

## *Evidence and Proof, Scientific*

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The use of scientific knowledge to resolve legal disputes has a venerable history. Chinese writing on forensic medicine dates back to at least 1250, and forensic medicine was a well-recognized discipline in Europe during the Middle Ages. The twentieth and twenty-first centuries have witnessed applications extending well beyond medicine. Disciplines as diverse as anthropology, chemistry, economics, geology, psychiatry, statistics, and toxicology, to name just a few, have been used to resolve contested facts in litigation.

Moreover, some specialties study factual issues that are predominantly of interest to the legal system. Thus, the field of criminalistics is concerned with such matters as the analysis of hairs and fibers; bloodstains and stains from other bodily fluids; firearms evidence; soil, glass and paint classifications; toolmarks; and arson accelerants and explosives.

### *Forensic Experts*

Although most forensic scientists successfully strive to be objective and unbiased, crime laboratories in the United States usually are part of police agencies, an arrangement that does little to foster complete independence. Officials and jurists have reported isolated but serious breaches of professional ethics and instances of incompetence at local, state, and national levels. In Europe and elsewhere, the practice of forensic medicine is more commonly located in universities whose faculty members prepare reports for courts.

Anglo-American law relies on the adversarial system to produce expert witnesses. Thus, parties are free to retain expert witnesses who will take an extreme position, and at least since the nineteenth century, British and American judges and legal commentators have complained about the testimony of scientific and medical experts.

### *United States Judicial Doctrine*

Two leading cases in the United States have placed significant limits on scientific testimony. In *United States v. Frye*, 293 F. 1013 (D.C. Cir. 1923), a man charged with murder sought to introduce the testimony of a psychology professor who administered a systolic blood pressure test to conclude that the defendant was truthful when he denied committing the murder. The trial judge excluded the testimony on tenuous grounds. The court of appeals affirmed on the ground that even though there was published research supporting the procedure and even though the test's inventor was a qualified expert, other psychologists had yet to accept his claim that a speaker's blood pressure is diagnostic of honesty. The court insisted that "the thing from which [a scientific] deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs."

In theory, *Frye* uses the extent of acceptance in a community of knowledgeable and demanding scientists to ensure that only valid scientific theories and techniques enter into

evidence in the courtroom. Yet, *Frye* has proved surprisingly difficult to apply and easy to manipulate. For example, some courts reasoned that the standard applies only to tests for truthfulness, to relatively esoteric applications of science, to unusual or "novel" claims, to the "hard sciences," or to very general principles or methodology rather than to the body of studies or results being applied to reach a conclusion in the particular case.

Especially since the early 1970s, *Frye* was subjected to critical analysis, limitation, modification, and finally, outright rejection. By 1990, a strong minority of jurisdictions had expressly adopted a "relevancy-plus" analysis that requires the court to inquire into the validity of the scientific technique. In general, judges applied either the pure general-acceptance standard or the newer relevancy-plus standard primarily in criminal cases, but in the 1980s and 1990s, courts began to use these standards and other evidentiary and procedural rules to counter "junk science" in toxic-tort cases.

The U.S. Supreme Court addressed the diverging case law in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Two young children born with deformed limbs and their parents sued the manufacturer of Bendectin, a prescription drug taken by the boys' mothers to treat nausea and vomiting during pregnancy. The district court granted summary judgment when plaintiffs were unable to point to any published epidemiological studies concluding that Bendectin causes limb reduction defects. Plaintiffs' experts referred to new computations based on the existing data, but the district and circuit courts deemed these unpublished, made-for-court calculations inadmissible.

The Supreme Court unanimously held that the lower courts had applied the wrong standard. The Court proclaimed that the "austere [general acceptance] standard, absent from and incompatible with the Federal Rules of Evidence, should not be applied in federal trials." Instead, the Court announced, "the trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." Elaborating, the Court suggested that this "reliability" determination "entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid" and whether the judge can properly apply it to the facts in issue. This, in turn, depends on several factors. Can the evidence be (or has it been) tested? Has the theory or technique been subjected to peer review and publication? What is the known or potential rate of error? Are there existing and maintained standards controlling the technique's operation? What is the degree of acceptance within the relevant scientific community?

Courts can apply either *Daubert* or *Frye* demandingly or flaccidly. Nevertheless, the simple fact that the Supreme Court reminded judges that they are "gatekeepers" of expert testimony inspired some federal courts to reexamine seemingly settled results as to the admissibility of many forms of scientific testimony, such as polygraphy and fingerprinting. Judges admitted some scientific evidence more readily, but they reviewed other matters with a newfound skepticism. In state courts, the doctrinal response to *Daubert* was mixed. Some states observed that they already employed this newer standard. A large number followed the Supreme Court's example, while others adhered to *Frye*.

Judicial experience with *Frye* and *Daubert* reveals that both standards are quite flexible and will produce untoward outcomes unless judges apply them with an understanding of the scientific process and norms. Most commentators have argued that the *Daubert* approach of direct inquiry into the grounds for believing that the method is valid is likely to produce better results. However, one approach is not inherently more lenient than the other is—the outcomes

depend more on how rigorously the standards are applied than on how the form of judicial scrutiny is phrased.

—*D.H. Kaye*

***Further Readings***

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