FRYE, DAUBERT, AND THE SOCIOLOGY OF SCIENTIFIC CONSENSUS

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I.

INTRODUCTION

Scientific evidence is alluring. In the courtroom, it commands respect. It promises objectivity and verifiability; it offers a view from the academy, not the litigant trenches. Its proponents, always experts, speak in dispassionate terms, and often with numbers, charts, graphs and figures. You can believe their testimony, they seem to be saying, for their results are the product of higher learning and ethos. Lawyers, as natural advocates, search out this “better” evidence and use it for all it is worth.

The persuasiveness of scientific evidence is derived from a philosophical, positivist belief in the nature of the scientific enterprise. As the theory goes, scientific knowledge is not merely published knowledge; its facts and theories have necessarily survived a period of critical examination by other competent and disinterested individuals. The objective of science “is not just to acquire information, nor to utter all non-contradictory notions; its goal is a consensus of rational opinion over the widest possible field.” J. Ziman, Public Knowledge; An Essay Concerning the Social Dimension of Science, 9 (Cambridge University Press 1968).

A basic test for admissibility of scientific evidence is founded upon a positivist and consensus-based theory of scientific knowledge. This is the point of the Frye test or standard, as it is popularly known. The Frye test requires “general acceptance” of the validity of proffered scientific testimony as a prerequisite for its admission into evidence. The leading and most comprehensive alternative to the Frye test’s threshold concentration on “general acceptance” is set forth in Daubert v. Merrell Dow Pharmaceuticals. Inc., 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993). Daubert rejects the Frye test as a threshold standard and requires a close textual analysis of the requirements of ER 702. While Daubert tends to relieve the Frye “general acceptance” test of its singular and threshold importance, its entire discussion of the meaning of scientific knowledge reads like a primer on the philosophy of science. It accepts a positivist view of the workings of science without question.
In actuality, the concept of “general acceptance” among scientists is a sociological phenomenon. To understand what the term means and implies requires an examination of how the scientific community operates and how local knowledge outcomes (e.g., research laboratory results) gain more universal or general acceptance. Sociologists of science study these issues.

For the legal practitioner faced with applying a general acceptance standard, the findings being developed by sociologists are quite revealing and perhaps quite troublesome. Sociologists distinguish between the core basis underlying certain scientific fields and the research frontier in which most scientists work. They are finding very little consensus among scientists at the research frontier. Since lawyers most often are interested in developing testimony fresh from the research frontier, the implications for application of any “general acceptance” standard are obvious.

II.

THE ORIGIN OF THE FRYE OR GENERAL ACCEPTANCE STANDARD

The Frye test, followed in scores of criminal cases since its inception in Frye v. United States, 54 App. D.C. 46, 293 Fed. 1013 (1923), requires that scientific testimony meet a “general acceptance” or, in other words, a consensus-based standard before being admitted into evidence. With the long passage of time since the original Frye decision, and in light of the host of authorities that mention Frye but never discuss its facts, it is easy to lose sight of how the Frye test first came into being.

Frye is a short case, just two pages long, including the two WEST key number criminal law headnotes. Frye was convicted of second degree murder. He sought unsuccessfully at trial to introduce testimony about the results of a systolic blood pressure deception test he believed proved his innocence. If the out-of-court test results were not admitted, Frye was willing to submit to the test in open court.

The nature of the scientific testimony Frye wanted to proffer was as follows:

It is asserted that blood pressure is influenced by change in the emotions of the witness, and that the systolic blood pressure risks are brought about by nervous
impulses sent to the sympathetic branch of the autonomic nervous system. Scientific experiments, it is claimed, have demonstrated that fear, rage, and pain always produce a rise of systolic blood pressure, and that conscious deception or falsehood, concealment of facts, or guilt of crime, accompanied by fear of detection when the person is under examination, raises the systolic blood pressure in a curve, which corresponds exactly to the struggle going on in the subject’s mind, between fear and attempted control of that fear, as the examination touches the vital points in respect of which he is attempting to deceive the examiner.

293 Fed. 1013-14 (emphasis added).

Frye conceded that he could find no case on point allowing the admission of systolic blood pressure test results or related testimony. He argued that the general rule governing the admissibility of expert witness testimony warranted its admission. The Frye court thought highly enough of Frye’s recitation of law to place in the text of its opinion:

The rule is that the opinions of experts or skilled witnesses are admissible in evidence in those cases in which the matter of inquiry is such that inexperienced persons are unlikely to prove capable of forming a correct judgment upon it, for the reason that the subject-matter so far partakes of a science, art, or trade as to require a previous habit or experience or study in it, in order to acquire a knowledge of it. When the question involved does not lie within the range of common experience or common knowledge, but requires special experience or special knowledge, then the opinions of witnesses skilled in that particular science, art, or trade to which the question relates are admissible in evidence.

Id., at 1014.

The Frye court classified the proffered evidence--either the results of the systolic blood pressure test or the actual demonstration before the jury--as scientific evidence. Such evidence, the court held, must be at such a stage of advancement so as to be demonstrable, not experimental. The Frye court recognized that the task of line drawing could be difficult at times:

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages 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., at 1014.
Like the general acceptance standard it espoused, the Frye test has gained general acceptance as a rule regulating both sides in a criminal case as they variously try to solidify or erase any reasonable doubt through the presentation of scientific testimony. In State v. Canaday, 90 Wn.2d 808, 585 P.2d 1185 (1978), a breathalyzer case, the Washington Supreme Court concluded the Frye standard was the “prevailing rule . . . with regard to the admissibility of testimony based on scientific experimental procedures at a criminal trial.” Id., at 813 (emphasis added).

Application of the Frye test has not come without some cynicism and frustration, such as that expressed recently by Washington court commissioner:

In terms of whether [a breathalyzer expert’s] testimony is accepted in the scientific community [,] I think anytime you can find one scientist who will say up, you’ll find another who will say down. I know the [proposed expert] testifies a lot, I know he writes a lot of articles, I know a lot of people with very preposterous ideas that write a lot of articles and get them published, but I’m not really sure that the Frye [v. United States, 54 App. D.C. 46, 293 Fed. 1013 (1923)] standard is not being met because I think there’s [sic] enough people that are listening to what [the expert] says that you can say that it’s at least tentatively accepted if not completely accepted. What you’re dealing with is more of a technical issue, I think, [rather] than a scientific principle, so I’m not sure if Frye would even necessarily be the appropriate standard to apply. City of Mount Vernon v. Cochran, 70 Wn. App. 517, 520, 855 P.2d 1180 (1993) (court held that the court commissioner properly approved an indigent defendant’s use of a breathalyzer expert in connection with a DWI prosecution; brackets in original and added). Cf. State v. Jones, 71 Wn. App. 798, 814, 863 P.2d 85 (1993) (“[I]f expert testimony does not concern novel theories or sophisticated or technical matters, it need not meet the stringent requirements for general scientific acceptance”).

The court commissioner’s opinion reflects a perhaps justified cynicism of the use of science by advocates. Advocates are driven to ignore the limited claim that science makes about “knowing” anything. In seeking to obtain a their zealous edge in litigation, advocates will use whatever information reasonably may help their cause and will tend to characterize that information most favorably to their specific cause. Cross-examination is expected to address any
limitations and uncover any flaws. When the court is required to assess competing scientific claims and make findings about scientific “facts,” it too necessarily becomes a participant in the social construction of science.

Whether the Frye test should continue to be the primary focal point for the legal world’s social construction of science is addressed in recent federal and state law and can be informed by research findings and conclusions being developed in the sociology of science field.

III.

THE STATUS OF THE GENERAL ACCEPTANCE STANDARD UNDER FEDERAL AND STATE LAW


1. Daubert’s Emphasis on Scientific Validity, Not Just on General Acceptance.

Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993), invites renewed examination of the Frye test. The decision rejects the Frye test as a threshold standard for review of novel scientific evidence. A plain meaning analysis of ER 702 is followed in Daubert: ER 702 contains no explicit reference to general acceptance. In fact, the language of ER 702 looks much closer to that “succinct” summary of the law provided by Mr. Frye, which the Frye court adopted, and to which it added its requirement of general acceptance.

Daubert involves an issue of whether a mother’s ingestion of the prescription anti-nausea drug, Bendectin, caused her children’s serious birth defects. Scientific experts, all with impressive credentials, submitted opposing expert witness affidavits addressing the etiological and epidemiological issues. The Daubert federal district court applied the “general acceptance” test and granted defendant’s motion for summary judgment, later affirmed by the Ninth Circuit.¹

¹ The “general acceptance” standard, as construed in the Ninth Circuit, required that expert opinion based on a scientific technique be “generally accepted” as reliable in the relevant scientific community. Expert opinion based on a methodology diverging significantly from procedures accepted by recognized authorities in the field cannot be shown to be generally accepted as a reliable technique. Daubert, 125 L. Ed. 2d at 477 (citing Ninth Circuit precedent).
The district court concluded that the plaintiffs’ experts had not based their testimony on human epidemiological evidence, which had not shown maternal use of Bendectin to be a risk factor for human birth defects. \textit{Daubert}, 125 L. Ed. 2d at 477.

\textit{Daubert} holds that the superseding enactment of the Federal Rules of Evidence in 1975 displaced the \textit{Frye} standard. ER 702, standing on its own, governs threshold admissibility issues of scientific testimony. It provides:

\begin{quote}
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.
\end{quote}

As the Supreme Court noted, “Nothing in the text of this Rule establishes ‘general acceptance’ as an absolute prerequisite to admissibility.” 125 L. Ed. 2d at 480. Parsing the language of Rule 702, the Court stated that the “adjective ‘scientific’ implies a grounding in the methods and procedures of science,” and that “the word ‘knowledge’ connotes more than subjective belief or unsupported speculation.” 125 L. Ed. 2d at 481. “The Court acknowledged that “arguably, there are no certainties in science,” but that Bin order to qualify as ‘scientific knowledge, ‘ an inference must be derived by the scientific method.” \textit{Id.}

\textit{Daubert} implicitly endorses a classical definition of scientific method as an inductive process of acquiring knowledge: science proceeds from observation, to hypothesis, to experiment. Scientific knowledge consists of that which can be verified through experiments.

\textit{Daubert}’s underlying philosophical premise of how science is supposed to work in theory, however, does not accurately describe how science operates in practice. As one scientist notes, “[I]nductivism in scientific papers [is] simply the posture we [scientists] choose to be seen in when the curtain goes up and the public sees us.” P. Medawar, \textit{Induction and Intuition in Scientific Thought} (1969), quoted in M. Levison, \textit{The Emperor’s New Suit, or the Scientific Method Exposed}, 2 Journal of Creative Behavior 98, 103 (1978). \textit{Id.}

According to \textit{Daubert}, proposed scientific testimony must be supported by appropriate validation. Scientific validity establishes a standard of evidentiary reliability. 125 L. Ed. 2d at
481. In a case involving scientific evidence, evidentiary reliability (i.e., trustworthiness) is based upon scientific validity (i.e., does the principle support what it purports to show?). Id. n.9.

Whether scientific testimony will “assist the trier of fact” involves a relevance determination. The Court describes the relevance determination as one of “fit.” Id. “Fit” is not always obvious; the concept relates to scientific validity. Id., at 481-82. “Rule 702’s ‘helpfulness’ standard requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility.” Id., at 482.

2. The Judge’s Gatekeeper Role Under Evidence Rule 702. The Daubert decision has been widely reported as granting the judge a “gatekeeper” role with respect to the admissibility of scientific evidence. It does. The Daubert dissenters acknowledge this role, but add a caution: while “Rule 702 confides to the judge some gatekeeping responsibility in deciding questions of the admissibility of proffered expert testimony,” it should not impose “on them either the obligation or the authority to become amateur scientists.” 125 L. Ed. 2d at 487.

Practitioners need to be mindful of the following points outlined in Daubert for dealing with scientific evidence:

- Faced with a proffer of expert scientific evidence, the trial judge must determine at the outset, pursuant to Rule 104(a), governing preliminary questions of the admissibility of evidence, whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue.

- The judge’s determination involves a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue.

- A key question to be answered in determining whether a theory or technique is scientific knowledge that will assist the trier of fact is whether the theory or technique can be and has been tested. The concept of falsification is important here, for scientific methodology today,
the Supreme Court notes, “is based on generating hypotheses and testing them to see if they can be falsified . . . .”

- A pertinent consideration is whether the theory or technique has been subjected to peer review and publication. This factor, like others, is relevant, but not dispositive. Submission to the scrutiny of the scientific community is a component of “good science,” because it increases the likelihood that substantive flaws will be detected.

- The court ordinarily should consider the known or potential rate of error of the particular scientific technique under review and the existence and maintenance of standards controlling the technique’s operation.

- “General acceptance” can have a bearing on the inquiry. Widespread acceptance can be an important factor in ruling particular scientific evidence admissible. A known technique that has been able to attract only minimal support within the relevant scientific community may properly be viewed with skepticism.

- The focus on the Rule 702 inquiry must be on principles and methodology, not on the conclusions that they generate.

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2 Justices Rehnquist and Stevens, who concurred and dissented in part, were at a loss to know what the majority meant by the concept of “falsifiability.” 125 L. Ed. 2d at 487.

The concept of falsifiability is abstract and may well be misunderstood and misapplied by lawyers and judges. The origin of the concept is attributed a philosopher of science, Karl Popper. Scientists dispute its bounds and application. The concept has been described in more detail as follows:

The critical element that distinguishes the empirical sciences from other forms of knowledge is the requirement that scientific hypotheses be empirically falsifiable . . . . If the results if an empirical test agree with the predictions derived from a hypothesis, the hypothesis is said to be provisionally corroborated, otherwise, it is falsified . . . . A hypothesis that is not subject, at least in principle, to the possibility of empirical falsification does not belong in the realm of science.

The requirement that scientific hypotheses be falsifiable rather than simply verifiable may seem surprising at first. It might seem that the goal of science is to establish the “truth” of hypotheses rather than attempt to falsify them.

A. Strahler, Understanding Science: An Introduction to Concepts and Issues. 58 (1992) (quoting F. Ayala, “Philosophical Issues” from ch. 16 of T. Dobzhansky, et al., Evolution (1977)). Strahler notes that, “In recent years, the principle of potential falsification as an absolute criterion that every scientific hypotheses must satisfy has come under fire from philosophers of science.” Id, at 61.
As can be gleaned from the foregoing list of pertinent considerations, the former Frye threshold standard has been relegated to the lesser status of an important, but not dispositive factor. This change in ranking means that scientific evidence can no longer be analyzed with a singular focal point in federal court. Rather, lawyers will necessarily have to perform a much more detailed and rigorous examination of underlying scientific methodologies, which can be daunting, especially when one is not well-versed in the statistical and mathematical language through which most scientific knowledge is expressed.


1. Threshold Applicability of the Frye Test for Novel Scientific Evidence in Criminal Cases. The most recent, in-depth treatment of the admissibility of scientific evidence in Washington is State v. Cauthron, 120 Wn.2d 879, 846 P.2d 502 (1993) (en bane), a criminal case involving the ‘admissibility of DNA typing and matching evidence. Cauthron held that the procedure of DNA typing at issue was “generally accepted” in the relevant scientific community, but that scientific testimony that the defendant’s DNA “matched” that of the perpetrator was not supported by valid probability statistics. The court remanded the case for a determination of whether the statistical evidence concerning DNA matching was valid before permitting expert testimony as to DNA typing.

   The Frye standard is applicable in Washington as a threshold standard for determining if evidence based on novel scientific procedures is admissible:

   Under Frye, a court is to determine if the evidence in question has a valid, scientific basis. Because judges do not have the expertise required to decide whether a challenged scientific theory is correct, we defer this judgment to scientists. This inquiry turns on the level of recognition accorded to the scientific principle involved--we look for general acceptance in the appropriate scientific community. * * * If there is a significant dispute between qualified experts as to the validity of the scientific evidence, it may not be admitted.

Cauthron. 120 Wn.2d at 886-67 (citation omitted).

   The Washington Supreme Court recently reaffirmed the applicability of the Frye test in State v. Riker, 123 Wn.2d 351, 869 P.2d 43 (1994), in which the court held that application of
the principles of the battered person syndrome on a criminal defendant’s actions in a nonbattering, nonintimate relationship had not achieved general acceptance in the appropriate scientific community. With reference to the Frye standard, the court stated:

We recognize that the United States Supreme Court has recently held that the Frye standard is not applicable under the Federal Rules of Evidence. * * * Nevertheless, in this state, we continue to adhere to the view that the Frye analysis is a threshold inquiry to be considered in determining the admissibility of evidence under ER 702. However, we find that many of the “general observations” made by Justice Blackmun in the majority opinion may be of use to trial judges in making the threshold Frye determinations.

Id., at 360 n.1 (noting that the battered person testimony would have been inadmissible even under the Daubert analysis).

As Riker notes, a preliminary determination of admissibility is conducted during a Frye hearing. See, e.g., State v. Kalakosky, 121 Wn.2d 525, 530, 539-40, 852 P.2d 1064 (1993)(“The trial court held a lengthy Frye hearing regarding the general acceptance of the DNA theory and the restriction fragment length polymorphism (RFLP) laboratory test in the relevant scientific community and the reliability of the particular test conducted in [the] case”; the supreme court held that “issue of human error in the forensic laboratory,” that the defendant contended occurred with respect to his test, was properly analyzed under Rule 702 and not under the Frye test); State v. Wheaton, 121 Wn.2d 347, 350, 850 P.2d 507 (1993) (after a Frye hearing, the court ruled that the “defendant had met his burden of showing that psychiatric principles and clinical knowledge about [multiple personality disorders] had gained general acceptance in the field of psychiatry”).

The trial court’s decision to admit or exclude novel scientific evidence pursuant to the Frye test is subject to a de novo standard of review on appeal (in contrast to remaining ER 702 issues which are subject to an abuse of discretion standard). Cauthron, 120 Wn.2d at 867. Once the Washington Supreme Court has made a determination that the Frye test is met as to a specific novel scientific theory or principle, trial courts may generally rely on that determination in the future, unless a party produces new evidence that seriously questions the continued general
acceptance or lack of acceptance as to the scientific theory or technique within the relevant scientific community. See Cauthron, 120 Wn.2d at 888 n.3.

Cauthron works a slight change in the law. Formerly, the test for admissibility of scientific testimony was previously set forth as a three-part test, as in State v. Swan, 114 Wn.2d 613, 790 P.2d 610 (1990), cert. denied, 498 U.S. 1046 (1991). The second part of former three-part test was the Frye determination.

By carving out the Frye determination and by limiting its application to novel scientific arguments, appellate courts retain the ability to review novel scientific claims rigorously under a de novo standard of review. The bulk of expert witness admissibility issues under ER 702, however, are left the trial court’s discretion. Those determinations are less apt to be reversed on appeal in light of the abuse of discretion standard of review applicable to ER 702 determinations.

2. Sparse Application of the Frye Test in Civil Litigation. Washington law offers little guidance on the admissibility of scientific evidence in civil litigation. Almost all Frye cases are criminal cases. However, Washington’s evidence rules apply to both criminal and civil proceedings. The Frye test has been construed as applicable in civil cases as a threshold matter, albeit infrequently and never with an extended discussion.

In Sanchez v. Haddix, 95 Wn.2d 593, 627 P.2d 1312 (1981), the Frye test appears to have been applied. Haddix involved wrongful death claims arising out of an automobile accident. The plaintiff’s expert witness attempted to offer testimony about the speed in which the decedent’s automobile was moving, based upon an experiment he had performed related to shattered glass found at the accident scene. Id., at 595. The experiment was meant to prove that the decedent’s car had been barely moving at the time of the accident. The supreme court held that the trial court did not abuse its discretion in excluding evidence of the glass experiment.

The conditions of the collision and experiment were patently dissimilar. It is enough to note that one involved the collision of two vehicles, with the glass

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3 The three-part test was as follows: The admissibility of expert testimony under ER 702 depends on whether (1) the witness qualifies as an expert, (2) the opinion is based on an explanatory theory generally accepted in the scientific community, and (3) the expert testimony would be helpful to the trier of fact. Swan. 114 Wn.2d at 655.
being ejected by inanimate forces, while the other employed only one vehicle, with glass being dropped by human hand. There was no showing that experiments of this kind are an accepted and a proven method of accident reconstruction. Id., at 596 (emphasis added).

The Frye test was applied in Burkett v. Northern, 43 Wn. App. 143, 715 P.2d 1159 (1986), an automobile personal injury lawsuit involving thermographic evidence. Thermography is a technique of recording heat energy emissions radiating from the body in photographic form. Proponents of the technique claim that an injured part of the body radiates more heat than other parts of the body and therefore provides an analogue for measuring soft tissue injuries and pain. Id., at 144. The court of appeals reversed a trial court’s admission of thermographic evidence, holding that the record failed to establish thermography was sufficiently reliable and accepted in the medical community. Id., at 147.

In Intalco Aluminum Corp. v. Dept. of Labor and Industries, 66 Wn. App. 644, 833 P.2d 390 (1992), the court of appeals, without mentioning the Frye standard by name, held that the “general acceptance” standard pertains to the methods used by, and not the conclusions of, expert witnesses. Id., at 662. Intalco’s distinction between methods and conclusions is supported by the Daubert observation that ER 702 does not apply to expert witness conclusions.

The issue of the Frye test’s applicability in civil cases is being raised in a case pending before Division I of the Court of Appeals, Reese v. Stroh, No. 33128-1-1. Reese involves medical malpractice allegations. The plaintiff contended that his treating physician’s failure to prescribe a certain drug, Prolastin™, resulted in an exacerbated lung condition. The trial court ruled that the plaintiff’s expert’s testimony endorsing a Prolastin™ course of treatment was inadmissible, since epidemiological studies had not demonstrated that the Prolastin™ treatment sought was efficacious. The plaintiff’s expert was the leading researcher in the field, however. Oral argument of this case occurred at the end of January 1994.

The plaintiff argued that the Frye test applies only in criminal cases in Washington, given the relative absence of Washington authorities applying the test in a civil context. The plaintiff pointed out that a leading law review on the Frye test, Gianelli, The Admissibility of Novel
Scientific Evidence: Frye v. United States, a Half Century Later, 80 Colum. L. Rev. 1197 (1980), did not even discuss the use of the Frye test in civil litigation.

The defendant argued the evidence would have been inadmissible under any test developed for the admission of scientific evidence, whether it be the Frye test, the Daubert standard, or a standard that one amicus brief recommended be followed, i.e., that enunciated in a Fifth Circuit case, Christopherson v. Allied-Signal Corp., 939 F.2d 1106 (5th Cir. 1991), cert. denied, 117 L. Ed. 2d 506 (1992).

Reese v. Stroh highlights the particular difficulties faced when the Frye test is applied to medical advances. The practice of medicine is part “art” and part “science.” “Medical knowledge” is different than “scientific knowledge.” It is a peculiar hybrid of “scientific” and “specialized” knowledge, as those terms are used in ER 702. “Specialized” knowledge appears to encompass “art” as that term was employed in the definition of expert testimony set forth in Frye.

Emerging medical treatments may (or may not) prove very useful to patients, even if epidemiological evidence has not been gathered (perhaps for economic reasons) or for other reasons does not allow for a more precise evaluation of the efficacy of the course of medical treatment under review. The key issue in medical malpractice cases is not so much the time of discovery of the novel treatment, but the natural lag time it takes for novel treatments to be incorporated into prudent medical practice. Whether a novel medical treatment should be prescribed as a course of treatment is an issue that has as much to do with medical economics as it does with the advances of pure science. Medical economists perhaps could provide more guidance on this issue.

As it relates to Reese v. Stroh, a more fruitful Frye-like inquiry might be on remand to determine when medical practitioners knew or reasonably should have known about the existence of the Prolastin™ course of treatment and when treating physicians should have been expected to incorporate this treatment into their daily practice in light of prevailing medical
economics and any other pertinent considerations. Relying on the testimony of a leading researcher presents obvious issues of self-interest and bias; the research agenda needs applications for continued grant funding. His testimony is located the research frontier. As discussed more fully in the next section, little or no consensus is possible with respect to scientific knowledge located at the research frontier.

IV.

**SCIENTIFIC CONSENSUS AND THE SOCIOLOGY OF SCIENCE.**

The Frye test is based on a consensus-based model of the significance of scientific discoveries. How scientists actually arrive at communal evaluations of what constitutes the cognitive content of science is itself being analyzed and tested through a field of study known as the sociology of science. One author summarizes the significance of this sociological research:

> Investigations into the social structure and operations of science have revealed a picture of scientific knowledge that is distant from the logically coherent but highly abstract accounts constructed by philosophers of science. This new, and in many ways disconcerting, picture of science has particular relevance for the law, because what is at issue in most legal proceedings is precisely the social dimension of science: the matrix of social practices, conventions, institutions, and interests that sustains scientific progress and gives legitimacy to particular scientific “facts.”


A. **Core Scientific Knowledge and the Research Frontier.**

Sociologists distinguish between core scientific knowledge and the research frontier. “The core consists of a small set of theories, analytic techniques, and facts which represent the given at any particular point in time.” S. Cole, *Making Science; Between Nature and Society* (Harvard University Press 1992), at 15. The core is where true scientific consensus can be located; this is textbook knowledge. Core scientific knowledge should be readily admissible under federal and state law. The other component of scientific knowledge, the research frontier, “consists of all the work currently produced by all active researchers in a given discipline. The
research frontier is where all new knowledge is produced. Most observers of science agree that the crucial variable differentiating core and frontier knowledge is the presence or absence of consensus.” Id.

Stephen Cole, a leading sociologist of science, explains the lack of consensus found at the research frontier:

An examination of frontier knowledge as opposed to core knowledge supports the view that science is not a rule-governed activity which enables scientists to achieve consensus. * * * [T]here may not be significantly more consensus in evaluating new scientific ideas than there is [in] judging nonscientific items such as human beauty, new works of art, or Bordeaux wines.

S. Cole, Making Science, supra, at 19.

Novel scientific testimony is almost by definition located at the research frontier. This categorization is of tremendous significance. It means that most novel scientific testimony should not be admitted into evidence, if the standard for general acceptance is being applied in a rigorous fashion. Such testimony will not have entered into the core of scientific knowledge that both Frye and Daubert consider to be valid and trustworthy. Since this result generally favors defendants in civil cases or plaintiffs, one can naturally expect defendants to employ sociological analysis more and more in connection with the admissibility of novel scientific testimony.

B. Differing Ways in Which Scientists Communicate.

Sociological studies show that scientists speak a different language than we do. Scientists engage in two basic forms of discourse when discussing their work. The formal mode of expression, as epitomized in scientific papers, is labeled by sociologists as an “empiricist repertoire” of communication. As part of this formal empiricist mode of discourse, scientific conclusions are made to appear as if they follow unproblematically from empirical evidence produced by means of impersonal experimental procedures.

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4 This discussion is drawn from G. Gilbert and M. Mulkey, Opening Pandora’s Box; A Sociological Analysis of Scientists’ Discourse (1984).
The empiricist repertoire is for public consumption. When challenged, the scientist is apt to resort to an empiricist repertoire selection of language in describing the scientific topic at hand. It creates a mode of discourse that conforms to a positivist definition of the scientific method.

When scientists describe their work informally among themselves, their discourse displays a “contingent repertoire” of communication. In informal settings, scientists are more apt to present their actions and beliefs as heavily dependent on speculative insights, prior intellectual commitments, personal characteristics, indescribable skills, social ties and group membership. In informal discourse, scientists construct accounts of their work and the work of others in a radically different way than that appearing in formal papers.\(^5\)

The sociological distinction between empiricist and contingent repertoires is of practical importance in evaluating the Frye test. The “general acceptance” standard may be met by introducing scientific literature. The major premise of a scientist’s specialty consists of the leading articles or treatises in the field. Some of these articles may have been co-authored by the scientist witness. Articles by other scientists may offer opposing viewpoints.

Sociological research shows that such papers and studies are a product of the empiricist repertoire and as such:

- Tend to leave out the dependence of experimental observation on theoretical speculation.
- Do not explain the degree to which experimenters are committed to specific theoretical positions.
- Are often written in rule-like fashion, but leave out experimental steps or other information, so that exact compliance or replication of the experiment is virtually impossible.\(^6\)

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\(^5\) Gilbert and Mulkay, * supra, at 56-57.

A spoof of a scientific abstract\footnote{This is taken from N, Salkind, Understanding Creative Writing by Research Scientists; A Simple Guide to Translating and Interpreting Abstracts, 10 Journal of Creative Behavior 224 (1976) .} illustrates the distinction between empiricist and contingent repertoires:

While it has not been possible to provide definite answers to specific questions\footnote{The experiment did not work out, but I figured I could get some publicity anyway.} regarding the investigation of (insert topic), it is generally believed\footnote{I think.} and in some scientific communities has long been known\footnote{I haven’t bothered to look up the original reference.} that the consequences of such research are of great theoretical and practical importance.\footnote{Interesting to me.} In the present research, a total of (insert number) samples were selected\footnote{The results of the other samples did not make sense and were ignored.} for detailed study using modified random procedures.\footnote{I got who I could to volunteer.} During the course of analysis, data from certain samples was excluded due to extreme uncharacteristic scores,\footnote{I dropped the deck.} while the remaining (insert number) sets of data were employed in the main analysis.\footnote{I put the deck together but could only salvage a few samples.}

When seeking to attack the general acceptance of scientific evidence, lawyers are required to engage in a pattern known to scientists as experimenter’s regress. This concept is explained as follows:

When scientists wish to contradict each other’s findings (as routinely happens in legal proceedings), the indeterminacy of experimentation provides a natural pathway of attack: Were the instruments properly calibrated? Were background conditions stably maintained? Was the experiment adequately controlled? Were the resulting inscriptions correctly interpreted? Was there a valid statistical analysis of the data? There is virtually no limit to the questions that can be asked about experiments as long as scientists have an interest in challenging one
another’s observations. A consensus develops around particular scientific theories, methods, and claims only when the incentives for attacking them disappear. Claims that no scientist any longer wishes to challenge or unpack are said to be “black boxed”; such claims constitute the expanding and, for the most part, invulnerable core of scientific knowledge.


Application of any consensus-based test, such as the Frye test, should be evaluated in light of the foregoing sociological research findings. The Frye test is based on only one criterion of the validity a scientist’s work—peer review and consensus. That may or may not be a true barometer of the validity of the scientific evidence at issue.

Sociologists studying scientific endeavors are analyzing many other features of the daily work of scientists. One important concept being explored relates to the “boundaries” scientists establish around particular fields of study. A scientist’s response to criticism of his or her work will vary depending upon the source of the critical comment. Since the Frye test locates general acceptance within particular fields, sociological research into “boundaries” may yield relevant information for lawyers.

While sociological research may yield information that is relevant in court proceedings, it should be noted that the vocabulary being developed by sociologists can sometimes be more opaque than the matters being investigated. For example, the Judicature article notes that the concept of “deconstruction” is being employed by sociologists of scientists to describe scientific texts or inscriptions. In other words, a mode of literary criticism is being imported into a social science, and perhaps eventually into the courtroom. This may hinder and obscure otherwise fruitful analysis.

“General acceptance” is and will continue to be an important factor in determining whether novel scientific testimony should be admitted into evidence. Sociological analysis identifies critical issues of interest. Lawyers and courts will need to become more conversant in sociological issues and research findings in order to evaluate scientific testimony meaningfully.