A Guide to Expert Testimony for Scientists

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This Guide comes in three parts. Part One provides concise summary—everything a scientist should know about the use of expert witnesses in legal and legislative situations for the purposes of the Expert Witness Training Academy (“EWTA”). Part Two digs a bit deeper, to provide additional context about the most important modern issues and controversies about the use of experts. Part Three includes the most important legal authority (rules of evidence and case law) pertaining to experts. Where I have provided a citation to legal authority, you will find that legal authority in Part III.

Part One will help orient you, guide you, and provide a quick review when you need it. Part Two will provide greater depth so that you understand what is at stake for the lawyers, judges, and other decision-makers who will use your research and testimony in controversial settings. Part Three provides the primary legal authorities for you should you wish to explore them. However, as an expert witness and a student in the EWTA, you will not likely need to delve into these legal materials.

Part One: The Nuts and Bolts

When Does the Legal System Rely on Expert Witnesses?

The American legal system often relies on expert witnesses to help those persons designated by the law, or by other authority, as “finders of fact.” The paradigm of the “finder of fact” is the American jury. In contrast, judges are generally limited to making legal rulings and instructing the jury on the law. There are times, however, when a judge serves as a “finder of fact”—when, for example, the parties do not have a right to a jury trial or when they waive that right.

Expert testimony is not automatically allowed in all legal contexts. In the courtroom, and frequently in other legal situations, the key requirement is whether the scientific, technical, or other specialized knowledge will assist a non-expert “finder of fact” in determining disputed factual issues, or public policy issues resting on disputed facts. Fed. R. Evid. 702. The idea behind this rule is that where the subject of the testimony is something an ordinary juror could understand, we do not want an expert’s opinions to replace or impinge on the exercise of the common sense of the typical juror.

The most common setting for expert testimony is in a courtroom at a trial, in which a jury or a judge (when serving as “the trier of fact”) makes the factual decision. But an expert may also be called to testify at an arbitration, in which the parties have agreed to have one or more

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designated individuals—who may or may not be lawyers or judges—decide the dispute. Or, an expert may be asked to testify in an administrative proceeding (such as an environmental agency hearing) or at a legislative hearing. The common denominator for all of these situations is that one or more individuals must make a decision about the facts under conditions of uncertainty—and need an expert’s knowledge, research, and opinions to help inform their judgment.

In a courtroom, experts may be asked to testify by one party. When that party presents its expert’s testimony, it does so through “direct examination,” a question-and-answer style of presentation familiar to anyone who watches television or movies! The “direct examination” of an expert witness will be followed by the “cross-examination” (more Q and A) by the opposing party, in which the opposing lawyer tries to show that the expert is not worthy of belief because of weaknesses in the expert’s credentials, omissions in the expert’s data, errors in the expert’s research techniques, or any other problem with the expert’s testimony. The main difference in direct examination and cross-examination, from an expert witness’s point-of-view, is that cross-examination questions will be leading questions—questions framed so that they suggest their own answer, and the witness is forced to answer only “yes” or “no.”

**What are the Purposes of Expert Testimony?**

Expert testimony can serve several purposes, whether presented at an administrative or legislative hearing, arbitration, pre-trial hearing, or trial. Experts may do one or more of the following:

- Provide the decision-maker (legislator, arbitrator, judge, or jury) with factual information and background to provide the decision-maker with an adequate context for the decision.
- Apply expert knowledge to the facts of a case and render an opinion about the facts, such as whether certain conditions actually caused an effect.
- Explain scientific principles and theories to the decision-maker.
- Explain testing procedures used as a basis for the expert’s opinion.
- Extrapolate from the actual facts or hypothetical facts and rendering an opinion regarding the likelihood of an event or occurrence. Experts may speculate on events or occurrences because of their special knowledge or training.
- Provide an opinion that contradicts or undermines the opinions or conclusions of an expert who testified for the opposing party.

**Who Does the Law Consider to Be Expert?**

A person who has specialized knowledge gained by education, research, training, experience, or skill may be qualified as an expert. Fed. R. Evid. 702. In a trial context, the judge decides—as a preliminary issue—whether an individual is sufficiently qualified to provide expert testimony.

If a judge decides to allow the expert to testify, or the parties agree (or “stipulate”) that the person is an expert, the expert’s qualifications and experience continue to be important
information for the “trier of fact” to use in evaluating the expert’s credibility, especially when there are conflicting expert opinions about the issue in dispute. Thus, even though the expert’s credentials may be extensively examined and tested in front of a judge in a pretrial hearing (called a “Daubert hearing” in federal court, and a “motion in limine” in state court), the parties will present those credentials again during direct-examination, and they will be challenged (again) on cross-examination. This is discussed more in Part Two.

What are the Legally Permissible Bases of an Expert Opinion or Conclusion?

This question captures the special status of an expert witness in contrast to ordinary witnesses. In general, non-expert witnesses may only testify on facts or matters within their first-hand knowledge: what the witness saw, heard, smelled, touched, or tasted. Fed. R. Evid. 701. A non-expert witness (sometimes called a “lay” witness) can only testify in the form of an opinion or conclusion if the testimony is based on that first-hand knowledge and cannot be described in a more precise way. Fed. R. Evid. 701. For example, a lay witness may want to testify that she heard a “loud” noise. That statement that the noise was “loud” is technically a conclusion or opinion. However, where the party offering the testimony can show that (1) the witness was in a position to hear a noise, and (2) the witness cannot communicate in any more precise way (such as how many decibels the noise registered), the witness may be permitted to testify in the form of her conclusion that the noise was “loud.” Fed. R. Evid. 701.

Expert witnesses may also use first-hand or personal knowledge of the facts acquired before or at the hearing, as a basis for their testimony. However, unlike lay witnesses, experts may use much wider range of information as the basis for their testimony, including:

- Information obtained from other experts, documents, records, files, witnesses, and other sources, prior to or during the hearing or trial;
- Evidence, including testimony, heard by or reported to the expert during the case;
- Evidence that otherwise satisfies the legal standards of the jurisdiction (more about this below).

However, experts may be limited in what they can tell the decision-maker about the basis of their opinion or conclusion. Sometimes, in forming an opinion, an expert researches and evaluates materials other than those produced by the expert him or herself, such as the research of other experts in the relevant field. Under some evidence rules, the expert may not be allowed, initially, to tell the jury about this extra research, because its original source is not on the witness stand, subject to cross-examination (so the expert’s outside research would be called “hearsay”). Fed. R. Evid. 703.

If you think about it, this evidence rule makes some sense—if one courtroom expert can just echo the research of other experts who are not present, the party presenting the one courtroom expert can save a lot of money in expert witness fees! But if the opposing party’s attorney starts to question (on cross-examination) the grounds for the in-court expert’s opinion or conclusions, then the expert can defend his or her opinion by talking about the other research relied upon. This is why attorneys must pay close attention to the questions they ask their
experts on “direct” examination as well as the questions they ask opposing experts on “cross-examination.” You may be asked to help the attorney craft the right questions at the right time to bring out the strength of your opinions and conclusions, and to help show the problems in a different expert’s testimony.

What is the Controlling Law Regarding the Use of Expert Witnesses?

The law of expert witnesses depends on where the legal dispute is to be resolved: federal or state court? And if state court, which one of the 50 states? Each one of the 50 states and the federal system are separate legal jurisdictions, with their own specific rules of evidence and body of judicial rulings regulating the qualifications of experts and limitations on expert testimony.

Fortunately, over half of the states tend to pattern their own evidence rules after those followed by the federal courts—the Federal Rules of Evidence—so one can group the different approaches into a few different “schools” or approaches to scientific expert testimony. These different approaches are discussed in more detail in Part Two of this manual.

How Does an Attorney Prepare to Question an Expert Witness?

There are several ways to prepare to examine an expert witness, depending on whether the expert will testify on behalf of an attorney’s client, or is an opposing expert witness. If the attorney has hired an expert witness to testify on behalf of a client, the attorney may work with that expert to develop his or her testimony into the question and answer format of direct examination. However, the attorney might also hire an expert who is not going to testify at the trial to help the attorney prepare for trial. This attorney does this because the non-testifying expert can work confidentially along with the attorney and the client—the client’s opposition generally cannot question this non-testifying expert, so the attorney and client can be more candid with the non-testifying expert about the strengths and weaknesses of the case without worrying that the other side will discover this information.

The expert who is going to testify at a civil trial must generally prepare an “expert report” as part of the pretrial discovery process. The exact content of the expert’s report depends on the rules of the jurisdiction, but in general, this expert report will contain information about the expert’s credentials and experience, as well as a summary of the opinions and conclusions of the expert along with the bases of those opinions and conclusions. For this EWTN exercise, you have been provided with the experts’ reports, as well as their C.V.s—these will be the main materials you will use to prepare to question the experts (in the role of an attorney) and to play the role of the experts.

An attorney would also likely depose the other side’s expert witnesses in an attempt to get more detail about whether the expert is truly qualified to testify at trial, and to prepare to cross-examine the expert if the expert is permitted to testify at trial. If an attorney can show that the expert is not qualified to testify, or has used unreliable methods or has unreliable conclusions, the attorney may want to bring a pretrial motion to prevent the expert from
testifying at all. In a deposition, the attorney will try to be exhaustive—pinning down all the bases and supporting materials for the experts’ opinions so that if the expert changes his or her testimony at trial, the attorney can confront the expert with his or her inconsistency. Finally, in the deposition, the attorney has a chance to challenge the expert and see how credible and calm the expert can be under the pressure of questioning.

If I am Assigned the Role of an Attorney During the EWTA Exercise, What Should I Ask the Expert Witness about During a Deposition or a Direct Examination? (And, if I am Assigned the Role of the Expert Witness in a Deposition or Direct Examination, What Should I Be Prepared to Answer?)

We will discuss this more in briefings on the topics of depositions and direct examinations, but in general, the “attorney” taking a deposition or doing the direct examination should be prepared to ask the following kinds of questions (and the “expert” should be prepared to answer them):

- The qualifications and experience of the expert.
- The opinions and conclusions of the expert.
- Explanation of each opinion and conclusion.
- The bases of each opinion and conclusion of the expert (such as the general theories or principles as well as facts that support an opinion or conclusion).
- The sources of information relied upon by the expert.
- Standard tests or routine procedures used to generate the opinion or conclusion.
- Special tests or procedures used to generate the opinion or conclusion.

The main difference between the questions asked during a deposition and the questions asked on direct examination is that the questions asked on direct examination are structured carefully in advance so that the party can communicate its expert’s story in a compelling way. In a deposition, the opposing side has prepared questions for the expert in advance, but asks the questions in a more free-flowing manner, trying to discover what the expert really knows, and what the weak points may be in the expert’s conclusions or underlying sources, methods or data.

If I am Assigned the Role of an Opposing Attorney During the EWTA Exercise, What Should I Ask the Expert About During Cross-Examination? (And, if I am Assigned the Role of the Expert Witness, What Should I be Ready to Discuss?)

In a pre-trial evidentiary hearing (such as a Daubert motion), an arbitration, or a trial, the side opposing the expert witness is given a chance to question the expert to test whether the expert is truly qualified, and can provide reliable opinions and conclusions. This process of “testing” or “challenging” the expert witness is generally called “cross-examination.”

If you are assigned to cross-examine an expert, you should prepare questions that test and challenge the witness on the following subjects (if you play the expert, you should be ready to answer questions on these topics):
• Lack of proper qualifications, credentials, or experience for the subject of the testimony;
• Whether the expert is a “professional expert,” who makes a substantial part of his or her living from testifying as an expert instead of doing non-litigation research.
• Existence of a financial interest in the subject of the testimony or the testing procedures that lead to the opinions or conclusions;
• Other biases or prejudices (is the expert a friend, a disgruntled past or current employee, or past business associate of a party?);
• Unreliable sources of information;
• Insufficient facts or data;
• Lack of thoroughness in investigating the facts or data;
• Insufficient testing of the facts or data;
• Lack of validity and reliability in testing of facts or data;
• Existence of other causes or explanations for conclusions or outcomes;
• Show differences of opinion among experts;
• Ask for different outcomes or opinions if the facts or assumptions are those of the opposing side, rather than the facts or assumptions the expert’s lawyer gave the expert.

We will spend a fair amount of time showing you how attorneys craft questions for cross-examination, because these questions are sometimes difficult to create, which may require attorneys to consult with their experts to draft them. Moreover, cross-examination questions can be difficult or frustrating for the expert to answer because they often call for only a “yes” or “no” answer, limiting the expert’s ability to control the response.
Part II: Controversy Regarding Scientific Experts

Expert witnesses need to understand that expert testimony is the subject of much debate in American courtrooms. The use of expert testimony on scientific issues, especially, is often fiercely contested because there is so much at stake—in the case of complex civil cases, large monetary awards, in the case of criminal prosecutions, an individual’s liberty. Attitudes toward expert testimony have changed. In the past thirty years, both federal and state courts have changed their evidentiary rules for the use of scientific expert witnesses, as they attempt to balance the desire for more reliable expert testimony with the cultural demand for and constitutional requirements of the American jury trial. This Part of the Guide provides expert witnesses an overview of the debate and the development of case law and rules, particularly on the federal level, aimed at tightening the standards for expert testimony—especially expert opinions resting on scientific principles and data. The cases cited in this section may be found in Part III of the Guide, if you wish to read them.

In general, U.S. state and federal courts do not have separate rules of evidence for criminal and civil cases, although a few individual evidence rules may sometimes contain separate provisions for criminal and civil cases. The rules regarding expert testimony, however, treat civil and criminal cases alike—at least in theory.

The contemporary movement for the reform of expert testimony in the U.S. began in the context of complex civil litigation, especially toxic tort and products liability cases, which could ultimately be decided by a lay jury. One cannot over-emphasize the significance of this special context. Of course, jurors are not the only decision-makers who struggle with the relationship between law and science in the courtroom. However, one cannot separate the issue of expert testimony reform from the topic of tort law reform, and more specifically, judicial control over jury verdicts. Behind the veneer of the search for more accurate decision-making in the adversary system is strong financial motivation—a growing concern for the high cost of trying complex cases that had the potential to result in unpredictable and substantial jury verdicts.

A. The Development of Expert Testimony Rules in the United States

Sharp criticism of the use of experts in American courtrooms can be traced back to the end of the nineteenth century. However, the current American rules for the admissibility of expert testimony stem from the early twentieth century. The dominant expert evidence rule of the twentieth century was set forth in Frye v United States, in which the District of Columbia Circuit Court of Appeal affirmed a trial court’s decision to exclude expert testimony regarding a

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2 The Sixth Amendment to the U.S. Constitution provides a right to jury trial in criminal cases. The Seventh Amendment provides a limited right to a jury trial in civil cases, stating in relevant part, that “In suits at common law . . . the right of trial by jury shall be preserved.”


4 M.A. Berger, “Upsetting the Balance between Adverse Interests: The Impact of the Supreme Court’s Trilogy on Toxic Tort Litigation” (2001) 64 Law and Contemp. Prob. 289.

lie detector test based on changes in systolic blood pressure.\textsuperscript{6} The court held that scientific findings must “be sufficiently established to have gained general acceptance in the particular field in which it belongs.”\textsuperscript{7} The court rejected the expert’s testimony because the lie detector test “ha[d] not yet gained such standing and scientific recognition among physiological and psychological authorities.”\textsuperscript{8}

Tal Golan suggests that \textit{Frye} was the first American case to separate the qualifications of an expert from the reliability of the expert’s opinion. In doing so, Golan argues, the \textit{Frye} court resurrected a much earlier idea. In 1782, a barrister of the Middle Temple, George Hardinge, argued that the court should exclude the testimony of John Smeaton, for although the witness qualified as an expert, the theory to which he proposed to testify was not established in science. Lord Mansfield, chief justice of the King’s Bench, was not persuaded—once qualified as an expert, a witness could testify in the form of an opinion. If there were faults with the expert’s opinion, it was up to the opposing side to expose those problems to the jury through cross-examination.\textsuperscript{9} Hardinge’s argument, however, ultimately prevailed in America. \textit{Frye} severed the question of the admissibility of expert testimony into two parts. First, was the witness qualified as an expert by training, education or other experience? Second, was the scientific method or theory that the expert’s opinion relied was fit for the jury to hear?

\textit{Frye} quickly became the majority rule on the admissibility of scientific or novel expert testimony in both federal and state courts. But \textit{Frye} did have its critics, who charged that the “general acceptance test” was overly protective, keeping relevant and reliable evidence away from the jury. \textit{Frye}’s critics pointed out that a new or novel theory is not inherently unreliable or irrelevant. Moreover, it was difficult to determine “general acceptance.” Was a majority of scholars or scientists in a particular field required to demonstrate “general acceptance”? Or would just a substantial number who adhere to a theory be sufficient? And how was the relevant scientific or technical “field” to be defined in an era of ever-growing scientific and technical sub-specialties?\textsuperscript{10}

In 1975, a new approach to expert testimony surfaced when Congress codified the Federal Rules of Evidence. The original version of Federal Rule of Evidence 702 set forth the basic standard for the admissibility of expert testimony:

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.\textsuperscript{11}

\textsuperscript{6} 293 F. 1013, 1014 (D.C. Cir. 1923)
\textsuperscript{7} Ibid.
\textsuperscript{8} Ibid.
\textsuperscript{9} Golan, note 5, 258-259.
However, there was no reference to *Frye* in the text of this rule or its legislative history. In the absence of any authoritative declaration that *Frye* was dead, many federal courts continued to follow *Frye* in evaluating scientific evidence. Other federal courts, however, looked to the text of Federal Rule of Evidence 702, specifically its requirement that expert testimony should “assist the trier of fact” to be admissible. This language, the courts reasoned, required the trial judge who was deciding whether to admit expert testimony resting on scientific methods to apply a flexible test of reliability that differed significantly from the “nose-counting” of acceptance by a scientific or expert community that marked the *Frye* test.

The essence of this “reliability,” or “relevance” test was a common sense notion: unreliable evidence cannot prove a material issue in the case. Thus, if the evidence could not prove an issue in the case, it would not “assist the trier of fact,” especially a jury. Nor would evidence that is unduly overwhelming, confusing or misleading. The relevancy test allowed a trial judge to consider the acceptance of the proffered theory or scientific method by experts in the field, but imposed an independent obligation to consider other factors as circumstantial evidence of the reliability of the evidence, such as the degree to which the method or theory has been “exposed to critical scientific scrutiny” or the non-forensic uses to which the scientific technique has been put, among other factors.

Almost twenty years after the adoption of the Federal Rules of Evidence, the U.S. Supreme Court finally decided whether the *Frye* test survived the codification of the Federal Rules. In *Daubert v Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court responded with a resounding no—and yes. The plaintiffs Jason Daubert and Eric Schuller and their parents sued Merrell Dow Pharmaceuticals (Merrell Dow) in California state court, alleging that the children’s birth defects had been caused by the mothers’ ingestion of the defendant’s product Bendectin, a drug prescribed to ameliorate nausea for about 17.5 million pregnant women in the United States between 1957 and 1982. At the time, California was known as a jurisdiction where the court system favored jury trials, and jury trials meant, at least in the rhetoric of corporate defendants, outlandish damage awards. Defendant Merrell Dow responded to the plaintiffs’ claims by using a procedural tool that allowed defendants with a ground of federal jurisdiction to remove the case from the state court to the federal court system.

The Supreme Court held that the Federal Rules of Evidence superseded *Frye*; *Frye* was neither included in the text of the rules nor part of their legislative history. But no sooner had the Supreme Court interred *Frye*’s “general acceptance” standard than it resurrected it,
transfigured as one of several factors for evaluating the reliability of scientific evidence. The other factors mentioned were testability (falsification of the theory), peer review, and error rates.\(^{21}\) The Supreme Court was quite clear that these four factors were neither an exhaustive list of considerations nor a checklist of items that needed to be ticked off one by one.\(^{22}\) Nonetheless, post-\textit{Daubert}, lower courts frequently treated the \textit{Daubert} “factors” as essential ingredients for admissible expert testimony.\(^{23}\)

At this point in the description of admissibility standards, it might be difficult to distinguish \textit{Daubert}’s approach from the relevancy approach, but there is a significant difference. The Supreme Court’s decision in \textit{Daubert} was far more explicit in demanding that scientific expert testimony meet scientific standards. Specifically, the Court stated that the trial court must make a preliminary determination 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.”\(^{24}\)

The Court’s reference to the concepts of scientific validity, reliability, falsifiability and error rates drew fire from Chief Justice Rehnquist, who objected to the Court roving well beyond deciding the precise question before it (whether \textit{Frye}’s “general acceptance” test survived the codification of the Federal Rules of Evidence) to charge federal judges with the obligation to become, in his words, “amateur scientists.”\(^{25}\) Nonetheless, the most lasting point from \textit{Daubert}, on which all of the Justices agreed, was its dominant metaphor: the trial judge must be a responsible “gatekeeper,” keeping the jury sheltered from expert testimony by charlatans peddling “junk science.”\(^{26}\)

In the U.S., the \textit{Daubert} decision is more commonly discussed as the “\textit{Daubert} trilogy,” because two significant U.S. Supreme Court cases followed the initial \textit{Daubert} ruling, adding crucial dimensions to the \textit{Daubert} doctrine on expert testimony. The second chapter of the \textit{Daubert} trilogy came in \textit{General Electric Company v. Joiner},\(^{27}\) when an electrician, who suffered from lung cancer, sued the manufacturer of polychlorinated biphenyls (PCBs) and manufacturers of electrical transformers and dielectric fluid, alleging strict liability, negligence, fraud, and battery. The trial court excluded the testimony of the electrician's experts and granted the defendants' motion for summary judgment, dismissing the case without a jury trial as a matter of law because of a lack of admissible evidence on the issue of causation. The Court of Appeals for the Eleventh Circuit reversed, holding that “[b]ecause the Federal Rules of Evidence

\begin{itemize}
\item \(^{21}\) Ibid, 593-594.
\item \(^{22}\) Ibid, 592.
\item \(^{23}\) D. M. Risinger, \textit{Goodbye to All That, or A Fool’s Errand, by One of the Fools: How I Stopped Worrying About Court Responses to Handwriting Identification (and “Forensic Science” in General) and Learned To Love Misinterpretations of \textit{Kumho Tire v. Carmichael}’ (2007) 43 Tulsa L. Rev. 447, 460 (despite \textit{Daubert}’s direction that the four factors were illustrations, not a checklist, ‘many lower courts have tried to make a code of regulations out of a caricature version of the “\textit{Daubert} factors”’).
\item \(^{24}\) \textit{Daubert} at 592-593.
\item \(^{25}\) Ibid, 600-601 (Rehnquist, C.J. and Stevens, J. concurring in part and dissenting in part).
\item \(^{27}\) 522 U.S.136 (1997).
\end{itemize}
governing expert testimony display a preference for admissibility, we apply a particularly stringent standard of review to the trial judge's exclusion of expert testimony.\textsuperscript{28}

The Supreme Court reinstated the trial court’s ruling, excluding the expert opinions. The Court held that a trial judge's determinations regarding the admissibility of expert testimony should be reviewed for error by appellate courts using the “abuse of discretion” standard of appellate review.\textsuperscript{29} The abuse of discretion standard of review is extremely deferential to the trial court’s decisions, making it unlikely that an appellate court would find error in a trial court’s decision to admit or reject expert opinion. The abuse of discretion standard of review is used for virtually all evidentiary rulings. Applying this standard, the appellate court will not find error unless the trial court’s decision is “manifestly erroneous.”\textsuperscript{30} Put in more colloquial terms, it is not enough for a trial court to simply make a mistake—the trial court’s decision must rise to the level of “abuse” of its analytical powers. It is very rare for an appellate court to reverse a trial court for “abuse of discretion.”

The final case in the Daubert trilogy is \textit{Kumho Tire Company v Carmichael},\textsuperscript{31} in which the Supreme Court extended the trial court’s gatekeeping role and the reliability standard set forth in Daubert to all types of expert testimony, scientific or otherwise.\textsuperscript{32} The plaintiffs in \textit{Kumho}, a family of eight, sued a tire manufacturer for products liability after the right rear tire of their mini-van failed, causing serious injury to all plaintiffs and the eventual death of one of the plaintiffs. The trial court rejected the proffered testimony of the plaintiffs' engineering expert that the particular tire failed due to manufacturing or design defect. As in Daubert and Joiner, the trial court also granted summary judgment against the plaintiffs, because of a lack of evidence of a product defect, an essential issue in the case. The Court of Appeals for the Eleventh Circuit reversed, holding that the trial court erred in applying the Daubert factors to an engineering, or technical expert.\textsuperscript{33}

The Supreme Court reversed the Court of Appeals, holding that Daubert’s reliability requirement applied to all types of expert testimony. Looking to the language of Federal Rule of Evidence 702 on the admissibility of expert testimony, the Court emphasized that the rule extends ‘its reliability standard to all “scientific,” “technical,” or “other specialized” matters within its scope’, not distinguishing different kinds of expertise. The \textit{Kumho} court also clarified an area that had confounded the lower courts since the Daubert decision, explaining the proper role of Daubert’s four-factor test: whether

1. the theory has been or can be tested,
2. the theory has been subjected to peer review,
3. there are standards controlling the operation of the technique or theory, or a known or potential error rate, and
4. general acceptance of the theory or technique.\textsuperscript{34}

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\textsuperscript{28} 78 F.3d 524, 529 (11th Cir. 1996).
\textsuperscript{29} 522 U.S. at 142.
\textsuperscript{30} Ibid. at 141-142.
\textsuperscript{31} 526 U.S.137 (1999).
\textsuperscript{32} 526 U.S. at 141.
\textsuperscript{33} 131 F.3d 1433 (11th Cir. 1997).
\textsuperscript{34} Ibid. at 149.
The *Kumho* court emphasized repeatedly that *Daubert*’s test was to be viewed as “flexible” and not as a definitive checklist of factors to apply in every case.\(^{35}\) The Court was emphatic on this point:

> we can neither rule out, nor rule in, for all cases and for all time the applicability of the factors mentioned in *Daubert*, nor can we now do so for subsets of cases categorized by category of expert or by kind of evidence. Too much depends upon the particular circumstances of the particular case at issue.\(^{36}\)

The Court observed that sometimes the *Daubert* factors might be helpful in determining reliability and sometimes not, depending on the issue at hand. To illustrate its point, the Court used an example of a trial judge analyzing an engineering expert’s experience-based methodology to see if it has produced erroneous results, or enquiring whether such a method is generally accepted in the relevant engineering community. In such a case, the *Daubert* factors might be helpful to determine reliability. In contrast, the Court noted, it would not matter that an expert’s work had been generally accepted by the relevant community if the discipline itself lacks reliability, such as astrology or necromancy.\(^{37}\) The power, the Court declared, is in the hands of the trial court; “the trial judge must have considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable.”\(^{38}\)

Following *Kumho*, Federal Rule of Evidence 702 was amended in 2000 to codify the *Daubert* trilogy. As amended, Rule 702 reads:

> 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, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.\(^{39}\)

The most significant aspect of this amendment is what it did not contain. The drafters of the amendment deliberately chose not to codify the four *Daubert* reliability “factors,” emphasizing, as the Supreme Court did in *Kumho*, that the factors of peer review, error rate, testability, existence and maintenance of standards and controls, and general acceptance were intended as examples of methods the courts could use to determine whether an expert’s methodology and conclusions were reliable, but that these factors were not an exhaustive list, nor was it necessary that all kinds of expert testimony “pass” all four factors.\(^{40}\)

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35 Ibid. at 150.
36 Ibid.
37 Ibid. at 151.
38 Ibid.
39 Fed. R. Evid. 702.
40 Committee Note to Fed. R. Evid. 702.
Moreover, the drafters of the amendment pointed out that since *Daubert*, federal courts had found other factors, not mentioned in the *Daubert* trilogy, to be helpful in determining whether a particular expert’s methodology and conclusions were reliable under the circumstances of the case at hand. These additional factors include: (1) whether the methodology, technique, or research was developed independent of the litigation or was developed for the purpose of providing expert testimony; (2) whether the scope of the expert’s inferences are justified by the data or evidence; (3) whether the expert has considered and can explain why he or she rejects alternate explanations; (4) whether the expert is applying the same level of intellectual rigor to his or her testimony as would be the case in the expert’s daily work; and (5) whether the field of expertise to which the expert belongs is known for reaching reliable conclusions.\textsuperscript{41} The drafters of the 2000 amendment also clarified the burden of proof on the party offering expert testimony; the proponent of the expert evidence must persuade the trial judge that the expert evidence is more likely than not reliable, that is, by “a preponderance of the evidence.”\textsuperscript{42}

Finally, it is essential to stress that although this summary has focused on the development of expert testimony rules in the federal courts, each of the 50 states has its own evidence law, whether embodied in legislative statutes, rules, or case law. The Federal Rules of Evidence serve as a model code for a majority of the states, but many of them deviate from the federal rules in significant ways. For example, even though the state of Minnesota generally follows the federal rules in developing its own evidentiary rules, it may choose not to follow the Supreme Court cases interpreting the identical language in the federal rules, or may choose not to adopt the 2000 amendment codifying those cases. Indeed, Minnesota is one of fifteen states (along with the District of Columbia, which is not a state) that still follows a variant of the *Frye v United States* “general acceptance” test.\textsuperscript{43} These sixteen jurisdictions may be in the minority, but they include some of the most politically and economically important states, such as Arizona, California, Florida, Illinois, Maryland, New Jersey, New York, Pennsylvania, and Washington. Only twenty-five states have adopted *Daubert* or a similar test, while six other states apply the *Daubert* factors with an emphasis on the “general acceptance” factor (coming from *Frye*), and the four remaining states have created their own tests, emphasizing relevancy and reliability.\textsuperscript{44}

**Daubert/Federal Rule of Evidence 702 Checklist:**

To summarize, an attorney who seeks to challenge the admissibility of expert testimony based on scientific, technical or other source of expertise will challenge the evidence based on one or more of the following factors:

- whether the theory has been or can be tested;
- whether the theory has been subjected to peer review;
- whether there are standards controlling the operation of the technique or theory, or a known or potential error rate;

\textsuperscript{41}ibid.
\textsuperscript{42}ibid (quoting Bourjaily v United States, 483 U.S. 171 (1987)).
\textsuperscript{44}ibid.
• whether the theory or technique has been generally accepted in the relevant field;
• whether the methodology, technique, or research was developed independent of the
  litigation or was developed for the purpose of providing expert testimony;
• whether the scope of the expert’s inferences are justified by the data or evidence;
• whether the expert has considered and can explain why he or she rejects alternate
  explanations;
• whether the expert is applying the same level of intellectual rigor to his or her testimony
  as would be the case in the expert’s daily work; and
• whether the field of expertise to which the expert belongs is known for reaching reliable
  conclusions.

B. Problems with the Daubert Trilogy

This subsection of the Expert Guide highlights the problems that have surfaced with the Daubert
approach and its progeny, suggesting why so many states have rejected the Daubert test; the article
first outlines the broader problems with the Daubert approach and then explains more particular
problems with expert testimony that have occurred in jurisdictions adopting Daubert or similar
approaches.

The first sign of trouble following the Supreme Court’s decision in Daubert was that both
the plaintiffs and defendant claimed victory. 45 Ordinarily, this could be dismissed as a public
relations strategy. However, there actually was something for both sides in the Court’s opinion.
The plaintiffs claimed victory, pointing to the Court’s holding that Federal Rule of Evidence 702
did not codify the ‘conservative’ Frye test, which had led to the exclusion of their expert
evidence at the trial court level. 46 In contrast, the defense focused on the Court’s concern about
‘junk science’ and its direction to the trial judge to serve as ‘gatekeeper’ against the introduction

of unreliable evidence. The plaintiffs’ hope that *Daubert* would prove to be a more liberal approach to the admissibility of expert testimony was soon dashed. On remand, the Court of Appeals for the Ninth Circuit, applying the new *Daubert* standard, held that the plaintiffs’ evidence was inadmissible and upheld the summary judgment in favor of the defendant.

The basic critique of *Daubert* is that it is unrealistic, especially given the abilities of legally-trained but not scientifically-trained judges. The argument is that trial judges are simply not equipped to apply the rigorous kind of analysis that the *Daubert* opinion envisions whenever expert testimony is at issue. The general refrain echoes Chief Justice Rehnquist’s lament that federal judges are not equipped to become ‘amateur scientists’. According to one study of over 400 judges, the overwhelming majority of judges have no real understanding of two of the four *Daubert* criteria. Specifically, while 88 percent of the judges reported that “falsifiability” is a useful guideline for assessing scientific evidence, 96% of these same judges lacked even a basic understanding of this core scientific concept. Similarly, 91 percent of the judges reported that they found ‘error rates’ helpful, although when questioned, they had no real understanding of this basic scientific precept. The “judicial incompetence” critique is not dispositive. There is no question that as the heightened responsibility to engage in ‘gatekeeping’ began to take root, judges in jurisdictions applying the *Daubert* factors were inundated with opportunities to ‘enhance’ their education in critical analysis of natural science and social science evidence. However, other critiques have had more durability.

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48 *Daubert* v Merrell Dow Pharmaceuticals, Inc., 43 F.3d 1311 (9th Cir. 1995).
49 *Daubert* at 600–601 (Rehnquist, C.J. and Stevens, J. concurring in part and dissenting in part).
51 Ibid at 444-445.
52 Ibid at 445.
One of the most difficult critiques is that the combination of the directive to become a “gatekeeper” of expert testimony has become an encroachment on the role of the jury. What was largely unnoticed in the immediate aftermath of the *Daubert* trilogy was the special procedural posture of these cases—the question of the admissibility of expert testimony was decided in the context of a motion for summary judgment (also called judgment as a matter of law), which ended the case before it reached trial.\(^53\) The *Daubert* trilogy is perhaps less significant because of its stated standard for admissibility of expert testimony, and more because it made it possible for federal courts to grant judgment as a matter of law in complex civil cases in which a dispositive issue rests on expert testimony, thus ensuring that the case would never be decided by a jury.\(^54\).

Americans are quite conflicted when it comes to the jury system. Americans treasure the jury system, so much so that the framers of the US Constitution put the right to jury trial in the document twice: once for criminal cases (in the Sixth Amendment) and once for the class of civil cases one would find “at common law” (in the Seventh Amendment). And yet, Americans commonly disparage juries, particularly in civil cases.\(^55\)

\(^53\) Federal R. Civ. P. 12(b)(6), 12(c), 50, and 56 all provide a federal judge with the power to enter judgment as a matter of law. Recent scholarship has started to question the constitutionality of these procedural devices in light of the Seventh Amendment. S.A. Thomas, ‘The Unconstitutionality of Summary Judgment: A Status Report’ (2008) 93 Iowa L. Rev. 1613; ‘Why Summary Judgment Is Unconstitutional’ (2007) 93 Va. L. Rev. 139. In criminal cases, only the defendant may ask the court to take the case away from the jury because the prosecution has failed to provide sufficient evidence on the essential elements of a criminal charge. Fed. R. Crim. P. 29 (motion for judgment of acquittal).

\(^54\) *Daubert* has been used to take the case away from the jury, even after the jury has rendered a verdict. In *Weisgram v Marley Co.*, 528 U.S. 440, 447-456 (2000), the Supreme Court held that Federal Rule of Civil Procedure 50 permits an appellate court to direct the entry of judgment as a matter of law if it determines that evidence was erroneously admitted at trial, and that the remaining, properly admitted evidence is insufficient to constitute a triable case. The appellate court, after *Weisgram*, does not have to remand the case to the trial court for a new trial; the appellate court can simply enter judgment for the defense, notwithstanding the jury verdict in the original trial.

\(^55\) Huber, ibid.
For many years it was conventional wisdom that summary judgment was inappropriate for complex civil cases. However, the willingness of federal courts to grant summary judgment changed dramatically in the late 1980s, as federal court caseloads began to grow. In 1986, the US Supreme Court responded to the concern about ‘runaway juries’ by reinterpreting Federal Rule of Civil Procedure 56, the summary judgment rule, making it easier to resolve even complex cases as a matter of law, without the need for a trial. However, even after the Supreme Court’s substantial reform of the summary judgment rule, it was not possible to resolve many complex tort cases in cases where the issue of causation rested on conflicting expert opinion. To resolve these evidentiary conflicts as a matter of law, it would be necessary to conclude, for example, that the party with the burden of proof on the issue of causation in a tort case had failed to provide sufficient evidence that would entitle a reasonable jury to find in that party’s favor. But this would require far deeper scrutiny of the expert’s data, methods, and opinions than American judges had performed to date to determine whether the expert’s testimony is “sufficiently reliable.”

No one seriously questions that expert opinion testimony should be “sufficiently reliable” to put before a jury. Although the academic and popular literature are replete with colorful references to astrology, crystal balls, Ouija boards, phrenology and other ‘junk’ science, serious disputes about expert opinion testimony do not, for the most part, rest on such cartoonish methodology. In the vast majority of cases, the question whether expert testimony is sufficiently reliable to be admitted arises amidst a significant dispute about whether a particular scientific theory is sound or whether the application of that theory to the particular circumstances in the case is sound. Thus, the key part of the question is what does ‘sufficiently’ reliable mean?

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As mentioned above, after the post-\textit{Daubert} trilogy amendments to Federal Rule of Evidence 702, the answer is clear for US courts. The trial court decides the admissibility of all expert testimony under the terms of Federal Rule of Evidence Rule 104(a). Under that Rule, the proponent of the evidence has the burden of establishing that the pertinent admissibility requirements are met by a preponderance of the evidence.\textsuperscript{57}

The problem with making the sufficient reliability of expert testimony a question solely for the judge under Rule 104(a) is that it makes easier for the judge to invade what would ordinarily be the province for the jury. One can illustrate how easy it is for the court to slide over the line—moving from its proper role in determining whether an expert’s methodology, and application of that methodology, is sufficiently reliable to allow it to be used as evidence in the case at hand to the jury’s role of deciding whether to find the expert’s conclusions sufficiently persuasive. One example comes from the Supreme Court’s decision in \textit{General Electric Company v Joiner}.\textsuperscript{58}

Recall that in this civil case, an electrician, who suffered from lung cancer, sued the manufacturer of polychlorinated biphenyls (PCBs) and manufacturers of electrical transformers and dielectric fluid, alleging strict liability, negligence, fraud, and battery, but the trial court excluded the plaintiff’s expert testimony of the electrician’s experts and granted the defendants' motion for summary judgment because of a lack of admissible evidence on the issue of causation. Applying a searching review of the trial court’s ruling, the Court of Appeals for the Eleventh Circuit reversed:\textsuperscript{59}

\begin{thebibliography}{99}
\bibitem{Daubert} Daubert, ibid, at 592. (The question is resolved under Rule 104(a)). \textit{Bourjaily v. United States}, 483 U.S. 171 (1987).
\bibitem{Bourjaily} 522 U.S.136 (1997).
\bibitem{Joiner} 78 F.3d 524, 529 (11th Cir. 1996).
\end{thebibliography}
the gatekeeping responsibility of the trial courts is not to weigh or choose between conflicting scientific opinions, or to analyze and study the science in question in order to reach its own scientific conclusions from the material in the field. Rather, it is to assure that an expert's opinions are based on relevant scientific methods, processes, and data, and not on mere speculation, and that they apply to the facts in issue. . . .

Instead of viewing the bases of an expert's opinion as a whole to screen out mere speculation, the district court assessed only a portion of the studies relied upon by each of the Joiners' experts, and then excluded the testimony because it drew different conclusions from the research than did each of the experts. Ultimately, the court should satisfy itself as to the legal reliability of proffered expert testimony, leaving the jury to decide the correctness of competing expert opinions.60

In short, the Court of Appeals found that the trial court had “crossed the line”—usurping the role of the jury.

However, the “line” can be confusing when the ultimate procedural question is the one raised at the trial level in Joiner—whether the court should grant summary judgment—judgment as a matter of law—or the case should continue to a jury trial. In the summary judgment context, where the central issue turns on the admissibility of expert opinion of causation or on some other essential issue, there are really two lines. The first consists of the trial judge’s decision about whether evidence is sufficiently reliable under Daubert to be considered by the jury as a basis for its decision (ie, admissible). Ordinarily, we think of this decision being made only at trial. However, the brilliance of Daubert (from a case management efficiency perspective) is that it made this a question solely for the judge under Rule 104(a),61 meaning that it could be decided

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60 Ibid at 530, 533.
any time before trial—on paper affidavits and motions, rather than through live testimony, at the discretion of the trial judge. The second line for the judge to cross is the issue for summary judgment—whether there is enough evidence on an essential element of the plaintiffs’ claim for the case to continue to trial (i.e., sufficient grounds to deny summary judgment). If the judge decides not to cross the first line—finding the evidence inadmissible because it is not sufficiently reliable—the case is likely over, because there is unlikely to be other admissible expert evidence. The trial judge can then easily cross the second line—deciding that there is insufficient evidence on an essential issue in the case (such as causation) to allow the jury to hear the case. Thus, we never reach the ultimate line: whether the jury believes the expert testimony is sufficiently credible that the plaintiffs have proved, for example, that the exposure to PCBs caused Mr. Joiner’s cancer. This is why I have argued that the Daubert’s greatest sin (from a US procedural constitutional perspective), especially when coupled with Joiner, is that it made it easier for the trial court to usurp the jury’s role through judgment as a matter of law in a veiled and quiet manner.62

If one can see how Daubert made the first step in this analysis possible, then one can see how Joiner (along with the summary judgment trilogy) created the second step to closing the courthouse doors to plaintiffs in complex civil cases. Joiner was an essential step, because it prevented appellate review of trial court summary judgment decisions resting on expert evidentiary rulings. The Court of Appeals in Joiner set forth the standard rules for appellate review of a summary judgment. A trial court can grant summary judgment ‘when there is no genuine issue of material fact, and the moving party is entitled to judgment as a matter of law.’ The party seeking summary judgment (here, the defense) ‘bears the burden of showing that there

is no issue of material fact. Finally, an appellate court reviews a trial court’s decision to grant of summary judgment de novo. As the name suggests, under the de novo standard, an appellate court is free to substitute its own judgment for that of the trial court. It might appear logical that where a trial judge’s evidentiary ruling effectively terminates the case through summary judgment, the appellate court would have the ability to scrutinize the trial court’s decision-making with at least the rigor that the trial court can give an expert’s reasoning. Nonetheless, the Supreme Court in Joiner reversed the section of the Court of Appeals decision addressing the admissibility of the expert opinions in the case, holding that the appellate court should not have second-guessed the trial court’s decision about the reliability of the expert’s methodology and its “fit” to the conclusions drawn in a particular case.

Writing for the majority, Chief Justice Rehnquist ‘adjusted’ the appellate court’s standard of review ‘glasses’ so that they reflected the proper deference to the trial court’s decision-making. He rejected the plaintiffs’

claims that because the District Court's disagreement was with the conclusion that the experts drew from the studies, the District Court committed legal error and was properly reversed by the Court of Appeals. But conclusions and methodology are not entirely distinct from one another. Trained experts commonly extrapolate from existing data. But nothing in either Daubert or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the ipse dixit of the expert.

Watch carefully the sleight-of-hand in the final two sentences of this quotation. In the penultimate sentence, the Supreme Court concedes that the plaintiffs’ expert methodology is

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64 Ibid at 529 (citation omitted).
65 522 U.S. at 146.
normally acceptable for experts of this type. Then, however, the Court declares that there is no
evidentiary principle that requires a trial court to accept the expert’s conclusions if the trial court
chooses not to accept the expert’s inference linking the conclusions to the methodology and data;
an inference made by an expert in an area in which the trial court is admittedly not an expert,
becomes, according to the Supreme Court, nothing more than an ‘ipse dixit’.

Despite the Court of Appeals analysis demonstrating that there were plausible
conclusions to be inferred from the Joiner experts’ data and methodology,\textsuperscript{66} the Supreme Court
refused to allow the appellate court to second-guess the trial court’s ruling on the reliability of
the expert testimony.\textsuperscript{67} The Court of Appeals had applied the ‘abuse of discretion’ standard of
review, but reasoned that because ‘the Federal Rules of Evidence . . . display a preference for
admissibility, we apply a particularly stringent standard of review to the trial judge's exclusion of
expert testimony.’\textsuperscript{68} Nonetheless, Supreme Court rejected both this argument and the plaintiffs’
argument that a more searching ‘abuse of discretion’ standard of review should apply to the trial
court’s decision because the evidentiary ruling in the case was ‘outcome-determinative’ (i.e.,
without the expert testimony, the plaintiff had no other proof of causation and could not survive
a summary judgment).

The Supreme Court responded that the issue of admissibility of expert testimony is the
kind of issue the abuse of discretion standard was created—to give the trial court flexibility in
deciding issues involving ‘multifarious, fleeting, special, narrow facts that utterly resist
generalization.’\textsuperscript{69} One can criticize the Court’s reasoning in Joiner, because the scientific
validity of scientific methodologies is subject to the kind of ‘generalization’ the Court

\textsuperscript{66} 78 F.3d at 532.
\textsuperscript{67} 522 US at 142.
\textsuperscript{68} 78 F.2d at 529 (citations omitted).
\textsuperscript{69} Pierce v Underwood, 487 US 552, 561-562 (1988)
emphasized, even if particular questions of application may be unique to particular case. In Joiner, for example, the appellate court found that the experts’ ‘weight of the evidence’ methodology was a ‘scientifically acceptable’ basis on which an expert could draw a conclusion, even if other experts had reached other conclusions based on the same data.70 Moreover, although the Supreme Court’s reasoning might make sense if the appellate court was reviewing a judgment entered after a trial, but where the evidentiary ruling becomes the determinative ruling, it makes the notion of ‘de novo’ review of the summary judgment superfluous.71 By holding that ordinarily deferential abuse of discretion standard applied, the Supreme Court quietly made the trial court’s decision to grant summary judgment, based on the lack of expert evidence of causation, non-reviewable by an appellate court for all practical purposes.

The Joiners were a bit luckier than other the other plaintiffs in the Daubert trilogy. The Supreme Court noted that there was an open factual question that needed to be remanded to appellate court for further proceedings.72 In turn, the appellate court remanded the case to the trial court to determine ‘whether Joiner was exposed to furans and dioxins, and whether if there was such exposure, the opinions of Joiner's experts would then be admissible.’73 Because there are no further proceedings indicated after this, one may reasonably infer that this case settled.

The plaintiffs in Daubert and Kumho as well as many plaintiffs with cases following the Daubert trilogy did not fare as well. As noted above, after taking the case back from the Supreme Court

70 The Court of Appeals described this methodology, relied on by the plaintiff’s experts in Joiner: ‘Opinions of any kind are derived from individual pieces of evidence, each of which by itself might not be conclusive, but when viewed in their entirety are the building blocks of a perfectly reasonable conclusion, one reliable enough to be submitted to a jury along with the tests and criticisms cross-examination and contrary evidence would supply.” 78 F.3d 524, 532 (11th Cir. 1996).
71 The Supreme Court had other choices to resolve the problem of appellate review of expert testimony rulings. M.J. Saks, ‘The Aftermath of Daubert: An Evolving Jurisprudence of Expert Evidence’ (2000) 40 Jurimetrics J. 229, 234 (‘Thus, appellate courts should review case-specific evidence rulings deferentially and trans-case scientific issues de novo, and lower courts should treat appellate decisions on trans-case scientific issues as they would holdings of law’).
73 Joiner v. General Electric Comp., 134 F.3d 1457 (11th Cir. 1998).
on remand, the Court of Appeals for the Ninth Circuit applied Daubert’s reliability standard, held that the plaintiffs’ evidence was not sufficiently reliable, and, without additional expert evidence to prove causation, upheld the trial court’s decision to grant summary judgment against the plaintiffs.74 The Supreme Court in Kumho also reversed the appellate court ruling, reinstating the trial court’s summary judgment.75 In 2001, the RAND Institute for Civil Justice released a study analyzing the impact of Daubert.76 The study confirmed what many court-observers suspected Daubert led to more evidence being challenged, more evidence being excluded, and more summary judgments being granted—especially against plaintiffs.77 In particular, the study found that ‘the frequency with which summary judgment was requested rose substantially after Daubert, as did the frequency with which summary judgment was granted.’78 The vast majority of the requests for summary judgment were aimed at plaintiffs’ evidence; only 10 percent of the requests were aimed at defendants’ evidence.79 Although English civil procedure differs significantly from US procedure where jury trials are more common, the problem of courts “crossing the line” from determining whether expert testimony is sufficiently reliable to determining whether expert testimony is ‘correct’ (which frequently means the trial court is persuaded or not persuaded by the expert) is a serious danger to the adversarial system, which typically leaves such issues of weight to the jury.

The difficulty is that ‘the line’ the trial court must walk can be fuzzy. The Supreme Court in Joiner was correct in clarifying a poorly chosen phrase in Daubert; the ‘focus, of course,

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74 Daubert v Merrell Dow Pharmaceuticals, Inc., 43 F.3d 1311 (9th Cir. 1995).
78 RAND Study at 56.
79 Ibid.
must be solely on principles and methodology, not on the conclusions that they generate.\textsuperscript{80} This was an overstatement, from which the Court retreated in Joiner, stating that ‘conclusions and methodology are not entirely distinct from one another’.\textsuperscript{81} Although this is correct, as argued above, the \textit{Joiner} Court went too far in the other direction—conflating the issue of admissibility of expert evidence with the issue of evidentiary sufficiency (for purposes of summary judgment).

The critiques about the critical competence of judges and judicial preemption of the jury’s job in weighing expert evidence are quite problematic even worse, however, is that with the Daubert trilogy, the Supreme Court created a ‘no-win’ situation for the trial judges. Although the Supreme Court tried to create a test with enough rigor to keep ‘junk science’ away from the trier of fact and at the same time provide sufficient flexibility to capture the wide range of expert opinions offered in courtrooms across the US, it ultimately created a discretionary standard that invites unequal application even in similar circumstances—and thus unjust decisions.\textsuperscript{82}

One treatise on scientific evidence observes that the admissibility of expert testimony appears to be a function of not only the legal standard recognized in the jurisdiction (\textit{Frye} or \textit{Daubert}), but also the degree of “permissiveness” in the legal culture, where permissiveness is defined as the quantity of expert evidence that is likely to be put before the jury.\textsuperscript{83} The degree of permissiveness is determined by the how the jurisdiction resolves

the classic problem of defining the proper roles for judges and juries in the trial process.

A high threshold indicates a relatively active judicial role in screening expert opinion for

\textsuperscript{80} \textit{Daubert}, 509 U.S at 595.
\textsuperscript{81} \textit{Joiner}, 522 U.S. at 146.
the jury. A low threshold leaves the weighing function to jurors—a task that might include, of course, the jury's according some expert evidence a weight of zero.\textsuperscript{84} The treatise goes on to identify ‘four basic approaches to the judicial role regarding expert evidence: (1) Daubert-rigorous; (2) Daubert-permissive; (3) Frye-rigorous; and (4) Frye-permissive.’\textsuperscript{85} The treatise notes that in applying this matrix, one is not only contrasting the culture of a particular community of courts (for example, federal courts versus state courts, Minnesota versus Florida, or even urban courts versus rural courts), but also may see variance within one particular jurisdiction and even within one particular courthouse.\textsuperscript{86} In short, regardless of the standard used, there is the problem of the user—especially where the standard invites the user to exercise discretion, as the Daubert standard does.

One of the problems with Daubert arose after the Court extended Daubert’s ‘reliability’ test to all types of experts in Kumho. As the Supreme Court acknowledged in Kumho, and the drafters of revised Federal Rule of Evidence 702 acknowledged, the standards for determining “reliability” may vary among fields. One of the most controversial areas for the application of the Daubert trilogy is in criminal cases. Professor Christopher Slobogin points to two categories of facts that may be “unprovable” in the strictest Daubert sense, but where expert testimony is vital.\textsuperscript{87} The first category is expert predictions of dangerousness by forensic mental health specialists. Expert opinion on dangerousness is frequently used in the penalty phase of US capital cases, sentencing proceedings, sexual predator commitments, and mental health commitments. The expert is called upon to render an opinion on an essentially “unprovable”

\textsuperscript{84} Ibid. There is an interesting value judgment implicit in this assessment, for the ‘low’ threshold is assigned to the active role of the jury in evaluating evidence, while the ‘high’ threshold means the judge takes the most active role.
\textsuperscript{85} Ibid.
\textsuperscript{86} Ibid.
\textsuperscript{87} C. Slobogin, Proving the Unprovable: The Role of Law, Science, and Speculation in Adjudicating Culpability and Dangerousness (New York: Oxford Univ. Press 2007).
fact—whether a future event may or may not occur in the future. The second category of cases consists of experts opining on the relevant mens rea of a criminal. In these cases, there may be no question that a certain perpetrator committed a criminal act, but the key issue for criminal responsibility is a backward-looking inquiry—what was the perpetrator’s state of mind at the time of the act? This is a question that is asked in a wide range of cases, raising issues of insanity, diminished capacity, and partial responsibility defenses, as well as to self-defense, entrapment, and witness credibility. Without expert guidance, the typical juror is left to draw on his or her social conventions, stereotypes, biases, analogies, and personal experiences in attempting to develop a narrative about what the defendant was thinking at the time of the act. Professor Slobogin argues there is often good reason to admit some forensic evidence of dangerousness under certain conditions and clinical or interpretative social science mental health testimony on the issue of culpability under certain circumstances. His focus is on whether expert opinion testimony is (1) necessary, (2) material, (3) probative (applying a type of professional acceptance standard), and (4) helpful (adding insight that a juror would not have on his or her own), and (5) with a relatively small risk of being unfairly prejudicial. Professor Slobogin argues that at this point, most clinical evidence of dangerousness is not sufficiently probative and is highly prejudicial, and should not be used by the decision-maker, with some exceptions; in contrast, he argues that many types of mental health experts could provide useful guidance on the issue of culpability. But Professor Slobogin’s view is controversial; other commentators have argued that any expert who purports to draw generalizations from non-case specific data ought to be subjected the rigors of the Daubert standard, particularly its direction to investigate the testability, standards and controls of an expert’s method. 88 As one might predict in this context,  

courts have a wide range of responses to expert opinion testimony aimed at such ‘unprovable facts’. 89

The reaction to this range of approaches to the Daubert precedent has not been positive. As one slightly exasperated commentator put it, ‘the result [of the Daubert trilogy] is a standardless standard’. 90 The most serious charge of inconsistency is that Daubert is unevenly applied in criminal cases compared to civil cases. Post-Daubert, commentators regularly pointed out that after Daubert, even courts that were willing to scrutinize and criticize scientific, social science, and technical experts in civil cases, turned a blind-eye to the problems with many forms of expert testimony resting on forensic science in criminal cases. 91

Finally, it is not surprising but is disheartening for those concerned about equal justice that within the criminal courtroom, researchers have documented that expert evidence offered by prosecutors in criminal cases is treated more favorably by the courts than experts offered by the defense. 92 To summarize using the most recent United States’ National Academy of Sciences report, Strengthening Forensic Science in the United States: A Path Forward, courts ‘have not with any consistency or clarity imposed standards ensuring the application of scientifically valid reasoning and reliable methodology in criminal cases involving Daubert questions.’ 93

some inconsistency might be justifiable in the name of flexibility, the degree to which applications of Daubert have varied—between civil and criminal evidence, between ‘hard science’ and ‘soft science’, between ‘syndrome experts’ and ‘pattern identification experts’ creates the appearance of injustice when it surfaces in courts of law.

C. Lessons Learned

From the forgoing description, it should be clear that creating a judicial standard for the admissibility of expert testimony resting on scientific, clinical, technical, social science, and other areas of expertise has not been clear cut. Commentators appear ready to declare the unfinished’, partial’ or complete failure of ‘the Daubert Revolution’.

Studies have suggested that the particular standard (Frye or Daubert) chosen by a US jurisdiction is less important than the message that is sent by highlighting the need for a trial court to use its critical judgment when asked to admit expert testimony.’ Two researchers opined that ‘[t]he results of this study are consistent with the theory that the power of the Supreme Court's Daubert decision was not so much in its formal doctrinal test, but rather in its

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96 J.A. Moreno, ‘CSI Bulls#!t: The National Academy of Sciences, Melendez-Diaz v Massachusetts, and Future Challenges to Forensic Science and Forensic Experts’ 2010 Utah L. Rev 327 (’[T]he so-called “Daubert Revolution” has failed to transform the practice of science-based law or (law-based) forensic science-- especially in the criminal courts’.); Note, ‘Admitting Doubt: A New Standard for Scientific Evidence’ (2010) 123 Harv. L. Rev. 202, (’The differences in competence between judges and juries are not great when assessing scientific information, and accurate interpretation of scientific evidence would be improved by the adoption of model jury instructions concerning reliability.’); Note, ‘Reliable Evaluation of Expert Testimony’ (2003) 116 Harv. L. Rev. 2142, 2142 (’[T]o the extent that judges do not follow a reliable methodology in executing their gatekeeping function, there is little guarantee that they will reach results superior to those of a jury and little reason to accept the trustworthiness of their rulings.”).
97 E.K. Cheng & A. H. Yoon, note 16, at 504 (’the findings [of our research] suggest that future attempts to improve the handling of scientific evidence in the courts could be more effective if advocates for rigorous use of scientific evidence shifted their focus away from tinkering with doctrinal tests and instead toward “softer” solutions that increase the judiciary’s understanding of scientific concepts and processes. For example, reformers instead might pay greater attention to judicial education programs and help develop official literature such as the acclaimed Reference Manual on Scientific Evidence’.); P.J. Jensen, Note, ‘Frye Versus Daubert: Practically the Same?’ (2003) 87 Minn. L. Rev. 1579, 1581.
ability to create greater awareness of the problems of junk science.98 The recent National Academy of Sciences report on the problems with forensic science did not point to an essential need for a particular doctrinal standard of admissibility of expert testimony. Instead, the report focused on problems of validity (do the techniques actually do what they purport to do—for example, does pattern analysis (such as bite marks, hair or handwriting analysis really result in source identification) and application (such as inconsistent procedures and issues of observer bias). Although the report noted the problems of confusion and inconsistent applications of Daubert, its recommendations focus solely on practical problems of forensic science as it is practiced by law enforcement on a day-to-day basis. Some of its recommendations included:

1) Create a National Institute of Forensic Science (an independent federal agency) that would
   a) Establish and enforce best practices of forensic science
   b) Accredit laboratories and certify professionals
   c) Fund and promote research (on federal, state, and university levels)
   d) Promote, review, and support forensic science education
   e) Establish standard terminology to be used in reporting on and testifying about the results of forensic investigation
2) Create and enforce a code of ethics for forensic scientists
3) Remove forensic sciences laboratories from the control of law enforcement agencies
4) Forensic laboratories should establish routine quality assurance and quality control procedures
5) Create quality control procedures to identify mistakes, fraud, and bias.

The problems of basic validity and use of forensic science are undoubtedly pervasive in all jurisdictions, but commentators have a good point that it is unrealistic, given stringent budget constraints of governments worldwide, that governments will create new agencies to be watch-dogs over forensic scientists and their laboratories. It is still important to send the message, whether as a matter of statute or rule, that the reliability of expert testimony is, to some degree, the first responsibility of a trial judge.99

However, one should not underestimate the financial cost (in terms of time and money) of a culture shift from a ‘laissez-faire’ to a ‘gatekeeper’ culture of expert testimony. There is simply no way to calculate the cost of the education of lawyers, judges, scientists and scholars as they become accustomed to a new approach to the admissibility of expert testimony, but it is, without doubt, an extraordinarily expensive endeavor. As expressed above, I have my doubts whether those costs have been justifiable in the civil context, where they have been most employed in the US, because the result appears to be skewed toward corporate defendants. However, when it comes to ensuring that criminal defendants are given fair trials and are not substantially disadvantaged by the resources of government investigators and prosecutors with access to ‘specialized’ forensic science (which is funded and orchestrated by the same government), fair-minded citizens should be willing to pay the price.

Finally, although lawyers, judges and law professors are trained to look to case law, rules, regulations, and statutes for guidance on difficult legal problems, we should all continue to search for other ways to ensure reliability and accuracy in the adversarial system.

Part Three: Legal Authorities