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THE STANDARD FOR ADMITTING SCIENTIFIC
EVIDENCE: A CRITIQUE FROM THE
PERSPECTIVE OF JUROR
PSYCHOLOGY*

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BY a wide margin, the Wayne Williams prosecution in Atlanta is the most highly publicized case in recent memory. One reason for the publicity was the incredibly long chain of homicides that led to the trial. Undoubtedly, another factor was that the homicides generated an unprecedented atmosphere of fear in a major city.¹ At least one commentator, however, has singled out another reason, namely that the *Williams* case "highlight[ed] a major development in the . . . courtroom. With the help of . . . [scientific] advances, more and more silent [physical] evidence is being turned into loudly damning testimony."²

The *Williams* prosecution is by no means an isolated case. In 1980, the National Center for State Courts released the results of a nation-wide survey of trial judges and attorneys.³ The Center found that almost half the judges and attorneys surveyed encounter scientific evidence in approximately one-third of their trials.⁴ One prosecutor even stated that scientific evidence is now "the backbone of every circumstantial evidence case."⁵ The trend is unmistakably to-

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1. See generally *Williams: Guilty as Charged*, NEWSWEEK, Mar. 8, 1982, at 31; *Williams: 'Prior Bad Acts'?*, NEWSWEEK Jan. 25, 1982, at 39; *Williams in the Dock*, NEWSWEEK Jan. 18, 1982, at 39; *A "Shark" Goes After the Evidence*, TIME, Jan. 18, 1982, at 25; *The Trial of Wayne Williams*, NEWSWEEK, Dec. 28, 1981, at 40; *The Atlanta Case: Murder Times Two*, NEWSWEEK, July 27, 1981, at 28; *Atlanta: Profile of a Suspect*, NEWSWEEK, July 6, 1981, at 22; *Case of the Green Carpet*, TIME, July 6, 1981, at 12; *Atlanta Takes a Suspect*, NEWSWEEK June 29, 1981, at 38; *Atlanta: A Break That Never Came*, NEWSWEEK, June 15, 1981, at 35; *City of Fear*, TIME, Mar. 2, 1981, at 31.

2. This is the view of Bennett Beach, legal editor of TIME. See *Mr. Wizard Comes to Court*, TIME, Mar. 1, 1982, at 90.

3. *Study To Investigate Use Of Scientific Evidence*, 7 NAT'L CENTER FOR STATE CTS. REP. 1 (Aug. 1980).

4. *Id.*

5. Clark, *Scientific Evidence*, in THE PROSECUTOR'S DESKBOOK 542 (P. Healy & J. Manak eds. 1969). See also Thornton, *Uses and Abuses of Forensic Science*, 69 A.B.A. J. 288 (1983).

ward increased use of scientific evidence at trial.

The temptation is to applaud the trend and welcome increased reliance on scientific evidence. But before joining the cult of science, we should pause to consider some recent incidents. In 1980, Food and Drug Administration officials charged that of the 12,000 clinical researchers in the United States, "perhaps as many as ten percent do something less than [honest research]."⁶ In 1981, outright fraud was discovered in one of the leading cancer research programs at Cornell.⁷ Earlier this year, one health journal estimated that fifteen percent of all medical laboratory tests are in error.⁸ Unfortunately, these problems are not confined to the laboratory; they are spilling over into the courtroom. For instance, in 1982 an experienced trial attorney charged that forensic experts are misstating and overstating their credentials in "a lot of cases" and that the problem is "growing."⁹ In short, there is good reason to be cautious before placing an *imprimatur* on the trend toward increased use of forensic evidence; and since many courts are rethinking the standard for the admission of scientific evidence,¹⁰ this is an opportune time to review the causes, criticisms and merits of the trend.

THE CAUSES OF THE INCREASED USE OF SCIENTIFIC EVIDENCE

What are the causes of this phenomenon? One factor is the pace of technological change, which constantly increases the number of scientific instruments and techniques available for use in the courtroom. As the Utah Supreme Court suggested in 1980, this is "an age when one scientific advancement tumbles in rapid succession upon another . . ."¹¹ This increase in the number of scientific techniques is understandable for it has been estimated that ninety percent of all the scientists who have ever lived are alive today.¹² The phenomenon, however, reflects not only this increase in the number of scientists and

6. W. BROAD & N. WADE, *BETRAYERS OF THE TRUTH* 83 (1983).

7. *Id.* at 63-73.

8. Bechtel, *Medical Tests: Don't Bet Your Life On Them*, PREVENTION, Jan. 1983, at 55. The author estimated that the 15% error rate accounts for approximately four million erroneous test results daily. *Id.*

9. Granelli, *Medical Experts: The Pitfalls*, NAT'L L.J., Apr. 19, 1982, at 24, col. 2. See *People v. Cornille*, 33 CRIM. L. REP. (BNA) 2144 (Ill. Sup. Ct. April 13, 1983). In addition to the problem of experts overstating their credentials, it is not uncommon for experts to overstate the conclusions that can be drawn from various scientific techniques. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197, 1238 (1980).

10. For a discussion of recent approaches used in developing a standard for admitting scientific evidence, see notes 25-38 and accompanying text *infra*.

11. *Phillips v. Jackson*, 615 P.2d 1228, 1234 (Utah 1980).

12. W. BROAD & N. WADE, *supra* note 6, at 53.

techniques, but also the fact that scientists are more focused on the forensic application of their research than ever before. Perhaps the most significant accomplishment of the Law Enforcement Assistance Administration (LEAA) is that it heightened scientists' consciousness of the contribution that they can make to the criminal justice system.¹³

Conceivably, these factors could explain the increased use of scientific evidence, but to rely solely on them would overlook important developments outside the scientific community. A major cause for the increased use of scientific evidence is simply that the evidentiary barriers to the admission of scientific proof are falling. Dean McCormick once predicted that "[t]he manifest destiny of evidence law is a progressive lowering of the barriers to truth."¹⁴ The law of scientific evidence seems to be bearing out that prediction.¹⁵

Until recently, in most jurisdictions the courts singled out scientific evidence and forced it to surmount a special, extraordinary standard to gain admission.¹⁶ That standard was the test announced in *Frye v. United States*.¹⁷ Under *Frye*, it is not enough that one qualified expert vouches for the theory and instrument; as part of the foundation for the admission of the scientific evidence, the expert must also testify that the theory and instrument have gained general acceptance within the relevant scientific circle.¹⁸ *Frye* was not only the majority view among American courts; it was the almost universal view,

13. The LEAA was created under Title I of the Omnibus Crime Control and Safe Streets Act of 1968. 42 U.S.C. § 3711 (1976). The LEAA sponsored research projects encouraging the use of scientific knowledge for forensic purposes. See generally Giannelli, *supra* note 9, at 1199.

14. C. MCCORMICK, HANDBOOK OF THE LAW OF EVIDENCE 165 (1954).

15. For a discussion of the relaxed standards which some courts have applied in admitting scientific evidence, see notes 25-38 and accompanying text *infra*. See also Giannelli, *supra* note 9, at 1237, 1245-46; Imwinkelried, *A New Era in the Evolution of Scientific Evidence: A Primer on Evaluating The Weight of Scientific Evidence*, 23 WM. & MARY L. REV. 261 (1981); Note, 64 CORNELL L. REV. 875, 880-85 (1979).

16. See Giannelli, *supra* note 9, at 1204. See also Note, 40 OHIO ST. L.J. 757, 759 (1979).

17. 293 F. 1013 (D.C. Cir. 1923).

18. *Id.* at 1014. In affirming the defendant's conviction, the *Frye* court found that the lie-detector test had not gained sufficient standing and scientific recognition to justify the admissibility of expert testimony regarding the results of such a test. *Id.* In much quoted language, the *Frye* court stated:

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

Id. (emphasis added).

with the overwhelming majority of federal and state courts following it.¹⁹ Indeed, at one point in the mid-1970's, *Frye* seemed to be the controlling test in at least forty-five states.²⁰

Frye is a formidable barrier to the introduction of scientific evidence as a quick review of some of the leading cases decided in 1977 illustrates. In that year alone, appellate courts citing *Frye* excluded evidence derived from the Decatur Ra-Gun,²¹ ion microprobiic analysis²² and a trace metal detection technique.²³ The impact of *Frye* is clear. Even if the world's leading scientific authority on a subject attests to a new theory, even if the Nobel prize winner in a specific field conducts a thorough, well-designed experiment to validate the technique, the courts cannot admit the evidence until most of the scientists in that specialized field know and approve of the theory.²⁴

In many jurisdictions, however, courts are abandoning *Frye* and relaxing the standards for the admission of scientific evidence.²⁵ In a number of states, the courts have reached this result by exercising their judicial power to change common-law rules. The courts of Flor-

19. See, e.g., *United States v. Marshall*, 526 F.2d 1349, 1360 (9th Cir. 1975) ("[b]ecause the polygraph has yet to gain general judicial recognition, the proponent of such evidence has the burden of laying a proper foundation showing the underlying scientific basis and reliability of the expert's testimony."); *United States v. Bruno*, 333 F. Supp. 570, 573 (E.D. Pa. 1970) (ink identification not yet sufficiently advanced to be admissible as evidence); *Reed v. State*, 283 Md. 374, 399, 391 A.2d 364, 377 (1978) (testimony based on "voiceprints" inadmissible as evidence of voice identification, since "voiceprints" had not reached the standard of acceptance in the scientific and legal communities required by *Frye*); *Commonwealth v. Nazarovitch*, 496 Pa. 97, 110, 436 A.2d 170, 177 (1981) (process of refreshing recollection by hypnosis has not gained sufficient acceptance to permit introduction of hypnotically-refreshed testimony). *But see* *United States v. Williams*, 583 F.2d 1194, 1198 (2d Cir. 1978), *cert. denied*, 439 U.S. 1117 (1979) (to determine the admissibility of voiceprint analysis, the court must balance the materiality and reliability of the evidence against its tendency to mislead, confuse or prejudice the jury); *State v. Williams*, 388 A.2d 500, 505 (Me. 1978) (voiceprint analysis is sufficiently reliable to be relevant and admissible).

20. Note, *supra* note 16, at 769.

21. *State v. Boyington*, 153 N.J. Super. 252, 379 A.2d 486 (N.J. Super. Ct. App. Div. 1977). The Decatur Ra-Gun is an instrument which uses the Doppler radar effect to detect violation of the speed limit. *Id.* at 254, 379 A.2d at 487.

22. *United States v. Brown*, 557 F.2d 541 (6th Cir. 1977). The *Brown* court defined ion microprobiic analysis as "a technique for measuring the trace element of a sample matrix." *Id.* at 555. Each matrix tested is compared to the others tested to see if they had a common origin (e.g. victim's hair and hair found on the defendant's clothing). *Id.*

23. *People v. Lauro*, 91 Misc. 2d 706, 398 N.Y.S.2d 503 (Sup. Ct. 1977). The "trace-metal detection test" determines whether an individual has recently held a metal object by applying a chemical solution and observing the affected area under an ultraviolet light. *Id.* at 711, 398 N.Y.S.2d at 506.

24. See Imwinkelried, *Evidence Law and Tactics for the Proponents of Scientific Evidence*, in SCIENTIFIC AND EXPERT EVIDENCE 33, 43 (2d ed. 1981).

25. For a general discussion on the relaxation of the *Frye* standard, see Imwinkelried, *supra* note 15, at 264-67.

ida,²⁶ Georgia,²⁷ Iowa,²⁸ Kentucky,²⁹ Michigan,³⁰ New York,³¹ Oregon,³² and Utah³³ all have done so. Other jurisdictions have lowered the admission standards through statutory construction. The Court of Appeals for the Second Circuit³⁴ and the District Court for the Northern District of Illinois³⁵ have construed the Federal Rules of Evidence as impliedly overturning *Frye*. In addition, courts in Maine, Montana, New Mexico and Ohio, which have adopted evidence codes patterned after the Federal Rules, have found that *Frye* is no longer good law.³⁶ In California, the passage of Proposition Eight,

26. *Coppolino v. State*, 223 So. 2d 68 (Fla. Dist. Ct. App. 1968), *appeal dismissed*, 234 So. 2d 120 (Fla. 1969), *cert. denied*, 399 U.S. 927 (1970) (trial judge has wide discretion in admitting evidence and his decision concerning the admissibility of evidence will not be disturbed absent abuse of discretion).

27. *Harper v. State*, 249 Ga. 519, 292 S.E.2d 389 (1982) (proper test for determining admissibility of a scientific procedure is not whether technique has gained acceptance in scientific community but whether procedure has reached a scientific stage of verifiable certainty).

28. *State v. Hall*, 297 N.W.2d 80 (Iowa 1980), *cert. denied*, 450 U.S. 927 (1981) (reliability and inherent understandability sufficient basis for admission of bloodstain and blood splatter analysis).

29. *Brown v. Commonwealth*, 639 S.W.2d 758 (Ky. 1982) (blood-test results admissible even though not widely used since they were supported by a qualified expert witness).

30. *People v. Young*, 106 Mich. App. 323, 308 N.W.2d 194 (Ct. App. 1981) (jury permitted to hear expert testimony on electrophoresis blood analysis since a qualified expert vouched for electrophoresis).

31. *People v. Daniels*, 102 Misc. 2d 540, 545-46, 422 N.Y.S.2d 832, 837 (Sup. Ct. 1979) (test for admissibility of polygraph evidence should be merely whether there is probative value, since to require general acceptance would mandate absolute infallibility).

32. *State v. Kersting*, 50 Or. App. 461, 623 P.2d 1095 (1981), *aff'd*, 292 Or. 350, 638 P.2d 1145 (1982) (only foundation required for the admission of a scientific technique which is not generally accepted is credible evidence sufficient for the trial judge to make the initial determination that the technique is reasonably reliable).

33. *Phillips v. Jackson*, 615 P.2d 1228, 1236-38 (Utah 1980) (applying a "reasonable reliability" test to human leucocyte antigen test in a paternity action).

34. *See United States v. Williams*, 583 F.2d 1194 (2d Cir. 1978), *cert. denied*, 439 U.S. 1117 (1979). By applying Rule 702 of the Federal Rules of Evidence, the *Williams* court determined that "spectrograph voice analysis evidence [was] not so inherently unreliable or misleading as to require its exclusion from the jury's consideration in every case." *Id.* at 1200. Rule 702 provides that "if scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education may testify thereto in the form of an opinion or otherwise." FED. R. EVID. 702. *See also*, Note, *supra* note 15.

35. *See United States v. Dorfman*, 532 F. Supp. 1118, 1134 n.14 (N.D. Ill. 1981). The *Dorfman* court's view of the relation between *Frye* and the Federal Rules of Evidence was somewhat ambiguous. In emphasizing that it did not adhere to *Frye*, it noted that "[i]t is unclear whether the Federal Rules of Evidence follow the *Frye* rule, although some leading commentators feel the rules have repudiated *Frye*." *Id.* (citations omitted).

36. *See Barmeyer v. Montana Power Co.*, 657 P.2d 594 (Mont. 1983); *State v. Williams*, 33 CRIM. L. REP. (BNA) 2051 (Ohio Sup. Ct. Mar. 23, 1983); *State v.*

the so-called Victim's Bill of Rights, may have the same effect.³⁷ Finally, in two states, courts have allowed defendants to avoid *Frye* on the basis of a constitutional right to present critical evidence.³⁸ The upshot is that in two federal circuits and thirteen states, the precedential value of *Frye* is either nonexistent or suspect. The liberalization of the admission standards for scientific evidence will encourage attorneys to offer the more novel types of scientific evidence that our technology is developing. This, in turn, should further increase the use of scientific evidence by the courts.

The final cause of the increasing use of scientific evidence may be the most important catalyst. Specifically, attorneys have come to the realization that lay jurors expect scientific proof. The evidence of this expectation is largely anecdotal:

A prosecutor from the East Coast thought that he had a strong case. He was a bit surprised that the defendant had not pleaded guilty. At trial, the defendant was a rather poor witness. The verdict—an acquittal—came as a shock. After the verdict, the prosecutor asked some of the jurors why the jury had balked at convicting. One juror explained that the prosecutor had not presented any fingerprint evidence. During the trial, no one, including the defense counsel, had even mentioned the word “fingerprint.” However, after years of watching the television programs, the *F.B.I.*, *Hawaii Five-O*, and *Quincy*, the jurors had built up an expectation that the prosecution would offer scientific proof of guilt. When he failed to do so, the jury found reasonable doubt.³⁹

Williams, 388 A.2d 500 (Me. 1978) (admission of scientific evidence requires only a showing that the evidence is relevant and of assistance to the trier of fact); *State v. Dorsey*, 87 N.M. 323, 532 P.2d 912 (Ct. App.), *aff'd*, 88 N.M. 184, 539 P.2d 204 (1975) (polygraph evidence admissible under governing evidentiary rules). *See also* Romero, *The Admissibility of Scientific Evidence Under the New Mexico and Federal Rules of Evidence*, 6 N.M. L. REV. 187 (1976); Note, *supra* note 16.

37. *See* Uelmen, *Proposition 8 Casts Uncertainty over Vast Areas of Criminal Law*, CAL. LAW., July/Aug. 1982, at 45. The author notes that “[b]y requiring the admission of all relevant evidence, the initiative abrogates all California decisions applying the *Frye* test.” *Id.* (citations omitted).

38. *See* *State v. Dorsey*, 87 N.M. 323, 532 P.2d 912 (Ct. App. 1975), *aff'd*, 88 N.M. 184, 539 P.2d 204 (1975) (polygraph results admissible under due process analysis when defendant's credibility is a crucial issue); *State v. Sims*, 52 Ohio Misc. 31, 369 N.E.2d 24 (C.P. Cuyahoga County 1977) (due process entitles defendant to new trial during which he may undergo a polygraph examination, the results of which can be disclosed to the jury). *See also* Imwinkelried, *Chambers v. Mississippi: The Constitutional Right to Present Defense Evidence*, 62 MIL. L. REV. 225 (1973).

39. *See* Imwinkelried, *supra* note 24, at 36-37.

The moral of this story has not been lost by experienced trial attorneys. A well-known speaker and author on trial advocacy has stated that in any case in which the jury might expect fingerprint evidence but in which the evidence is lacking, his practice is to call a fingerprint technician as a witness to explain to the jury why the evidence is missing.⁴⁰ This advice takes on even more significance today in light of the publicity given trials such as the *Williams* prosecution. The media gave that case maximum publicity, and scientific evidence in the form of fiber and hair analysis played a pivotal role.⁴¹ The inevitable result of the *Williams* case and others like it is that the jurors' expectation of scientific proof is probably stronger now than at any point in our prior history. In short, there is legally and technologically more opportunity to use scientific evidence than in the past and more incentive to capitalize on that opportunity.

THE CRITICISMS OF THE INCREASED USE OF SCIENTIFIC EVIDENCE

Our society is so enamored with science that it is easy to assume that the increased use of scientific evidence is not only inevitable but also necessarily beneficial. A moment's reflection, however, shows that these assumptions are false. The expanded use of scientific evidence is not unavoidable; we could maintain *Frye* or even toughen the standard for admitting scientific evidence. Nor is the increased use of such evidence necessarily beneficial. Quite apart from the problem of scientific fraud, scientists, judges, and jurors all are fallible. If the incidence of error in scientific analysis is too high, or if the trier of fact is unable to evaluate the evidence critically, the increased use of scientific evidence may be undesirable. Indeed, the critics of scientific evidence raise precisely these two points: the mounting evidence of misanalysis in forensic science⁴² and doubts whether triers of fact, especially lay jurors, can cope with forensic evidence.⁴³

These two criticisms of scientific evidence have substantial merit. There is, for instance, evidence of a shockingly high level of error in forensic analysis. In the late 1950's, the Toxicology Section of the American Academy of Forensic Sciences uncovered indications of "a

40. This comment was made by Mr. E. J. Salcines, state attorney for the Thirteenth Judicial Circuit of Florida, during a lecture he delivered in New York a few years ago. See generally E. SALCINES, TRIAL TECHNIQUE—PREDICATE QUESTIONS (Nat'l Dist. Att'y Ass'n 1977).

41. For a listing of just a few of the articles discussing this trial, see note 1 *supra*.

42. For a discussion of this forensic misanalysis, see notes 44-56 and accompanying text *infra*. See also Imwinkelried, *supra* note 15, at 267-69.

43. For a discussion of the judicial concern that jurors may be excessively influenced by scientific evidence, see notes 57-67 and accompanying text *infra*. See also Giannelli, *supra* note 9, at 1237.

great degree of error" in blood alcohol analyses.⁴⁴ In the mid-1970's, Dinovo and Gottschalk reported significant variations among laboratories in drug analysis.⁴⁵

These blood alcohol and drug studies were conducted on a small scale, but they inspired the much larger and systematic Laboratory Proficiency Research Testing Program which was conducted by the Law Enforcement Assistance Administration.⁴⁶ Two hundred and forty forensic laboratories throughout the United States participated in this testing program. The Project Advisory Committee sent the participating laboratories blind samples for analysis.⁴⁷ An alarmingly high percentage of the laboratories submitted inaccurate or incomplete responses.⁴⁸ For example, on three of the twenty-one tests, fewer than half the laboratories arrived at a correct, complete analysis.⁴⁹ The LEAA project director, Mr. John Sullivan, conceded that the program demonstrated that laboratories were having difficulty in identifying the samples.⁵⁰

In January 1983, the *Journal of Forensic Sciences* published the results of a new survey on the proficiency of toxicology laboratories⁵¹ in which 105 laboratories, representing forty-nine states, participated.⁵² The results of this survey are consistent with the findings of the Laboratory Proficiency Testing program. The 1983 survey tested and found error in the participating laboratories' qualitative and quantitative analyses. As to the laboratories' qualitative analyses, the survey revealed a significant percentage of false positive and negative results; analysts reported finding chemicals that were not present and also failed to identify chemicals that were present.⁵³ The survey team described the laboratories' performance on these samples as "disap-

44. See Niyogi, *Toxicology*, in SCIENTIFIC AND EXPERT EVIDENCE 343, 383 (2d ed. 1981).

45. Dinovo & Gottschalk, *Results of a Nine-Laboratory Survey of Forensic Toxicology Proficiency*, 22 CLIN. CHEM. 843 (1976). This study analyzed a testing program designed to "assist the National Institute on Drug Abuse in its efforts to improve the investigating and reporting of drug related deaths in nine major U.S. cities" *Id.* The study's major finding was that the nine laboratories examined "varied considerably in the precision and accuracy with which they performed drug assays." *Id.* at 846.

46. PROJECT ADVISORY COMMITTEE, LABORATORY PROFICIENCY TESTING PROGRAM (1975-76).

47. LEAA NEWSLETTER, Sept. 1978, at 1, col. 1, at 5, col. 1.

48. *Id.*

49. *Id.*

50. *Id.*

51. Peat, Finnigan & Finkle, *Proficiency Testing in Forensic Toxicology: A Feasibility Study*, 28 J. FORENSIC SCI. 139 (1983).

52. *Id.* at 141.

53. *Id.* at 144.

pointing.”⁵⁴ The survey also discovered errors in quantitative analyses, finding “considerable” interlaboratory variation in quantitation.⁵⁵ On some samples, the coefficient of variation was 133%.⁵⁶

In the minds of many, if not most, courts, the first criticism is compounded because lay jurors are in awe of scientific testimony and tend to overestimate its probative value. If this is true, *Frye* makes eminently good sense; *Frye* helps to ensure that the only scientific evidence admitted is that which measures up to the jurors’ exaggerated expectations.

Judicial concern for these exaggerated expectations is most prevalent in the area of statistical proof.⁵⁷ In the leading case of *People v. Collins*,⁵⁸ the California Supreme Court characterized mathematics as

54. *Id.* at 139.

55. *Id.* at 157.

56. *Id.* at 156.

57. Statistical proof is the presentation of mathematical probabilities of the happening of certain events. All evidence involves the question of probabilities. See FED. R. EVID. 401. This rule states that “[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 or less probable* than it would be without the evidence.” *Id.* (emphasis added).

A common example of the use of probabilities is fingerprint testimony in which an expert assesses the probability that several sets of prints were produced by the same person’s hand. 2 WIGMORE, EVIDENCE § 414 (Chadbourn rev. ed. 1979). While questions of probabilities are quite common, the use of mathematics experts to present statistical evidence has been rare. See Finkelstein & Fairley, *A Bayesian Approach to Identification Evidence*, 83 HARV. L. REV. 489, 489 n.2 (1970) (citing seven cases). For a discussion of the use of statistics and probabilities in trials, see Kaplan, *Decision Theory and the Factfinding Process*, 20 STAN. L. REV. 1065 (1968).

58. 68 Cal. 2d 319, 438 P.2d 33, 66 Cal. Rptr. 497 (1968). In *Collins*, a professor of mathematics testified that the probability of more than one set of persons having the characteristics of the perpetrators of the crime, as elicited from eyewitnesses, was one in twelve million. *Id.* at 325-26, 438 P.2d at 36-37, 66 Cal. Rptr. at 501. The court concluded that this evidence should not have been admitted on the ground, *inter alia*, that probability theory could not prove beyond a reasonable doubt that 1) the guilty couple *in fact* possessed the characteristics described by witnesses, and 2) only one couple possessing the characteristics could be found within the area. *Id.* at 330, 438 P.2d at 40, 66 Cal. Rptr. at 504-05. Since the case was close, the admission of this evidence was prejudicial and warranted a new trial. *Id.* at 332, 438 P.2d at 41-42, 66 Cal. Rptr. at 505.

For other cases involving the use of mathematical probability theory, see *Miller v. State*, 240 Ark. 340, 343-44, 399 S.W.2d 268, 270 (1966) (statistical evidence inadmissible since based on estimates and assumptions); *People v. Jordan*, 45 Cal. 2d 697, 707, 290 P.2d 484, 490 (1955) (expert’s conclusions about certain probabilities were properly admitted since an adequate factual groundwork had been laid); *State v. Sneed*, 76 N.M. 349, 354, 414 P.2d 858, 862 (1966) (probability theory applied to identity of the criminal inadmissible where odds are based on estimates of unproven validity); *People v. Risely*, 214 N.Y. 75, 84-85, 108 N.E. 200, 202-03 (1915) (evidence of probabilities that a forged document was typed on defendant’s typewriter inadmissible where witness failed to qualify as an expert in the mechanics of typewriters). For the earliest reference to the use of probability theory, see *The Howland Will Case*, 4 AM. L. REV. 625, 648-49 (1870) (discussing *Robinson v. Mandell*, 20 F. Cas. 1027

“a veritable sorcerer in our computerized society,” a sorcerer who threatens to “cast a spell” over the trier of fact.⁵⁹ While courts have aimed their most pointed comments at statistical evidence, they have also voiced a general doubt as to whether lay jurors can properly assess any scientific evidence. The same California court that decided *Collins* expressed concern about the “misleading aura of certainty which often envelops a new scientific process”⁶⁰ The District of Columbia Court of Appeals has asserted that jurors often attribute a “mystic infallibility” to scientific testimony.⁶¹ In a similar vein, the Maryland Court of Appeals has stated that jurors routinely overestimate the objectivity and certainty of scientific evidence.⁶²

The judicial skepticism of jurors’ ability to evaluate the evidence is deep-seated,⁶³ with courts often relying on that skepticism as a rationale for the *Frye* test.⁶⁴ Moreover, in recent years, courts have taken their skepticism one step further—a step that may yet have great impact on the use of scientific evidence in civil cases. In a growing line of cases, dealing with complex, technical issues, some federal courts have invoked their doubts about juror competence as a basis for overriding the seventh amendment right to a jury trial.⁶⁵ In these

(C.C.D. Mass. 1868) (No. 111959) (use of probability theory in handwriting analysis).

59. 68 Cal. 2d at 320, 438 P.2d at 33, 66 Cal. Rptr. at 497.

60. *People v. Kelly*, 17 Cal. 3d 24, 32, 549 P.2d 1240, 1245, 129 Cal. Rptr. 144, 149 (1976) (quoting *Huntington v. Crowley*, 64 Cal. 2d 647, 656, 414 P.2d 382, 390, 51 Cal. Rptr. 254, 262 (1966)).

61. *United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974). *See also United States v. Baller*, 519 F.2d 463, 466 (4th Cir.), *cert. denied*, 423 U.S. 1019 (1975) (relevant scientific evidence should not be excluded unless “an exaggerated popular opinion of its accuracy” is likely to prejudice the jury).

62. *Reed v. State*, 283 Md. 374, 385, 391 A.2d 364, 370 (1978).

63. To emphasize the limitations of the lay citizens who serve as jurors, one court contrasted the technological success of the space program to the human failings dramatized in Watergate. *D’Arc v. D’Arc*, 157 N.J. Super. 553, 565, 385 A.2d 278, 284 (N.J. Super. Ct. Ch. Div. 1978), *aff’d*, 175 N.J. Super. 598, 421 A.2d 602 (N.J. Super. Ct. App. Div. 1980). More specifically, in refusing to admit voiceprint evidence, the court emphasized that this evidence could assume an “aura of mystic infallibility in the eyes of a jury of laymen.” *Id.* (citations omitted). It noted in conclusion:

Admittedly, the burden borne by the proponents of a new scientific technique is a heavy one. But in an era permeated with man’s disbelief in man, perhaps rooted in Watergate, and in which mankind has taken for granted the infallibility of science, somewhat rooted in the successes of space exploration, we should expect nothing less.

Id.

64. *See, e.g., United States v. Addison*, 498 F.2d 741 (D.C. Cir. 1974); *People v. Kelly*, 17 Cal. 3d 24, 549 P.2d 1240, 130 Cal. Rptr. 144 (1976); *People v. King*, 266 Cal. App. 2d 437, 72 Cal. Rptr. 478 (1968); *Reed v. State*, 283 Md. 374, 391 A.2d 364 (1978).

65. *See Higginbotham, Continuing the Dialogue: Civil Juries and the Allocation of Judi-*

civil cases, the lower federal courts have held that the case's technical complexity warranted denying a party the right to a jury trial, a right the party otherwise would have had under the seventh amendment.⁶⁶ In one case, the court declared that the sophisticated scientific testimony "may exceed the ability of a [lay] jury to decide the facts in an informed and capable manner."⁶⁷

The combined effect of these criticisms—the level of error in forensic analysis and the jury's supposed inability to critically evaluate the evidence—is a powerful argument for caution in the admission of scientific proof. If these criticisms are well-founded, the result of liberally admitting scientific evidence may be a miscarriage of justice rather than increased reliability in fact-finding.

THE COUNTERARGUMENTS TO THE CRITICISMS

Even the most ardent proponent of the expanded use of scientific evidence would acknowledge that there is a large element of truth in these criticisms. It seems patent that there is a significant level of error in forensic analysis—certainly a higher level than we initially suspected. Furthermore, common sense suggests that lay jurors with little or no background in science will have difficulty understanding complex, technical testimony.

In the final analysis, however, the criticisms of scientific evidence miss the point. It is misleading to focus solely on the strengths and weaknesses of scientific evidence. In principle, the judgment must be comparative. To the extent that we discriminate against scientific evidence, subjecting it to uniquely discriminatory, restrictive rules such as *Frye*, we encourage the courts to rely on other types of evidence. Thus, our task is not to make an absolute judgment about the merits of scientific evidence. Rather, our task is to compare it with other types of evidence to decide whether the differential treatment of scientific evidence is justifiable. In the end, this comparison leads to the conclusion that the judicial discrimination against scientific evidence is unsound.

cial Power, 56 TEX. L. REV. 47, 53-55 (1979); Note, *The Right to Jury Trials in Complex Litigation*, 92 HARV. L. REV. 898 (1979). See generally Annot., 54 A.L.R. FED. 733 (1981). This line of cases reflects the concern for juror competence expressed by the Supreme Court. See *Ross v. Bernhard*, 369 U.S. 531 (1970). In attempting to define the limitations on the right to jury trial in civil cases, the Court referred to "the practical abilities and limitations of juries." *Id.* at 538 n.10. Published cases raising this point generally involve either complicated antitrust or securities litigation, requiring extensive, complex expert testimony. See, e.g., *Pons v. Lorillard*, 549 F.2d 950 (4th Cir. 1977), *aff'd*, 434 U.S. 575 (1978).

66. See, e.g., *Bernstein v. Universal Pictures, Inc.*, 79 F.R.D. 59 (S.D.N.Y. 1978).

67. *In re Boise Cascade Sec. Litigation*, 420 F. Supp. 99, 104 (W.D. Wash. 1978).

Consider, for example, the criticism that there is a significant incidence of error in forensic analysis. Before leaping to the conclusion that the level of error justifies *Frye*, we must compare that level of error with the incidence of error in other types of potential evidence, such as lay eyewitness testimony. Even a cursory review of the witness psychology studies of eyewitness identification⁶⁸ will demonstrate that the error in eyewitness testimony is at least as frequent and less controllable than error in scientific testimony.

Indeed, to say that lay testimony is as error prone as scientific evidence is an understatement. Although it is true that the margin of error was substantial on some of the tests in the Laboratory Proficiency Testing Research Program,⁶⁹ the margin was negligible on other tests. For example, on tests of drugs and fibers, the accuracy level was nearly ninety-nine percent.⁷⁰ Contrast that with the witness psychology studies of lay eyewitness identification testimony⁷¹ where researchers consistently find a high level of error.⁷² There are literally hundreds of studies confirming this finding.⁷³ In one experiment, fewer than fifteen percent of the lay witnesses to a simulated crime correctly identified the perpetrator.⁷⁴ If we consider other types of routinely admitted lay testimony such as excited utterances, the available data indicates not only a possibility, but worse yet, a high probability of inaccuracies.⁷⁵

The level of error in lay testimony is not only high; unfortunately, the error is largely intractable. Inherent deficiencies in the

68. For references to studies of eyewitness testimony, see note 71 *infra*.

69. For a discussion of these tests, see notes 46-50 and accompanying text *supra*.

70. PROJECT ADVISORY COMMITTEE, *supra* note 46, at 251.

71. See E. LOFTUS, EYEWITNESS TESTIMONY (1979); A. YARMEY, THE PSYCHOLOGY OF EYEWITNESS TESTIMONY (1979); Buckout & Greenwald, *Witness Psychology*, in SCIENTIFIC AND EXPERT EVIDENCE 1291 (2d ed. 1981); Buckout, *Eyewitness Testimony*, 231 SCI. AM. 23 (1974); Levine & Tapp, *The Psychology of Criminal Identification: The Gap from Wade to Kirby*, 121 U. PA. L. REV. 1079 (1973); Stewart, *Perception, Memory and Hearsay*, 1970 UTAH L. REV. 1.

72. For an interesting discussion of the unreliability of eyewitness testimony, see Buckout, *supra* note 71. Dr. Buckout has conducted numerous tests on the unreliability of eyewitnesses. In one experiment, an assault on a college professor was staged before 141 eyewitnesses. *Id.* at 29. Four weeks later, the witnesses were shown a photo-spread which included the "attacker." Only 40% identified the "attacker" when they were asked, "Do you recognize any of these men?" However, when shown a distinctive picture and told that "[o]ne of these men is the suspect; it is important that you identify him," 60% identified the man. *Id.* at 29-30.

73. For good bibliographies of the available literature in this area, see E. LOFTUS, *supra* note 71, at 237-47; A. YARMEY, *supra* note 71, at 230-67.

74. Buckout & Greenwald, *supra* note 71, at 1298.

75. See Stewart, *supra* note 71, at 28.

human processes of perception and memory cause the error,⁷⁶ and "very little can be done to improve" the processes.⁷⁷ Furthermore, nothing can be done to control the fortuitous events, such as traffic accidents and crimes, that lay persons unexpectedly witness.

In contrast, the laboratory is a much more controllable environment. Laboratories have tools such as microscopes for enhancing powers of perception.⁷⁸ Scientists can use photographic techniques to record events and thereby eliminate concerns about the quality of memory.⁷⁹ Experiments can be planned to allow time for meticulous observation and recordation. Thus, notwithstanding the evidence of error in scientific analysis, we should not discriminate against such testimony on this basis. Lay testimony is even more prone to error, and the causes of errors in it are less controllable than the sources of inaccuracy in scientific analysis. When we examine the comparative data on lay and scientific testimony, scientific evidence fares very well.

Even if scientific evidence is less error prone than other types of evidence, discrimination against scientific evidence would be defensible if jurors attach too much weight to it. This, the second criticism of scientific evidence,⁸⁰ is precisely what the advocates of the *Frye* test repeatedly assert.⁸¹ Numerous courts, including the California Supreme Court, the Court of Appeals for the District of Columbia, and the Maryland Court of Appeals, have expressed this concern.⁸² But, is this assertion merely speculation, or is there empirical support for it? The truth is that there is little or no objective support for the assertion and that almost all the available data points to the contrary conclusion.

The starting point for any discussion of the competence of lay jurors must be the Chicago Jury Project.⁸³ This project is unques-

76. See Levine & Tapp, *supra* note 71, at 1095-1103. See also H. BURTT, APPLIED PSYCHOLOGY 292-301 (1941).

77. Levine & Tapp, *supra* note 71, at 1130.

78. See Judd, *Scanning Electron Microscopy as Applied to Forensic Evidence Analysis*, in SCIENTIFIC AND EXPERT EVIDENCE 873 (2d ed. 1981).

79. See A. MOENSSENS & F. INBAU, SCIENTIFIC EVIDENCE IN CRIMINAL CASES 507-63 (2d ed. 1978).

80. For a discussion of this second criticism, see notes 57-67 and accompanying text *supra*.

81. See notes 63-64 and accompanying text *supra*. See also Note, *supra* note 15.

82. See notes 60-62 and accompanying text *supra*.

83. H. KALVEN & H. ZEISEL, THE AMERICAN JURY (1966). This study, conducted by the University of Chicago Law School and funded by the Ford Foundation, examined the dynamics of juries in criminal trials by submitting questionnaires to 3500 judges of which 555 "[c]ooperated fully." *Id.* at 33-44. The judges were asked to answer specific questions about the actual cases before them, particularly

tionably the most intense study ever conducted on the ability and behavior of American jurors. It led to the publication of the landmark work, *The American Jury* by Professors Kalven and Zeisel,⁸⁴ which discusses the question of whether juries can adequately follow the evidence and understand the case.⁸⁵ This study reaches two important conclusions. First, the authors conclude that "the jury does by and large understand the facts and get the case straight."⁸⁶ The authors state this conclusion quite forcefully; in their view, the available data is "a stunning refutation of the hypothesis that the jury does not understand" the facts.⁸⁷ The authors also concluded that the jury's verdict "moves with the weight and direction of the evidence."⁸⁸ Again, the authors were of the opinion that the results permitted a fairly definite conclusion. After charting the data, the authors state that the available studies "corroborate strikingly the hypothesis that the jury follows the direction of the evidence."⁸⁹ The authors' conclusions are highly relevant because many of the cases they studied involved scientific evidence.⁹⁰

More recent literature on the use of lie detector tests, based on surveys of courtroom use⁹¹ and controlled experiments simulating courtroom testimony,⁹² supports the conclusions of *The American Jury*. Studies have focused on the judicial experience with polygraphy in Massachusetts,⁹³ Michigan,⁹⁴ Utah,⁹⁵ Wisconsin⁹⁶ and Canada.⁹⁷

concerning the crime involved, the witnesses' testimony and the attorneys' abilities. Most importantly, the judges were asked to compare how they would have decided the case with the jury's verdict. *Id.* The AMERICAN JURY represents the first significant study of the role of the jury in the American criminal justice system. See Kaplan, Book Review, 115 U. PA. L. REV. 475 (1967).

84. H. KALVEN & H. ZEISEL, *supra* note 83.

85. *Id.* at 149-62.

86. *Id.* at 149.

87. *Id.* at 157.

88. *Id.* at 149.

89. *Id.* at 161.

90. *Id.* at 137.

91. See, e.g., Peters, *A Survey of Polygraphic Evidence in Criminal Trials*, 68 A.B.A. J. 162 (1981); Tarlow, *Admissibility of Polygraph Evidence in 1975: An Aid in Determining Credibility in a Perjury-Plagued System*, 26 HASTINGS L.J. 917 (1975).

92. See, e.g., Carlson, Pasano & Jannuzzo, *The Effect of Lie-Detector Evidence on Jury Deliberations: An Empirical Study*, 5 J. POL. SCI. & ADM. 148 (1977); Cavoukian & Heslegrave, *The Admissibility of Polygraph Evidence in Court*, 4 LAW & HUM. BEHAV. 117 (1980); Markwart & Lynch, *The Effect of Polygraph Evidence on Mock Jury Decision-Making*, 7 J. POL. SCI. & ADM. 324 (1979).

93. See Tarlow, *supra* note 91, at 968. See also Barnett, *How Does a Jury View Polygraph Results?*, 2 POLYGRAPH 275 (1972).

94. Tarlow, *supra* note 91, at 968 n.258.

95. *Id.* (citing *State v. Jenkins*, 523 P.2d 1232 (Utah 1974) (the jury convicted the defendant although the judge admitted polygraph testimony supporting the defendant's innocence)).

According to these studies, jurors frequently reject polygraphy evidence and return verdicts inconsistent with the polygraphist's testimony.⁹⁸ In the most recent study in Wisconsin, Robert Peters of the Crime Laboratory Bureau, Wisconsin Department of Justice, states that "[t]he actual trial results clearly support the belief that juries are capable of weighing and evaluating all evidence and rendering verdicts that may be inconsistent with the polygraph evidence."⁹⁹ In light of his survey of Wisconsin cases, Mr. Peters flatly asserts that "polygraph evidence does not assume undue influence in the evidentiary scheme."¹⁰⁰

Laboratory experiments with polygraphy have reached results consistent with the surveys of courtroom use. In an American study conducted at Yale, only fourteen and one-half percent of the mock jurors tested thought that the lie detector evidence was "more significant" than the lay testimony.¹⁰¹ In Canadian experiments, sixty-one percent of the mock jurors labeled the polygraphy evidence as "less significant" than the lay testimony.¹⁰² During these mock deliberations, the jurors spent little time even discussing the polygraphic evidence.¹⁰³

Other surveys of scientific evidence come to the same conclusion. For example, in one survey of cases involving sound spectrography—voiceprint analysis—researchers found that even after hearing voiceprint evidence, jurors frequently acquit.¹⁰⁴ In one survey, when spectrography evidence was introduced against the defendant, the conviction rate was eleven percent lower than average.¹⁰⁵

96. See generally Peters, *supra* note 91.

97. Cavoukian & Heslegrave, *supra* note 92.

98. See Tarlow, *supra* note 91, at 968 n.258. See also Peters, *supra* note 91, at 165. The author reviewed 11 Wisconsin trials in which polygraph evidence was admitted by stipulation of the parties. *Id.* at 164. Of the 19 lawyers involved in these cases who responded to the author's survey, 17 felt that the polygraph evidence was "reasonable and intelligible" and only four felt that the jury "disregarded significant evidence because of the polygraph testimony." *Id.* See also Barnett, *supra* note 93. In interviews with eight jurors in a criminal trial at which polygraph evidence was used by the defense, the jury treated the evidence simply as "an additional piece of evidence." *Id.* at 277.

99. Peters, *supra* note 91, at 165.

100. *Id.*

101. Carlson, Pasano & Jannuzzo, *supra* note 92, at 153.

102. Markwart & Lynch, *supra* note 92, at 333.

103. *Id.*

104. Greene, *Voiceprint Identification: The Case in Favor of Admissibility*, 13 AM. CRIM. L. REV. 171 (1975). Greene, an assistant U.S. Attorney for the District of Columbia, analyzed the experiments with sound spectrography and surveyed recent cases—appellate and trial level—involving the use of voice-identification evidence. *Id.* at 173-89.

105. *Id.* at 190-91. See also Note, *supra* note 16, at 766.

Jurors have treated psychiatric testimony in a similar manner, perhaps reflecting juror skepticism of testimony by mental health experts.¹⁰⁶ A later phase of the Chicago Jury Project, dealing with psychiatric testimony, illustrates the point.¹⁰⁷ While the major part of the Project was an analysis of over five hundred jury trials,¹⁰⁸ a later stage of the Project involved experimental juries exposed to psychiatric testimony.¹⁰⁹ In that experiment, the overwhelming majority of the mock jurors believed that they understood the psychiatric testimony;¹¹⁰ and after interviewing the mock jurors, the researchers concluded that the jurors did, in fact, understand the essence of the testimony.¹¹¹

Of course, it can be argued that polygraphy and psychiatry are atypical, since both techniques have received extensive adverse publicity.¹¹² They may be the exception rather than the rule; it is possi-

106. See R. SIMON, *THE JURY AND THE DEFENSE OF INSANITY* (1967).

107. *Id.*

108. For a discussion of this phase of the project, see notes 83-90 and accompanying text *supra*.

109. R. SIMON, *supra* note 106. The mock juries were shown differing versions of two trials, one trial for housebreaking and the other for incest, in which the "defendant" pleaded not guilty by reason of insanity. *Id.* at 34-77. There were six different versions of the housebreaking trial, with variations in instructions (M'Naghten rule, Durham "product rule" and an "uninstructed" version) and variations in information concerning the defendant's commitment following trial. Each version was shown to five different juries. Thus, a total of 30 juries viewed some version of the housebreaking trial. There were also six different versions of the incest trial, each version having variations in the jury instructions and variations in the strength of psychiatric testimony. The incest trial was shown to a total of 98 juries.

110. *Id.* at 85-86. Seventy-three percent of the jurors felt the psychiatric testimony was helpful; 67% felt that no further psychiatric treatment was necessary to aid them in their deliberations; and 77% believed that the testimony was not "too technical." *Id.* at 86.

111. *Id.* at 217-18.

112. The public controversy over the use of psychiatric evidence was most apparent during the trial of John Hinckley, Jr., in 1982. See, e.g., Kauffman, *The Insanity Plea on Trial*, N.Y. TIMES MAG., Aug. 8, 1982, at 16 (cover story); *A Controversial Verdict*, NEWSWEEK, July 5, 1982, at 30; *Is the System Guilty?*, TIME, July 5, 1982, at 26 (cover story); *Pro and Con: Bar Psychiatrists as Trial Witnesses?*, U.S. NEWS AND WORLD REP., June 7, 1982, at 57; *The Insanity Plea on Trial*, NEWSWEEK, May 24, 1982, at 56 (cover story). *The New York Times* referred to the Hinckley trial as a "battle of the psychiatrists." N.Y. Times, May 27, 1982, at B7, col. 1. The controversy over the use of psychiatric evidence in cases involving the insanity defense rages within the scientific community as well. For two views of this controversy, see *Pro and Con: Bar Psychiatrists as Trial Witnesses?*, *supra*. On the use of psychiatry to determine the legal question of insanity, psychiatrist Willard Gaylin has stated that "[i]t has been degraded to a point of professional embarrassment." Kauffman, *supra*, at 58 (quoting GAYLIN, *THE KILLING OF BONNIE GARLAND: A QUESTION OF JUSTICE* (1982)).

The lie detector test has never garnered the same publicity as psychiatric evidence, but there has always been great public awareness of its use. In one notorious example, Frank Rizzo, a former mayor of Philadelphia, agreed to submit to a lie-detector test to prove his innocence of charges of political harassment and corrupt

ble that jurors generally overestimate the value of scientific evidence but are particularly skeptical of polygraphy and psychiatry because of prior publicity. However, even that explanation is breaking down. In 1980, Dr. Elizabeth Loftus, one of America's leading witness psychologists, reported the results of an experiment conducted to determine the relative weight that jurors attach to lay and scientific testimony.¹¹³ The hypothetical fact situation for the experiment was a bad check case.¹¹⁴ In one variation of the hypothetical, the defendant was identified by lay testimony. In another variation, the identification was based on high-caliber scientific evidence such as fingerprints. The mock jurors were more willing to convict on the basis of lay identification testimony than on the basis of fingerprints.¹¹⁵ Jurors not only trust their own perception and memory; they tend to trust the perception and memory of other lay persons as well.¹¹⁶ In addition, scientific testimony is new to them, and the natural distrust of the unfamiliar comes into play.¹¹⁷

It would be foolish and premature to conclude on the basis of this meager data that most lay jurors are definitely capable of critically evaluating scientific evidence. Research into the extent of their capability is still in its early stages. In the final analysis, we may identify certain types of scientific evidence that jurors have special difficulty analyzing.

At the very least, however, the clear weight of the available hard data calls into question the assumption underlying *Frye*, namely, that scientific testimony overwhelms the typical lay juror. The scientific community has a right to accuse the legal community of being biased and unscientific in its treatment of scientific testimony. As Professors Kalven and Zeisel stressed, the question of the jury's competence cannot be answered *a priori*.¹¹⁸ The question must be investigated empirically, and the truth of the matter is that the empirical studies

practices in selecting architectural firms for city work. The Mayor, who had stated, "I believe in the polygraph," reportedly "flunked six key questions." *Rizzo's Waterloo?*, NEWSWEEK, Aug. 3, 1973, at 90.

113. Loftus, *Psychological Aspects of Courtroom Testimony*, in 347 ANNALS N.Y. ACAD. SCI. 27 (1980).

114. *Id.* at 32.

115. *Id.* at 33.

116. *Id.* See also Loftus & Monahan, *Trial by Data: Psychological Research as Legal Evidence*, AM. PSYCHOLOGIST, Mar. 1980, at 276; Taylor, *Reliability of Eyewitness Identification*, CRIM. DEF., Sept.-Oct. 1982, at 7.

117. Austin, *Jury Perceptions on Advocacy: A Case Study*, LITIGATION, Summer 1982, at 16 (in an antitrust case involving a great deal of expert testimony about economics and electronics, the jurors were "skeptical of the experts").

118. H. KALVEN & H. ZEISEL, *supra* note 83, at 151.

conducted to date simply do not support the assumptions made by most courts.

This topic has far-reaching significance; it implicates fundamental libertarian and democratic values. In a criminal case, when a defendant's liberty is at stake, how tolerant can we be of evidence prone to error? In a democratic society, to what extent shall we place our faith in lay jurors who have no expertise in the technical field to which the testimony in the case relates? If we assume that scientific evidence is unduly error-prone and that lay jurors cannot adequately analyze it, we shall face some cruel choices. On those assumptions, in effect, liberty is pitted against democracy. We can give defendants' liberty the maximum protection by limiting the role of the jury, or we can opt to preserve the jury's role at the risk of erroneous fact-finding and wrongful conviction. We need not face that choice at all, however, if the preliminary indications of jurors' competence prove to be correct. While we certainly need additional research to test the preliminary indications, at least at this point we have good reason to be hopeful. The poet Thomas Campbell once wrote that the message of science is despair.¹¹⁹ Campbell feared that the empiricism of science would eventually erode our belief in intangible values. But Campbell may have been wrong. It may be science that gives us new hope and renewed faith in the democratic jury.¹²⁰

119. *Pleasures of Hope*, Part II, lines 325-26.

Oh! Star-eyed Science, hast thou wandered there
To waft us home the message of despair?

Id.

120. See, e.g., Younger, *A Practical Approach to the Use of Expert Testimony*, 31 CLEV. ST. L. REV. 1, 39, 40 (1982) ("In my experience, the jury does a very good job of assessing the credibility of an expert [J]urors are eminently capable of weighing . . . one expert's qualifications against another's.").