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THE DEATH AND TRANSFIGURATION OF *FRYE*

Richard D. Friedman*

"The decision in *Daubert* kills *Frye* and then resurrects its ghost."¹

I. THE DEATH OF *FRYE*

The rule of *Frye v. United States*² was seventy years old, and had long dominated American law on the question of how well established a scientific principle must be for it to provide the basis for expert testimony. Even after the passage of the Federal Rules of Evidence, several of the federal circuits, as well as various states, purported to adhere to *Frye*'s "general acceptance" standard. But now, unanimously, briefly, and with no apparent angst, the United States Supreme Court has held in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*³ that the *Frye* rule is incompatible with the Federal Rules.

This outcome might appear startling were it not so sensible. General acceptance sounds more like the language of judicial notice than of

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1. In re Joint Eastern & Southern District Asbestos Litigation, 827 F. Supp. 1014, 1033 (S.D.N.Y. 1993) (Sweet, J.).

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

3. 113 S.Ct. 2786 (1993).

admissibility. In trials, we expect evidence to be conflicting. In most contexts, a court does not demand that it be satisfied that a proposition is almost certainly true before admitting evidence of, or based on, that proposition. So long as a juror might reasonably think that the evidence aids substantially in the truth-determining process, we are ordinarily content to present the evidence to the jury and ask it to evaluate the evidence as part of its overall factfinding job. And if the case is tried without a jury, there is, if anything, less reason to preclude the factfinder from relying in part on an expert opinion merely because the theory on which the opinion is based has not gained general acceptance.

Thus, excluding scientific evidence that does not have general acceptance is, as Justice Blackmun put it in *Daubert*, an unduly "austere standard."⁴ It conflicts not only with the language of Rule 702 — which allows an expert opinion based on "scientific, technical, or other specialized knowledge" if it "will assist the trier of fact to understand the evidence or to determine a fact in issue" — but also with the liberal nature of the Rules in general, as exemplified by Rule 102,⁵ and of modern evidentiary law.

II. QUESTIONS AND AMBIGUITIES

Though some states may yet adhere to the *Frye* rule,⁶ the best guess is that most will follow the Supreme Court's lead and reject it. But of course the supposed death of *Frye* raises one large and troubling question, from which many subsidiary and troubling questions devolve: If *Frye* is dead, what will take its place?

Surely there must be some substitute, because the problem addressed by *Frye* is endemic to our adjudicative system. Indeed, it is endemic to any adjudicative system in which the factfinding process seeks to take advantage of specialized knowledge that might help determine the truth but in which the factfinders themselves lack such knowledge. Given the factfinders' lack of knowledge, and perhaps their inability to assess adequately the information they are provided, the basic dilemma is clear. If we exclude the expert evidence from the factfinders' consideration, we may be depriving the truth-

4. *Id.* at 2794.

5. Rule 102 provides:

These rules shall be construed to secure fairness in administration, elimination of unjustifiable expense and delay, and promotion of growth and development of the law of evidence to the end that the truth may be ascertained and proceedings justly determined.

6. *See* Flanagan v. State, 625 So. 2d 827, 829 n.2 (Fla. 1993) (adhering to *Frye* despite *Daubert*'s construction of Fed. R. Evid. 702 as superseding *Frye*).

determining process of information that would assist in learning the truth. On the other hand, it may be that the evidence is in fact worthless, or of far less value than the factfinder is likely to attribute to it. Thus, allowing the factfinders to hear and use the evidence may actually lead them further away from the truth.

The problem is more pressing in the context of an adversarial system in which a party is able to recruit experts who will present testimony favoring that party's interests, and in which an expert often has strong incentive to persuade the factfinder of the merits of the sponsoring party's position. Even if the great weight of learning points in one direction, a party seeking to persuade the factfinder in the other direction will often be able to find an expert who is willing to go counter to the majority. If we could be sure that truth never lay with the dissenters, or with those who claim to be pioneers, this difficulty could often be satisfactorily addressed by a rule resembling *Frye*. But we do not generally have that confidence, for "time has upset many fighting faiths"⁷ in science as well as in law. Particularly in the context of litigation, it is important to remember that the views of the scientific establishment on a particular issue may reflect the interests of those who have the financial ability and incentive to support research and publication directed to that issue.⁸ Moreover, often we do not know enough about a field, or the precise issue in dispute has not been crystallized long enough, even to identify one position or the other as the majority view.

And the problem becomes yet more severe, and at the same time takes on an ironic aspect, when a jury is the factfinder. Acting through the courts, the adjudicative system must decide whether the jury — which it may regard as rather impressionable and unsophisticated — is to have access to the expert opinion. But the courts themselves lack the relevant specialized knowledge, and often must struggle themselves to understand the subject matter.

Perhaps in light of these complexities, Chief Justice Rehnquist, joined by Justice Stevens, expressed the view in *Daubert* that the wisest course was not to venture to create a replacement for the *Frye* rule. They would have stopped with the declaration of *Frye*'s death, "leaving the further develop-

7. *Abrams v. United States*, 250 U.S. 616, 630 (1919) (Holmes, J., dissenting).

8. *See, e.g., Joseph Sanders, The Bendectin Litigation: A Case Study in the Life Cycle of Mass Torts*, 43 HASTINGS L.J. 301, 346 (1992) ("Careerist concerns may have caused academics to select topics that would lead to publication in prestigious journals. Moreover, the federal government, through the FDA, encouraged research by offering grants to fund the study of Bendectin's effects. Finally, the Bendectin litigation itself generated research, as parties encouraged and even funded work on Bendectin. Legal needs gave shape and direction to the epidemiological study of teratogenic effects. The volume and sophistication of studies focusing specifically on Bendectin was, in large part, the result of the litigation.") (footnote omitted).

ment of this important area of the law to future cases."⁹ But Justice Blackmun, writing for the other justices, was unwilling to leave the matter quite so much in the air.¹⁰ He expressed confidence in the capacity of the adversary system to avoid the "wholesale exclusion" of evidence under *Frye* without descending to "a 'free-for-all' in which befuddled juries are confounded by absurd and irrational pseudoscientific assertions."¹¹

For one thing, Justice Blackmun reminded the courts of their power to grant judgment as a matter of law against a party when all the evidence considered together would not support judgment in that party's favor.¹² Often, indeed, it may be that, even assuming the proffered expert evidence is admissible, the whole of the proof is insufficient to support a finding of the proposition for which the evidence is offered. If, for example, scientific evidence, but no other evidence, is admitted in a criminal case to prove some element of the prosecution's case, the court may well decide that doubts about the validity of the scientific evidence would necessarily cause a conscientious jury to have a reasonable doubt about the defendant's guilt. In a civil case, too, the gap between admissibility and sufficiency may well become significant. And the question of whether the court should grant judgment as a matter of law may actually be easier to resolve than the question of whether the expert evidence is admissible.

Daubert itself is illustrative. *Daubert* is one of many cases brought by persons who claimed that they suffered serious birth defects as a result of their mothers' ingestion of Bendectin, a prescription anti-nausea drug formerly marketed by Merrell Dow. The most serious defects claimed, and the ones involved in most of the litigation, are limb reduction defects. Merrell Dow has consistently maintained that Bendectin is not a human teratogen — that is, a substance capable of causing birth defects in human fetuses — and that no admissible evidence leads to the conclusion that it is. Merrell Dow has been able to demonstrate beyond genuine dispute that there have been more than 30 published epidemiological (human statistical) studies, involving over 130,000 patients, that have examined the relation between Bendectin and human birth defects, and that none of these studies has concluded that Bendectin is a human teratogen.¹³ The claimants have

9. 113 S.Ct. at 2800 (dissenting in part and concurring in part).

10. 113 S.Ct. at 2794-95 & n.7.

11. *Id.* at 2798.

12. *Id.*

13. *Id.* at 2791. Some of the studies, however, were at least suggestive that Bendectin *might* cause some human birth defects. See Turpin v. Merrell Dow Pharmaceuticals, Inc., 959 F.2d 1349, 1354-57 (6th Cir. 1992); Joseph Sanders, *From Science to Evidence: The Testimony on Causation in the Bendectin Cases*, 46 STAN. L. REV. 1, 25-26 (1993) (summarizing, though not advocating, "The Case

offered both in vitro (test tube) studies of animal cells and in vivo (live) studies of animals showing that Bendectin causes birth defects in animals; pharmacological studies purporting to show similarities between the chemical structure of Bendectin and that of other substances known to cause birth defects; and unpublished reanalyses of the previously published epidemiological studies, purporting to show that, while the studies taken individually do not warrant the conclusion that Bendectin is a human teratogen, taken together and in conjunction with the other evidence, and subjected to proper statistical analysis, they are at least suggestive of an association between Bendectin and limb reduction defects.¹⁴

It is certainly at least arguable that each of the components of the claimants' evidence ought to be admissible. Each component contains information that might be useful in more fully understanding the nature and effects of Bendectin, and it is not self-evident that the evidence would lead the jury farther away from the truth, rather than closer to it. But even if the evidence is *admissible*, that does not mean it is *sufficient* to warrant a verdict in the claimant's favor. Perhaps a court could conclude that a reasonable jury, presented with all the evidence, could not rationally conclude, at least to the degree of confidence required by the judicial system,¹⁵ that Bendectin is a human teratogen. More likely, a court might easily conclude that — even if the jury accepts all the claimants' evidence, and finds that Bendectin is indeed a human teratogen — the evidence suggests such a weak linkage between Bendectin and human birth defects that the jury could not reasonably conclude that any individual claimant's defects were more likely than not caused by Bendectin.¹⁶ Thus, a court might hold, as at least two have in

Against Bendectin").

14. See *Daubert*, 113 S.Ct. at 2791-92; *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 911 F.2d 941, 946-49 (3d Cir. 1990); Affidavit of Shanna Helen Swan, App. 113-117, in *Daubert*. In *DeLuca*, the plaintiff's expert, Dr. Alan Done, was willing to make a stronger statement, that the "bulk of the available human epidemiological data . . . are indicative of human teratogenicity." 911 F.2d at 948-49. On remand, the trial court held his testimony inadmissible, in large part because of the court's perception that "Dr. Done's epidemiological methodology yielded erroneous results so frequently that it is not helpful to the trier of fact." *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 791 F. Supp. 1042, 1057 (D.N.J. 1992), *aff'd*, 6 F.3d 778 (1993) (without opinion), *cert. denied*, 62 U.S.L.W. 3350 (Jan. 10, 1994).

15. The received wisdom is that in an ordinary civil case we demand that the plaintiff satisfy the jury only that her factual contentions are more likely true than not. I believe, though, that in most cases a more stringent standard may actually be at play. See Richard D. Friedman, *Generalized Inferences, Individual Merits, and Jury Discretion*, 66 B.U.L. REV. 509, 515-16 (1986).

16. See *Turpin*, 959 F.2d at 1359 ("Taken in the light most favorable to the

Bendectin cases,¹⁷ that even if the plaintiff wins the evidentiary battle she must lose the judgment war. Though such a holding of course depends in part on analysis of the scientific evidence, it is not based on a rule concerning scientific evidence as such; rather, it is a garden variety case of summary judgment, or of judgment as a matter of law at trial, based on the conclusion that in the court's view the evidence taken as a whole will not support a verdict for the plaintiff.

In some cases, then, the necessity of deciding the *Frye*-type problem can be avoided by deciding the broader issue of sufficiency of all the evidence. But of course in many cases, perhaps most, falling into at least three categories, this means of avoidance is not available. First, if the party presenting the challenged evidence has neither the burden of production nor the burden of persuasion with respect to the proposition for which the evidence is offered, the question of sufficiency never comes into play. Second, sometimes a decision to admit the expert evidence will mean almost inevitably that the jury could reasonably find the conclusion that the expert asserts. Finally, often other evidence besides the expert evidence is sufficient to support that finding. In a criminal case, for example, the prosecutor might present ample non-scientific evidence of identification to bring the case to the jury. If the prosecutor also presents DNA evidence of identification, the court must confront the question of whether that evidence should be admitted; whether with the DNA evidence or without, the case is going to the jury, and the evidentiary question cannot be avoided.

The *Daubert* Court therefore recognized that, apart from the possibility of keeping the case away from the jury altogether, "a gatekeeping role for the judge" survives the death of *Frye*.¹⁸ And the Court guaranteed that role would be a substantial one by declaring that "under the Rules the trial judge must ensure that any and all scientific evidence or testimony admitted is not only relevant, but reliable."¹⁹ Elsewhere, the Court equated "evidentiary

plaintiffs, the scientific evidence that provides the scientific foundation for the expert opinion on causation in this case is not sufficient to allow a jury to find that it is more probable than not that Bendectin caused the minor plaintiff's injury."); *Sanders*, *supra* note 8, at 347 ("While no study can remove all residual uncertainty regarding Bendectin's safety, if the drug is a teratogen, it is a relatively mild one (having effects too subtle to be measured reliably with existing techniques).").

17. *Turpin*, 959 F.2d at 1350, 1353, 1359; *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307, 313-15 (5th Cir. 1989). Since *Daubert*, the Sixth Circuit has followed *Turpin* in another Bendectin case, *Elkins v. Richardson-Merrell, Inc.*, 8 F.3d 1068 (6th Cir. 1993).

18. 113 S.Ct. at 2798.

19. *Id.* at 2795. With respect to relevance, the Court emphasized that the scientific proposition must "fit" the purpose for which it was offered: "[S]cientific

reliability" with "scientific validity" as a standard for determining admissibility.²⁰ Without attempting "to set out a definitive checklist or test" for determining the bounds of the gatekeeping role, and while stressing that "[t]he inquiry envisioned by Rule 702 is . . . a flexible one," Justice Blackmun offered some "general observations."²¹

As an organizing principle for these observations, Justice Blackmun put great stress on Rule 702's use of the term "scientific knowledge." The Court held that to qualify as such knowledge, "an inference or assertion must be derived by the scientific method."²² Even at this broad level of generality, Justice Blackmun's approach raised instant controversy. Rule 702 does not refer only to "scientific knowledge," Chief Justice Rehnquist pointed out, but also to "technical or other specialized knowledge." Does the "scientific method" requirement apply to these other forms of knowledge as well?²³ If the answer is negative — as it presumably is — then how are these other forms of knowledge to be distinguished from scientific knowledge?²⁴ And we can already imagine another, subsidiary question that is almost sure to arise: If a given piece of evidence has some of the characteristics of scientific evidence, but for some reason does not satisfy the "scientific method" test, may it nevertheless be admitted under the "technical or other specialized knowledge" branches of Rule 702 — or does such a "near miss" disqualify the evidence from admissibility under Rule 702 altogether?

These questions are not mere hypotheticals. A great deal of the evidence to which Rule 702 applies either is clearly not considered scientific evidence or is close to the line between scientific and other forms of specialized knowledge. Examples of the first type might include the testimony of a DEA agent about the methods of drug operations, and that of a fire chief that a given fire was the result of arson. Presumably such evidence should be unaffected by the "scientific method" rule of *Daubert*, and preliminary indications are that the lower federal courts recognize this.²⁵ Examples of the more marginal type of case might include the testimony of economists analyzing price data to draw an inference of a conspiracy not to compete,²⁶

validity for one purpose is not necessarily scientific validity for other, unrelated purposes. . . . Rule 702's 'helpfulness' standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility." *Id.* at 2796.

20. *Id.* at 2795 n.9, 2797.

21. *Id.* at 2796, 2797.

22. *Id.* at 2795.

23. 113 S.Ct. at 2800 (dissenting in part and concurring in part).

24. *Id.*

25. See *United States v. Daccarett*, 6 F.3d 37, 58 (2d Cir. 1993) (DEA agent); *United States v. Markum*, 4 F.3d 891, 895-96 (10th Cir. 1993) (fire chief).

26. See *Petruzzi's IGA Supermarkets, Inc. v. Darling-Delaware Co., Inc.*, 998

or medical testimony based in part on the witness's clinical experience.²⁷ To what extent the federal courts will feel compelled in such cases to apply the "scientific method" requirement remains to be seen. Hopefully, though, they will recognize that the dangers that led the court to impose such a requirement are very strong only in cases of great technical complexity and that, even in some fields of great difficulty, at least some issues are not readily susceptible to full exploration by the scientific method.

Beyond this question of scope lie many other uncertainties. Just what constitutes the scientific method is an enormously difficult and intractable question. Justice Blackmun's opinion could not hope to provide a useful definition to guide future courts. Instead, he presented four considerations that, he said, ordinarily should be addressed "in determining whether a theory or technique is scientific knowledge".²⁸

(1) Whether the theory or technique "can be (and has been) tested." Put another way, Justice Blackmun suggested that to be considered scientific knowledge a proposition must be falsifiable.²⁹

(2) "[W]hether the theory or technique has been subjected to peer review and publication."³⁰

F.2d 1224, 1237 (3d Cir. 1993).

27. See *Cantrell v. GAF Corp.*, 999 F.2d 1007, 1014 (6th Cir. 1993). Note also the comments of the Florida Supreme Court, in a post-*Daubert* case that adhered to *Frye*:

Of course, not all expert testimony must meet [the *Frye*] test in order to be admissible. . . . [P]ure opinion testimony, such as an expert's opinion that a defendant is incompetent, does not have to meet *Frye*, because this type of testimony is based on the expert's personal experience and training. While cloaked with the credibility of the expert, this testimony is analyzed by the jury as it analyzes any other personal opinion or factual testimony by a witness. Profile testimony, on the other hand, by its nature necessarily relies on some scientific principle or test, which implies an infallibility not found in pure opinion testimony.

Flanagan v. State, 625 So. 2d 827, 828 (Fla. 1993). But at some stage of the reasoning process, even expert evidence based largely on the expert's personal experience and training usually also draws, at least implicitly, on broader principles of the expert's discipline.

28. 113 S.Ct. at 2796.

29. *Id.* at 2796-97. The Chief Justice said he was "at a loss" to understand what this means. *Id.* at 2800 (dissenting in part and concurring in part). Essentially, a theory is falsifiable if, assuming hypothetically that the theory is false, a test can be performed to demonstrate that falsity.

30. *Id.* at 2797.

(3) "[I]n the case of a particular scientific technique, . . . the known or potential rate of error, . . . and the existence and maintenance of standards controlling the technique's operation."³¹

(4) The degree to which the theory or technique has been accepted within a relevant scientific community.³² Thus rises the ghost of *Frye*.

Each of these criteria presents substantial ambiguity. These ambiguities are likely to complicate decisionmaking, but they will probably be genuinely troublesome only if, contrary to the Court's stated intention,³³ lower courts treat the criteria as checklist items, each of which must be satisfied for a proposition to be deemed scientific, rather than merely as factors to be weighed, along with others, into an overall balance.

(1) To what level of certainty must testing have been conducted to satisfy the first criterion? If a technique or theory is by its nature not testable, but has gained a substantial degree of adherence, what should the courts' attitude be?

(2) Suppose a technique has just been devised, perhaps to address a problem that has never or hardly ever arisen before.³⁴ Will evidence of the technique be excluded simply because the technique has not been subjected to peer review? Justice Blackmun did recognize that "[s]ome propositions . . . are too particular . . . to be published."³⁵ But what if a proposition, though broad enough, is too new to have been published — will that excuse the lack of publication, or will it simply mean that the courts are not yet ready to allow that proposition to form part of the basis for a finding of fact? The questions of whether a proposition is sufficiently broad and — if it is material — sufficiently ripe to have been published are potentially copious sources of contention.

(3) How high a rate of error is too high? How shall the sufficiency of operating standards be determined?

(4) The Court's declaration that 'general acceptance' can yet have a bearing on the inquiry³⁶ preserves all the ambiguities of *Frye*, though they have less significance under *Daubert* because acceptance is now only part of the picture:

31. *Id.*

32. *Id.*

33. *Id.* at 2796.

34. *See, e.g.,* Coppolino v. State, 223 So. 2d 68 (Fla. App. 1968), *appeal dismissed*, 234 So. 2d 120 (1969), *cert. denied*, 399 U.S. 927 (1970) (conviction affirmed based in part on evidence of toxicologist drawing on procedures developed for the case).

35. 113 S.Ct. at 2797.

36. *Id.*

(a) What must have gained broad acceptance — the fundamental theory on which the expert bases her opinion, the particular application, or something in between? On many questions calling for specialized knowledge — as on many legal issues — there may be widespread agreement on the most basic principles and then a steady divergence of opinion as reasoning moves from general to particular.³⁷ A test emphasizing agreement at the broadest level may be toothless; one demanding agreement at the narrowest level may be unrealistic. The *Daubert* Court said, "The focus, of course, must be solely on principles and methodology, not on the conclusions they generate."³⁸ But this does little more than restate the dilemma. How narrow may a proposition in the reasoning process be and yet be deemed a "principle"? How broad and yet be considered a "conclusion"?

(b) How broad is the relevant community in which acceptance is measured? May a court define a field consisting of those who practice and believe in the efficacy of a given technique?³⁹

(c) How general must acceptance be? Presumably the abrogation of *Frye* means the rejection of holdings to the effect that the existence of a group of "scientists significant either in number or expertise [who]

37. See Thompson & Ford, *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests*, 75 VA. L. REV. 45, 57-58 (1989) ("a scientist may have no trouble accepting the general proposition that DNA typing can be done reliably, yet still have doubts about the reliability of the test being performed by a particular laboratory"). Compare *Coppolino v. State*, 223 So. 2d 68 (Fla. Dist. Ct. App. 1968), *appeal dismissed*, 234 So. 2d 120 (Fla. 1969), *cert. denied*, 399 U.S. 927 (1970) (dispute whether decedent received a toxic dose of succinylcholine chloride, the presence of which in the body was previously believed impossible to detect; toxicologist testifies for the prosecution that, based on his procedures, some standard and others new, he concluded that she did receive such a dose; other experts testify both in support and in opposition; conviction affirmed), *with* *People v. Young*, 425 Mich. 470, 472, 485-86, 499, 391 N.W.2d 270, 270, 277, 283 (1986) (serological electrophoresis of dried evidentiary bloodstains has not achieved sufficient scientific acceptance to warrant admissibility, notwithstanding conceded reliability of electrophoresis of fresh blood).

38. 113 S.Ct. at 2797.

39. Compare *Robinson v. State*, 47 Md. App. 558, 425 A.2d 211 (1981) (general acceptance within the field of forensic chemistry of electrophoretic techniques for identifying source of bodily fluids held sufficient for admissibility, notwithstanding lack of wide use of techniques outside crime laboratories), *with* *People v. Brown*, 40 Cal. 3d 512, 709 P.2d 440, 220 Cal. Rptr. 637 (1985) (casting doubt on *Robinson*); *People v. Young*, 425 Mich. 470, 391 N.W.2d 270, 276 (1986) (rejecting for *Frye* purposes the "community of scientists having direct empirical experience with electrophoresis of evidentiary bloodstains").

publicly oppose [a technique] as unreliable" is in itself sufficient to cause the exclusion of evidence of the technique.⁴⁰ But how significant a group, in number or expertise, of those *supporting* a technique or theory will be necessary to satisfy the courts on the "acceptance" score?

(d) By what means, and how clearly, must acceptance be shown? In particular, to what extent is publication after peer review necessary, or sufficient, to show the requisite degree of acceptance — and what does the acceptance criterion add to the peer review criterion?

III. THE TRANSFIGURATION OF *FRYE*

It appears likely that, although *Daubert* will change the way courts articulate their reasoning, it will not have any dramatic impact on actual evidentiary decisions. Though *Frye* purported to require extreme deference to the scientific establishment, the deference was never complete — in some cases, scientific battles were fought out before juries. Under the regime of either *Frye* or *Daubert*, four decisionmakers each have a part in determining the role that proffered scientific evidence will play in reaching a factual conclusion: the jury (assuming there is one), the trial court, the appellate courts, and the scientific establishment. The problem addressed by both *Frye* and *Daubert* thus may be regarded as one of allocating power among these actors. The courts actually decide whether the jury may consider the evidence, though they may defer to a greater or lesser degree to the scientific establishment; and, if the evidence is admitted, the jury then determines how much weight to accord the evidence.

1. The Gate Between the Evidence and the Jury

The Court's rather perplexing insistence that scientific evidence must be reliable indicates that it intends the judicial "gatekeeping role" to be a rather stringent one.⁴¹ Judge Robert Sweet has said, "The trial judge's function of determining the 'reliability' of the evidence provides the mechanism for screening junk science."⁴² But at the same time, that function also provides

40. *People v. Shirley*, 31 Cal. 3d 18, 56, 641 P.2d 775, 181 Cal. Rptr. 243, cert. denied, 458 U.S. 1125 (1982) (issue whether hypnosis should be used to restore the memory of potential witness).

41. The Court's discussion of reliability is perplexing because, as the Chief Justice pointed out, nothing in the Rules suggests that expert evidence must be reliable. 113 S.Ct. at 2800 (concurring in part and dissenting in part). Indeed, where two experts give conflicting opinions, presumably one opinion or the other, and at least one underlying premise or step in the reasoning leading to the conclusion, must be unreliable.

42. *In re Joint Eastern & Southern District Asbestos Litigation*, 827 F. Supp.

the mechanism for keeping the evidence away from the jury. *Daubert* may therefore reflect continuing mistrust of the jury's ability to sort out the wheat from the chaff in considering scientific evidence — or, perhaps more precisely stated, a differential in the courts' confidence in their own and the jury's ability to do the job.

This differential in confidence is not necessarily justified on the grounds that judges are more sophisticated than jurors in evaluating scientific evidence — for that is unclear. A better justification may be that the process of judicial decisionmaking, including the methods by which information is received and decisions are reviewed, is better suited than is the rather awkward process of juror decisionmaking for evaluation of evidence that is beyond at least the usual the ken of laypeople, judges, and jurors alike. In some circumstances, judicial screening may also help the courts import the "best evidence" principle into this realm — excluding evidence, say, of a given type of testing, to encourage proponents in similar situations to present a more rigorous form of evidence. And a judicial role may help to ensure similar treatment of the same type of evidence across a range of cases; this matter is more fully discussed below.

When all is said and done, however, an aggressive gatekeeping function means that in some circumstances the entity constitutionally designated to be the factfinder is barred from hearing evidence that rationally could assist the factfinding process. Judges should exercise that function with some degree of humility.

2. Limitations on the Trial Judge

Had the *Daubert* Court merely wanted to maintain restraints on the jury's role, it could have done so without much elaboration. Indeed, the Court could have satisfied itself by reminding trial courts that, when sitting with a jury, they must be careful to ensure that scientific evidence will "assist" the jury within the meaning of Rule 702, and that evidence that appears likely to lead the jury further away from the truth, rather than closer to it, does not meet this standard or the more general standard of Rule 403. The Court did give at least lip service to the role of the trial judge, and it declared that it did not intend to set out a definitive test for the admissibility of evidence. But at the same time, it set out criteria — the overall requirement that scientific evidence be "valid" and derived by the scientific method, and the more detailed criteria for determining whether this standard is met — that appellate courts may use to evaluate the trial court's decision.

1014, 1033 (S.D.N.Y. 1993).

Daubert, therefore, appears to anticipate an active role for the appellate courts in the evaluation of scientific evidence.

In some situations, an active appellate role has substantial attraction. Some issues present themselves recurrently, without much alteration from one case to another. There is much to be said for a jurisdiction-wide determination of such an issue. For example, is a particular method of DNA testing, comparing a sample taken from a crime scene and a sample taken from the suspect, sufficiently reputable to warrant admissibility? Absent factors distinguishing one case from another on this issue, it makes sense for the question of admissibility to be resolved for both cases by the same decisionmaker.

Once again, the Bendectin litigation is also illustrative. Suppose one plaintiff wins a large judgment on the ground that Bendectin more likely than not caused her defect, and another plaintiff with the same type of defect is denied recovery, in another court in the same jurisdiction, on the ground that there is no admissible scientific evidence tending to prove that Bendectin is capable of causing that type of defect. This is, at the least, a very unsatisfying result. Jurisdiction-wide determination of admissibility of the evidence makes sense.⁴³

It appears likely that the *Daubert* Court, writing in the context of a Bendectin case, had especially in mind such broad, recurrent issues. This might help explain the Court's emphasis on factors such as peer review and error rates. It is important to recognize, however, that not all scientific evidence is addressed to issues so broad or so recurrent. When the evidence is very narrow, addressed to the particular facts of a given case, a sensible

43. Indeed, there is a plausible argument, though hardly an incontrovertible one, for taking a stronger view, following in the line of Professors Walker and Monahan, that the broad, recurrent issue of whether Bendectin is a human teratogen should be determined across the jurisdiction, and the determination should then be instructed to the jury in all cases presenting that issue, much like a ruling of law. See, e.g., Laurens Walker & John T. Monahan, *Social Frameworks: A New Use of Social Science in Law*, 73 VA. L. REV. 559 (1987). One counter-argument is that the determination should be made by a jury, and that the desire to preserve equity across cases should be satisfied, to the extent possible, by bringing all plaintiffs together — through joinder or the class action device — in the litigation making that determination. Of course, complete joinder is not always possible. Principles of issue preclusion may then apply. But the Bendectin litigation is illustrative of one potential problem — the multiple claimant anomaly — of applying issue preclusion in the mass tort context: Had Merrell Dow lost the first litigation on the issue of teratogenicity, it may well have been precluded from relitigating the issue against other claimants; a victory, however, did not preclude other claimants, and left Merrell Dow in the position of having to relitigate the same question many times over.

allocation of judicial responsibilities probably requires great deference to the trial court's decision on admissibility.

3. Deference to the Scientific Establishment

Daubert, like *Frye*, indicates the appellate courts' unwillingness to place too much reliance on either juries or trial courts in evaluating scientific evidence. But, like *Frye*, *Daubert* indicates a continued attitude of deference to the scientific establishment. Unlike *Frye*, of course, *Daubert* does not even purportedly make "general acceptance" an absolute precondition to the admissibility of scientific evidence. Nevertheless, "general acceptance" is explicitly one of the criteria listed by the *Daubert* Court for determining whether scientific evidence is admissible. And another of the criteria, peer review and publication, is also clearly dependent on acceptance by the scientific community.

How much reliance on the scientific community is appropriate is a delicate question, and should probably vary from one case to another. The more difficult the subject is, for judges as well as jurors, the more justifiable is a tendency to defer to the scientific establishment. Perhaps more importantly, deference is more appropriate the broader and more recurrent the scientific issue is. Not only do breadth and recurrence make jurisdiction-wide determination of the issue, at least for the time being, more sensible; they also make it more likely that a generally accepted view of the scientific community will be determinable at all.

Even when they are inclined to defer to the scientific community, however, the courts should bear in mind that, as Justice Blackmun wrote in *Daubert*,

[T]here are important differences between the quest for truth in the courtroom and the quest for truth in the laboratory. Scientific conclusions are subject to perpetual revision. Law, on the other hand, must resolve disputes finally and quickly.⁴⁴

From this observation, Justice Blackmun drew the conclusion that science tolerates bad information better than does law: Hypotheses that are incorrect "will eventually be shown to be so" as part of "[t]he scientific project," but "[c]onjectures that are probably wrong are of little use . . . in the project of reaching a quick, final, and binding legal judgment — often of great consequence — about a particular set of events in the past."⁴⁵ Thus, restricting the evidence presented to the jury is necessary under an evidentiary-

44. 113 S.Ct. at 2798.

45. *Id.*

ry scheme "designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes."⁴⁶

True enough, but an irony should not be overlooked. For much the same reason — that science is patient, whereas law must decide quickly — science is much more hesitant than is law to declare conclusions and to act on them.⁴⁷ Law does so because it has to. Every day, for example, the courts decide cases "of great consequence" under the currently prevailing legal doctrines, even though they know that some of those doctrines may be altered in the near or distant future; they do not hesitate to decide because a "cosmic understanding" of the legal issue has not yet been gained. And the same necessity suggests that sometimes courts ought to be willing to allow juries to take advantage of scientific information even when the scientific establishment is unwilling to declare a conclusion.

Once more the Bendectin cases may be illustrative. Some of the epidemiological studies suggest some connection, albeit slight, between Bendectin and human birth defects,⁴⁸ but under traditional methods of significance testing scientists have been hesitant to draw the conclusion.⁴⁹ And yet under methods of meta-analysis — a relatively new and increasingly important research approach to accumulating knowledge across a series of studies⁵⁰ — a plausible case can be made that Bendectin is more likely than

46. *Id.* at 2799.

47. *See, e.g.*, Sanders, *supra* note 8, at 342-43 ("Scientists, being conservative, generally try to minimize Type I errors; that is, they decline to find a causal relationship unless it is unlikely that the observed results occurred by chance."); 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, 683 (1992) ("a fundamental norm among scientists to avoid claims of having found effects that are incorrect because of sampling error").

48. *See supra* note 13.

49. Ironically, although significance testing has been relied on heavily by those courts holding in favor of Merrell Dow, the appropriateness of admitting the results of such testing has been powerfully criticized as misleading, incomplete, and intrusive on the function of the jury. David H. Kaye, *Is Proof of Statistical Significance Significant?*, 61 WASH. L. REV. 1333 (1986).

50. *See, e.g.*, R.J. Bullock & Daniel J. Svyantek, *Analyzing Meta-Analysis: Potential Problems, a Unsuccessful Replication, and Evaluation Criteria*, 70 J. APPL. PSYCH. 108, 108 (1988); LARRY V. HEDGES, *STATISTICAL METHODOLOGY IN META-ANALYSIS* 4 (1982) (discussing "the low statistical power of significance tests when effects on sample size are small"); *cf.* Shlomo S. Sawilowsky & Barry Markman, *Another Look at the Power of Meta-Analysis in the Solomon Fair-Group Design*, 71 J. PERCEPTUAL & MOTOR SKILLS 177, 177 (1990) ("Meta-analysis techniques are usually employed on apparently diverse or seemingly conflicting results, as opposed to a group of studies, all of which yielded the same statistical

not a human teratogen, albeit a weak one. Although meta-analysis has been used in a rapidly growing number of contexts and studies, it appears that many scientists are rather hostile to it and that even many authors of research reviews are unfamiliar with it.⁵¹ Criteria for evaluating its various methods are still developing.⁵² As compared to traditional methods of significance testing, meta-analysis may more closely approach our evidentiary system's willingness to allow an inference to be drawn from various bits of information, none of which independently supports the inference.

If a court admits evidence of meta-analyses, it abandons the comfortable harbor offered by traditional and widely accepted methods, and exposes itself to storms of controversy over new and sometimes dubious techniques. And yet, it may well come closer to understanding not only the cosmos, but also the facts of the particular dispute before it. That is the type of dilemma that arose long before *Frye*. And it will continue to arise long after *Daubert* has receded in memory.

conclusion. Although in theory meta-analysis could be used when all studies are barely nonsignificant, we have not seen published examples.").

51. JOHN E. HUNTER & FRANK L. SCHMIDT, *METHODS OF META-ANALYSIS* 14 (1990); Kenneth W. Wachter, *Disturbed by Meta-Analysis?*, 241 *SCIENCE* 1407, 1407 (1988) ("More and more scientists from all fields are resorting to 'meta-analysis' when they review a body of scientific literature. . . . A boom in meta-analysis is under way, but the boom is not being universally welcomed.").

52. See Bullock & Svyantek, *supra* note 50.