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PRETRIAL MEDIATION OF COMPLEX SCIENTIFIC CASES: A PROPOSAL TO REDUCE JURY AND JUDICIAL CONFUSION

SUSAN E. COWELL*

INTRODUCTION

Would you sign a petition to ban water? A Cambridge economist found that seventy-six percent of surveyed respondents condemned dihydrogen monoxide (water).¹ It is questionable that such people could serve as capable fact finders (jurors) in complex scientific cases (such as complicated environmental torts). More than juror ignorance is at issue: individuals serving on the bench also lack science backgrounds. In fact, only four sitting members of the federal judiciary reported a specific science education, resulting in their inability to mitigate the lack of juror knowledge.²

Consider the practical impacts of a nonscientific justice system adjudicating complex scientific cases. Federal judges decide not only the admissibility of scientific evidence, but also the merits, or validity, of an expert's opinion.³ In addition, the judge's lack of a scientific

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1. See Matt Ridley, *Acid Test: Dihydrogen Monoxide: Now There's a Real Killer*, DAILY TELEGRAPH LONDON, Sept. 15, 1997, at 20. One hundred twenty-three people were asked whether the chemical dihydrogen monoxide should be strictly regulated, or even banned on the basis of the following information:

The chemical industry routinely uses a chemical "dihydrogen monoxide" in its processes. It is used in significant ways and often leads to spillages and other leaks and it regularly finds its way into rivers and into our food supply. It is a major component of acid rain. It contributes to erosion. It decreases the effectiveness of automobile brakes. In its vapour state it is a major greenhouse gas. It can cause excessive sweating and vomiting. Accidental inhalation can kill you. It has been found in tumors of terminal cancer patients.

Id.

2. See Search of Westlaw, Almanac of the Federal Judiciary (June 13, 2000). There were three sitting federal judges with engineering degrees, and one judge with a physics degree. The educational search was performed for engineering, physics, chemistry, biology, and geology.

3. See, e.g., *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 147 (1999) (extending the *Daubert* factors to the testimony of nonscientists such as engineers because "[*Daubert*] applies

background coupled with the dizzying array of issues presented in complex cases creates jury confusion. Simply stated, jury confusion results in a judicial exercise in futility. Lawyers carefully present their cases and experts may give extensive testimony, yet verdicts often have little to do with the facts of the case.⁴ Instead, juries sometimes distribute justice on the basis of attorney tactics⁵ or perceptions of experts,⁶ which is not justice.

Justice, for torts, involves the identification of those responsible for harm and their punishment.⁷ Justice, therefore, requires fact-finders to analyze and weigh facts to assess responsibility. But without tools, such as prior scientific training, to analyze scientific issues, no fact-finder could be faulted for confusion regarding facts based on science. These considerations led to judicial intervention, as well as proposals to change the traditional adjudication of complex scientific cases. These proposals, however, largely ignore using the parties who possess the most scientific training. The opposing scientific experts themselves possess the requisite knowledge, and it may be possible to enhance their assistance to both judges and jurors using pretrial mediation. Pretrial mediation can be used, with scientific experts, to narrow issues for jury consideration and provide judges with guidance to analyze scientific evidence.

Mediation, an alternate dispute resolution ("ADR")⁸ technique, has been used in scientific disputes.⁹ Mediation is a nonbinding proceeding conducted by a neutral third party with the goal of a

to all expert testimony"); *General Electric Co. v. Joiner*, 522 U.S. 136, 146 (1997) (allowing judges to assess the merits of the scientific evidence); *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 579-80 (1993) (forcing judges to decide the admissibility of scientific evidence under the Federal Rules of Evidence).

4. See Joseph Sanders, *From Science to Evidence: The Testimony on Causation in the Bendectin Cases*, 46 STAN. L. REV. 1, 85 (1993).

5. See Franklin Strier, *The Educated Jury: A Proposal for Complex Litigation*, 47 DEPAUL L. REV. 49, 56, 82 (1997).

6. See *Confronting the New Challenges of Scientific Evidence: VI. Addressing the Problems of Complex and Scientific Evidence*, 108 HARV. L. REV. 1583, 1585 (1995) [hereinafter *Confronting the New Challenges*].

7. See BAILEY KULKIN & JEFFREY W. STEMPEL, *FOUNDATIONS OF THE LAW: AN INTERDISCIPLINARY AND JURISPRUDENTIAL PRIMER* 14 (1994) (describing one interpretation of Aristotle's corrective justice for torts).

8. Although ADR encompasses a broad range of techniques such as arbitration, mediation, fact-finding, mini-trial, facilitation, partnering, summary jury trial and conciliation, this Note focuses on mediation.

9. See Asheem Mehta, *Resolving Environmental Disputes in the Hush-Hush World of Mediation: A Guide for Confidentiality*, 10 GEO. J. LEGAL ETHICS 521, 521 (1997); Lynn Peterson, *The Promise of Mediated Settlements of Environmental Disputes: The Experience of EPA Region V*, 17 COLUM. J. ENVTL. L. 327, 338 (1992).

mutually agreeable settlement.¹⁰ This Note argues that mediation, for purposes of evaluating and presenting scientific claims, should bring opposing scientific experts together to discuss issues in depth using their full expertise, instead of constraining their discussions through forensics.

Accordingly, this Note proposes pretrial mediation between opposing scientific experts to reduce jury confusion and provide judges with guidance to assess admissibility of scientific evidence and expert opinions by eliminating and clarifying scientific issues. Part I discusses why complex scientific cases do not conveniently fit into our judicial system. The inherent tension between science and law has resulted in adjudicatory procedural and substantive devices, ill suited to the problems courts face. Next, Part II discusses the results of the tension—the struggle to define admissible scientific evidence and jury confusion. This Note then addresses the dissatisfaction among the major players in the adjudicatory process (judges, jurors, and scientists) that has led to proposals to change how our legal system handles scientific disputes. Finally, Part III proposes a pretrial mediation process. This pretrial mediation results in a written document that details (1) the undisputed scientific issues, (2) disputed issues and the reasons for continued disagreement, and (3) reasons for objections to proposed scientific testimony.

I. THE TENSION BETWEEN SCIENCE AND LAW

Science and law are in tension.¹¹ Science and law possess distinctly different goals, and different approaches to those goals. The differing goals and methodologies of each discipline create tension. The results are continuing difficulties creating and implementing scientific evidentiary standards,¹² jury confusion, and frustration with the entire judicial process.

10. See Pamela A. Kentra, *Hear No Evil, See No Evil, Speak No Evil: The Intolerable Conflict for Attorney-Mediators Between the Duty to Maintain Mediation Confidentiality and the Duty to Report Fellow Attorney Misconduct*, *BYU L. REV.* 715, 718 (1997).

11. See Jane Maienschien et al., *Biology and Law: Challenges of Adjudicating Competing Claims in a Democracy*, 38 *JURIMETRICS J.* 151, 156-58 (1998); Richard L. Marcus, *Evidence: Discovery Along the Litigation Science Interface*, 57 *BROOK. L. REV.* 381, 384-85 (1991); A. Dan Tarlock, *The Futile Search for Environmental Laws Based on "Good Science,"* 1 *INT'L J. BIOSCIENCES & L.* 9, 9-10 (1996).

12. See Tarlock, *supra* note 11, at 10.

A. *The Nature of Science*

The goal of science is a well-reasoned conclusion reached by an approved scientific method.¹³ Scientists focus on the route and reasoning leading to a conclusion rather than the "truthfulness" of the conclusion.¹⁴ Science progresses with new information and may be more aptly described as the continued refining of hypotheses that approach a highly probable truth.

One example of scientific change that shattered prior scientifically valid conclusions comes from the environmental science community. In the span of three years, mercury concentrations in Wisconsin lakes decreased by a factor of twenty to one-hundred times.¹⁵ This remarkable drop in mercury concentrations was not the result of environmental cleanup.¹⁶ Instead, the accepted, peer-reviewed techniques underlying earlier measurements changed.¹⁷ The progression of science, in the span of three years, yielded new peer-accepted sampling protocols that resulted in vastly lower measurements.¹⁸

Scientific changes have also impacted litigation. The progression of the Bendectin litigation¹⁹ illustrates the change in scientific certainty over time that Bendectin likely caused certain birth defects.²⁰ Further studies minimizing the uncertainty, inherent in early studies, fueled the change. Unfortunately, adjudications of this controversy continued to result in jury verdicts that clearly

13. See Alexander Morgan Capron, *Daubert and the Quest for Value-Free "Scientific Knowledge" in the Courtroom*, 30 U. RICH. L. REV. 85, 86 (1996).

14. "Truthfulness" is used to describe the immediate and time-tested correctness of a conclusion.

15. See William F. Fitzgerald & Carl J. Watras, *Mercury in Surficial Waters of Rural Wisconsin Lakes*, 87/88 SCI. TOTAL ENV'T 223, 223, 228 (1989).

16. See *id.* at 223.

17. See *id.* at 227; see also Herbert L. Windom et al., *Inadequacy of NASQAN Data for Assessing Metal Trends in the Nation's Rivers*, 25 ENVTL. SCI. & TECH. 1137, 1137 (1991) (noting that the United States Geological Survey National Stream Quality Accounting Network trace metal data, collected since 1974, was unreliable because the old techniques produced contaminated samples).

18. See Fitzgerald & Watras, *supra* note 15, at 223.

19. See Mike Redmayne, *Expert Evidence and Scientific Disagreement*, 30 U.C. DAVIS L. REV. 1027, 1063-64 (1997). The Bendectin litigation focused on whether Bendectin, an anti-nausea morning sickness drug, caused birth defects. See *id.*

20. See *id.* The scientific community went from being cautious about branding the drug Bendectin as the cause of certain birth defects to a virtual consensus that Bendectin was a cause of the birth defects. See *id.*; see also Sanders, *supra* note 4, at 4. (discussing the transcripts of six (there were about 1700 filed cases) Bendectin trials against Merrell Dow including the first Bendectin case *Mekdeci v. Merrell National Laboratory*, 711 F.2d 1510 (11th Cir. 1983)).

contradicted the scientific consensus.²¹

Law requires a timely answer to conclude disputes, whereas scientists prefer to leave a question open for continued testing and refinement.²² Advances in technology and further research make continued evaluation both necessary and prudent to the growth and development of science. In contrast to law, science responds to uncertainty by delaying a final conclusion until more research is conducted.²³

B. *The Nature of Law*

Law's goal is to do justice, according to legal principles rooted in social policy,²⁴ by assessing responsibility at a given moment in time.²⁵ Judges attempt to handle uncertainty through burdens of proof and standards of evidence.²⁶ Our judicial system does not necessarily seek a time-honored conclusion, it simply seeks closure of an issue.²⁷ The judicial system's findings are final, in the *res judicata* or collateral estoppel sense, even though they may later be deemed incorrect.²⁸ Unfortunately for law, uncertainty is inherent to science.²⁹ Law attempts to address uncertainty by labeling science as good (science that is widely accepted) or junk (science that is not widely accepted).³⁰ The *Daubert v. Merrell Dow* court equated good science as science based on reasoning from old science, just as good legal reasoning is

21. See Redmayne, *supra* note 19, at 1062-63 (noting that approximately 40% of the verdicts were in favor of the plaintiffs, though on appeal few verdicts stood).

22. See Heidi Li Feldman, *Science and Uncertainty in Mass Exposure Litigation*, 74 TEX. L. REV. 1, 16, 42 (1995).

23. See *id.* at 42.

24. See Peter H. Schuck, *Multi-Culturalism Redux: Science, Law, and Politics*, 11 YALE L. & POL'Y REV. 1, 21 (1993).

25. See *id.* at 25.

26. See Redmayne, *supra* note 19, at 1075.

27. See Maienschien et al., *supra* note 11, at 158.

28. See Schuck, *supra* note 24, at 25; *Confronting the New Challenges*, *supra* note 6, at 1589 nn.41, 43 & 45 (discussing the case of *Wells v. Ortho Pharmaceutical Corp.*, 615 F. Supp. 262 (N.D. Ga. 1985), *aff'd in part and modified in part*, 788 F.2d 741 (11th Cir. 1986) (award reduced to \$4.2 million), *cert. denied*, 479 U.S. 950 (1986). The case was about a plaintiff who won a \$5.1 million judgment, in part based on testimony regarding an American Medical Association article, see Hershel Jick et al., *Vaginal Spermicides and Congenital Disorders*, 245 JAMA 1329 (1981), used to show that the plaintiff's birth defects were caused by the defendant's spermicide. The article's authors, one year after the trial, stated that further research failed to confirm their findings. See *id.* (referring to Peter Huber, *Junk Science in the Courtroom*, 26 VAL. U. L. REV. 723, 724-25 (1992)).

29. See Feldman, *supra* note 22, at 15.

30. See Redmayne, *supra* note 19, at 1075-79 (noting that law deals with uncertainty using formal burdens of proof); Tarlock, *supra* note 11, at 11-12.

based on old law or precedent.³¹ While law struggles with uncertainty, science thrives on uncertainty and has progressed to modern form, which possesses even more uncertainty.

C. *How Modern Scientific Disputes Magnify the Tension*

Modern science, as opposed to nonmodern science, magnifies the inherent tension between science and law. Modern science, particularly environmental science, differs from nonmodern science because its uncertainty arises from scientific conclusions that cannot necessarily be replicated and because it requires sifting through layers of scientific expertise and technology.

Modern science, as used in this Note, may be thought of as revised empiricism. "According to revised empiricist accounts, science progresses as scientists trade in one theory for another, as they collectively come to realize that a rival to the established theory better satisfies the various scientific desiderata—predictive power, simplicity, unity of theory, fruitfulness, and so on."³² "[T]here is no such thing as a once-and-for-all crucial experiment in which a hypothesis is conclusively demonstrated to be false. A test for a hypothesis is crucial not absolutely, but relative to background assumptions."³³

Nonmodern science, in contrast, is akin to logical empiricism. Logical empiricists emphasize testability of science.³⁴ This presupposes "that both initial conditions and observational results can be" readily explained in "uncontestable terms, thereby enabling the straightforward experimental confirmation or falsification of the tested hypothesis."³⁵

An example of modern science illustrates how it exerts tension on the legal system. The environmental tort depicted in the novel *A Civil Action* involved trichloroethylene ("TCE") groundwater contamination that allegedly caused residents of Woburn, Massachusetts, to suffer adverse health effects and death.³⁶ The relevant scientific evidence included: results of well tests showing the presence of TCE, geologic and hydrogeologic data to prove that the

31. See Tarlock, *supra* note 11, at 12 (referring to *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 43 F.3d 1311 (9th Cir. 1995), discussed *infra* Part D(1)(b)).

32. Feldman, *supra* note 22, at 15.

33. *Id.* at 13-14.

34. See *id.* at 9-10.

35. *Id.* at 12.

36. See JONATHAN HARR, *A CIVIL ACTION* 79-81 (1996).

TCE could have reached the city water wells from the two defendants' properties, and that low-level exposure to TCE could have caused the various adverse health effects and deaths.³⁷

The first problem is that the scientific conclusions regarding the TCE problem are not subject to replication. A conclusion that TCE from defendants' properties migrated to the city wells cannot be replicated through an experiment dumping TCE on the properties to see if it reaches the city's wells. There is also no opportunity to directly test the assertion that TCE exposure causes the observed health affects. Instead, experts must conduct tests using advanced technology to produce evidence for courts to evaluate.

The second problem is that this evidence will be produced and evaluated by specialized scientists. The evidence described above required an army of scientific specialists.³⁸ These specialists bring different terminologies and technologies into the courtroom. This array of terminologies creates a potential for confusion. In addition, the expert's ultimate opinion relies on the propagation of scientific uncertainty, inherent in each methodological step, throughout the expert's reasoning. The tension between modern science and law arises from the necessity to sift through layers of technology and scientific specialties that either have inherent uncertainty or create uncertainty from confusion.

D. Science Forced into a Legal Mold

The court system utilizes several devices to assist in the adjudication of scientific cases and assess the admissibility of expert testimony. Procedures include opportunities for pretrial conferences, evidentiary hurdles, and discretion allowing the bifurcation of trials. At a substantive level, judges can, but seldom do, request scientific assistance in complex cases. Finally, there are suggestions to aid juries and increasingly more uses of ADR.

1. Procedural Methods to Handle Scientific Evidence

a. Pretrial Conferences

Under Federal Rule of Civil Procedure 16,³⁹ judges conduct

37. *See id.* at 297-99.

38. *See id.* at 198-210.

39. FED. R. CIV. P. 16.

pretrial conferences, in part to define the issues including “nature of the claims, the theories of general and specific causation, the defenses, and in particular the bases for disagreement among the experts.”⁴⁰ Judges may, under Federal Rule of Civil Procedure 16(c)(8),⁴¹ refer pretrial proceedings to a magistrate judge or special master. Some judges, however, prefer retaining pretrial control to enhance their familiarity with cases.⁴² Judges closely examine the reasons for the dispute rather than stopping at a general statement of disagreement.⁴³

In addition, judges, using Federal Rule of Civil Procedure 26(a)(2)(B),⁴⁴ can order the parties to submit “a detailed written disclosure with respect to each expert witness retained to testify at trial, including a complete statement of all opinions to be expressed and the basis and reasons therefor; the data or other information considered by the witness in forming opinions.”⁴⁵ These procedures are designed to narrow issues for trial and cull out undisputed issues.⁴⁶

Judges assess expert evidence, breaking down the case in order to facilitate case management.⁴⁷ These “steps, while not intuitively obvious to the *non-expert*, may be identified in the process of issue identification.”⁴⁸ Judges perform issue assessment by using reference guides (unless the court appoints an expert).⁴⁹ These subject-specific

40. FEDERAL JUDICIAL CTR., REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 15 (1994).

41. FED. R. CIV. P. 16(c) provides that “[a]t any conference under this rule consideration may be given, and the court may take appropriate action, with respect to . . . (8) the advisability of referring matters to a magistrate judge or master.” Cf. *La Buy v. Howes Leather Co.*, 352 U.S. 249, 256-58 (1957) (indicating that the use of special masters should only be in “exceptional circumstances”).

42. See FEDERAL JUDICIAL CTR., *supra* note 40, at 21.

43. See *id.* at 15. For example, while experts often have “diametrically oppos[ing] opinions,” a close examination of the issue “may well disclose that [the expert’s] differences are the products of different starting points,” or because experts possess differing philosophies, like “acceptable risk.” See *id.* at 16-17.

44. FED. R. CIV. P. 26(a)(2)(B).

45. *Id.*

Except as otherwise stipulated or directed by the court, this disclosure shall, with respect to a witness who is retained or specially employed to provide expert testimony in the case or whose duties as an employee of the party regularly involve giving expert testimony, be accompanied by a written report prepared and signed by the witness. The report shall contain a complete statement of all the opinions to be expressed and the basis and reasons therefor; the data or other information considered by the witness in forming the opinions.

Id.

46. See FEDERAL JUDICIAL CTR., *supra* note 40, at 15-17.

47. See *id.*

48. *Id.* at 18 (emphasis added).

49. These guides are: *The Reference Guide on Forensic DNA Evidence*, *The Reference Guide on Epidemiology*, *The Reference Guide on Toxicology*, *The Reference Guide on Survey*

guides provide step-by-step guidance to narrow issues and assess scientific data. The *Reference Manual on Scientific Evidence*, however, cautions that “[t]he guides are not intended to instruct judges concerning what scientific evidence should be admissible. Instead, they outline for judges the pivotal issues in the area of science that are often the subject of dispute between litigants.”⁵⁰ Judges can also order parties to narrow the issues and delineate areas of agreement and detail points of contention.

The problem with these judicial assessments and facilitation of pretrial discussions is that nonscientists are assessing complex scientific data. Judges, as already discussed, lack scientific training and voice trepidation even applying the *Daubert* factors⁵¹ to assess scientific testimony credibility, much less the validity of each scientific proposition in a chain of logic leading to an expert’s conclusion. Even if judges order parties to narrow issues, judges lack the scientific background to act as a catalyst to help guide and realistically assess expert’s assertions. Therefore, any judicial analysis of scientific data or facilitation of discussions to narrow issues may not produce as in-depth or efficient assessments of scientific data as a neutral scientist could in facilitating the discussions.

b. Evidentiary Standards

In determining the admissibility of scientific evidence, federal courts are bound by the decision contained in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁵² Before *Daubert*, courts assessed scientific evidence using the test articulated by the Supreme Court in *Frye v. United States*.⁵³ Under the *Frye* rule, scientific evidence could be admitted into evidence if it was commonly accepted in the scientific community (common acceptance test).⁵⁴ This rule was largely criticized for excluding new, cutting-edge science.⁵⁵

Research, The Reference Guide on Statistics, The Reference Guide on Multiple Regression, The Reference Guide on Estimation of Economic Losses in Damage Awards. See id. at 18-19. See generally Joe S. Cecil, *Limitations and Potential of the Reference Manual on Scientific Evidence*, 36 JURIMETRICS J. 225 (1996) (providing reviews, at times critical, of the scientific content of the manuals). But see Carey Goldberg, *Judges Take Hands-On DNA Lessons*, CHI. TRIB., Apr. 25, 1999, §1, at 8 (reporting that many judges are attempting to use seminars to learn the basics of genetics).

50. FEDERAL JUDICIAL CTR., *supra* note 40, at 118.

51. See *infra* Part II(A).

52. 509 U.S. 579, 579 (1993).

53. 293 F. 1013 (D.C. Cir. 1923).

54. See *id.* at 1014.

55. See DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND

In *Daubert*, the petitioners alleged limb reduction birth defects resulting from their mother's ingestion of Bendectin, an anti-nausea drug marketed by Merrell Dow.⁵⁶ The Supreme Court granted certiorari "in light of the sharp divisions among the courts regarding the admission of expert testimony."⁵⁷

Considering scientific evidence, the *Daubert* opinion replaced the common law test of *Frye* because Federal Rule of Evidence 702⁵⁸ specifically addressed scientific evidence so a departure from the rules was not warranted.⁵⁹ The *Daubert* Court stated that, under the Federal Rules of Evidence, trial judges "must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable."⁶⁰ The Court then defined four factors that judges could use to assess scientific evidence: (1) whether the theory or technique can be or has been tested; (2) whether the theory or technique has been subjected to peer review; (3) the potential or known rate of error; and (4) whether the theory or technique has gained widespread acceptance.⁶¹

Critics contend judges lack sufficient scientific knowledge to carry out the rule.⁶² However, the Supreme Court acknowledged and discounted this criticism after *Daubert*.⁶³ The lack of clear objective

SCIENCE OF EXPERT TESTIMONY 8 (1997).

56. See *Daubert*, 509 U.S. at 582-83.

57. See, e.g., *id.* at 585; *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 146-47 (1999) (granting certiorari "about whether, or how *Daubert* applies to expert testimony . . . as based not upon 'scientific' knowledge, but rather upon 'technical' or 'other specialized' knowledge").

58. See FED. R. EVID. 702 ("If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact at 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.").

59. See *Daubert*, 509 U.S. at 587-89. Because states are not bound by the Federal Rules of Evidence, they are not required to follow the *Daubert* ruling. See FAIGMAN, *supra* note 55, at 11-12 n.7. States fell into six categories in how they assess scientific evidence: (1) 19 states use the essential principles of *Daubert* because they either adopted *Daubert* or previously used a similar test; (2) eight states indicated a willingness to reconsider their scientific evidence rule; (3) 11 states follow the *Frye* test or a "state formulation using general acceptance and relevancy"; (4) six states use their own version of relevance/reliability; (5) four states remain undecided; and (6) three states have not assessed or cited *Daubert*. See *id.*

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

61. See *id.* at 593-94.

62. See *id.* at 600-01 (Judge Rehnquist's concurrence pointed out that, although Rule 702 "confides to the judge some gatekeeping responsibility in deciding questions of admissibility of proffered expert testimony[,] [he] do[es] not think that it imposes on them either the obligation or the authority to become amateur scientists in order to perform that role."); John W. Osborne, *Judicial/Technical Assessment of Novel Scientific Evidence*, U. ILL. L. REV. 497, 518 (1990); *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1316 (9th Cir. 1995).

63. See *General Electric Co. v. Joiner*, 522 U.S. 136, 147-48 (1997) (Breyer, J., concurring).

This requirement will sometimes ask judges to make subtle and sophisticated determinations about scientific methodology and its relation to the conclusions an

standards has led to different court interpretations of the *Daubert* decision. In *Daubert*, the Ninth Circuit Court of Appeals, on remand, seemed to equate good science with prior science, reverting back to the premise of the *Frye* rule. Expanding upon the decision in *Daubert*, the Supreme Court reinforced and strengthened judicial powers to include a judicial assessment of the merits, or validity, of an expert's opinion⁶⁴ and has extended *Daubert* to nonscientific testimony.⁶⁵ So while the judicial system's check on junk science⁶⁶ is sensible, giving this power to a nonscientific judiciary seems questionable.

c. *Bifurcation*

Very complex cases may be procedurally bifurcated into causation and liability proceedings.⁶⁷ In fact, one study showed that

expert witness seeks to offer—particularly when a case arises in an area where the science itself is tentative or uncertain, or where testimony about general risk levels in human beings or animals is offered to prove individual causation. . . . [J]udges are not scientists and do not have the scientific training that can facilitate the making of such decisions. . . .

Of course, neither the difficulty of the task nor any comparative lack of expertise can excuse the judge from exercising the “gatekeeper” duties that the Federal Rules impose. . . . [t]o the contrary, when law and science intersect, those duties often must be exercised with special care.

Id.

64. *See id.* at 146-47.

65. *See Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 147-50 (1999).

66. Junk science has many definitions. *See* PETER W. HUBER, *GALILEO'S REVENGE: JUNK SCIENCE IN THE COURTROOM* 3 (1991). One definition of junk science is:

Junk science cuts across chemistry and pharmacology, medicine and engineering. It is a hodgepodge of biased data, spurious inference, and logical legerdemain, patched together by researchers whose enthusiasm for discovery and diagnosis far outstrips their skill. It is a catalog of every conceivable kind of error: datadredging, wishful thinking, truculent dogmatism, and, now and again, outright fraud.

Id.; Lisa M. Agrimonti, *The Limitations of Daubert and Its Misapplication to Quasi-Scientific Experts, A Two-Year Case Review of Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786 (1993), 35 WASHBURN L.J. 134, 156 n.45 (1995) (referring to Barry J. Nace, *The Daubert Decision*, Address at the Annual Meeting of the Kansas Trial Lawyers Association and Crown Center Seminar XXII (Dec. 1994), which noted that “[j]unk science is any science in which there is an opinion that does not conform with the opinion that the corporations want to have accepted”); *Junkscience.com* (visited Mar. 19, 1999) <<http://www.junkscience.com>>. Finally, the Junk Science Home Page defines junk science as

bad science used to further a special agenda, such as personal injury lawyers extorting deep-pocket businesses; the “food police,” environmental Chicken Littles and gun-control extremists advocating wacky social programs; overzealous regulators expanding bureaucratic power/budgets; cut-throat businesses attacking competitors; unethical businesses making bogus product claims; slick politicians; and wannabe scientists seeking fame and fortune.

Id.

67. FED. R. CIV. P. 42(b) states that

[t]he court, in furtherance of convenience or to avoid prejudice, or when separate trials will be conducive to expedition and economy, may order a separate trial of any

eighty-four percent of trial judges support bifurcation because it "expedite[s] settlements and improve[s] the fairness of trial outcomes."⁶⁸ It seems reasonable to assume that juries in a unitary trial would be more easily distracted or tempted to ignore complex issues, such as scientific evidence.

A study presenting the same complex issues to a jury in a traditional unitary trial versus a jury in a bifurcated proceeding confirmed that defendants benefited from the bifurcated proceedings.⁶⁹ General causation verdicts in the unitary trial favored the plaintiff by 85.4%, as opposed to only 68.6% in the bifurcated trial.⁷⁰

Critics of bifurcated trials are reluctant to provide the second jury with only a portion of the case because of the jury's need to hear the entire case to reach a decision⁷¹ or fear of a Seventh Amendment violation.⁷² In the past, some courts actually denied the right to a trial by jury, reasoning that there is a complexity limitation to the Seventh Amendment,⁷³ or a due process violation if the case's complexity precludes a fair decision by a jury.⁷⁴ Other courts refused to read a complexity exception into the Seventh Amendment.⁷⁵

claim . . . or of any separate issue . . . always preserving inviolate the right of trial by jury as declared by the Seventh Amendment to the Constitution or as given by a statute of the United States.

Id.

68. Irwin A. Horowitz & Kenneth S. Bordens, *Mass Tort Civil Litigation: The Impact of Procedural Changes on Jury Decisions*, 73 JUDICATURE 22, 23 (1989).

69. See Irwin A. Horowitz & Kenneth S. Bordens, *An Experimental Investigation of Procedural Issues in Complex Tort Trials*, 14 LAW & HUM. BEHAV. 269, 269 (1990). Horowitz and Bordens conducted a study exposing jurors to a four-hour videotape of actors portraying a toxic tort case where a company's chemical allegedly affected rivers, food supply and recreational facilities. In addition, "plaintiffs claimed medical, economic and psychological damage." *Id.* at 274-75.

70. See *id.* at 277.

71. See generally Nancy Pennington & Reid Hastie, *Evidence Evaluation in Complex Decision Making*, 51 J. PERSONALITY & SOC. PSYCHOL. 242 (1986) (suggesting that jurors in criminal cases need to hear the entire case to reach a decision).

72. A Seventh Amendment violation may occur if a second jury reevaluates the findings of the first jury in a bifurcated trial and reaches a different conclusion. See *In re Rhone-Poulenc Rorer, Inc.*, 51 F.3d 1293, 1303 (7th Cir. 1995); *Castano v. American Tobacco Co.*, 84 F.3d 734, 751 (5th Cir. 1996).

73. See *In re Boise Cascade*, 420 F. Supp. 99, 105 (W.D. Wash. 1976).

74. See *In re Japanese Elec. Prod. Antitrust Litig.*, 631 F.2d 1069, 1086 (3d Cir. 1980).

75. See *In re U.S. Fin. Sec. Litig.*, 609 F.2d 411, 431 (9th Cir. 1979); *Zenith Radio Corp. v. Matsushita Electric Indus. Co.*, 478 F. Supp. 889, 942 (E.D. Pa. 1979).

2. Substantive Devices Used in Complex Scientific Cases

a. *Special Masters*

Judges employ special masters⁷⁶ to assist in pretrial proceedings. These individuals supervise discovery and overall case management, make factual determinations required to rule on evidence admissibility, and hold Federal Rule of Evidence 104(a) hearings to formulate recommendations to the judge on the admissibility of expert testimony.⁷⁷ Under Federal Rule of Civil Procedure 53(e), a special master must file a report that, if required, makes “findings of facts and conclusions of law.”⁷⁸ Special masters may also facilitate settlements, or provide assistance at the liability or remedial stage of litigation.⁷⁹

Special masters possess substantial powers under Federal Rule of Civil Procedure 53.⁸⁰ According to Rule 53(c), special masters may require the production of documents and other evidence, rule on admissibility of evidence, and examine witnesses under oath.⁸¹ Despite the apparent utility of special masters, they are seldom used by the judiciary because of cost, difficulty of finding neutral experts, and potential delay in adjudication.⁸²

In addition, a few circuit court decisions found that special master appointments violated Article III, requiring that judges must try civil cases.⁸³ “[T]he appointment [of special masters] may represent a deviation from the traditional adversary model of justice by interjecting a neutral, but not passive, specialized decision-maker into the judicial system, which otherwise depends on more passive, generalist judges.”⁸⁴

76. See FED. R. CIV. P. 53 (governing the appointment and duties of a special master appointed by the court).

77. See FEDERAL JUDICIAL CTR., *supra* note 40, at 584-85.

78. FED. R. CIV. P. 53(e) (noting that a special master's report is treated as a source of evidence in a jury trial). In a jury trial, the special master cannot be cross-examined regarding her report, and parties who participated in the evidentiary trial are not entitled to discover the report's supporting evidence. See FEDERAL JUDICIAL CTR., *supra* note 40, at 617-18. In a nonjury trial, however, the report (with any conclusions or findings of fact) is accepted unless clearly erroneous. See FED. R. CIV. P. 53(e)(2).

79. See FEDERAL JUDICIAL CTR., *supra* note 40, at 586-90.

80. See FED. R. CIV. P. 53.

81. See FED. R. CIV. P. 53(c).

82. See AMERICAN BAR ASS'N, CIVIL JURY PRACTICE STANDARDS 22 (1998).

83. See *Stable v. Warrob, Inc.*, 977 F.2d 690, 698 (1st Cir. 1992); *In re Bituminous Coal Operators' Ass'n*, 949 F.2d 1165, 1168-69 (D.C. Cir. 1991).

84. FEDERAL JUDICIAL CTR., *supra* note 40, at 621.

b. *Court-Appointed Expert Panels and Experts*

Judges, under Federal Rule of Evidence 706,⁸⁵ may appoint neutral expert panels⁸⁶ or neutral experts.⁸⁷ A neutral expert is

an expert who can respond to the technical or scientific issue in a manner consistent with generally accepted knowledge in an area, without regard to the interests advanced by either party. This would rule out experts with significant ideological, financial, or professional interests in debatable normative issues related to the issue in dispute.⁸⁸

The American Bar Association's ("ABA") Litigation Section issued civil practice standards governing and approving the use of court-appointed experts.⁸⁹ Unlike special masters, a court-appointed expert's report is subject to cross-examination.⁹⁰

An example of expert-panel usage is *Hall v. Baxter Healthcare Corp.*,⁹¹ a products liability case against the manufacturers of silicone breast implants. The judge assembled an expert panel consisting of an epidemiologist, rheumatologist, immunologist/toxicologist, and polymer chemist.⁹² The court allowed these members to question witnesses and provide their recommendations to the judge.⁹³ After both sides had an opportunity to question the panel experts and submit objections and proposed alternative findings, the judge provisionally granted the defendants' motions to exclude plaintiffs' causation testimony⁹⁴ related to any systemic disease or syndrome.⁹⁵

In *Renaud v. Martin Marietta Corp.*, the judge appointed an expert to assess whether the plaintiffs' use of one data point was scientifically sound.⁹⁶ The *Renaud* case involved plaintiffs who alleged they were injured from contaminated drinking water caused

85. See FED. R. EVID. 706 (describing expert appointment and compensation).

86. See *Gates v. United States*, 707 F.2d 1141, 1142, 1144 (10th Cir. 1983) (a panel of experts appointed under Rule 706 assisted the trial court).

87. See FED. R. EVID. 706.

88. FEDERAL JUDICIAL CTR., *supra* note 40, at 544-45 n.48.

89. See AMERICAN BAR ASS'N, *supra* note 82, at 20-23.

90. See FEDERAL JUDICIAL CTR., *supra* note 40, at 618.

91. 947 F. Supp. 1387 (D. Or. 1996).

92. See *id.* at 1392-93 (appointing experts to assist in the "gatekeeper" role imposed by the Federal Rules of Evidence).

93. See *id.* at 1393-94.

94. See *id.* at 1395 n.19 (indicating that the judge would defer the effective date of his opinion and possibly reconsider his decision based upon the findings of an appointed national expert panel in pending multidistrict litigation).

95. See *id.* at 1394.

96. 749 F. Supp. 1545, 1553 (D. Colo. 1990), *aff'd*, 972 F.2d 304 (10th Cir. 1992).

by the defendant manufacturer.⁹⁷ The plaintiffs extrapolated their exposure over eleven years from a single data point that the court expert determined was “[an] unsound scientific practice.”⁹⁸ The judge found that the evidence proved “at most that there was a possibility that the plaintiffs were exposed to contaminants”⁹⁹ and granted the defendants’ motion for summary judgment.¹⁰⁰

A survey of active federal district court judges¹⁰¹ found that twenty percent had appointed an expert under Rule 706,¹⁰² and ninety-seven percent of those judges were satisfied with the expert.¹⁰³ Judges who appointed experts used them to assist the court’s decision making or to aid settlement.¹⁰⁴ The reasons that judges cited for a failure to appoint experts were cost,¹⁰⁵ infrequency of cases requiring an expert, and respect for the adversarial system.¹⁰⁶ “Many [judges] who had appointed experts professed commitment to the adversarial process and the ability of juries to assess difficult evidence, and they indicated that they would appoint an expert only where the adversarial process failed.”¹⁰⁷ Thus, if judges do not use experts, perhaps juries can be assisted in better understanding complex cases.

c. *Methods to Enhance Jury Comprehension*

Proposals suggest aiding jury comprehension through various methods. The ABA’s Litigation Section proposed standards gathered from various state and federal courts to enhance juror comprehension.¹⁰⁸ Jury proposals relate to improving comprehension and reducing the volume of material that jurors must consider. One example of enhancing comprehension allows jurors to take notes or even question witnesses.¹⁰⁹ Comprehension might also be enhanced

97. *See id.* at 1547.

98. *Id.* at 1553.

99. *Id.*

100. *See id.* at 1555.

101. *See* FEDERAL JUDICIAL CTR., *supra* note 40, at 535 n.30 (noting that survey results consisted of 431 returned questionnaires out of 537).

102. *See id.* at 535.

103. *See id.* at 537.

104. *See id.*

105. Court-appointed expert compensation generally comes from the parties. Some judges indicated that the problems of allocating the cost among the parties, prompt payment during the tenure of the expert, and resistance by the parties to pay court-appointed experts often discourages the court from appointing an expert. *See id.* at 557.

106. *See id.* at 540.

107. *Id.* at 542.

108. *See* AMERICAN BAR ASS’N, *supra* note 82, at iv.

109. *See* Keith Broyles, *Taking the Courtroom into the Classroom: A Proposal for Educating*

by using neutral experts, or party-selected experts who could explain the general fundamentals of complex scientific issues to the jury.¹¹⁰ Another commentator suggested that judges provide preliminary jury instructions and explain the issues at the start of trial, giving jurors a framework for assessing the evidence.¹¹¹ Juror comprehension would also improve if legal and technical terms could be avoided at trial.¹¹² Finally, having experts testify in succession (an expert immediately followed by his opposing expert) would allow the jury to assess opposing viewpoints while the first expert's testimony is still fresh in jurors' memories.¹¹³

Reducing the issues that juries hear might be accomplished by bifurcating the trial into general and specific causation portions.¹¹⁴ Judges may also limit the scope or length of the trial to reduce the volume of proof that the jury must assimilate.¹¹⁵ Finally, judges could reduce the number of issues by having the parties stipulate to matters not reasonably disputed.¹¹⁶

d. ADR Uses

ADR mechanisms are not new to scientific disputes,¹¹⁷ or the court system.¹¹⁸ The Environmental Protection Agency (the "EPA") issued guidelines governing the use of such mechanisms,¹¹⁹ including granting confidentiality to mediation sessions.¹²⁰ For example, mediation in Superfund cases is appropriate to evaluate the strengths of opposing party's cases especially if the disputants can use mediation "to reach an equitable settlement that avoids . . . trial costs

the Lay Juror in Complex Litigation Cases, 64 GEO. WASH. L. REV. 714, 732-35 (1996); cf. Larry Heuer & Steven Penrod, *Increasing Jurors' Participation in Trials: A Field Experiment with Jury Notetaking and Question Asking*, 12 LAW & HUM. BEHAV. 231, 231 (1988) (noting that a survey concluded that juror notetaking had no strong advantages or disadvantages).

110. See FEDERAL JUDICIAL CTR., *supra* note 40, at 34.

111. See *id.* at 35.

112. See *id.*

113. See *id.*

114. See *id.* at 34.

115. See *id.*

116. See *id.* at 35.

117. See generally Maienschien et al., *supra* note 11; Mehta, *supra* note 9; Peterson, *supra* note 9.

118. See generally ROBERT J. NIEMIC, FEDERAL JUDICIAL CTR., *MEDIATION & CONFERENCE PROGRAMS IN THE FEDERAL COURTS OF APPEALS: A SOURCEBOOK FOR JUDGES AND LAWYERS* (1997); U.S. DEP'T OF JUSTICE, *GUIDANCE ON THE USE OF ALTERNATIVE DISPUTE RESOLUTION FOR LITIGATION IN THE FEDERAL COURTS* (1992).

119. See generally U.S. ENVTL. PROTECTION AGENCY, *FINAL GUIDANCE ON THE USE OF ALTERNATIVE DISPUTE RESOLUTION TECHNIQUES IN ENFORCEMENT ACTIONS* (1987).

120. See *id.* at D2.

exceeding the costs of actual site cleanup.”¹²¹ The EPA identified allocation of costs among parties, cost documentation, remedy issues, as well as compliance with EPA requests and consent orders, as potentially appropriate issues for mediation.¹²²

Currently, all thirteen United States Courts of Appeal have mediation programs,¹²³ which are permitted by Rule 33 of the Federal Rules of Appellate Procedure.¹²⁴ The program objectives include improving case management,¹²⁵ which can “help parties simplify or clarify issues . . . [which have] the potential to streamline the appellate process, even when the cases do not settle.”¹²⁶ Appellate mediation conferences generally occur before briefs are filed. Circuits may select cases that appear likely to settle, randomly select cases meeting minimum requirements, or allow nearly all civil cases to be eligible.¹²⁷ These mediations are confidential and facilitative (the mediator, as a neutral party, “helps disputants resolve problems, evaluate positions, and proceed toward settlement”),¹²⁸ though the First and Second Circuits permit mediators to make predictions of the probable outcome of the case if it were to go before the court.¹²⁹

The United States Department of Justice (the “DOJ”), implementing the Civil Justice Reform Act of 1991, issued guidelines for ADR federal court litigation.¹³⁰ The DOJ advocated several forms of ADR (“arbitration, mediation, early neutral evaluation, fact-finding and mini-trials”)¹³¹ for cases that have the characteristics of impasse or have a potential for impasse, and for efficiency

121. Peterson, *supra* note 9, at 348.

122. *See id.* at 350-66.

123. *See* NIEMIC, *supra* note 118, at 3.

124. FED. R. APP. P. 33 provides:

The court may direct the attorneys, and in appropriate cases the parties, to participate in one or more conferences to address any matter that may aid in the disposition of the proceedings, including the simplification of the issues and the possibility of settlement. A conference may be conducted in person or by telephone and be presided over by a judge or other person designated by the court for that purpose. Before a settlement conference, attorneys must consult with their clients and obtain as much authority as feasible to settle the case. As a result of a conference, the court may enter an order controlling the course of the proceedings or implementing any settlement agreement.

Id.

125. *See* NIEMIC, *supra* note 118, at 4.

126. *Id.*

127. *See id.* at 5-6.

128. *See* Patrick Mead & Ed Newcomer, Jr., *Alternative Dispute Resolution (ADR) Glossary of Terms*, WASH. STATE BAR NEWS, Apr. 1993, at 25.

129. *See* NIEMIC, *supra* note 118, at 8.

130. U.S. DEP'T OF JUSTICE, *supra* note 118, at 1.

131. *Id.* at 3.

considerations.¹³² The DOJ uses mediation to “structure negotiations [and to provide] a catalyst between the parties . . . during the course of negotiations.”¹³³ In comparison, fact-finding uses a neutral expert to independently investigate the facts specified by the parties and issue a finding. This finding may then be used by the parties for settlement discussions or by a judge in the litigation.¹³⁴ Additionally, the ADR forms discussed by the DOJ are confidential.¹³⁵

II. THE RESULTS OF THE TENSION BETWEEN SCIENCE AND LAW

Although the loser will always grumble, when major players in a process complain, something may be wrong with the process. Judges express concerns and conduct their cases with implicit hesitation when carrying out scientific assessments.¹³⁶ Jurors implicitly express confusion when deciding complex issues. Scientists criticize the legal process. As a result, these parties and commentators have proposed changes to our current adjudicatory system.

A. *Judicial Frustration with the Current System*

Judges voice hesitation when attempting to assess scientific evidence under the *Daubert* standards.¹³⁷ Judges indicate that there are four basic reasons why they need scientific or technical knowledge in order to: (1) “evaluate scientific or technical evidence . . . and to rule on objections to evidence”; (2) “assess claims and facilitate settlement”; (3) educate themselves or jurors in the particular subject matter; and (4) “scientifically analyze and evaluate other evidence.”¹³⁸

Cases indirectly indicate that judges are uncomfortable applying and analyzing all of the *Daubert* factors. The Ninth Circuit, on remand from the Supreme Court, applied a new factor of whether scientific research was conducted independent of the litigation.¹³⁹

132. *Id.* at 13-14.

133. *Id.* at 5.

134. *See id.* at 8.

135. *See id.* at 19 (stating that when public agencies are involved, if documents are disclosed to a third party, like a mediator, they may no longer be confidential under the Freedom of Information Act).

136. *See Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1316 (9th Cir. 1995); *Officer v. Teledyne Republic/Sprague*, 870 F. Supp. 408, 410 (D. Mass. 1994).

137. A Ninth Circuit *Daubert* judge stated, “Our responsibility, then, unless we badly misread the Supreme Court’s [*Daubert*] opinion, is to resolve disputes among respected, well-credentialed scientists about matters squarely within their expertise.” *Daubert*, 43 F.3d at 1316.

138. *See FEDERAL JUDICIAL CTR.*, *supra* note 40, at 583.

139. *See Daubert*, 43 F.3d at 1317 n.5.

Other courts place a lot of weight on the general acceptance factor without fully analyzing the other factors.¹⁴⁰ *Daubert* itself created a loophole for judges by allowing them to take judicial notice of other court acceptances of science.¹⁴¹ Some circuits did categorize evidence as nonscientific so they did not need to apply *Daubert*.¹⁴² This practice, however, should be curtailed by the recent Supreme Court decision in *Kumho Tire Co. v. Carmichael*,¹⁴³ which extends *Daubert* to the testimony of experts, not just experts who are scientists.¹⁴⁴

B. Scientist Dissatisfaction with the Current System

The scientific community welcomed judicial oversight, at least in theory.¹⁴⁵ Like other disciplines, science suffers from its share of fraud and misrepresentation.¹⁴⁶ In addition to calls for science courts, scientists have also suggested greater use of neutral experts.¹⁴⁷ The criticism of current judicial oversight is that it assesses science using nonscientific premises.¹⁴⁸ Only two of the four *Daubert* factors directly involve scientific merit (peer review and general acceptance), while the remaining two factors (testability and known rate of error) only provide proxies for merit.¹⁴⁹

Scientific merit cannot be readily ascertained by peer review because, despite widespread belief, peer reviewers do not replicate findings reported in articles nor does peer review and publication confer truth, accuracy, validity, reliability, or certainty to the science.¹⁵⁰ Peer review does not mean that the published article is

140. See, e.g., *Officer*, 870 F. Supp. at 410.

141. See *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 584-85 (1993); Erica Beecher-Monas, *Blinded by Science: How Judges Avoid the Science in Scientific Evidence*, 71 TEMP. L. REV. 55, 102 n.122 (1998) (noting "the danger [is] that one or two jurisdictions will determine the admissibility of a given category of evidence and others will simply ride their coattails, turning the old general acceptance test on its head by making it acceptance by other courts rather than other scientists").

142. See *United States v. Jones*, 107 F.3d 1147, 1157 (6th Cir.), cert. denied, 521 U.S. 1127 (1997); *Iacobelli Constr., Inc. v. County of Monroe*, 32 F.3d 19, 25 (2d Cir. 1994).

143. 526 U.S. 137 (1999).

144. See *id.* at 148.

145. See Marcus, *supra* note 11, at 390.

146. See *id.* at 388-90 (referring to Nobel Prize winner David Baltimore's withdrawal of a paper after it became known that some of the data it used was faked, and the presence of the National Institutes of Health's Office of Scientific Integrity (which some call the science police)).

147. See Tarlock, *supra* note 11, at 17.

148. See Marcus, *supra* note 11, at 392.

149. See FAIGMAN, *supra* note 55, at 18.

150. See ABA STANDING COMM. ON SCIENTIFIC EVIDENCE, SECTION OF SCIENCE & TECH., SCIENTIFIC EVIDENCE REVIEW: MONOGRAPH NO. 2, at 19-20 (Marc S. Klein et al. eds.,

“generally accepted” and the fact that information has not been peer reviewed does not mean it cannot be “generally accepted.”¹⁵¹ In addition, some journals accept and use author-nominated reviewers.¹⁵² Different journals are also not equal in quality so publication in “weaker” journals is not likely to exclude “bad” science.¹⁵³ Finally, judges determine the weight of peer review, rather than scientists who are readily familiar with the reputation of specific journals and the corresponding quality of the journal’s peer review process.

The general acceptance factor, retained from *Frye*, fails to recognize cutting-edge science. Judges are called upon to determine exactly *when* a proposition receives general acceptance, and also to define the relevant field that must confer general acceptance.¹⁵⁴ Therefore, the narrower the court determines the pertinent field, the more likely the court finds general acceptance.¹⁵⁵ “The general acceptance test thus degrades into a process of deciding whose noses can count . . . [so] [b]ecause the pertinent field can be so readily manipulated, the test by itself provides courts with little protection against shoddy science.”¹⁵⁶

Testability of science goes to the status of a statement as either scientific or nonscientific.¹⁵⁷ Unfortunately, the *Daubert* Court did not specify how testability is determined. Judges may assess testability by examining empirical test results; but unless judges develop some scientific expertise to separate valid research from “research designed merely to supply impressive looking graphs and imposing numbers,” they will not be able to properly determine the issue’s testability.¹⁵⁸ Complicating this task is the fact that research is

1994).

151. *See id.* at 20.

152. The *Journal of Environmental Science & Technology* requires authors to submit names of three or four experts in their field for possible reviewers. The publication states that “[t]he technical editors try to use at least one reviewer from [the author’s list]” and it typically assigns two or three reviewers to each article. *See* Journal of Environmental Science & Technology, *Editorial Policy* (visited Feb. 12, 1999) <<http://acsinfo.acs.org/instruct/esthag.pdf>>. *Science Magazine* requests that manuscripts be submitted with the names of four to six potential referees. *Science Magazine, Information to Authors/Contributors* (visited Feb. 12, 1999) <<http://www.sciencemag.org/misc/con-info.shtml>>. *Nature* allows authors to suggest independent reviewers, though *Nature* may not follow the suggestions. *See* *Nature, Nature Extended Guide to Authors* (visited Feb. 12, 1999) <<http://www.nature.com/author/guide.html>>.

153. *See* FAIGMAN, *supra* note 55, at 27-28.

154. *See id.* at 8-9.

155. *See id.* at 9.

156. *Id.*

157. *See id.* at 20.

158. *Id.* at 21.

not a cookie-cutter pursuit so there are many different ways to conduct valid research.¹⁵⁹

The final *Daubert* factor, rate of error, looks at a method's propensity for mistake.¹⁶⁰ The most important source of error is the research method itself, and may include variables such as sample size, sample population selection, and apparatuses used.¹⁶¹ Scientists rely on iterations with various research methods over time to reduce the rate of error and develop acceptance.¹⁶² Unfortunately, law does not have the luxury of waiting until error is reduced.

All of the *Daubert* factors involve the intimate details of everyday scientific life. Scientists, rather than judges, are best able to understand the subtleties of each factor to reach a conclusion of scientific soundness. In addition, judges and scientists think differently. Judges tend to focus on the evidentiary bottom line, whether specific study results should be accepted,¹⁶³ whereas scientists focus on the route leading to the results. Lecturers for continuing judicial education find that judges do not focus on general principles of data assessment, instead they focus on snippets from individual cases.¹⁶⁴ One lecturer warned that "unless the judge understands the principles that underlie the details, the result can be the misapplication of rules that have no bearing on the situation."¹⁶⁵ While these factors are confusing enough to judges, our adversarial system also demands that juries assess complex science.

C. Jury Confusion

Jury confusion is often attributable to both lack of juror scientific understanding and the use of scientific experts in our judicial system. Studies show that adults lack basic scientific knowledge; one survey found that over fifty percent of Americans did not know that the Earth revolved around the sun once per year.¹⁶⁶ The study also found that "[t]eaching is a profession in crisis . . . [w]e are currently losing

159. *See id.*

160. *See Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 594 (1993).

161. *See FAIGMAN, supra* note 55, at 26-27.

162. *See id.* at 27.

163. *See John M. Conley & David W. Peterson, Essay: The Science of Gatekeeping: The Federal Judicial Center's New Reference Manual on Scientific Evidence*, 74 N.C. L. REV. 1183, 1205-06 (1996).

164. *See id.*

165. *Id.* at 1206.

166. *See GERALD HOLTON, SCIENCE AND ANTI-SCIENCE* 147 (1993).

thirteen mathematics and science teachers for each one entering the profession”¹⁶⁷ so the prospects of rectifying scientific illiteracy is grim. In addition, because of juror selection biases, there is little reason to hope that people available for jury service will exceed these dismal averages. In fact, a juror study revealed that, overall, thirty percent of jurors have difficulty understanding even one to five words, terms or concepts in judge’s instructions.¹⁶⁸ But even if some juror ignorance could be mitigated, the civil justice system would still depend on expert witnesses because of the complexity of issues.

Unfortunately, the way that scientific experts are used in the adversarial system undercuts their idealized role as teachers and guides through a scientific maze. Scientific experts have become a pawn in the tactical game of adjudication. Considering the estimated \$200 million industry of jury consulting,¹⁶⁹ the strategic use of scientific experts and lawyer tactics is not too surprising. An example, as some commentators suggest, is the use of unequal numbers of experts on both sides of a controversy that can cause jury confusion.¹⁷⁰ In addition, juries sometimes assess the characteristics of the expert rather than her substantive testimony.¹⁷¹

Attorney tactics also play a part in juror confusion. Thus, in complex cases, where issues are not straightforward, attorney tactics will likely factor more heavily into jury decisions. Examples of such techniques are distraction of the jury during the opposition’s testimony or a relentless attack of witness credibility, even though the attorney knows that the witness is conveying the truth.¹⁷² Attorneys also play on the emotions of juries and routinely work to create a “likeability factor” with juries.¹⁷³ Especially when there is a mismatch of attorney skills, juries sometimes judge the attorneys and not the cases.¹⁷⁴ In short, the adversarial process can mislead jurors.¹⁷⁵

167. *Id.*

168. See Strier, *supra* note 5, at 80.

169. See Sandra Day O’Connor, *Juries: They May Be Broken, but We Can Fix Them*, 44 *FED. LAW.* 20, 23 (1997).

170. See Redmayne, *supra* note 19, at 1068.

171. See *Confronting the New Challenges*, *supra* note 6, at 1585-86 (describing jurors’ negative attitude toward one expert because they felt an expert was overpaid and that there was a social gap between the jurors and the expert).

172. A survey found that 30% of jurors felt that one or both attorneys attempted to distort or hide facts instead of revealing the truth for the jury. See Strier, *supra* note 5, at 82.

173. See *id.* at 56-57.

174. A survey found that 36% of jurors that perceived a decision (verdict, award size, or sentence length) as wrong attributed it either partially or significantly to differences between opposing attorneys’ courtroom skills. See *id.* at 57, 83.

175. See *id.* at 55 (describing the findings of a study of an asbestos case from MOLLY SELVIN

Although this phenomenon may occur in all trials, it seems plausible that jurors in complex scientific cases, with their previously discussed lack of scientific knowledge, would have a greater tendency to discount scientific information and look to the extraneous factors of attorney tactics to reach a decision.

Of course attorneys could argue that they are complying with their code of ethics. The *Model Rules of Professional Conduct* states that attorneys have an obligation to represent their clients zealously within the bounds of the law.¹⁷⁶

The Federal Rules of Evidence represent rules that lawyers must follow in federal court.¹⁷⁷ Under the Federal Rules of Evidence the majority of relevant evidence is admissible,¹⁷⁸ but is limited by Federal Rule of Evidence 403.¹⁷⁹ Therefore, if an attorney litigates an issue that is really undisputed and low in probative value, Rule 403 is violated and such conduct is not permitted, even from the zealous advocate.

D. *Proposals to Change the Current Adjudicatory System*

Despite the judicial devices and ADR uses, both the legal and scientific communities call for changes in how the judicial system handles scientific cases.¹⁸⁰ These proposals include: a science court, methods to directly address jury confusion, and increased use of ADR procedures.

& LARRY PICUS, *THE DEBATE OVER JURY PERFORMANCE: OBSERVATIONS FROM A RECENT ASBESTOS CASE 45-46* (1987)).

176. MODEL RULES OF PROFESSIONAL CONDUCT Rule 1.3 cmt. 1 (1999).

A lawyer should pursue a matter on behalf of a client . . . and may take whatever lawful and ethical measures are required to vindicate a client's cause or endeavor. A lawyer should act with commitment and dedication to the interests of the client and with zeal in advocacy upon the client's behalf.

Id.

177. FED. R. EVID. 101 (stating that the federal rules govern proceedings in the United States courts).

178. FED. R. EVID. 402 provides that "[a]ll 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." In turn, "[r]elevant 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 than it would be without the evidence." FED. R. EVID. 401.

179. FED. R. EVID. 403 states that "[a]lthough 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."

180. See Broyles, *supra* note 109. See generally Task Force of the Presidential Advisory Group on Anticipated Advances in Science and Tech., *The Science Court Experiment: An Interim Report*, 193 SCIENCE 653 (1976).

1. Science Court Proposal

In the mid-1970s, scientists proposed and supported a science court.¹⁸¹ Scientists would staff the science courts, who would entertain scientific issues that pertained to public decisions.¹⁸² The proposed science court was to be an adversarial proceeding among scientists to decide scientific facts (“a result, or more frequently the anticipated result, of an experiment or an observation of nature”),¹⁸³ as opposed to social value decisions.¹⁸⁴

Examples of science court subjects include whether “water supplies be fluorinated” or if “Red Dye #40 [is] safer than Red Dye #2.”¹⁸⁵ The result would be a series of factual statements, including statements regarding uncertainty, and suggestions of areas that required additional research.¹⁸⁶

This proposal left science to the scientists, but would not reach many legal disputes that do not, or would not, rely on the selected issues. During the past twenty-five years, these science court variations all failed.¹⁸⁷

2. Jury Proposals

Other proposals directly address juries in complex cases. One proposal suggests that juries be partially composed of college-educated individuals,¹⁸⁸ while other commentators suggest educating jurors in complex cases,¹⁸⁹ or allowing notetaking and juror questions.¹⁹⁰ A college-educated jury has superficial appeal, but critical legal scholars¹⁹¹ would, no doubt, object to confining the

181. See *id.* at 656 (listing other science court proposals in its bibliography).

182. See *id.* at 653 (noting that the panel of scientists acting as judges should not be experts in the contested subject matter or possess any bias toward the subject matter).

183. *Id.* at 656.

184. See *id.* at 653.

185. *Id.*

186. See *id.*

187. See *Confronting the New Challenges*, *supra* note 6, at 1604; Arthur Kantrowitz, *Elitism vs. Checks and Balances in Communicating Scientific Information to the Public* (visited Mar. 3, 1999) <<http://www.fplc.edu/risk/vol4/spring/kantro.html>> (noting that “[i]t gradually became clear that although both sides of the Washington politics-science complex would give lip service to the need for new procedures, they were unwilling to aid in creating an institution that might not be easy to control”).

188. See Strier, *supra* note 5, at 79.

189. See Broyles, *supra* note 109, at 742-44 (suggesting that jurors receive instruction from a neutral “educator” regarding “subject matter, terminology, and foundation for the evidence and arguments that will be presented at trial”).

190. See *id.* at 733-34.

191. Critical legal scholars argue such rules protect the socially powerful at the expense of

adjudication of disputes to the most powerful members of society. Also, assisting jurors by allowing notetaking and questioning could help alleviate the problem of jury confusion, but the fact remains that the substance of a case may still be confusing.

3. ADR Proposals

In an extensive report detailing the problems of mass torts, the ABA's Commission on Mass Torts suggested that legislation be enacted to enable courts to convene one or more impartial experts for factual disputes of a scientific or technical nature and to require parties to enter ADR provided that a right to a jury trial is not denied or impaired.¹⁹² Additionally, the Federal Rules of Civil Procedure governing pretrial conferences have several subsections that would allow ADR.¹⁹³

Professor Debrah Hensler¹⁹⁴ urges the use of ADR in scientific disputes.¹⁹⁵ She defines ADR as "mechanisms that are designed to reduce the probability of a dispute going to trial through the use of a

the socially weak and should be avoided. See KULKIN & STEMPEL, *supra* note 7, at 175.

192. See AMERICAN BAR ASS'N COMM'N ON MASS TORTS, REPORT TO THE HOUSE OF DELEGATES, NO. 126, at iii-iv (1989).

193. FED. R. CIV. P. 16(c) notes:

At any conference under this rule consideration may be given, and the court may take appropriate action, with respect to

(1) the formulation and simplification of the issues, including the elimination of frivolous claims or defenses;

.....

(3) the possibility of obtaining admissions of fact and of documents which will avoid unnecessary proof, stipulations regarding the authenticity of documents, and advance rulings from the court on the admissibility of evidence;

(4) the avoidance of unnecessary proof and of cumulative evidence, and limitations or restrictions on the use of testimony under Rule 702 of the Federal Rules of Evidence;

.....

(9) settlement and the use of special procedures to assist in resolving the dispute when authorized by statute or local rule;

.....

(12) the need for adopting special procedures for managing potentially difficult or protracted actions that may involve complex issues, multiple parties, difficult legal questions, or unusual proof problems;

.....

(16) such other matters as may facilitate the just, speedy, and inexpensive disposition of the action.

194. Professor Hensler is Senior Social Scientist at the RAND Institute for Civil Justice and Visiting Professor of Social Science in Law at the University of Southern California Law Center.

195. See generally Deborah R. Hensler, *Science in the Court: Is There a Role for Alternative Dispute Resolution?*, 54 LAW & CONTEMP. PROBS. 171 (1991); see also *Confronting the New Challenges*, *supra* note 6, at 1601 (noting that mediation in complex cases avoids decision-makers lacking a technical background, which is preferred because the "parties will understand the intricacies and scientific aspects of their dispute," but presents mediation only as a way to settle disputes).

neutral third party,” specifically excluding “procedures that are solely intended to expedite or reduce the costs of the pretrial process . . . since they are not formally directed at resolving the dispute.”¹⁹⁶ Focusing on settlement, Professor Hensler describes the use of expert panels and mediation as well as other varieties of ADR (early neutral evaluation, summary jury trials, conciliation procedures, mini-trials, and arbitration).¹⁹⁷

Professor Hensler describes mediation as aiding the parties to reach a mutually acceptable resolution, which may include innovative settlement terms beyond monetary damages.¹⁹⁸ For example, a tort mediation agreement may include provisions for “future environmental testing or ongoing physical exams of classes of claimants.”¹⁹⁹ Litigants have used mediation when disputes became “ripe” (costs of litigation outweighed costs of settlement) for settlement.²⁰⁰ Expert panels, according to Professor Hensler, “assess the substantive evidence” and advise attorneys, parties and their experts of the “strengths and weaknesses of each side’s case.”²⁰¹ This assessment serves as a basis for settlement talks.²⁰²

4. Shortcomings of Discussed ADR Uses and Proposals

The discussed current ADR uses and proposals focus on settlement and emphasize confidentiality. This Note does not focus on settlement or complete confidentiality because a settlement focus promotes nonadversarial adjudication (uncomfortable to many members of the judiciary) and confidentiality removes information and disputes from public view.

Critics of mediation largely raise concerns of privatization of justice.²⁰³ By removing disputes from the public forum of the courts, justice becomes “privatized” and society fails to benefit from the dispute because of the process’ confidentiality.²⁰⁴ Professor Fiss²⁰⁵

196. Hensler, *supra* note 195, at 180.

197. *Id.* at 187.

198. *Id.* at 184-85.

199. *Id.* at 185.

200. *See id.* at 187.

201. *Id.* at 181.

202. *See id.*

203. *See* Owen M. Fiss, *Against Settlement*, 93 YALE L.J. 1073, 1085-86 (1984).

204. *See* Jack B. Weinstein, *Some Benefits and Risks of Privatization of Justice Through ADR*, 11 OHIO ST. J. ON DISP. RESOL. 241, 246 (1996). *But see* Kentra, *supra* note 10, at 717, 722 (noting that confidentiality is mediation’s strength).

205. Professor Fiss is Alexander M. Bickel Professor of Public Law at Yale University.

comments that parties removed from the judicial process may not understand community norms of behavior.²⁰⁶ In the environmental context, community norms manifest themselves as acceptable risk given acceptable scientific uncertainty.²⁰⁷ The court and jury serve as the societal check on and moderator of behavior; court officials, unlike mediators, are subject to political accountability.²⁰⁸ Professor Fiss concludes that “[a]djudication is more likely to do justice than conversation, [or] mediation . . . precisely because it vests the power of the state in officials who act as trustees for the public, who are highly visible, and who are committed to reason.”²⁰⁹ This strong argument against removing disputes from the courts, and public view, assumes a mediation predicated on settlement, like Professor Hensler’s suggestions and current uses of ADR in the courts.

III. PROPOSED PRETRIAL MEDIATION METHOD

Science should be left to the scientists to the fullest possible extent. Scientists are in the best position to assess opposing science. In a mediation process, the mediator guides assessments and facilitates discussions regarding further clarification of scientific issues. Ideally, some issues will be agreed upon, while others will be more tightly framed for later jury consideration. The proposed mediation is a modification of a general mediation model, does not focus on settlement, is not entirely confidential, and exists to assist fact-finders and judges rather than supplant them. A brief discussion of general mediation provides a framework for this proposal.

A. *Overview of a General Mediation*

There are mediation model variations, but a general mediation is a confidential process conducted by a neutral third party to assist the disputants to reach a mutually agreeable settlement.²¹⁰ This mediation model proceeds through the following steps: opening statements, framing of issues, opportunities for disputants to engage in discussion, and caucusing.²¹¹

206. Owen M. Fiss, *Out of Eden*, 94 YALE L.J. 1669, 1672-73 (1985).

207. See Tarlock, *supra* note 11, at 17.

208. See Fiss, *supra* note 203, at 1085.

209. Fiss, *supra* note 206, at 1673.

210. See Mehta, *supra* note 9, at 523.

211. See CENTER FOR CONFLICT RESOLUTION, MEDIATOR TRAINING (1998) (on file with the Center for Conflict Resolution, Chicago, Illinois).

Each party is given an opportunity to give a brief opening statement, providing an overview of the dispute from that party's perspective.²¹² Then the mediator frames identified disputed issues, thereby providing the agenda for the remainder of the mediation.²¹³ Next, the mediator directs the parties through the issues, encouraging parties to explain their position to the opposing party, instead of the mediator (because the mediator is not the decision-maker). Generally, after the parties discuss the issues, the mediator privately caucuses with each party.²¹⁴

Mediators caucus to make sure that each party understands the opposing party's arguments, and also to "reality test" positions taken by the individual party.²¹⁵ Reality testing forces the party to realistically view their position with respect to the opposition's evidence and possibly with respect to what may occur if the dispute is brought before a judge.²¹⁶ The goal is to have the disputants reach a mutually agreeable settlement, or at least a much better understanding of the dispute.

Mediation advocates believe mediation is superior to traditional adjudication because it helps maintain party control, is efficient (in both cost and time), and confidential.²¹⁷ Party control of an agreement brings party satisfaction to the process and is believed to increase agreement compliance.²¹⁸ Confidentiality enables parties to be more forthcoming with information, which will aid discussions and make settlement possible.²¹⁹

B. Proposal for Mediation in Complex Scientific Cases

A knowledgeable mediator, guiding a fact-finding (investigation of disputed issues) discussion between the parties, should be used in complex scientific cases. This Section describes the proposed mediation in terms of timing and function, mediator selection and cost, end written product, and process, and provides a hypothetical example of the proposed mediation strategy.

212. See Kentra, *supra* note 10, at 719-20.

213. See *id.* at 720.

214. See *id.*

215. See CENTER FOR CONFLICT RESOLUTION, *supra* note 211.

216. See *id.*

217. See Kentra, *supra* note 10, at 720-22.

218. See *id.* at 718.

219. See *id.* at 722.

1. Mediation Timing and Function

The proposed pretrial mediation commences after discovery is largely complete (although additional discovery may be performed if needed to facilitate the discussions). The mediation's function is to hone issues for both the judge and jury. Discussions between opposing experts and a neutral mediator should proceed more quickly than a pretrial conference conducted by a judge simply because the parties readily "speak the same language." Time spent at this early stage on educating a judge is misspent if some issues drop out later as undisputed or if they need to be better honed for understanding.

2. Mediator Selection and Cost

Opposing parties agree on the need for expert mediators, though for different reasons.²²⁰ Because the training for mediation is not onerous,²²¹ scientific organizations and agencies²²² or private mediation services²²³ would be asked to provide such experts. Like the mediators in appellate court programs, these mediators would either be volunteers with mediation training or the court could provide training.²²⁴ Parties would select the mediator.²²⁵ (If the parties could not agree, the court would make a selection of qualified scientists from a master list kept by the court.)

Although the emphasis is on *neutral* experts, some may argue that scientists have personal biases and many reputed scientists disagree. The point of this proposal, however, is not to adjudicate science, but to eliminate undisputed issues²²⁶ and detail the route and

220. A survey conducted by a private mediation provider showed that 44% of parties felt that technical expertise was important, while 92% of the parties felt that a technical expert as a negotiator would save money. See Kelly A. Fox, *Survey Tracks Use of ADR of Environmental Disputes*, CORP. LEGAL TIMES, Apr. 1995, at 14, 14.

221. See, e.g., Illinois Not-For Profit Dispute Resolution Act, 710 ILL. COMP. STAT. 20/2 (West 1987) (stating that 30 hours of training is required to become a mediator in Illinois).

222. Examples include: the National Academy of Sciences, the United States Environmental Protection Agency, the United States Geological Survey, the Center for Disease and Control, and the Army Corps of Engineers.

223. At least one private alternative dispute company has a scientific division. See JAMS-Endispute, *The Environmental Dispute Forum* (visited Mar. 6, 1999) <<http://www.jams-endispute.com/why/environmental/index.html>> (offering "a nationwide panel of neutral dispute resolvers" and the "establishment and management of expert neutral panels").

224. See NIEMIC, *supra* note 118, at 10.

225. Cf. FEDERAL JUDICIAL CTR., *supra* note 40, at 545 (presenting survey results stating that 41 of 66 judges appointed experts without party input).

226. See Kantrowitz, *supra* note 187. Dr. Kantrowitz (relying upon two university experiments of the proposed science court procedure) noted that scientist-advocates were

reasoning for continued disagreement of disputed issues. This proposal's mediation is facilitative, and mediator training would remind scientist-mediators that their own viewpoints regarding conclusions are not to be interjected into the mediation. The scientist-mediator's role is to efficiently get the issues on the table for party discussion, guide the discussion, and focus the parties to explain their conclusions and reasoning.

Similar to the cost of court-appointed experts, parties would share the cost of the mediation. Unlike settlement-focused mediation, parties have more incentive to participate in pretrial mediation because the focus is not on removing the dispute from the judicial system and the procedural process that parties favor.²²⁷ Removal of undisputed issues and framing specific points of dispute in a step-wise fashion reduces trial time and jury confusion by focusing a jury's attention solely on disputed facts. There is no reason to retain undisputed issues just as tactical ploys for attorneys to shield the weak points of their cases by confusing juries as to what the real issues are. Evidence shows that juries are not predictable, and it is doubtful that clients would permit the attorneys to waste time and money litigating a largely useless piece of evidence.

3. The Mediation Process

The pretrial mediation process is the same as the general model except the goal is to reduce the number of disputed issues and explore the reasoning of each issue. Issues still disputed after a mediation would be detailed by providing the route and reasoning of each assertion with its corresponding opposition in a written report.

One potential problem is that formal rules of evidence are not used during mediations. The possibility of "bad" science entering the discussions should be mitigated by the expert's impatience and knowledge to quickly weed out useless information, as well as the sharing of mediation costs between the parties. (Because parties are sharing the costs of mediation, there is little incentive to prolong the proceedings.) Conversely, there may be an incentive for attorneys to more carefully tailor their cases and prepare their experts. Of course, there is a risk that some parties may use the increased cost of a

"almost always" in agreement with factual statements that supported their positions so that a joint statement could be easily negotiated. *Id.*

227. See Tom R. Tyler, *Citizen Discontent with Legal Procedures: A Social Science Perspective on Civil Procedure Reform*, 45 AM. J. COMP. L. 871, 882-83 (1997) (noting that research indicates that people care most about the process by which their case was handled).

prolonged mediation as a tactic. This risk could be eliminated through the power of a mediator to issue a separate report that would detail the party's continued presentation of erroneous information, which later could be used by a judge to impose sanctions upon the uncooperative party.²²⁸

Confidentiality would be accorded to the mediation session itself (to allow parties to be forthcoming), but the final end-product, the written report, would become part of the court record. The idea of a written report is supported by the ABA's Civil Procedure Standard 11, which provides that all communications between the court and expert, as well as between parties and the court expert, be available in written form.²²⁹

Ideally, the report would be generated by the parties. However, the mediator could also issue a report to fill gaps intentionally left by the parties, but could not contradict a party agreement. This would encourage parties to actively participate in the process and assure that the judge receives some scientific guidance. The written report would stipulate agreements with respect to particular issues or subissues. Disputed issues, including the admissibility of scientific evidence, would be delineated along with the reasons for each disputed point.

4. The Written Report from the Mediation

The written report would serve two functions. First, it would refine the dispute for the jury. Second, it would provide the judge with guidance concerning the admissibility of scientific evidence. As previously discussed,²³⁰ jury confusion could be mitigated through the use of juror notebooks. Jurors, however, may lack the background to follow the dispute and categorize the issues. The written report would serve as an outline of the issues and reasons for disputed issues; this would help jurors follow the arguments and put each piece of evidence in proper perspective. If parties eliminated some issues through agreement, the jury would be presented with fewer issues so jury confusion is reduced. Jury comprehension should also be enhanced through a more structured, honed dispute.

The second function of the written report is that judges receive a

228. See FED. R. CIV. P. 16(f) (giving judges the authority to issue sanctions "if a party or party's attorney fails to participate in good faith").

229. ABA Civil Procedure Standard 11(c) allows communication between the court and expert by "[p]roviding that all communications between court and expert will be in writing with copies to the parties." AMERICAN BAR ASS'N, *supra* note 82, at 20-21.

230. See *supra* Part I(D)(2)(c).

scientific analysis of the disputed issues, which would greatly assist their *Daubert* evidentiary rulings. Judges still would be required to go through the *Daubert* factors, but with information in hand from the scientists, judges could make a much easier educated inspection of the issues.

The scientists, acting as mediators, merely serve as a neutral third party. The parties control the process, and in a sense adjudicate portions of their dispute by removing issues from contention. The jury and judge, however, do not lose any information in the process. No longer would disputed issues still be presented to the judge and jury as agreed upon, and disputed issues would simply be detailed for easier understanding.

Parties may feel uncomfortable providing evidence to buttress their claims or attack opposing claims that later might be included in a written report that becomes part of a court record. However, the parties themselves are in control of the written report (unlike reports by special masters, traditional court-appointed experts or fact-finders), and any evidence they put forth to support or dispute issues during mediation could still be requested by the court under Federal Rule of Evidence 705.²³¹

In short, a pretrial mediation would reduce jury confusion and aid judges' *Daubert* assessments. Furthermore, a scientist-conducted pretrial mediation would be more efficient, both in terms of time and money, because complex issues would be explored more rapidly and in greater depth than if discussions were conducted by a nonscientist.

5. An Example of the Proposed Mediation Method

The case in *A Civil Action* was tried first for causation.²³² The issue was whether the defendants contaminated the city wells (i.e., whether TCE emanated from their properties and migrated to the city wells).²³³ This issue depended upon testimony from hydrogeologists, who relied on pump tests, computer models, and associated calculations of groundwater flow.²³⁴

At the first pretrial meeting, the judge would identify the

231. FED. R. EVID. 705 stipulates that "[t]he expert may testify in terms of opinion or inference and give reasons therefor without first testifying to the underlying facts or data, unless the court requires otherwise. The expert may in any event be required to disclose the underlying facts or data on cross-examination."

232. See HARR, *supra* note 36, at 286-87.

233. See *id.*

234. See *id.* at 332, 354-55.

evidence from the hydrogeologists as technically challenging and order mediation to detail this evidence. The parties would be allowed to jointly select a mediator from a court list of qualified individuals (with the required expertise and mediation training) or, in absence of an agreement, the court would select the mediator.

The mediator would meet with the opposing experts and discuss the issue of whether groundwater flowed from the defendants' properties to the city wells. Each expert would explain his methodology and reasoning to the opposing expert. A defendant expert would have had to explain his calculations, suggesting that water from one defendant's property could not reach the city wells.²³⁵ This expert would not have even gotten through his entire reasoning because his reasoning was based on a calculation leading to an impossible result. Accepting his conclusion and necessary underlying calculation meant one defendant's property existed under ten feet of water.²³⁶

During the real trial, as chronicled in *A Civil Action*, it took portions of four days to finally elucidate the impossibility of the expert's calculations and implausibility of his ultimate conclusion that the city wells could not be contaminated from the direction of defendants' properties.²³⁷ It seems highly probable that a knowledgeable scientist-mediator directing the expert's reasoning and his calculations would have taken far less time without taking jury time or risking jury confusion.

Of course, as previously discussed, environmental science often incorporates a variety of scientific specialties so there may be more than one mediator needed for any particular case. It would be possible, if necessary, for multiple mediations to occur simultaneously with different opposing experts and mediators.²³⁸

CONCLUSION

The judiciary has not reconciled the tension between science and law through rules governing the admittance of scientific evidence or by judicial assessment of the validity of scientific testimony.

235. See *id.* at 353-55.

236. See *id.* at 359.

237. See *id.* at 353-62.

238. This is similar to the judicial use of expert panels discussed in Part I(D)(2)(b). The advantage of the proposed mediation is that issues would be more quickly parsed both for simplification and to see if there are areas of agreement before wasting trial time.

Attempts to force science into a legal mold have resulted in dissatisfaction among judges, juries, and scientists.

A pretrial mediation has the potential to reduce jury confusion and provide nonscientific judges with guidance from scientists regarding admissible evidence and testimony. Judicial oversight would still be available and jurors would still obtain all pertinent information (stipulations of undisputed issues and a refined guide to the disputed issues). As a result, jury confusion would be reduced in complex cases and science returned to an informational tool rather than a tactic.