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NOTES

SCIENTIFIC EVIDENCE AND THE QUESTION OF JUDICIAL CAPACITY

The use of scientific evidence to resolve legal disputes has a long history; the history of problems associated with scientific evidence is equally long. One of the most serious problems has been the inability of lay factfinders to understand complex scientific and technical evidence. If a factfinder lacks the ability to assess evidence adequately or if the judicial system lacks the resources and time to educate the factfinder, the judicial system fails to fulfill its role as an arbiter of disputes. Moreover, a party’s right to due process of law may be violated if the factfinder cannot understand and base a decision solely on the evidence.

Scientific and technological developments have resulted in increased use of scientific evidence in the courtroom. The factfinder must understand scientific evidence in order to give the evidence its proper weight. Increasingly, the factfinder must evaluate complex scientific and technological data. Cases in which the validity or reliability of the science or technology itself is at issue create even greater problems because the factfinder must evaluate evidence about which even experts may disagree. Faced with such

1. See, e.g., Folkes v. Chadd, 99 Eng. Rep. 589 (1782) (the first case in which the parties called their own expert witnesses); A Trial of Witches at Bury St. Edmonds, 6 Howell’s State Trials 687, 697 (1665) (perhaps the first use of an expert witness at trial) (cited in Reed v. State, 283 Md. 374, 385 n.7, 391 A.2d 364, 370 n.7 (1978)).
2. See generally Foster, Expert Testimony—Prevalent Complaints and Proposed Remedies, 11 Harv. L. Rev. 169 (1897) (discussing the problem of confusion among lay factfinders caused by expert witnesses reaching opposite conclusions).
3. See infra text accompanying notes 21-22 & 41.
4. For example, human leukocyte antigen tissue typing tests might become a common method of proving paternity in child support proceedings, see, e.g., Phillips v. Jackson, 615 P.2d 1228 (Utah 1980), and microfiber analysis might be one way to link defendants with crimes, see, e.g., Driskell v. State, 659 P.2d 343 (Okla. 1983).
5. For example, experts may disagree about the safety of a waste disposal site, see, e.g., Save Our Selves v. Louisiana Envtl. Control Comm’n, 430 So. 2d 1114 (La. Ct. App. 1983),

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uncertainty, the lay factfinder nevertheless must determine which evidence is more credible.8

This Note examines the judicial capacity to understand scientific evidence. After discussing the importance of scientific evidence as a tool for resolving disputes, the Note analyzes proposed solutions to the problem of understanding scientific evidence in light of the relevant policy considerations embodied in the Anglo-American judicial system. After discussing the various proposals, the Note concludes that the most feasible solution is the expanded use of existing trial and pretrial procedures.

THE PROBLEMS OF SCIENTIFIC EVIDENCE

Scientific evidence should assist the trier of fact in understanding issues underlying a legal dispute.7 To decide whether the preferred evidence will assist the trier of fact, most courts follow the admissibility standard enunciated in Frye v. United States.8 The Frye rule requires that the scientific method underlying the evidence have gained general acceptance within the relevant scientific community. Because of the constant flux in scientific knowledge, courts must apply this standard each time a party offers

or the effectiveness of a drug such as laetrile, see, e.g., Rutherford v. United States, 399 F. Supp. 1208 (W.D. Okla. 1975), aff’d and remanded, 542 F.2d 1137 (10th Cir. 1976), on remand, 429 F. Supp. 506 (W.D. Okla. 1977), aff’d and remanded, 582 F.2d 1234 (10th Cir. 1978), rev’d, 442 U.S. 544 (1979), on remand, 616 F.2d 455 (10th Cir.), cert. denied, 449 U.S. 937 (1980).

6. Although an essential task of the factfinder is to determine which evidence is more credible, the task is more difficult when the outcome of a trial depends upon an evaluation of evidence at the cutting edge of science.

7. Rule 702 of the Federal Rules of Evidence provides that expert testimony is admissible "[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue." Fed. R. Evid. 702.

8. 293 F. 1013 (D.C. Cir. 1923). In Frye, the defendant offered into evidence the results of a systolic blood pressure deception test, a forerunner of the polygraph. The trial court excluded the results. The United States Court of Appeals for the District of Columbia Circuit affirmed, stating that an admissible scientific principle or discovery "must be sufficiently established to have gained general acceptance in the particular field in which it belongs." Id. at 1014. This standard has become the majority rule in state courts, and the controlling test in federal courts. See, e.g., United States v. Alexander, 526 F.2d 161, 163 (8th Cir. 1975); Reed v. State, 283 Md. 374, 381, 391 A.2d 364, 368-69 (1978). See generally Imwinkelried, Judge Versus Jury: Who Should Decide Questions of Preliminary Facts Conditioning the Admissibility of Scientific Evidence?, 25 WM. & MARY L. REV. 577, 577-78 (1984).
novel scientific evidence. Determining a scientific method's general acceptance, however, can be costly in terms of public and private resources.

A growing number of courts and commentators,10 therefore, favor a less restrictive admissibility standard that would admit novel scientific evidence if it satisfies a traditional relevancy analysis.11 Although general acceptance within the scientific community does not affect admissibility under this standard, the extent of acceptance does affect the weight given to the evidence.12

The Problem of Cost

Judicial application of the relaxed admissibility standard for novel scientific evidence would reduce substantially the cost of presenting the evidence to the trier of fact. One party to a suit often will not have the financial resources to present his own experts or to challenge the other party's use of expert evidence. Scientific experts are expensive to retain.13 If one party has substan-


With particular regard to expert testimony based on the application of new scientific techniques, it is recognized that prior to the admission of such testimony, it must be established that the particular scientific method is itself reliable. . . . On occasion, the validity and reliability of a scientific technique may be so broadly and generally accepted in the scientific community that a trial court may take judicial notice of its reliability. Such is commonly the case today with regard to ballistics tests, fingerprint identification, blood tests, and the like.

Id. (footnotes omitted).


12. See 583 F.2d at 1198-99.

tially greater resources than the other party, the presentation of scientific evidence may favor the wealthier party. The wealthier party can retain the best experts in the field and can present a greater variety of scientific evidence. This ability to present better experts may influence the weight given to the evidence. The relative resources of the parties also may affect the ability of the factfinder to comprehend fully the relevant scientific and technological issues. Consequently, a party may forego a claim, accept an unfair settlement, or acquiesce in an unfavorable plea bargain if he is financially unable to retain his own experts.

The Problem of Undue Influence

Another problem associated with scientific evidence is the ability of impressive scientific evidence to influence unduly the lay factfinder. Seventy percent of the judges and lawyers surveyed in a recent poll indicated that juries accord scientific evidence more credibility than other evidence, and seventy-five percent believed that judges find scientific evidence more credible. Although this result is not inherently alarming, it indicates that scientific evidence sometimes may receive unjustified weight. For example, if the prosecution in a drug possession case introduced a laboratory report stating that a white powdery substance was cocaine, the jury undoubtedly would give this evidence substantial weight. Based on a recent study, however, the weight that juries give to laboratory reports may be unjustified. This study of over 235 forensic laboratories throughout the United States found significant margins of error in the forensic analysis conducted by the

14. Id. at 23. "When a severe imbalance of resources exists, the trier of fact has little hope of being informed about the relevant scientific and technical issues." Id.
15. Id.
16. Id. at 7.
17. See United States v. Williams, 583 F.2d 1194, 1199 (2d Cir. 1978), cert. denied, 439 U.S. 1117 (1979); cf. Imwinkelried, supra note 10, at 267 ("Scientific proof is far from infallible.").
19. See Imwinkelried, supra note 10, at 268-69 (citing Law Enforcement Assistance Administration Newsletter 5 (Sept. 1978)).
The use of scientific evidence in litigation creates special problems when lay factfinders are unable to comprehend complex scientific and technological evidence. If the factfinder does not understand scientific evidence, the evidence may obscure key facts in a cloud of confusing technical terms and jargon.

Understanding all relevant evidence is essential to the proper resolution of disputes. As a matter of due process, therefore, courts require the factfinder to "decide the facts in an informed and capable manner" and to understand and address rationally the issues of the case. As society becomes more complex and technologically oriented, the lay factfinder's ability to comprehend scientific evidence becomes increasingly suspect. Today, almost all scientific or professional disciplines provide scientific or technological evidence in courts. For example, product liability suits usually involve engineering questions, personal injury suits often re-

20. Id.
21. In re Boise Cascade Sec. Litig., 420 F. Supp. 99, 104 (W.D. Wash. 1976). In Boise, a securities fraud case involving difficult accounting questions, the court rejected a motion for a jury trial. Id. at 105. Complex suits, such as Boise, test the jury's ability to comprehend complicated economic, statistical, and financial problems, analogous to the problems presented by scientific evidence.
22. In re United States Fin. Sec. Litig., 75 F.R.D. 702, 711 (S.D. Cal. 1977) (court rejected a request for a jury trial because the case, involving over 100,000 pages of evidence and difficult accounting principles, was too complex for a jury), rev'd, 609 F.2d 411 (9th Cir. 1979), cert. denied, 446 U.S. 929 (1980).
23. M. Saks & R. Van Duizend, supra note 18, at 8. Saks and Van Duizend list the following scientific and professional disciplines represented in courts: engineering, medicine, chemistry, physics, toxicology, anthropology, statistics, economics, accounting, biology, document examination, sociology, psychology, law, linguistics, ballistics, and weapon identification. Id. The use of such experts is an important tool in the adjudicatory process because the use of science and technology can reduce uncertainty about particular facts. Id. at 5. For example, if a defendant is arrested in the vicinity of a homicide, a question might arise whether he actually was at the scene of the crime or was simply in the general area by chance. If scientific evidence such as fingerprint identification or fiber analysis could place the defendant at the precise scene, then the likelihood of the defendant's guilt would increase. Thus, to the extent that scientific evidence reduces uncertainty, it improves the decisionmaking process. Scientific evidence, therefore, is valuable to the factfinder because it facilitates the decisionmaking process.
quire medical testimony as well as actuarial testimony, and physicians often testify in medical malpractice suits. A homicide prosecution may involve testimony from a pathologist, a ballistics expert, or a toxicologist; an arson case may require testimony from a fire marshall, a forensic chemist, or a psychiatrist. As these examples indicate, science and technology play an active role in our judicial system.

Participants in the judicial system favor using scientific evidence. In a 1974 survey of judges and lawyers, 86% of the respondents favored the increased use of scientific evidence in criminal cases. See supra note 18. Lawyers favor increased use because scientific evidence receives greater weight than other types of evidence. See id. and accompanying text. Judges favor the increased use because scientific evidence reduces uncertainty and helps ensure more accurate results. See supra note 23.


29. See, e.g., People v. Acosta, 620 P.2d 55, 56 (Colo. Ct. App. 1980) (toxicologist testified about alcoholic content of defendant's blood in a vehicular homicide case); State v. Malzac, 309 Minn. 300, 307, 244 N.W.2d 258, 262 (1976) (toxicologist testified that despite defendant's high blood alcohol level, the defendant could understand his actions when he killed his girlfriend).

30. See, e.g., Manigan v. State, 402 So. 2d 1063, 1066 (Ala. Crim. App.) (fire marshall testified about cause of fire in a first-degree arson case), cert. denied, 402 So. 2d 1072 (1981); State v. Rogers, 375 So. 2d 1304, 1311 (La. 1979) (fire marshall testified in arson case in which fire chief and other firemen set fire to a fire station).


33. Participants in the judicial system favor using scientific evidence. In a 1974 survey of judges and lawyers, 86% of the respondents favored the increased use of scientific evidence in criminal cases. See supra note 18. Lawyers favor increased use because scientific evidence receives greater weight than other types of evidence. See id. and accompanying text. Judges favor the increased use because scientific evidence reduces uncertainty and helps ensure more accurate results. See supra note 23.
to incorporate that technology into the adjudicatory process, however, create a serious comprehension problem for the lay factfinder and concomitant problems for the judicial system. 34

Comprehension by the Jury

The jury system became a stable institution in England around the thirteenth century. 35 Initially, the jury consisted of individuals with special knowledge of the facts or subject matter involved. 36 During the middle of the fourteenth century, the jury evolved into a group of impartial arbiters; 37 individuals with direct or special knowledge assumed the role of witnesses. This shift represented a commitment to using laymen in the administration of justice. 38

Under the earlier jury system, scientific evidence would not have created the current problems of comprehension because a jury composed of individuals with direct or specialized knowledge probably would possess the ability to comprehend the evidence. If a case involving the safety of a toxic waste disposal site were tried under the pre-fourteenth century system, for example, the jury might include a toxicologist, a geologist, and others with specialized knowledge of toxic wastes. Such a jury would have a greater facility for understanding the evidence. Today, the use of jurors with direct or specialized knowledge rarely occurs, however, because of two important principles in the Anglo-American jury system: impartiality and the adversarial system.

The modern Anglo-American jury system rests on the principle that jurors determine the facts based on the evidence presented at trial, and not on preconceived knowledge of the facts or subject matter. 39 A factfinder with special knowledge of the subject matter

34. See Cooney, Taking the Stand: Rising Use of Expert Witnesses Creates Controversy, Wall St. J., Apr. 20, 1971, at 1, col. 1. The increasing use of scientific evidence is due to the continued development of science and technology, which creates new ways to answer old questions. See M. Saks & R. Van Duzen, supra note 18, at 5 (scientific evidence promotes certainty in legal decisionmaking, but also is subject to extensive cross-examination).
35. See W. Holdsworth, 1 A History of English Law 316 (3d ed. 1922).
36. See id. at 317.
37. See id. at 319.
might be affected by personal or professional biases that would prevent impartial analysis of the evidence. For example, a scientist who advocates a particular theory might not assess objectively evidence based on conflicting theories. One commentator has suggested that the lack of impartiality would "seriously undermine, if not obliterate, both the rationale and the participatory aspects of adjudication."40 Impartiality is a function of due process, and a system that furthers bias and prejudice on the part of the factfinder violates due process.41

The second principle of Anglo-American jurisprudence that prevents a factfinder with special knowledge from serving as a juror is the adversary system.42 A juror with special knowledge is usually dismissed for cause or through preemptory challenge during voir dire because at least one of the parties perceives the professional biases of the potential factfinder as a detriment to his case.43 The adversarial nature of our judicial system, therefore, which seeks to bring about a fair and just resolution of a particular dispute, often results in the use of a factfinding body that is ignorant about the subject matter involved in the dispute.

40. Id. at 122.
41. Commonwealth Coatings Corp. v. Continental Casualty Co., 393 U.S. 145, 150 (1968) ("[A]ny tribunal permitted by law to try cases and controversies not only must be unbiased but also must avoid even the appearance of bias."); Thiel v. Southern Pac. Co., 328 U.S. 217, 220 (1946) ("The American tradition of trial by jury, considered in connection with either criminal or civil proceedings, necessarily contemplates an impartial jury drawn from a cross-section of the community.").
42. Under the adversary system, each party presents evidence supporting his version of the events; theoretically, the entire story is laid before the factfinder. The generally held belief is that the adversarial system is the best means to achieve truth and certainty in dispute resolution. See Gross, Adversaries, Juries, and Justice, 26 Loy. L. Rev. 525, 543 (1980) ("If cases are being conducted by advocates on both sides . . . there is every reason to expect that all relevant questions will be raised at some time before the conclusion of the evidence.") (quoting The Morris Report ¶ 283 (1965)); Uviller, The Advocate, The Truth, and Judicial Hackles: A Reaction to Judge Frankel's Idea, 123 U. Pa. L. Rev. 1067 (1975) ("[P]ropely directed and purged of obvious abuses, the juxtaposition of two contrary perspectives, the impact of challenge and counter-proof, often disclose to a neutral intelligence the most likely structure of Truth."). But see Frankel, The Search for Truth: An Umpireal View, 123 U. Pa. L. Rev. 1031 (1975). Less reliable methods of dispute resolution include, for example, trial by battle and trial by ordeal. See generally W. Holdsworth, supra note 35, at 299-312.
The application of the principles of impartiality and the adversarial system has raised questions concerning the ability of juries to decide cases involving complicated scientific or technical issues. Critics of the jury system suggest that, in cases involving complex scientific questions, the jury should consist of particularly knowledgeable people—the so-called “blue ribbon” jury. A special jury would be better able to understand complex evidence. The blue ribbon jury could not be used in criminal cases, however, because the sixth amendment guarantees the defendant’s right to an impartial jury of his peers, and scientists are not among the peers of most defendants. Although blue ribbon juries could be used in civil matters, jurors would not be impartial if they had a predisposed professional bias concerning the subject matter of the dispute.

Proponents of the current system believe that the jury forms the best tribunal for resolving complicated questions of fact. Lay jurors bring a fresh perspective to each trial, which enables them to avoid the typecasting that may occur when judges sit as factfinders. Moreover, in a complicated case, no single juror needs to retain all the evidence as long as other jurors recall all the

44. See H. Kalven & H. Zeisel, supra note 38, at 5. (“The jury trial at best is the apotheosis of the amateur. Why should anyone think that 12 persons brought in from the street, selected in various ways, for their lack of general ability, should have any special capacity for deciding controversies between persons?”) (quoting Dean Griswold, 1962-1963 Harvard Law School Dean’s Report, at 506); G. Williams, The Proof of Guilt: A Study of the English Criminal Trial 271 (3d ed. 1963) (footnote omitted) (“There is no guarantee that members of a particular jury may not be quite unusually ignorant, credulous, slow-witted, narrow-minded, biased or temperamentally.”).
46. Blue ribbon juries would be similar to the prefourteenth century jury system. See supra text accompanying note 36.
47. The sixth amendment provides: “In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed.” U.S. Const. amend. VI.
48. Blue ribbon juries would not be permitted in the federal system given the mandate of the Federal Jury Selection and Service Act, which requires that jurors be “selected at random from a fair cross section of the community in the district or division wherein the court convenes.” 28 U.S.C. § 1861 (1982).
49. See H. Kalven & H. Zeisel, supra note 38, at 8; Foster, supra note 2, at 185.
50. H. Kalven & H. Zeisel, supra note 38, at 8.
Although the present jury system may be preferable in most instances, juries may not be competent to handle disputes involving complex issues of scientific fact. Scientific evidence may present the jury with problems of comprehension similar to those encountered in complex litigation. Chief Justice Burger and other commentators have suggested that jury trials should be waived in complex civil trials. In Ross v. Bernhard, the United States Supreme Court indicated that the right to a jury trial in civil litigation depends in part on the "practical abilities and limitations of juries." In civil suits, the right to a jury trial arguably should be foreclosed if the technological and scientific evidence is beyond the comprehension of the jury. The possibility of depriving a party of the right to a jury trial in cases supposedly beyond the comprehension of the jury, however, raises serious seventh amendment questions. Additionally, determining which cases involve issues that are beyond the comprehension of the jury is difficult.

**Comprehension by the Trial Judge**

The judge in a bench trial fulfills the same factfinding function as the jury in a jury trial. The trial judge also must rule on the admissibility of evidence and determine the applicable law. The

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51. See id.
54. Id. at 538 n.10. Other factors affecting the right to a jury trial in civil suits include the remedy sought and whether a right to a jury trial existed with respect to the particular issues before the merger of law and equity. See infra note 56. See generally C. Joiner, Civil Justice and the Jury 54-56 (1962).
56. The seventh amendment provides: "In Suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any Court of the United States, than according to the rules of the common law." U.S. Const. amend. VII. No right to a jury trial exists in suits at equity. Curtis v. Loetter, 415 U.S. 189, 193 (1974).
57. In bench trials, the judge often relaxes the rules of admissibility preferring an over-inclusive, rather than under-inclusive approach, to admissibility. If the trial judge mistakenly admits evidence, the presumption arises that the judge can ignore the inadmissible
trial judge generally has a more extensive education than the average juror. This additional education places the judge in a better position than an average juror to evaluate evidence because the judge's background has forced him to master unfamiliar concepts and ideas. The judge's skills should enable him to comprehend complex scientific evidence more easily than jurors who lack extensive formal education.

A trial judge's educational advantage does not indicate, however, that the judge necessarily possesses the technical skills necessary to fully comprehend complex scientific evidence. Trial judges are trained in law and rarely have a technical background. Accordingly, the trial judge also may fail to fully comprehend complex scientific evidence.

In addition to his more extensive formal education, however, a trial judge may use several judicial tools to help him understand unfamiliar evidence. A judge can call his own expert witnesses, ask witnesses questions, and consult outside sources for background information. The ability to question witnesses is especially helpful in a bench trial because the judge can eliminate confusion and misunderstandings sua sponte. In contrast, the jury must rely on the parties' attorneys to probe areas of confusion. Although the ability to use special procedures gives the judge an advantage over the jury, this advantage has its costs: judicial time

evidence in making findings of fact and conclusions of law. Conversely, if a judge excludes admissible evidence, he may have committed reversible error. See McCormick's Handbook of the Law of Evidence § 60 (2d ed. 1972) [hereinafter cited as McCormick].

58. See, e.g., Ethyl Corp. v. Environmental Protection Agency, 541 F.2d 1, 67 (D.C. Cir.) (Bazelon, C.J., concurring) ("Substantive review of mathematical and scientific evidence by technically illiterate judges is dangerously unreliable. . . ."), cert. denied, 426 U.S. 941 (1976); International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 651 (D.C. Cir. 1973) (Bazelon, C.J., concurring) ("The court's opinion today centers on a substantive evaluation of the Administrator's assumptions and methodology. I do not have the technical know-how to agree or disagree with that evaluation.").


60. See, e.g., Fed. R. Evid. 706. For a more detailed discussion of this option, see infra notes 170-74 and accompanying text.


62. See Fed. R. Evid. 201.
and energy. Additionally, the availability of these procedures does not guarantee that a judge will understand the technical evidence presented. Consequently, neither judges nor lay jurors are always fully competent to evaluate complex scientific and technological evidence.

The Problem of Judicial Administration

Using scientific evidence to resolve disputes often creates manageability problems for the judicial system.63 Court dockets are overloaded, and many judges and commentators have complained about the resulting delay.64 Scientific evidence that a jury comprehends readily should reduce trial time and delay. Conversely, if the scientific evidence presented is not readily understandable, trial time may increase due to efforts by the parties, the court, and the jury to digest the evidence. The increased use of scientific evidence,65 the trend toward a more relaxed standard of admissibility,66 and the increasing number of suits involving science and technology67 will compound the problem of delay. Thus, scientific evidence often creates additional burdens of manageability and poses serious problems of judicial administration.68

Proposed Solutions

Proposals for dealing with scientific evidence problems have existed almost as long as the problems themselves. Judges,69 law-

63. See In re Boise Cascade Sec. Litig., 420 F. Supp. 99, 105 (W.D. Wash. 1976) ("The explosion of litigation in the past two decades in terms both of number of filings and the complexity and scope of many of those cases has led thoughtful minds to wonder whether the judicial system as we now know it can cope with some of these cases."). See generally Rifkind, Are We Asking Too Much Of Our Courts?, 70 F.R.D. 96-104 (1976).
65. See supra note 34.
66. See supra note 10 and accompanying text.
67. See supra note 34.
68. See Foster, supra note 2.
69. See Markey, Jurisprudence or "Juriscience"?, 25 WM. & MARY L. REV. 525, 539-42
yers,\textsuperscript{70} scientists and expert witnesses,\textsuperscript{71} and scholars\textsuperscript{72} have proposed solutions. A review of these proposals demonstrates the strengths and weaknesses of the various approaches to scientific evidence in the courtroom.

The Science Court Proposal

One author has proposed the creation of a Science Court to resolve the uncertainty and complexity surrounding scientific and technological issues.\textsuperscript{73} In 1976, the Task Force of the Presidential Advisory Group on Anticipated Advances in Science and Technology also recommended the creation of a Science Court for the limited purpose of resolving scientific disputes hindering the administrative decisionmaking process.\textsuperscript{74} Under the latter proposal, the Science Court would operate much like a regular court, but would adjudicate only technologically complex issues.\textsuperscript{75} Before the Science Court considered an issue, the submitting agency would separate fact issues from social policy considerations\textsuperscript{76} because the Science Court would adjudicate only disputed questions of fact. The court's findings of fact would be presumptively valid.\textsuperscript{77} The administrative agency that submitted the issue then could rely on the Science Court's findings in developing an appropriate policy based on relevant value considerations.\textsuperscript{78}

The Task Force Report set forth an elaborate set of procedures that essentially involves five stages. The first stage involves separation of disputed facts from social policy considerations, and selec-

\textsuperscript{70} See, e.g., Campbell, \textit{A Historical Basis for Banning Juries}, Nat'l L.J., Feb. 11, 1980, at 17, col. 1 (proposing nonjury trials in complex civil suits).
\textsuperscript{72} See, e.g., M. Saks & R. Van Duizend, \textit{supra} note 18, at 91-101.
\textsuperscript{73} Kantrowitz, \textit{supra} note 71.
\textsuperscript{74} Task Force of the Presidential Advisory Group on Anticipated Advances in Science and Technology, \textit{The Science Court Experiment: An Interim Report}. 193 Sci. 653 (1976) [hereinafter cited as \textit{Task Force Report}].
\textsuperscript{75} \textit{Id.} at 654.
\textsuperscript{76} \textit{Id.} at 653.
\textsuperscript{77} \textit{Id.} at 655.
tion of the participants. The Science Court would operate on the assumption that the separation of facts and values is possible. The Science Court participants would be magistrates, judges, and case managers. The magistrate, a disinterested scientist from an "adjacent" field of science, would control the court's procedure and would have the assistance of legal counsel. The opposing parties would select the judges from a list of eminent scientists. The judges and the magistrate, upon selection, would appoint a case manager for each party, who would present the different sides of the scientific issues.

The second stage of the procedure involves submission of a series of "statements of scientific facts" by the case managers to the panel of judges. The judges would review the statements and eliminate those statements not exclusively concerned with questions of scientific fact. After the judges had screened the statements, the third stage of the procedure would allow the case managers to examine and evaluate the statements of scientific fact. The case managers could challenge each other's statements, but unchallenged statements would appear in the court's final report. Challenged statements would go through a mediation process to further define the points of disagreement. This stage is analogous to the stipulation of facts in an ordinary lawsuit. The facts agreed

80. Id. See also Kantrowitz, Controlling Technology Democratically, 63 Am. Sci. 505, 506-07 (1975).
81. Task Force Report, supra note 74, at 654. See generally Matheny & Williams, supra note 78, at 343-44.
82. Task Force Report, supra note 74, at 654. No criteria have been suggested to define an "adjacent" field of science. See Martin, Procedures for Decision Making Under Conditions of Scientific Uncertainty: The Science Court Proposal, 16 HARV. J. ON LEGIS. 443, 451 n.10 (1979) (expert should not be associated with the scientific specialty in question).
83. Task Force Report, supra note 74, at 654.
84. Id.
85. Id.
86. Id.
87. Id.
88. Id. During the second stage, the judges would eliminate nonscientific questions of fact and mixed questions of policy and fact. Id. at 653.
89. Id. at 654-55.
90. Id. at 655; see also Kantrowitz, The Science Court Experiment, 13 TRIAL, Mar. 1977, at 49.
91. Task Force Report, supra note 74, at 655.
upon by the parties would appear in the final opinion, but facts not agreed upon would be considered in the fourth stage of the procedure.\textsuperscript{92} In the fourth stage, challenged statements would be subject to an adversarial examination to resolve remaining questions of fact.\textsuperscript{93} The Science Court would use quasi-legal procedures to test each side's version of the facts.\textsuperscript{94} Essentially, this stage would resemble a trial in which each side presents its witnesses and cross-examines witnesses called by the other side. Upon completion of the arguments, the judges would resolve the remaining questions of fact.

The final stage of the Science Court procedure involves the production of the judges' final report.\textsuperscript{95} The judges would submit a final report to the governmental agency that initiated the proceedings.\textsuperscript{96} The report would contain three parts: first, a statement containing the unchallenged and unmodified statements of scientific facts agreed upon by the parties;\textsuperscript{97} second, the judges' opinion concerning the validity of the challenged statements based on evidence presented during the adversary stage;\textsuperscript{98} and third, the court's recommendation of areas needing further research because of existing limitations on scientific knowledge.\textsuperscript{99}

Proponents argue that the Science Court would provide a precise, organized structure for making accurate factual determinations for administrative decisionmaking. The factual determinations would reflect the best available scientific judgment on the issues and would alleviate the burden placed on agencies and courts to resolve disputed scientific and technical issues.\textsuperscript{100} Proponents believe this process holds great promise for supplying provisional answers to essential technical questions that agencies must resolve before determining social policy.\textsuperscript{101} The proposal would allow experts to address conflicting arguments in a structured set-

\textsuperscript{92} Id.
\textsuperscript{93} Id.
\textsuperscript{94} Id.
\textsuperscript{95} Id.
\textsuperscript{96} See Matheny & Williams, supra note 78, at 344.
\textsuperscript{97} Task Force Report, supra note 74, at 655.
\textsuperscript{98} Id.
\textsuperscript{99} Id.
\textsuperscript{100} Id. at 653.
\textsuperscript{101} Id.
ting, thereby promoting a complete and considered evaluation of all arguments.\textsuperscript{102}

The Science Court would be a valuable institution for resolving disputes over scientific facts because it would reduce uncertainty. The Science Court would enable an administrative agency to establish policy based on the best available scientific evidence. As science and technology advance, agencies could revise policy decisions to reflect those changes. The Science Court’s findings would enable agencies to make difficult policy decisions without waiting for absolute scientific certainty.\textsuperscript{103}

The Science Court proposal has drawn much criticism.\textsuperscript{104} One criticism concerns the ability of the court to separate questions of fact from social policy considerations.\textsuperscript{105} Critics believe that differentiating between facts and values is an inherently value-laden process.\textsuperscript{106} Because separating facts and values is a central premise of the Science Court proposal, if this separation is not attainable, the entire process would fail.

Other critics fear that, after the Science Court had made a determination of scientific fact, the fact would be surrounded by an aura of authority that could stifle further research.\textsuperscript{107} This criticism, however, is misplaced. The Task Force Report states that one function of the Science Court’s final report would be to identify areas needing further research.\textsuperscript{108} Furthermore, researchers seldom are stifled by authoritative determinations of fact.\textsuperscript{109}

Another criticism of the Science Court is that, after the findings of fact, administrative consideration of social policy values, and agency decision, dissatisfied parties may relitigate the issues in

\textsuperscript{102} Id.

\textsuperscript{103} See Bazelon, Coping, supra note 59, at 820.

\textsuperscript{104} See generally Casper, Technology Policy and Democracy: Is The Proposed Science Court What We Need?, 194 Sci. 29 (1976); Matheny & Williams, supra note 78.

\textsuperscript{105} Casper, supra note 104, at 30.

\textsuperscript{106} Id.

\textsuperscript{107} Id. Matheny & Williams, supra note 78, at 349-52.

\textsuperscript{108} Task Force Report, supra note 74, at 655.

\textsuperscript{109} For example, although the United States Supreme Court made a legal determination concerning the commencement of life in Roe v. Wade, 410 U.S. 113 (1973), researchers continue to research the topic. See generally Comment, Homo Sapienism: Critique of Roe v. Wade and Abortion, 39 ALB. L. REV. 856 (1975); Comment, Viability and Abortion, 64 KY. L.J. 146 (1975).
The critics fear that value considerations might be subordinated to the presumably valid facts. Critics who stress this possibility believe that the social policy values are the most important consideration and that the benefits of greater certainty do not justify subordination of values.

Any solution to the problem of comprehending scientific evidence must be simple or the decisionmakers may ignore it. The Science Court proposal, as outlined by the Task Force, would not be easy to apply. Serious questions remain concerning appropriate disputes for the Science Court to resolve, and parties might be reluctant to submit disputes to an untested dispute resolution system.

The Science Court’s usefulness in solving the problems surrounding the reliability of scientific evidence would be limited to special cases. Although the proposal retains aspects of the adversarial system and eliminates the system’s reliance on lay factfinders, the use of factfinders with special knowledge also would threaten the traditional values of our present adversarial system. Impartiality might be endangered by using scientists to make factual determinations. Even if the judges were screened for possible bias resulting from their position in the scientific community, they might carry personal and professional biases that could influence their decisions. Finally, the use of scientists to make factual determinations is contrary to the general principles of the American jury system and would be a major step toward the creation of a technocracy.

110. See Matheny & Williams, supra note 78, at 347.
111. See Casper, supra note 104, at 30.
112. See id.
113. For example, the Science Court would be structured to deal with bipolar issues. The procedure for dealing with multipolar issues, such as nuclear power, is not adequately addressed. Also, whether the Science Court would address all agency disputes or only disputes with major policy implications is unclear. See Task Force Report, supra note 74, at 653-54.
114. The Science Court, as outlined by the Task Force, would deal only with scientific disputes within governmental agencies. The Science Court, therefore, would be of limited value in resolving scientific disputes arising in private litigation.
115. See supra text accompanying notes 42-43.
116. See Markey, supra note 69, at 526, 534-36. Chief Judge Markey’s term, “juriscience,” is similar in meaning to “technocracy.” “Technocracy” and “juriscience” describe a society or system guided by the principles of science and run by those with scientific or technical expertise in contrast to a system governed by jurisprudential principles.
Educational Efforts to Improve Scientific and Technological Abilities of the Factfinder

Some commentators have suggested that, in order to improve the capacity of the courts to understand complex scientific and technological evidence, the legal system should try to improve the scientific and technological abilities of judges. 117 This proposal suggests that prospective judges should have a technical background and that judges currently on the bench should undergo systematic training in science and technology. 118 Commentators favoring this proposal argue that special training would familiarize the courts with scientific methods and principles and greatly improve the judiciary's capacity to understand scientific evidence. 119

This proposal suffers from several drawbacks. First, education would be expensive. Courts are overburdened with heavy case loads, and this proposal would divert judicial resources from the courtroom to the classroom. The result would be increased delay and increased burdens on the courts. Second, experienced judges might be reluctant to submit to the uncertainties and potential embarrassments of the classroom. Third, a judge with limited scientific training might not obtain adequate knowledge to decide an issue that could be better explained by an expert. 120 Finally, the proposal is simplistic. Science is a vast area and judges, by necessity, could learn only a limited amount about any one subject. Additionally, this practice might set an unfortunate precedent. If judges received special training in science and technology, then a similar argument could be made for training in other complex fields, such as accounting or economics.

Advisory Panels of Scientists and Lay Persons

Another proposed solution for improving the judicial comprehension of scientific evidence is the creation of advisory panels
consisting of lay persons and scientists. These panels, which would be established by governmental agencies or by municipal governments, would attempt to resolve difficult policy questions containing disputed scientific facts. Scientists would provide scientific understanding of technical issues, and lay persons would inject the “wisdom of the community” into the process to guard against “scientific elitism.” Proponents of this approach believe that advisory panels would possess the technical abilities and common sense to resolve questions of policy too important for a panel of scientists and questions too complex for a panel of lay persons. After the panel had made the relevant factual determination, it would submit a recommendation to the authority that established the panel. The authority then would make its policy determination on the basis of the panel’s recommendations.

One problem with advisory panels is the possibility that the scientists could intimidate the lay members. Although the panel’s lay members would bring common sense to the panel, the expert members presumably would offer that quality as well as technical expertise. This imbalance might prompt the lay members to follow the experts, especially when the lay persons were confused about technical matters.

Another criticism of advisory panels is the lack of an established procedure for selecting panelists. Questions about the number of scientists needed to ensure full treatment of all technical issues and the number of lay persons needed to check scientific elitism remain unanswered. As with the proposed Science Court, the lack of an established procedure would make many litigants reluctant to resolve disputes in this unprecedented system.

122. See id. at 1067.
123. Id.
124. Id.
125. See id.
126. Id.
127. See id. at 1068.
128. Id. at 1067.
129. Id.
130. Further criticisms of advisory panels involve the disproportionate role that scientists would play, as well as their lack of accountability under an advisory system.
Simplifying the Evidence

Some commentators have suggested altering the scientific evidence, rather than changing the decisionmaking structure.131 Under this approach, technical and scientific evidence would be simplified for the judge or jury.132 If the evidence could not be made comprehensible, the trial judge would have the discretion to exclude it.133 This proposal is an extension of the probative-versus-prejudicial-impact balancing test of rule 403 of the Federal Rules of Evidence.134 The proposal would keep decisionmaking in the hands of average citizens and forestall the development of a technocracy.135

A simplified presentation of scientific evidence might ameliorate the comprehension problems currently faced by judges and juries. Excluding scientific evidence that is difficult to comprehend, however, ignores the benefits of such evidence.136 This proposal assumes that the comprehension problem substantially outweighs the benefits of scientific evidence and, therefore, sacrifices the benefits to eliminate the problem. Parties usually attempt to explain intelligibly all the evidence, but some cases involve scientific and technological issues that cannot be simplified beyond a certain level.137 This approach fails to acknowledge the important role that science and technology often play in dispute resolution.

Another shortcoming of this proposal is the inability of judges to evaluate the ability of a jury to comprehend technical data.138

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131. See, Markey, supra note 69, at 542; Van Duizend & Saks, supra note 13, at 27.
132. Van Duizend & Saks, supra note 13, at 27.
133. See id.
134. “Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.” Fed. R. Evid. 403.
135. See supra note 116 and accompanying text.
136. The potential benefits of scientific evidence relate to its probative value, relevance, and capacity for reducing uncertainty. See supra note 23.
138. Section 1865 of Title 28 of the United States Code establishes the qualifications for jury service:
Judges might exclude evidence that the jury could have understood, or might admit evidence that the jury will fail to understand. A judge concerned with avoiding confusion might exclude relevant, probative, and comprehensible evidence.

\textit{Increased Use of Existing Judicial Tools}

Some commentators have suggested that better use of existing procedures could eliminate the problem of comprehending scientific evidence.\textsuperscript{138} These procedures include using special masters,\textsuperscript{140} advisory juries,\textsuperscript{141} and court-appointed experts.\textsuperscript{142} Additionally, courts could use pretrial discovery conferences to narrow the contested issues.\textsuperscript{143} Courts also have the inherent power to use flexible trial techniques to better educate lay factfinders.\textsuperscript{144}

\footnotesize{(b) In making such determination the chief judge of the district court, or such other district court judge as the plan may provide, shall deem any person qualified to serve on grand and petit juries in the district court unless he—

(1) is not a citizen of the United States eighteen years old who has resided for a period of one year within the judicial district;

(2) is unable to read, write, and understand the English language with a degree of proficiency sufficient to fill out satisfactorily the juror qualification form;

(3) is unable to speak the English language;

(4) is incapable, by reason of mental or physical infirmity, to render satisfactory jury service.

\textit{28. U.S.C. § 1865 (1982).} This statute sets only minimum qualifications and does not give the judge the necessary guidance to determine a juror's ability to understand complex, technical evidence.

\textit{139. See M. Saks & R. Van Duzend, supra note 18, at 96.}

\textit{140. Fed. R. Civ. P. 53; see infra note 158.}

\textit{141. Fed. R. Civ. P. 39(c).}

\textit{142. Fed. R. Evid. 706; see infra note 171.}

\textit{143. Federal Rule of Civil Procedure 26(f) provides:}

\textit{At any time after commencement of an action the court may direct the attorneys for the parties to appear before it for a conference on the subject of discovery.

Following the discovery conference, the court shall enter an order tentatively identifying the issues for discovery purposes, establishing a plan and schedule for discovery, setting limitations on discovery, if any; and determining such other matters, including the allocation of expenses, as are necessary for the proper management of discovery in the action.}

\textit{Fed. R. Civ. P. 26(f).}

\textit{144. See, e.g., Vuyanich v. Republic Nat'l Bank, 521 F. Supp. 656 (N.D. Tex. 1981) (trial judge did extensive reading and permitted a lecture by an expert to help the judge comprehend complex statistical and econometric data).}
The greatest problem with existing procedures is not misuse, but nonuse. Commentators suggest that nonuse results from unfamiliarity with the procedures or from a judicial belief that the tools are too cumbersome. Another problem with this proposal is the lack of an incentive to encourage greater use of available procedures. An incentive to use existing procedures might provide an opportunity to study and evaluate their effectiveness. One of the existing procedures that merits consideration is the pretrial conference.

**Expanded Use of the Pretrial Conference**

Rule 16 of the Federal Rules of Civil Procedure provides general authority for establishing pretrial procedures. Rule 16 authorizes


148. Rule 16 of the Federal Rules of Civil Procedure provides in part:

(a) **Pretrial Conferences; Objectives.** In any action, the court may in its discretion direct the attorneys for the parties and any unrepresented parties to appear before it for a conference or conferences before trial for such purposes as

(1) expediting the disposition of the action;

(2) establishing early and continuing control so that the case will not be protracted because of lack of management;

(3) discouraging wasteful pretrial activities;

(4) improving the quality of the trial through more thorough preparation, and;

(5) facilitating the settlement of the case.

(c) **Subjects to Be Discussed at Pretrial Conferences.** The participants at any conference under this rule may consider and take action with respect to

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

(2) the necessity or desirability of amendments to the pleadings;

(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;

(5) the identification of witnesses and documents, the need and
courts to require that the parties to an action participate in a pretrial conference to facilitate the orderly administration of the suit.\textsuperscript{149} Chief Judge Pollack has stated that the pretrial conference “is a device to aid the efficient presentation of a case in order to maximize the chances of a fair and just result.”\textsuperscript{150} The purpose of the pretrial conference is “to simplify the issues, obtain admissions of fact, identify witnesses, delineate the factual and legal issues, and set the stage for an efficient trial of the facts which remain in dispute.”\textsuperscript{151}

The pretrial conference is the starting point in dealing with complex scientific evidence.\textsuperscript{152} If a court is aware of potentially com-

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\textsuperscript{151} Dunagan & Ricketts, An Overview of Pre-Trial Preparation for Business Related Litigation, 16 Tulsa L.J. 139, 177 (1980).

\textsuperscript{152} The 1983 amendments to Rule 16 codified existing local rules and encouraged the scheduling and holding of a pretrial conference.
plex scientific evidence early in a dispute, the court will have a
greater opportunity to use the available procedures to facilitate the
court's understanding of the evidence. Using pretrial conferences
to improve the ability of the lay factfinder to understand scientific
evidence is a relatively easy solution to the comprehension prob-
lem because it does not involve learning new procedures, establish-
ing a new court, or enacting new statutes.

To ensure the appropriate use of existing procedures, judges
should consider each individual procedure and employ those that
will be helpful. Rule 16(c)(10) states that the conference partici-
pants may consider "the need for adopting special procedures for
managing potentially difficult or protracted actions that may in-
volve complex issues, multiple parties, difficult legal questions, or
unusual proof problems."153 The clause explicitly authorizes and
encourages the use of pretrial procedures and other judicial tools
to deal with difficult cases.154

During the pretrial conference, the judge should use any devices
that will improve the ability of a lay factfinder to understand the
case. The increased use of the various procedural tools will permit
courts to evaluate the procedures' effectiveness in different situa-
tions. Understanding the effectiveness of various tools will clarify
the need for further refinements or completely new procedures.

Special Masters

The pretrial conference gives the court a preview of the case and

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and any unrepresented parties, by a scheduling conference, telephone, mail, or
other suitable means, enter a scheduling order that limits the time
(1) to join other parties and to amend the pleadings;
(2) to file and hear motions; and
(3) to complete discovery.
The scheduling order also may include
(4) the date or dates for conferences before trial, a final pretrial con-
ference, and trial; and
(5) any other matter appropriate in the circumstances of the case.
The order shall issue as soon as practicable but in no event more than 120 days
after filing of the complaint. A schedule shall not be modified except by leave
of the judge or a magistrate when authorized by district court rule upon a
showing of a good cause.

a chance to identify problems before trial. Thus, if the judge discovers a scientific evidence problem during the pretrial conference, he has an opportunity to resolve the problem at an early stage. Appointment of a special master in a case involving a great deal of scientific and technological evidence might be appropriate and helpful. Rule 16(c)(6) authorizes the appointment of a master during the pretrial conference. The term "master" could include scientific examiners. Rule 53 of the Federal Rules of Civil Procedure specifies the procedure for appointing masters. Courts could use masters with a scientific background to reduce uncertainty and confusion surrounding technological and scientific evidence. The master's findings could be admitted into evidence and could reduce confusion because the factfinder could rely on the master's independent, impartial findings, rather than weighing competing evidence presented by the litigants' hired experts.

Rule 53(b) of the Federal Rules of Civil Procedure states that "[a] reference to a master shall be the exception and not the rule. In actions to be tried by a jury, a reference shall be made only when the issues are complicated." Despite this limitation, the growth in complicated scientific disputes demands using competent scientific masters to sort out technical evidence and present findings in an understandable fashion.

In a nonjury trial, the master essentially would become the factfinder. The judge would accept the master's findings of fact...

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157. Leventhal, supra note 119, at 549.
158. Rule 53 provides:
   (a) APPOINTMENT AND COMPENSATION. The court in which any action is pending may appoint a special master therein. As used in these rules the word "master" includes a referee, an auditor, an examiner, and an assessor...
   (b) REFERENCE. A reference to a master shall be the exception and not the rule. In actions to be tried by a jury, a reference shall be made only when the issues are complicated; in actions to be tried without a jury, save in matters of account and of difficult computation of damages, a reference shall be made only upon a showing that some exceptional condition requires it.
159. See infra note 164.
161. Rule 53(c)(2) provides:
   (2) In Non-Jury Actions. In an action to be tried without a jury the court shall accept the master's findings of fact unless clearly erroneous. Within 10
unless they were clearly erroneous. The parties, nevertheless, could contest the master's report, and the judge could hear arguments and modify the master's report if necessary. In jury trials, the master's report is admissible as evidence and is subject to the court's ruling on any objections to the report. The jury remains the ultimate finder of fact, however, and can reject the master's report. The use of masters to reduce problems presented by scientific evidence safeguards the traditional values of the jury system. The litigants participate in the master's proceedings just as they do in regular court proceedings. Increased use of special science masters would enable courts to learn which cases are handled best by masters.

Advisory Juries

An alternative to using special masters in nonjury trials is the appointment of an advisory jury. Rule 39(c) of the Federal Rules of Civil Procedure provides that “[i]n all actions not triable of right by a jury the court upon motion or of its own initiative may try any issue with an advisory jury.” If a case involved complex scientific evidence, an advisory jury could consist of scientists from the appropriate field or from a related field. These juries would...
become “assistant triers of fact” and would aid the judge in understanding complicated evidence. By relying on an advisory jury, the judge could gain a fuller understanding of the evidence. Increased use of this tool would promote efficiency, competency, fairness, and confidence in the legal system. If the use of advisory juries gained the trust and confidence of all participants in the legal system, the use of these juries would increase. Using advisory juries would allow judges to deal more competently with complex scientific and technological issues.

**Court-appointed Experts**

A judge might choose to call a court-appointed expert witness to eliminate confusion created by the use of scientific evidence. Rule 706 of the Federal Rules of Evidence authorizes using court-appointed experts. Courts can appoint experts if expert testimony will help the trier of fact evaluate the evidence. A court should appoint experts if the court believes that the parties’ experts have not presented a complete picture or have confused the factfinder.

Court-appointed experts assist lay factfinders because the experts are an additional source of evidence that may reduce uncertainty. Moreover, court-appointed experts usually have more credi-

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169. *Id.* Advisory juries could perform many of the proposed functions of the Science Court. *See supra* notes 73-116 and accompanying text.


171. Rule 706 provides in part:

(a) Appointment.—The court may on its own motion or on the motion of any party enter an order to show cause why expert witnesses should not be appointed, and may request the parties to submit nominations. The court may appoint any expert witnesses agreed upon by the parties, and may appoint expert witnesses of its own selection. An expert witness shall not be appointed by the court unless he consents to act. A witness so appointed shall be informed of his duties by the court in writing, a copy of which shall be filed with the clerk, or at a conference in which the parties shall have opportunity to participate. A witness so appointed shall advise the parties of his findings, if any; his deposition may be taken by any party; and he may be called to testify by the court or any party. He shall be subject to cross-examination by each party, including a party calling him as a witness.

*Fed. R. Evid.* 706(a). Rule 706(b) provides for compensation for the court appointed expert. The trial court has discretion to divide the expert’s fee between the parties. *Fed. R. Evid.* 706(b).

bility than partisan experts. Partisan experts often are unsure whether they owe allegiance to the court or to the party who hired them. Court-appointed experts do not suffer from any role confusion because they owe allegiance to the court. Using court-appointed experts, therefore, can help resolve disputed points between the parties or the partisan experts.

CONCLUSION

Greater use of scientific evidence in the courtroom threatens the ability of judges and jurors to comprehend the evidence. Nevertheless, scientific evidence should be welcomed because it often reduces uncertainty, thereby improving the decisionmaking process. If scientific evidence is to remain a factor that affects the decisionmaking process, the evidence must be made understandable within the existing judicial structure.

Thoughtful solutions to the problems of scientific evidence often treat only part of the problem, or threaten the impartial and adversarial nature of our judicial system. Greater use of existing judicial procedures could eliminate confusion created by the use of scientific evidence and would serve the important policies embodied in the Anglo-American judicial system. This approach would preserve impartiality without disrupting the roles of the participants in the existing legal system. Even if the court used a special master, the jury would be the ultimate arbiter of disputed facts. An advisory jury, whose members would be selected on the basis of expertise and impartiality, would be appropriate only in nonjury trials. Court-appointed experts, who owe their allegiance to the court, may be used in bench or jury trials. The court should appoint only experts who do not have a personal or professional interest in the outcome of the dispute to ensure their impartiality.

This approach also would preserve the adversary system. The parties could participate in the master's proceedings and thereafter could challenge the master's findings. If a court used an advisory jury, the parties still would take the usual adversarial approach to the trial. The ultimate finder of fact would be the trial judge, and the advisory jury simply would help the judge understand the evi-

173. See Fed. R. Evid. 706 advisory committee note.
dence. If a court appointed experts of its own, the parties would retain significant rights of cross-examination. Either party could examine the court-appointed expert,\textsuperscript{175} or call his own expert witnesses.\textsuperscript{176}

Pretrial conferences simplify and focus the issues and facilitate the presentation of the case. Chief Judge Robert Pecham, commenting on his experience with pretrial conferences, stated that using a pretrial conference improves the organization of trials and makes them more comprehensible to the lay juror.\textsuperscript{177} Increasing the comprehension of lay jurors is a worthy goal of the judicial system and, therefore, should be the primary goal of the pretrial conference. The pretrial conference, as well as the other existing judicial tools, hold great promise for increasing comprehensibility in cases involving complex scientific issues, and their effective use will lead to fairer, more just decisions.

\textbf{John W. Wesley}

\textsuperscript{175} Fed. R. Evid. 706(a).
\textsuperscript{176} Fed. R. Evid. 706(d).
\textsuperscript{177} See, Peckham, \textit{supra} note 149, at 805.