would have excluded under *Frye* because the evidence has not been generally accepted, the evidence, in theory, should be scientifically reliable. More importantly perhaps, *Daubert* could bar evidence that is generally accepted but cannot meet the new

170. See, for example, *Cella v. United States*, 998 F.2d 418, 423 (7th Cir. 1993).

171. See, for example, *United States v. Merrill*, 746 F.2d 458, 465 (9th Cir. 1984).

172. See FRE 403.

173. See, for example, Thomas W. Kirby, *Junking Bad Science; The Court Didn't Just Dump the Old Test for Scientific Testimony This Term; It Set Up Trial Judges as the Arbiters of What's Junk and What's Not*, *The Connecticut Law Tribune* (Aug. 2, 1993) (stating, "*Daubert* recognizes that scientific barbarians are at the gates. Rather than sealing the gates to all innovative scientists, however, *Daubert* authorizes and requires the trial judge to act as a careful and discerning gatekeeper.>").

multifactor test of scientific reliability.¹⁷⁴ Perhaps the *Frye* test survived so long because judges and lawyers were comfortable with it and because it allowed them to avoid determining the reliability of scientific evidence themselves.¹⁷⁵ Although *Frye* may have simplified matters for the judiciary, it arguably did not provide the true scrutiny of expert testimony that today's complex litigation demands. Without this scrutiny, *Daubert's* new flexible inquiry may be the only way to control today's proliferation of the battle of the experts.¹⁷⁶ Federal judges, as *Daubert* gatekeepers, no longer will be able to avoid scrutinizing issues of scientific reliability. With more scientific education seminars for judges and more judicial clerks with scientific backgrounds, *Daubert* may potentially act as a better filter for unreliable scientific testimony than *Frye*.

More likely, however, *Daubert* will create problems in federal district courts. It almost certainly will lead to an increase in the amount of novel, scientific testimony that parties attempt to introduce into trials.¹⁷⁷ Most of the evidence admitted, hopefully, will be valid and reliable, but some junk science undoubtedly will be included. Parties may be forced to provide secondary experts to explain their experts' methodology to novice scientists on the bench.¹⁷⁸ Unable

174. Theoretically, at least, judges under *Daubert* will make their own inquiries into the reliability of expert testimony, rather than merely rely on a head count of experts. In this situation, some theories or methods that traditionally have been considered sound, and still generate general support in a given field, may be discredited by recent scientific breakthroughs or developments. Thus, *Daubert* possibly will help to bar admission of outdated ideas.

175. David O. Stewart, *A New Test: Decision Creates Uncertain Future for Admissibility of Expert Testimony*, 79 A.B.A. J. 48, 51 (Nov. 1993).

176. *Id.*

177. Parties no longer will be deterred from trying to introduce experts who will bolster their arguments, even if the experts are at the fringe of the scientific community and plan to testify about theories that have gained little, if any, support among the experts' peers. Although *Daubert* allows the degree of acceptance of testimony to play a part in the determination of its admissibility, without lack of acceptance being exclusionary in and of itself, parties often will try to admit questionable evidence. Even if *Daubert* eventually does filter out all unreliable testimony, federal trial courts still may be deluged with proffered testimony to screen.

178. One undisputable drawback of abandoning a peer review standard of admissibility and placing the trial court judge in the role of sole gatekeeper is time. *Daubert's* multifactor inquiry undoubtedly will take longer than *Frye's* head count:

The Third Circuit's experience with its *Downing* test is instructive. In *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 911 F.2d 941 (3d Cir. 1990), the district judge on remand was ordered to conform to the *Downing* test in evaluating the expert testimony at issue. This required him to conduct a hearing held on five separate days, followed by extensive post-hearing submissions of the parties, in order to determine whether [one witness's] testimony is admissible. Thus, when expert testimony is challenged, federal district judges can expect to spend a substantial portion of their already precious time satisfying the factors of the *Daubert* test.

Dyk and Castanias, 15 Nat'l L. J. at 18 (cited in note 37).

merely to rely on the tried and true general acceptance standard, judges surely will admit some untested theories. Some of these theories will be unreliable. *Daubert* places great faith in the judiciary, and the liberal Rules place great faith in juries to filter out unreliable evidence, hoping that vigorous cross-examination will discredit it. The system actually should work this way. Yet, cross-examination is not as effective a filter as peer review. Neither courts, parties, nor juries have the time, expertise, or money to evaluate independently the degree to which each piece of testimony is rooted in the scientific method. Put simply, the *Daubert* test is excessively cumbersome and too variable.

C. *The Failed Amendment to Rule 702*

In 1991, the Committee on Rules of Practice and Procedure of the Judicial Conference of the United States recommended amending Rule 702 to reduce the use of expert testimony by requiring a higher degree of relevance and introducing a reliability requirement into the text of the Rule.¹⁷⁹ The drafters of the proposed amendment intended it to limit the use but increase the utility and reliability of opinion testimony bearing on scientific issues.¹⁸⁰ They suggested the amendment in reaction to the increasingly costly and complicated use of junk science in federal litigation.¹⁸¹ The drafters did not intend the pro-

179. The proposal to amend Rule 702 was made in August, 1991. The premise of the amendment was that the courts already had abandoned *Frye*. The proposed rule reads:

Testimony providing scientific, technical, or other specialized information, in the form of an opinion or otherwise, may be permitted only if (1) the information is *reasonably reliable* and will *substantially* assist the trier of fact to understand the evidence or to determine a fact in issue, and (2) the witness is qualified as an expert by knowledge, skill, experience, training, or education to provide such testimony. Except with leave of court for good cause shown, the witness shall not testify on direct examination in any civil action to any opinion or inference, or reason or basis therefor, that has not been seasonably disclosed as required by Rules 26(a)(2) and 26(e)(1) of the Federal Rules of Civil Procedure.

Committee on Rules of Practice and Procedure of the Judicial Conference of the United States, Preliminary Draft of Proposed Amendments to the Federal Rules of Civil Procedure and Federal Rules of Evidence (1991) (proposed amendment to FRE 702) ("*Preliminary Draft*") (emphasis added).

180. Advisory Committee's Notes to Proposed Amendments to FRE 702.

181. The Committee asserted:

The use of such testimony has increased greatly since enactment of the Federal Rules of Evidence. This result was intended by the drafters of the rule, who were responding to concerns that the restraints previously imposed on expert testimony were artificial and an impediment to the illumination of technical issues in dispute. See, for example, Cleary, ed., *McCormick on Evidence* § 203 [(cited in note 77)]. While much expert testimony now presented is illuminating and useful, much is not, virtually all is expensive, if not to the proponent then to adversaries. Particularly in civil litigation with high financial stakes, large expenditures for marginally useful expert testimony has become commonplace. Procurement of expert testimony is occasionally used as a trial technique to wear down

posed Rule, while requiring a greater degree of relevance and reliability, to mandate a complete return to the strict requirements of *Frye*.¹⁸² Although the suggested Rule's text does not say so explicitly, it would call on courts to reject testimony based on premises lacking significant support within the scientific community, or that otherwise would be of little help to the factfinder.¹⁸³ The Committee clearly recognized that Rule 702 had replaced *Frye*, yet thought that the current Rule's overbroad phrasing allows too much expert testimony into federal trials.¹⁸⁴ The Committee did not anticipate *Daubert*, however, as the proposal's text does little to indicate the manner in which the reliability of expert testimony should be judged.¹⁸⁵ Unfortunately, Congress has not enacted even this limited proposed amendment to Rule 702.

V. CLARIFYING THE FEDERAL RULE ON EXPERT TESTIMONY

Daubert's idyllic general observations do not provide a manageable and consistent method for judging the admissibility of expert testimony. Truly independent assessment of the reliability of every piece of proposed scientific testimony soon may prove to be a logistical nightmare, yet the Rules provide no easier test. Unfortunately, Congress has not accepted the Advisory Committee's amendment to Rule 702.¹⁸⁶ By clarifying Rule 702, however, the right balance between practicality and flexibility can be found.¹⁸⁷ Congress should consider an amendment that will produce accurate, consistent results without requiring judges to expend time they do not have playing amateur

adversaries. In short, while testimony from experts may be desirable if not crucial in many cases, excesses cannot be doubted and should be curtailed.

Advisory Committee's Notes to Proposed Amendments to FRE 702.

182. Advisory Committee's Notes to Proposed Amendments to FRE 702 (citing *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923)).

183. Advisory Committee's Notes to Proposed Amendments to FRE 702.

184. The danger of junk science has grown, and the Advisory Committee recognized this: While concern for the quality and even the integrity of hired testimony is not new, . . . the hazards to the judicial process have increased as more technical evidence is presented: "When the evidence relates to highly technical matters and each side has shopped for experts favorable to its position, it is naive to expect the trier of fact to be capable of assessing the validity of dramatically opposed testimony."

Id. (quoting Weinstein and Berger, 3 *Weinstein's Evidence* ¶ 706[01] at 706-07 (cited in note 9)).

185. Aside from weakly invoking *Frye* in the Committee's Notes by calling on courts to "reject testimony that is based upon premises lacking any significant support and acceptance within the scientific community," the amended Rule offers no concrete criteria by which to judge reliability. See Advisory Committee's Notes to Proposed Amendments to FRE 702.

186. The Committee's proposed amendment to Rule 702 is still available for consideration.

187. Adding a more direct statement establishing peer review as the cornerstone of any inquiry into the reliability of expert testimony could improve the proposed Rule.

scientist. To do this while avoiding the pitfalls of *Frye*, any new version of Rule 702 must allow the more qualified scientific community to determine most questions of scientific reliability without automatically excluding ideas merely because they have not been tested universally. A new Rule 702 would do well to establish explicitly a rebuttable presumption that only testimony (whether scientific, technical, or specialized) derived by using methodology that has gained significant acceptance in the appropriate field is admissible.¹⁸⁸

An improved Rule 702 might read as follows: If scientific, technical, or other specialized information will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness may testify thereto in the form of an opinion or otherwise only if (1) the information is reasonably reliable, and (2) the witness is qualified as an expert by knowledge, skill, experience, training, or education to provide that testimony.

Information normally will be considered reasonably reliable if it is based on premises, or derived from techniques, having significant support and acceptance within the relevant specialized community. A party seeking to object to a witness testifying thereto must show by a preponderance of the evidence that the information is not reasonably reliable.

Information based on premises or derived from techniques not having significant support and acceptance within the relevant specialized community normally will not be considered reasonably reliable. A party seeking to have an expert base her testimony on this type of evidence must show by a preponderance of the evidence that this information is reasonably reliable.¹⁸⁹

This amended Rule would serve a number of purposes. First, it would retain a firm emphasis on relevance by requiring that expert testimony assist the trier of fact. Second, like the Advisory

188. Professor Paul C. Giannelli has advocated placing a special burden on the admissibility of novel scientific evidence. He argues that (1) the burden of admissibility should require a showing of reliability by a preponderance of the evidence in civil cases and beyond a reasonable doubt in criminal cases, (2) the proponent of the evidence should have the burden of production and persuasion, and (3) the judge should decide the issue of whether the burden of proof has been satisfied as a preliminary question of fact. See Giannelli, 80 Colum. L. Rev. 1197 (cited in note 9). See also Stephen A. Saltzburg, *Standards of Proof and Preliminary Questions of Fact*, 27 Stan. L. Rev. 271, 292 (1975) (arguing that "an enhanced burden of proof [should be required] whenever there is something extraordinary about a particular kind of fact question or type of evidence").

189. This proposal is derived in part from the current Rule 702, the Advisory Committee's proposed Rule 702, and Professor Giannelli's proposal. Unlike Professor Giannelli's suggestion of requiring a beyond-a-reasonable-doubt standard in criminal cases, which seems to run contrary to the intended liberal nature of the Rules, this proposal seeks to preserve the original intent of the Rules—to admit as much relevant evidence as possible—while still establishing an increased burden on the admissibility of expert testimony.

Committee's proposal, it would introduce a requirement that the testimony be reasonably reliable. This proposal, however, would address *Daubert* directly by establishing in the text of Rule 702 that peer review and acceptance should be the primary indicators of reliable expert testimony. Unlike *Frye*, though, it would not work as an absolute bar against admitting theories that are not generally accepted. Rather, it merely would establish a presumption that these theories are not reliable enough to be admitted.

By placing the burden on the proponent of testimony that is not generally accepted to show its reliability by a preponderance of the evidence, the enactment of a Rule similar to the one proposed in this Recent Development would discourage junk science by making it difficult, but not impossible, to introduce an expert's novel ideas if his theories have not yet gained significant support among his peers.¹⁹⁰ The proposed Rule also would limit the number of objections to accepted theories by requiring the objecting party to make a showing of unreliability by a preponderance of the evidence.¹⁹¹

Any amendment to Rule 702 should directly address the fate of *Frye*, the problems of *Daubert*, and the continuing need for peer review of expert testimony. Although the liberal stature of the Rules generally operates to allow juries to hear as much relevant evidence as possible, permitting them to reach fully informed and deliberate decisions, this policy creates problems with regard to expert testi-

190. As Professor Giannelli argued, the cost and effort of obtaining and presenting other expert opinions or evidence supporting novel methodology should be borne by the testimony's proponent. See Giannelli, 80 Colum. L. Rev. at 1244-45 (cited in note 9). Pragmatism demands that the admittance of expert testimony that is not significantly accepted be the exception to a rule that seeks to allow most issues of scientific reliability to be determined by scientists. A rebuttable presumption against admitting testimony that has not been significantly accepted, with the burden of rebutting the presumption falling on the testimony's proponent, furthers this goal.

By requiring that proposed testimony be significantly accepted, this Recent Development's proposal seeks to avoid creating a rigid requirement that a pure majority of experts in a field accept a certain methodology. In some fields, acceptance by a significant portion of a body of experts may indicate sufficient reliability for admittance; in other more stable fields, however, courts should require acceptance by a majority. The language "significant acceptance" seeks to allow trial judges some flexibility in determining what degree of acceptance merits judicial notice. See *United States v. Gould*, 741 F.2d 45, 49 (4th Cir. 1984). In *Gould*, the court advocated a substantial acceptance standard and stated: "This is a less stringent test than the 'general acceptance' test first announced in *Frye* . . . , and since widely adopted as a foundational test of relevance for all kinds of scientific evidence. While less stringent, it nevertheless remains a test of relevance dependent upon some degree of proven acceptance within the appropriate discipline of the 'generalized proposition that constitutes the major premise of the relevance syllogism.'" *Id.*

191. Simple considerations of efficiency should discourage most challenges to the admissibility of testimony derived from accepted methodology, and the onus should be on a party objecting to testimony that has been significantly accepted to show clearly that it is not grounded in reliable scientific, technical, or specialized methodology.

mony. The long-standing problem still exists—testimony bearing an aura of scientific authority exerts an undue influence on impressionable and trusting juries.¹⁹² In fact, the problem continues to grow. Litigation in many fields, such as toxic torts and products liability, has become so technical that the issues in a case may be almost completely beyond the grasp of many jurors. Relaxing the criteria for admitting evidence in general may make sense, but Congress would do well to put more conservative restraints on this trend with regard to expert testimony. A compromise between the extremes of *Frye's* absolute bar and *Daubert's* cumbersome balancing could be reached most effectively by amending Rule 702 to provide fair and workable criteria for admitting expert testimony.

VI. CONCLUSION

Some commentators have seen the demise of the general acceptance standard as a victory, permitting challenges to principles that might be blindly, though generally, accepted.¹⁹³ After all, some have argued that even the views of Einstein and Galileo were not immediately accepted, and that Copernicus was adjudged a heretic.¹⁹⁴ Therefore, the mainstream is clearly not infallible, and our courts should not passively perpetuate the status quo.¹⁹⁵

The preceding position springs from a dangerously inaccurate view of the role of our legal system. Our judiciary exists to dispense justice, to settle interpersonal disputes, and to interpret the law. It does not exist to drive the limits of scientific research. The theories of Einstein, Galileo, and Copernicus were given legitimacy only through testing and retesting by their professional peers, not by the vote of a jury or the approval of a judge. How many laypersons on a jury would have been able to make use of the quantum physics of Einstein before the research community had received these concepts favorably? How many judges would be able to assess independently the reliability of Einstein's theories even today? For every new scientific paradigm that is accepted as reliable by experts in any given field, countless others are considered and rejected. Our system should not contem-

192. Courts fear that expert testimony will have an undue influence on juries because people generally believe that science is objective, and thus unerring.

193. See Richard J. Heleniak, *Expert Testimony After Daubert; So What's New?*, *The Legal Intelligencer* 7 (Sept. 28, 1993).

194. *Id.*

195. *Id.*

plate that judges and juries can make amateur assessments of the merits of new research. That work should be left to the more capable scientific community.¹⁹⁶ Although the mainstream is not infallible, faith in the mainstream is a necessary commitment to reliability and consistency within the law.¹⁹⁷

The current version of Rule 702 has proven to be too vague to provide a clear standard for admitting expert testimony. For nineteen years, it has allowed courts to assess proffered scientific testimony as liberally or as conservatively as they please. The Supreme Court's latest interpretation of the Rule makes this failing all too clear. *Daubert* did well to recognize that peer review should be a relevant factor in the admissibility of expert testimony, but its general observations obscured the fact that this review must continue to be the primary focus of the inquiry. To correct this, Congress should adopt an amended Rule 702 that returns the ability to judge scientific reliability to the scientific community.

Alan W. Tamarelli, Jr.

196. A true understanding of the bulk of modern science is only available to experts: [T]he creative scientist can begin his research where he leaves off and thus concentrate exclusively upon the subtlest and most esoteric aspects of the natural phenomena that concern his group. And as he does this, his research communiqués will begin to change in ways whose evolution has been too little studied but whose modern end products are obvious to all and oppressive to many. No longer will his researches usually be embodied in books addressed, like Franklin's *Experiments . . . On Electricity* or Darwin's *Origin of Species*, to anyone who might be interested in the subject matter of the field. Instead they will usually appear as brief articles addressed only to professional colleagues, the men whose knowledge of a shared paradigm can be assumed and who prove to be the only ones able to read the papers addressed to them.

Thomas S. Kuhn, *The Structure of Scientific Revolutions* 20 (U. of Chicago, 2d ed. 1970).

197. Faith in the scientific status quo not only provides our judicial system with predictability and consistency—two prerequisites of justice—but also allows scientific advancement to run its normal course:

Without commitment to a paradigm there could be no normal science. . . . [I]t is not only normal science that depends upon a commitment to a paradigm. If existing theory binds the scientist only with respect to existing applications, then there can be no surprises, anomalies, or crises. But these are just the signposts that point the way to extraordinary science. If positivistic restrictions on the range of a theory's legitimate applicability are taken literally, the mechanism that tells the scientific community what problems may lead to fundamental change must cease to function. And when that occurs, the community will inevitably return to something much like its pre-paradigm state, a condition in which all members practice science but in which their gross product scarcely resembles science at all. Is it really any wonder that the price of significant scientific advance is a commitment that runs the risk of being wrong?

Id. at 100-01.

