

THE MISBEGOTTEN JUDICIAL RESISTANCE TO THE *DAUBERT* REVOLUTION

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INTRODUCTION

Until approximately thirty years ago, expert witnesses hired by parties to litigation in the United States could testify almost without limit about any relevant issue within the scope of their expertise.¹ Beginning in the mid-1980s, federal law rapidly and radically evolved until by 2000 all expert testimony needed to pass a reliability test before it could be deemed admissible.² Much of this evolution took place in toxic tort cases, in the context of broader debate about the efficiency and justice of toxic tort litigation.³ Controversy surrounded mass tort litigation involving the morning sickness drug Bendectin, silicone gel breast implants, and the herbicide Agent Orange, among other products and substances.⁴

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1 See *infra* notes 27–9 and accompanying text.

2 See *infra* notes 50–9 and accompanying text.

3 Dozens of treatises and law review articles have been written about toxic tort litigation and attendant controversies. For a sampling of books on the subject, see, e.g., CARL F. CRANOR, *REGULATING TOXIC SUBSTANCES* (1993) [hereinafter CRANOR, *REGULATING*]; CARL F. CRANOR, *TOXIC TORTS* (2006) [hereinafter CRANOR, *TOXIC TORTS*]; KENNETH R. FOSTER & PETER W. HUBER, *JUDGING SCIENCE* (1999); KENNETH FOSTER ET AL., *PHANTOM RISK: SCIENTIFIC INFERENCE AND THE LAW* (1993); JONATHAN HARR, *A CIVIL ACTION* (1995); PETER W. HUBER, *GALILEO'S REVENGE* (1991); SHEILA JASANOFF, *SCIENCE AT THE BAR* (1995).

4 For books discussing some of these mass torts and the evidentiary issues they presented, see MARCIA ANGEL, *SCIENCE ON TRIAL* (1996); MICHAEL D. GREEN, *BENDECTIN AND BIRTH DEFECTS* (1996); JOSEPH SANDERS, *BENDECTIN ON TRIAL* (1998); PETER H. SCHUCK, *AGENT ORANGE ON TRIAL* (1986); see generally Victor E. Schwartz & Cary Silverman, *The Draining of Daubert and the Recidivism of Junk Science in Federal and State Courts*, 35 *HOFSTRA L. REV.* 217, 224 (2006) (“It is not a coincidence that *Daubert* coincided with the emergence of toxic torts and the burgeoning use of experts in civil litigation.”).

Many courts ultimately determined that much of this litigation relied on causation theories that were not supported by sound scientific evidence. This led to judicial rulings restricting the admissibility of expert testimony, which in turn created sufficient uncertainty and controversy to provoke Supreme Court intervention.⁵ In a period of six years, the Supreme Court issued the so-called *Daubert* trilogy of opinions—*Daubert v. Merrell Dow Pharmaceuticals, Inc.*,⁶ *General Electric Co. v. Joiner*,⁷ and *Kumho Tire Co. v. Carmichael*⁸—each of which tightened the standards for the admissibility of expert testimony.⁹ In 2000, an amendment to Federal Rule of Evidence 702 codified a test that allows experts to testify only when their opinions meet a stringent reliability test.¹⁰

The profound changes to the traditional *laissez-faire* law of expert testimony provoked resistance from some federal judges who favored more liberal rules of admissibility. These judges rejected the early precedents excluding expert testimony from toxic torts cases of the late 1980s,¹¹ applied *Daubert* narrowly in the mid-1990s,¹² and, in the late 1990s, exploited loopholes and ambiguities in *Joiner* and *Kumho Tire* to admit questionable expert testimony.¹³ All of these actions, while broadly contrary to the trajectory of expert evidence law, were within the bounds of a reasonable interpretation of the extant law.

Judicial resistance should have withered away, however, after the 2000 amendment to Federal Rule of Evidence 702. The rule provides that expert testimony that would otherwise be helpful to the jury is admissible only when (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.¹⁴

To get a sense of the dramatic shift amended Rule 702 represents, just a decade before it went into effect no American jurisdiction applied such strict admissibility criteria. Most federal courts, recognizing their place in the scheme of things,¹⁵ have acquiesced to the new regime. There has, however,

5 See *infra* notes 7–81 and accompanying text.

6 509 U.S. 579 (1993).

7 522 U.S. 136 (1997).

8 526 U.S. 137 (1999).

9 See *infra* notes 82–139 and accompanying text.

10 FED. R. EVID. 702.

11 See *infra* notes 27–81 and accompanying text.

12 See *infra* notes 82–107 and accompanying text.

13 See *infra* notes 108–136 and accompanying text.

14 FED. R. EVID. 702.

15 Cf. *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1316 (9th Cir. 1995) (“Our responsibility, then, unless we badly misread the Supreme Court’s opinion, is to resolve disputes among respected, well-credentialed scientists about matters squarely within their expertise, in areas where there is no scientific consensus as to what is and what is not ‘good science,’ and occasionally to reject such expert testimony because it was not ‘derived by the scientific method.’ Mindful of our position in the hierarchy of the federal judiciary, we take a deep breath and proceed with this heady task.”).

been an extraordinary undercurrent of rebellion by a minority of federal judges who implicitly object to the radical changes¹⁶ wrought by the “*Daubert* revolution.” These judges ignore the text of Rule 702, and instead rely on lenient precedents that predate (and conflict with) not only the text of amended Rule 702, but also with some or all of the *Daubert* trilogy.¹⁷

The most prominent example of such judicial truculence is the First Circuit’s 2011 opinion in *Milward v. Acuity Specialty Products Group, Inc.*¹⁸ In *Milward*, the First Circuit reversed as an abuse of discretion a district court’s ruling excluding causation evidence in a toxic tort case.¹⁹ In doing so, the appellate court ignored Rule 702, disregarded the Supreme Court’s opinion in *Joiner*, relied on obsolete precedents, misunderstood the underlying rationale for exclusionary rules for expert testimony, misapplied basic scientific concepts, and credulously endorsed “weight of the evidence” as a valid scientific methodology.²⁰

Not surprisingly, plaintiffs’ lawyers have greeted *Milward* with great enthusiasm, treating the opinion as a jurisprudential Moses that will part the Rule 702 Sea and lead them to the Promised Land of pre-*Daubert* admissibility rules.²¹ Defense lawyers, meanwhile, have been aghast.²² The Supreme

16 See David L. Faigman, *The Daubert Revolution and the Birth of Modernity: Managing Scientific Evidence in the Age of Science*, 46 U.C. DAVIS L. REV. 893, 895 (2013) (describing these changes as “revolutionary”).

17 See *infra* notes 147–222 and accompanying text.

18 639 F.3d 11 (1st Cir. 2011). *Milward* has provoked a great deal of commentary, both favorable and unfavorable. See, e.g., 3 DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE § 29:6, at 781 (2010–2011 ed. 2010); DAVID H. KAYE ET AL., THE NEW WIGMORE: A TREATISE ON EVIDENCE—EXPERT EVIDENCE § 10.5.1 (Supp. 2012); Steve C. Gold, *The “Reshaping” of the False Negative Asymmetry in Toxic Tort Causation*, 37 WM. MITCHELL L. REV. 1507, 1580 (2011) (suggesting that *Milward* holds the “promise of reshaping toxic tort causation law”); Michael D. Green, *Introduction: The Third Restatement of Torts in a Crystal Ball*, 37 WM. MITCHELL L. REV. 993, 1010 n.53 (2011) (describing *Milward* as “[o]ne of the most significant toxic tort causation cases in recent memory”); Carl Cranor, *Milward v. Acuity Specialty Products: How the First Circuit Opened Courthouse Doors for Wronged Parties to Present Wider Range of Scientific Evidence*, CPR BLOG (July 25, 2011), <http://www.progressiverreform.org/CPRBlog.cfm?idBlog=616EE094-D602-ED68-85FD84E7EB0A212E>; William A. Ruskin, *Daubert on the Defense?*, TOXIC TORT LITIG. BLOG (June 6, 2012), <http://www.toxicortlitigationblog.com/tags/milward-v-acuity-specialty-pro>.

19 *Milward*, 639 F.3d at 26.

20 See *infra* notes 198–220 and accompanying text.

21 See Steve Baughman Jensen, *Reframing the Daubert Issue in Toxic Tort Cases*, TRIAL, Feb. 2013, at 46; *Symposium Considers “Weight of the Evidence” Approach*, TRIAL, Sept. 2012, at 50.

22 See Eric Lasker, *Manning the Daubert Gate: A Defense Primer in Response to Milward v. Acuity Specialty Products*, 79 DEF. COUNS. J. 128, 128 (2012); James F. Rogers, James Shelton & Jessalyn H. Zeigler, *Changes in the Reference Manual on Scientific Evidence (Third Edition)*, 80 DEF. COUNS. J. 287, 293–96 (2013); Barnes & Thornberg LLP, *Rejecting Milward: A “Weight of the Evidence” Methodology Is No Methodology at All*, NAT’L L. REV. (July 30, 2012), <http://www.natlawreview.com/article/rejecting-milward-weight-evidence-methodology-no-methodology-all>; Julie A. Brennan, *Milward v. Acuity Specialty Products: The “Weight of the Evidence” Necessitates Supreme Court Review of First Circuit’s Decision*, DRITODAY (March 8,

Court refused to review *Milward*,²³ so it remains good law in the First Circuit, requiring district court judges to admit speculative causation testimony. *Milward* also has the potential to influence the law in other circuits and in state courts.²⁴

This Article reviews the history of the evolution of the rules for the admissibility of expert testimony since the 1980s, the revolutionary nature of what ultimately emerged, and the consistent efforts by recalcitrant judges to stop or roll back the changes, even after Rule 702 was amended to explicitly incorporate a strict interpretation of those changes.

Part I reviews the law of expert testimony through the Supreme Court's *Daubert* decision. Critics had charged for decades that the adversarial system was a failure with regard to expert testimony. Parties to litigation, they argued, often presented expert testimony of dubious validity because it supported their positions, while lay juries were incapable of discerning which side had the better case. But it took the rise of toxic tort litigation based on questionable causation theories and the attendant threat to multi-billion dollar industries to provoke a meaningful response from the courts—a sudden and dramatic shift toward stricter admissibility standards.

Part II describes the *Daubert* trilogy and the emergence of amended Rule 702. A pattern emerged of the Supreme Court attempting to strengthen the rules governing expert testimony, some lower courts resisting, and the Court responding by issuing a new opinion clarifying the courts' new "gatekeeping" responsibilities. Eventually, an amendment to Federal Rule of Evidence 702 codified the *Daubert* trilogy, and did so with language that removed ambiguities and loopholes that had been exploited by judges who had been inclined to try to evade the Court's rulings.

Nevertheless, as Part III describes, some federal judges have continued to apply significantly more lenient standards for expert testimony than Rule 702 permits. They do so by ignoring the language of Rule 702, and instead

2012), <http://dritoday.org/feature.aspx?id=295>; Nathan A. Schachtman, *Milward—Unhinging the Courthouse Door to Dubious Scientific Evidence*, SCHACHTMANLAW.COM (Sept. 2, 2011, 8:13 AM), <http://schachtmanlaw.com/milward-unhinging-the-courthouse-door-to-dubious-scientific-evidence>; Eric Swan, *Milward and the First Circuit's Weight-of-the-Evidence Approach*, DRITODAY (Sept. 11, 2012), <http://dritoday.org/feature.aspx?id=420>.

²³ See *U.S. Steel Corp. v. Milward*, 132 S. Ct. 1002 (2012).

²⁴ Indeed, it already has. See *Kuhn v. Wyeth, Inc.*, 686 F.3d 618, 625 (8th Cir. 2012) (“[T]rial courts are not empowered ‘to determine which of several competing scientific theories has the best provenance.’” (quoting *Milward*, 639 F.3d at 15)); *In re Fosamax (Alendronate Sodium) Prods. Liab. Litig.*, Nos. 11–5304, 08–08, 2013 WL 1558690, at *4 (D.N.J. April 10, 2013) (citing only *Milward* in support of its statement that the “Defendant is free to address these issues on cross-examination, but Defendant’s concerns do not prohibit Dr. Cornell from testifying as an expert because he is qualified and the methodology he used is sufficiently reliable”); *Johns v. Bayer Corp.*, No. 09cv1935 AJB (DHB), 2013 WL 1498965, at *21 (S.D. Cal. Apr. 10, 2013) (citing only *Milward* in explaining why it was denying a defense motion to exclude expert testimony); *In re Chantix (Varenicline) Prods. Liab. Litig.*, 889 F. Supp. 2d 1272, 1300 (N.D. Ala. 2012) (relying on *Milward* in asserting that any testimony on which reasonable scientists can disagree is admissible).

relying on precedents from a bygone era. The First Circuit's *Milward* opinion, described in detail in Part III, demonstrates many errors and fallacies common to judges who have chosen to resist the *Daubert* revolution.

The underlying issue tying the history and present controversy over the admissibility of evidence in toxic tort litigation is a dispute over the underlying rationale for having special rules for the admissibility of expert testimony. Judges who favor more liberal rules for admissibility believe that the rules are meant to address only the problem of "junk science"—scientific testimony that not only falls outside the scientific mainstream, but does so in the face of well-accepted contrary evidence.²⁵

More restrictive judges, by contrast, are addressing the broader problem of "adversarial bias" that results from our legal system allowing the parties to choose their own experts. Parties to litigation have a natural inclination to choose experts whose views match their theory of the case, even if those experts are outliers or hired guns. Rule 702 tries to limit this problem by insisting that experts show an *objectively verifiable* basis for their testimony, so that the trier of fact is not in the position of relying on the mere *ipse dixit* of an expert chosen solely because his views are consistent with the partisan position of a party to litigation.²⁶

This Article concludes by discussing some of the factors that have led some federal judges to defy Rule 702. The author contends that the Supreme Court should take an appropriate opportunity to crack down on such judicial rebellion for two reasons. First, Rule 702 is the law of the land, and federal judges are obligated to enforce it regardless of their personal views on what expert testimony should be admissible. Second, Rule 702 represents a constructive effort to confront the problem of adversarial bias while retaining the basic contours of the broader adversarial process.

I. THE LAW OF EXPERT TESTIMONY THROUGH *DAUBERT*

Before *Daubert*, American courts generally applied a very forgiving test when considering the admissibility of expert testimony. Courts required only that an expert be at least marginally qualified to testify on the subject at hand, and that his testimony be relevant to an issue in the case.²⁷ The only significant limitation was that the expert's testimony had to be "beyond the ken of the jury."²⁸

25 See *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 153 (1997) (Stevens, J., concurring in part and dissenting in part) (arguing that expert testimony was admissible because it wasn't "junk science" (internal quotation marks omitted)).

26 See *id.* at 143 (majority opinion).

27 See KAYE ET AL., *supra* note 18, § 2.1 (describing the traditional rules for the admissibility of expert testimony).

28 *Id.* § 2.1.1 (internal quotation marks omitted). The main exception was that "many jurisdictions applied the general acceptance test of *Frye v. United States* to scientific testimony, mostly in criminal cases." *Id.* § 1.2 (footnote omitted). Contrary to myth, however, *Frye* was not traditionally a significant barrier to expert testimony. See David E. Bernstein, *Frye, Frye Again: The Past, Present, and Future of the General Acceptance Test*, 41 JURIMETRICS J.

Even this restriction on expert testimony gradually withered. Many courts ruled that any potentially helpful expert testimony was admissible.²⁹ Any flaws in an expert's testimony were issues of weight, not admissibility. To the extent there were problems with an expert's methodology or reasoning, opposing counsel's only recourse was to try to alert the trier of fact to these problems at trial through cross-examination.³⁰ Federal Rule of Evidence 702, enacted in 1975 and eventually adopted by most states, did away with the "beyond the ken of the jury" test in favor of a helpfulness test.³¹

These very liberal admissibility rules coexisted with deep suspicion of expert testimony.³² Critics charged that the incentive structure facing litigants and the experts themselves made the prevalence of biased, one-sided expert testimony inevitable.³³ The underlying problem critics identified is that attorneys seeking expert witnesses do not, and have no incentive to, pursue expertise wherever it leads. Rather, they search for an expert willing to support the litigant's position.³⁴ Expert testimony in the United States is

385, 394–95 (2001) (noting that the civil cases applying *Frye* were limited largely to paternity tests and techniques more often used in criminal investigations); Jennifer L. Mnookin, *Expert Evidence, Partisanship, and Epistemic Competence*, 73 BROOK. L. REV. 1009, 1016 (2008) ("Through 1970, [*Frye*] was cited only fifty-eight times, and the bulk of those cases involved the lie detector, the same technology at issue in *Frye*"). Even accounting for the fact that some "general acceptance" cases did not cite *Frye*, the general acceptance test was applied sparingly.

29 See KAYE ET AL., *supra* note 18, § 2.2.2.

30 See *id.*

31 Original Rule 702 provided: "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 . . ." 4 JACK B. WEINSTEIN & MARGARET A. BERGER, WEINSTEIN'S FEDERAL EVIDENCE § 702App.01 (Joseph M. McLaughlin ed., Matthew Bender 2d ed. 2013). Despite what seems to be rather clear language, some courts continued to nevertheless apply the "beyond the ken" test.

32 See KAYE ET AL., *supra* note 18, § 2.1.

33 See, e.g., Samuel R. Gross, *Expert Evidence*, 1991 WIS. L. REV. 1113, 1132 ("The problem is professional partisanship. Experts whose incomes depend on testimony must learn to satisfy the consumers who buy that testimony; those who do not will not get hired.").

34 See KAYE ET AL., *supra* note 18, § 1.3.1 ("Perhaps the most frequent criticism of experts was that they too often became partisans, the hired mouthpieces for the parties' points of view instead of the objective spokesmen for scientific truth.").

For examples, see Lucilius A. Emery, *Medical Expert Evidence*, 39 AM. L. REV. 481, 488 (1905) (stating that partisanship is "the most prolific cause of the disrepute in which medical evidence is held"); William L. Foster, *Expert Testimony,—Prevalent Complaints and Proposed Remedies*, 11 HARV. L. REV. 169, 171 (1897) (reporting that complaints of "bias" against experts are frequent); Henry Wollman, "Physicians—Expert Witnesses." "Some Reforms.", 17 MEDICO-LEG. J. 20, 28 (1899) ("The public believes that expert testimony is a hired, a purchased commodity, and that the number of experts on each side is measured by the size of the purse of the respective sides. That it is just as easy to obtain the same expert on one side as on the other, if you only 'have the price.' That the expert has no conscientious scruples about the side he is on. That he doesn't think about the side, only the money."). As Susan Haack puts it, attorneys are not interested in inquiry, but in advo-

therefore subject to massive adversarial bias—bias that arises because experts are hired to advance the cause of one party to an adversarial proceeding.³⁵

Critics identified three distinct types of adversarial bias: (1) conscious bias, which occurs when an expert deliberately tailors evidence to support a client, (2) unconscious bias, which occurs when the expert does not intentionally mislead the court, but is influenced by psychological attachment to his “side,” and (3) selection bias, which results from litigants choosing as their expert witnesses persons whose views are known to support the litigants’ position.³⁶ So in some cases attorneys would deploy “hired guns,”³⁷ in others, especially in the forensic context, they would find “team players,”³⁸ and, perhaps most frequently, they would simply select from the supply of available and honest experts those who had sincere views on the issue at hand that happened to coincide with what the attorney needed them to say to advance his client’s case.

Many reformers argued that the appropriate remedy to adversarial bias (combined with inexpert juries) was increased reliance on court-appointed, nonpartisan experts.³⁹ Learned Hand, writing in the *Harvard Law Review* in 1901, asked, “[H]ow can the jury judge between two statements each

cacy. See Susan Haack, *What’s Wrong with Litigation-Driven Science? An Essay in Legal Epistemology*, 38 SETON HALL L. REV. 1053, 1070 (2008).

35 See David E. Bernstein, *Expert Witnesses, Adversarial Bias, and the (Partial) Failure of the Daubert Revolution*, 93 IOWA L. REV. 451, 456–57 (2008) (discussing adversarial bias).

36 *Id.* at 454–56. These forms of bias have been recognized since at least *Abinger v. Ashton*, 17 L.R. Eq. 358, 373–75 (Ch. 1873).

37 L. Timothy Perrin, *Expert Witness Testimony: Back to the Future*, 29 U. RICH. L. REV. 1389, 1389 (1995); see also *Olympia Equip. Leasing Co. v. W. Union Tel. Co.*, 797 F.2d 370, 382 (7th Cir. 1986) (“[E]xpert[s] . . . are ‘often the mere paid advocates or partisans of those who employ and pay them, as much so as the attorneys who conduct the suit. There is hardly anything, not palpably absurd on its face, that cannot now be proved by some so-called ‘experts.’” (quoting *Keegan v. Minneapolis & St. L. R. Co.*, 78 N.W. 965, 966 (Minn. 1899)); see also *E.I. du Pont de Nemours and Co. v. Robinson*, 923 S.W.2d 549, 553 (Tex. 1995) (“[T]here are some experts who ‘are more than willing to proffer opinions of dubious value for the proper fee.’” (quoting 2 STEVEN GOODE ET AL., TEXAS PRACTICE: GUIDE TO THE TEXAS RULES OF EVIDENCE: CIVIL AND CRIMINAL § 702.2, at 17 (2d ed. 1993))); Dan L. Burk, *When Scientists Act Like Lawyers: The Problem of Adversary Science*, 33 JURIMETRICS J. 363, 368–70 (1993) (discussing the causes of “adversary science” in the courts).

38 See DAVID H. KAYE, *THE DOUBLE HELIX AND THE LAW OF EVIDENCE* 68 (2010); see Gross, *supra* note 33, at 1139 (noting that the process of preparing witnesses “pushes the expert to identify with the lawyers on her side and to become a partisan member of the litigation team”); Roger Koppl, *How to Improve Forensic Science*, 20 EUR. J.L. & ECON. 255, 256 (2005); Peter J. Neufeld, *The (Near) Irrelevance of Daubert to Criminal Justice and Some Suggestions for Reform*, 95 AM. J. PUB. HEALTH (SUPP. I) S107, S111 (2005); D. Michael Risinger et al., *The Daubert/Kumho Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion*, 90 CAL. L. REV. 1, 27–30 (2002).

39 The most famous commentary on point was Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 56–57 (1901); see also Emery, *supra* note 34, at 492–93; G.A. Endlich, *Proposed Changes in the Law of Expert Testimony*, 32 AM. L. REV. 851, 853–54 (1898); Clemens Herschel, *Services of Experts in the Conduct of Judi-*

founded upon an experience confessedly foreign in kind to their own? It is just because [jurors] are incompetent for such a task that the expert is necessary at all.”⁴⁰ But despite recurring suggestions that the American legal system limit or even eliminate expert witnesses selected by parties to litigation,⁴¹ court-appointed experts were and remain rare.⁴²

For decades, the American legal system soldiered on with adversarial experts subject to forgiving admissibility rules. The system was shaken out of its complacency by the increased use of scientific evidence in criminal cases starting in the early 1970s.⁴³ Faced with novel forensic techniques such as voiceprint analysis, hair analysis, and so on, courts increasingly adopted and applied the *Frye* general acceptance test, named after a 1923 decision involving primitive lie detectors, to such evidence.⁴⁴ Some federal courts—either thinking themselves constrained by the Federal Rules of Evidence to eschew

cial Inquiries, 21 AM. L. REV. 571, 572 (1887); Emory Washburn, *Testimony of Experts*, 1 AM. L. REV. 45, 61–62 (1867).

40 Hand, *supra* note 39, at 54. For a modern reiteration of Hand’s question, see Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535, 1552–53 (1998) (“[I]f a judge or a jury does not have the requisite scientific training, how can that judge or jury make a warranted choice between competing ‘vigorously cross-examined’ claims by putative experts in, say, medicine, mathematics, chemistry, or biology?”).

41 For numerous examples of recurring suggestions for the elimination of adversarial experts, see Edward K. Cheng, *Same Old, Same Old: Scientific Evidence Past and Present*, 104 MICH. L. REV. 1387, 1393–96 (2006). See generally KAYE ET AL., *supra* note 18, § 11.2 (“[F]rom the later part of the nineteenth century to the present, the dominant proposed solution to the problems of adversarial experts has been to call for the use of non-adversarial experts, in order to create a nonpartisan source of expert knowledge.”); see also Gross, *supra* note 33, at 1188 (describing the use of non-partisan experts as “[t]he most frequently suggested reform”).

Several recent articles favor court-appointed experts, at least in some contexts. See, e.g., Sofia Adroque & Alan Ratliff, *The Independent Expert Evolution: From the “Path of Least Resistance” to the “Road Less Traveled?”*, 34 TEX. TECH L. REV. 843, 882–97 (2003); David E. Bernstein, *The Breast Implant Fiasco*, 87 CAL. L. REV. 457, 486–510 (1999) (reviewing MARCIA ANGELL, *SCIENCE ON TRIAL* (1996)); Ryan M. Seidemann et al., *Closing the Gate on Questionable Expert Witness Testimony: A Proposal to Institute Expert Review Panels*, 33 S.U. L. REV. 29, 69–85 (2005); John Shepard Wiley, Jr., *Taming Patent: Six Steps for Surviving Scary Patent Cases*, 50 UCLA L. REV. 1413, 1425–38 (2003); Debra L. Worthington et al., *Hindsight Bias, Daubert, and the Silicone Breast Implant Litigation: Making the Case for Court-Appointed Experts in Complex Medical and Scientific Litigation*, 8 PSYCHOL. PUB. POL’Y & L. 154, 161–63 (2002).

42 See KAYE ET AL., *supra* note 18, § 11.2.3, (“[B]y all accounts judges exercise these powers infrequently.”); Michael J. Saks, *The Phantom of the Courthouse*, 35 JURIMETRICS J. 233, 234 (1995) (reviewing JOE S. CECIL & THOMAS E. WILLING, *COURT-APPOINTED EXPERTS* (1993)) (“Rule 706[, providing for the appointment of experts] . . . is a rule that was never really intended to be used. And not using it is what most judges do with it most of the time.”).

43 See David L. Faigman, *The Daubert Revolution and the Birth of Modernity: Managing Scientific Evidence in the Age of Science*, 46 U.C. DAVIS L. REV. 893, 898 (2013) (“Although *Frye* was decided in 1923, it did not achieve true notoriety until the 1970s”); Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197, 1198 (1980).

44 See Giannelli, *supra* note 43, at 1206–07.

Frye, or persuaded by critiques of *Frye* that began to circulate in judicial opinions and scholarly articles—began to develop a reliability test to screen scientific evidence.⁴⁵

Even more momentous, in the late 1970s, plaintiffs began to file what turned into a wave of “toxic tort” lawsuits—litigation alleging that exposure to pharmaceuticals, pollutants, or other toxic substances caused cancer, birth defects, or other ailments. Early examples of such litigation included cases alleging harm caused by the swine flu vaccine,⁴⁶ claims that the morning sickness drug Bendectin caused birth defects,⁴⁷ and lawsuits arguing that cancer and other harms were caused by the defoliant Agent Orange when it was used during the Vietnam War.⁴⁸ Litigation over these products involved hundreds or thousands of plaintiffs, and put vast sums of money and entire industries at risk. These cases also brought a new wave of complex expert testimony to the courts, and added great urgency to the question of whether the traditional battle of partisan experts was a sound way of resolving factual disputes.⁴⁹

One group of judges and commentators supported the retention of traditional liberal rules for admissibility of expert testimony. They contended that testimony by a qualified expert who claimed to find causation by relying on *some* supporting evidence based on accepted scientific methodologies should be admissible to prove causation in a toxic torts case without further inquiry as to the testimony’s reliability.

The leading case adopting this perspective, and probably the leading case on the admissibility of expert testimony in toxic torts cases pre-*Daubert*,

45 See *United States v. Downing*, 753 F.2d 1224, 1238–39 (3d Cir. 1985); *United States v. Williams*, 583 F.2d 1194, 1198–99 (2d Cir. 1978).

46 See, e.g., *Lima v. United States (In re Swine Flu Immunization Prods. Liab. Litig.)*, 508 F. Supp. 897 (D. Colo. 1981), *aff’d sub nom. Lima v. United States*, 708 F.2d 502 (10th Cir. 1983).

47 For overviews, see generally GREEN, *supra* note 4; SANDERS, *supra* note 4. For a discussion of the harm to public health caused by this litigation, see David E. Bernstein, *Learning the Wrong Lessons from “An American Tragedy”: A Critique of the Berger-Twerski Informed Choice Proposal*, 104 MICH. L. REV. 1961, 1962–67 (2006).

48 See SCHUCK, *supra* note 4; Michael D. Green, *Expert Witnesses and Sufficiency of Evidence in Toxic Substances Litigation: The Legacy of Agent Orange and Bendectin Litigation*, 86 NW. U. L. REV. 643, 671–80 (1992).

49 Ironically, one product that clearly caused significant harm to the public, cigarettes, was subject to only minimal litigation at this time. A first wave of lawsuits against cigarette makers in the 1950s and 1960s utterly failed, and such litigation did not return with any force until the late 1980s. See Robert L. Rabin, *A Sociolegal History of the Tobacco Tort Litigation*, 44 STAN. L. REV. 853, 857, 864 (1992); Robert L. Rabin, *Institutional and Historical Perspectives on Tobacco Tort Liability*, in SMOKING POLICY 110, 110–25 (Robert L. Rabin & Stephen D. Sugarman eds., 1993); Robert L. Rabin, *The Third Wave of Tobacco Tort Litigation*, in REGULATING TOBACCO 176, 176–97 (Robert L. Rabin & Stephen D. Sugarman eds., 2001); Robert L. Rabin, *The Tobacco Litigation: A Tentative Assessment*, 51 DEPAUL L. REV. 331, 332–47 (2001); Robert L. Rabin, *Tobacco Control Strategies: Past Efficacy and Future Promise*, 41 LOY. L.A. L. REV. 1721, 1732–44 (2008).

was the 1984 D.C. Circuit case of *Ferebee v. Chevron Chemical Co.*⁵⁰ *Ferebee* involved a claim that exposure to a herbicide caused an individual's cancer. The case involved a unique workplace exposure, and therefore was not the sort of issue for which one could expect to have sufficient epidemiological data. Instead, the plaintiff's expert relied, rather vaguely, on "tissue samples, standard tests, and patient examination" to support his causation testimony.⁵¹

The *Ferebee* court held that this testimony was admissible, because the "basic methodology" used by the expert was "sound."⁵² The court did not explain how reviewing "tissue samples, standard tests, and patient examination" was a *sound* methodology for discovering whether a particular chemical causes cancer, much less whether exposure to that chemical caused a given individual's cancer. Rather, the court was content to rely on the expert's judgment that such evidence was sufficient for him to conclude that the herbicide exposure caused the plaintiff's cancer.

The court explained its rationale as follows:

[P]roducts liability law does not preclude recovery until a "statistically significant" number of people have been injured or until science has had the time and resources to complete sophisticated laboratory studies of the chemical. . . . [T]he fact that . . . science would require more evidence before conclusively considering the causation question resolved is irrelevant.⁵³

The court added that the fact that this "case may have been the first of its exact type, or that [the plaintiff's] doctors may have been the first alert enough to recognize such a case, does not mean that the testimony of those doctors, who are concededly well-qualified in their fields, should not have been admitted."⁵⁴ "On questions such as these, which stand at the frontier of current medical and epidemiological inquiry," the court concluded, "if experts are willing to testify that such a link exists, it is for the jury to decide whether to credit such testimony."⁵⁵

50 736 F.2d 1529 (D.C. Cir. 1984); *accord* *City of Greenville v. W.R. Grace & Co.*, 827 F.2d 975 (4th Cir. 1987); *Wells v. Ortho Pharm. Corp.*, 788 F.2d 741 (11th Cir. 1986); *Bandura v. Orkin Exterminating Co.*, 664 F. Supp. 1218 (N.D. Ill. 1987), *aff'd*, 865 F.2d 816 (7th Cir. 1988). See generally *Burke v. Dow Chem. Co.*, 797 F. Supp. 1128, 1138 (E.D.N.Y. 1992) (describing *Ferebee* as "a leading case"); Alani Golanski, *Judicial Scrutiny of Expert Testimony in Environmental Tort Litigation*, 9 PACE ENVTL. L. REV. 399, 406 (1992) (noting that *Ferebee* was frequently cited as a leading case favoring liberal standards for the admissibility of expert causation testimony). Some *Frye* courts continue to utilize similar reasoning in defending their choice not to scrutinize plaintiffs' experts' reasoning in toxic tort cases. See *Nonnon v. City of New York*, 819 N.Y.S.2d 705, 715 (App. Div. 2006) (refusing to apply *Frye* to a toxic exposure case because applying the general acceptance test to such cases would prevent plaintiffs "suffering the ill effects . . . of environmental contaminants" from obtaining compensation).

51 *Ferebee*, 736 F.2d at 1536.

52 *Id.* at 1535–36.

53 *Id.* at 1536.

54 *Id.*

55 *Id.* at 1534.

The difficulty with *Ferebee* is that it implicitly treated plaintiffs' experts in toxic torts cases as if their status as qualified experts meant that their reasoning and conclusions necessarily reflected the views of a reputable segment of their scientific peers. In fact, however, due to adversarial bias in this context, this assumption is wrong.⁵⁶ A toxic tort plaintiff with even marginally suggestive evidence of general causation has little trouble finding qualified experts from among the tens of thousands of at least minimally qualified American physicians, toxicologists, and so on who are willing to testify that specific causation should be extrapolated from such evidence.

Ferebee's forgiving rhetoric became a rallying cry for courts inclined to admit extremely dubious expert testimony in a variety of toxic tort contexts.⁵⁷ A series of verdicts for plaintiffs followed in cases in which experts presented testimony that at best went well beyond available scientific knowledge, and at worst relied on utter balderdash.⁵⁸

For example, there were several multi-million dollar verdicts against defendants based on the thoroughly discredited theories of a group of medical charlatans who called themselves "clinical ecologists."⁵⁹ In one infamous case, the Eleventh Circuit affirmed a five million dollar award to a plaintiff who alleged that his birth defects resulted from his mother's use of a common spermicide.⁶⁰ An attorney in a Bendectin case won a ninety-five million dollar verdict thanks to his expert's claim to have pieced together an "evidentiary mosaic" to support his causation theory.⁶¹

56 See Bernstein, *supra* note 35, at 465–67; Joseph Sanders, *Science, Law, and the Expert Witness*, 72 LAW & CONTEMP. PROBS. 63, 77 (2009) ("Witnesses are chosen because they prefer a point of view, and the very choice of experts clouds the degree of consensus that may surround a topic."). It's worth noting that *Ferebee* was problematic because of its reasoning, not necessarily because of its result. A recent review of *Ferebee* concludes that the D.C. Circuit's ruling may not have been a miscarriage of justice. The plaintiff may very well have had reliable expert testimony of causation, even though the D.C. Circuit did not explain why that was true and also seemed to disclaim the need for reliable testimony. See Nathan A. Schachtman, *Ferebee Revisited*, SCHACHTMANLAW.COM (Nov. 8th, 2012, 2:27 PM), <http://schachtmanlaw.com/ferebee-revisited/>.

57 See Golanski, *supra* note 50, at 406 (noting that *Ferebee* was frequently cited as a leading case favoring liberal standards for the admissibility of expert causation testimony).

58 See FOSTER ET AL., *supra* note 3 (reviewing many of these cases, and comparing conclusions of scientists in reviews of the relevant scientific literature to the how courts treated the same issues); HUBER, *supra* note 3 (providing accounts of many of these cases); HANS ZEISEL & DAVID KAYE, PROVE IT WITH FIGURES 45–68 (1997) (discussing some of these cases).

59 See, e.g., *Elam v. Alcolac, Inc.*, 765 S.W.2d 42, 219 (Mo. Ct. App. 1988) (compensatory and punitive damages totaling forty-nine million dollars). For harsh criticism of *Elam*, see Richard S. Cornfeld & Stuart F. Schlossman, *Immunologic Laboratory Tests: A Critique of the Alcolac Decision*, in PHANTOM RISK, *supra* note 3, at 401.

60 See *Wells v. Ortho Pharm. Corp.*, 788 F.2d 741, 747–48 (11th Cir. 1986).

61 See *Oxendine v. Merrell Dow Pharm., Inc.*, 506 A.2d 1100, 1110 (D.C. 1986) ("Like the pieces of a mosaic, the individual studies showed little or nothing when viewed separately from one another, but they combined to produce a whole that was greater than the sum of its parts: a foundation for Dr. Done's opinion that Bendectin caused appellant's birth defects.").

Such verdicts led to withering criticism from within and without the legal community.⁶² Editorialists in science journals and newspapers like the *New York Times* called for stricter controls on expert testimony.⁶³ In the face of such criticism, many courts backtracked somewhat. The D.C. Circuit itself limited *Ferebee's* very porous admissibility standard to cases in which the defendants could not present strong contradictory epidemiological or other evidence disproving causation.⁶⁴ *Ferebee* came to stand for the proposition that a party may proffer speculative scientific expert testimony if the issue was on the "frontier of current medical and epidemiological inquiry,"⁶⁵ and the expert was relying on a methodology used in the mainstream scientific community.⁶⁶

Meanwhile, verdicts for plaintiffs based on questionable causation theories continued to pile up, leading to increased criticism through the early 1990s.⁶⁷ The problem, according to critics, was not simply experts testifying

62 For an example of criticism from the medical profession, see BD. OF TRS., AM. MED. ASSOC., *IMPACT OF PRODUCT LIABILITY ON THE DEVELOPMENT OF NEW MEDICAL TECHNOLOGIES* (1988) [hereinafter *IMPACT OF PRODUCT LIABILITY*].

63 See James L. Mills & Duane Alexander, *Occasional Notes: Teratogens and "Litogens,"* 315 *NEW ENG. J. MED.* 1234, 1234-35 (1986); *Federal Judges vs. Science*, *N.Y. TIMES*, Dec. 27, 1986, § 1, at 22.

64 See *Ealy v. Richardson-Merrell, Inc.*, 897 F.2d 1159, 1164 (D.C. Cir. 1990); *Brock v. Merrell Dow Pharm., Inc.*, 874 F.2d 307, 311, *modified on other grounds*, 884 F.2d 166 (5th Cir. 1989); *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823, 832 (D.C. Cir. 1988). Defendants rarely have such evidence on their side, especially in the early stages of mass litigation, but they did eventually benefit from such evidence in the Bendectin litigation. See generally Bernstein, *supra* note 47, at 1962-70 (reviewing the Bendectin litigation). And they eventually also benefited in the breast implant litigation. See Bernstein, *supra* note 41, at 480-84.

65 *Ferebee v. Chevron Chem. Co.*, 763 F.2d 1529, 1534 (D.C. Cir. 1984).

66 *Richardson*, 857 F.2d at 832 (reaffirming *Ferebee*, but limiting it to expert testimony regarding issues on the frontier of scientific inquiry); see also *Christophersen v. Allied-Signal Corp.*, 939 F.2d 1106, 1127 (5th Cir. 1991) (en banc) (per curiam) (citing *Ferebee* and noting "through traditional methods . . . the relationship between nickel, cadmium, and small-cell colon cancer is scant"); *In re Bendectin Prods. Liab. Litig.*, 732 F. Supp. 744, 748 (E.D. Mich. 1990) (holding the underlying data of a study must be "reasonably relied upon by experts in the field"); *Bandura v. Orkin Exterminating Co.*, 664 F. Supp. 1218, 1219 (N.D. Ill. 1987), *aff'd*, 865 F.2d 816 (7th Cir. 1988) (stating an expert's study should be admitted if the results are reasonable); *Rubanick v. Witco Chem. Corp.*, 576 A.2d 4, 14-15 (N.J. Super. Ct. App. Div. 1990) (stating evidence should be admitted as long as a reasonable expert could come to the same conclusion as the expert). The D.C. Circuit, for example, held that animal studies and chemical structure analyses that were not admissible to prove that Bendectin caused a plaintiff's birth defects, because there was a great deal of contrary data. The same type of studies, however, were admissible to prove that Depo Provera caused that plaintiff's birth defects, an issue that had not been widely studied. See *Ambrosini v. Labarraque*, 966 F.2d 1464, 1469 (D.C. Cir. 1992).

67 A key, but hardly the only, factor prompting the attention that the issue received, was HUBER, *supra* note 3. For criticism in non-legal periodicals, see *IMPACT OF PRODUCT LIABILITY*, *supra* note 62, at 9; Bert Black, *Evolving Legal Standards for the Admissibility of Scientific Evidence*, 239 *SCI.* 1508, 1511 (1988) (questioning judges' ability to properly examine scientific studies and urging courts to use consistency within the scientific com-

against a great weight of contrary evidence. Rather, courts erred in allowing experts to speculate or guess that causation existed based on weak data that did not reach a minimum threshold of scientific reliability.⁶⁸ Due to selection bias, there was (and is) no shortage of sincere, well-qualified expert witnesses “who . . . confuse hypothesis with confirmed fact, and testify . . . to the actual existence of causal relations or substantially enhanced risks on weak or no evidence.”⁶⁹

A few courts—fed up with what they saw as the laxity of their colleagues in admitting unreliable testimony produced by selection bias—began to search for a means of ensuring that expert testimony had some objective basis before admitting it into evidence. Some courts adopted the reliability test pioneered in the toxic tort context by the *Agent Orange* opinion.⁷⁰ The reliability test’s popularity grew to the point that the Judicial Conference Advisory Committee on Civil Rules proposed amending the rules of evidence to allow only expert testimony that is “reasonably reliable and will substantially assist the trier of fact.”⁷¹ Early incarnations of the reliability test, how-

munity as their barometer); Blake Fleetwood, *From the People Who Brought You the Twinkie Defense*, WASH. MONTHLY, June 1987, at 33 (examining the expert witness industry); Constance Holden, *Science in Court*, 243 SCI. 1658, 1658 (1989) (questioning judges’ ability to properly examine scientific studies and suggesting emulation of the expert evidence rules of European countries); Eliot Marshall, *Immune System Theories on Trial*, 234 SCI. 1490, 1492 (1986) (stating that normal immune levels must be established before courts rule on the admissibility of studies reflecting their change); Walter Olson, *The Case Against Expert Witnesses*, FORTUNE, Sept. 25, 1989, at 134, available at http://money.cnn.com/magazines/fortune/fortune_archive/1989/09/25/72505. For criticism in the legal academic literature, see Bert Black, *A Unified Theory of Scientific Evidence*, 56 FORDHAM L. REV. 595 (1988) [hereinafter Black, *Unified Theory*]; Ronald L. Carlson, *Policing the Bases of Modern Expert Testimony*, 39 VAND. L. REV. 577 (1986); E. Donald Elliott, *Toward Incentive-Based Procedure: Three Approaches for Regulating Scientific Evidence*, 69 B.U. L. REV. 487 (1989); Fredrick I. Lederer, *Proposals for a Model Rule on the Admissibility of Scientific Evidence*, 115 F.R.D. 79, 84–145 (1987); James E. Starrs, *Frye v. United States Restructured and Revitalized: A Proposal to Amend Federal Evidence Rule 702*, 26 JURIMETRICS J. 249 (1986); David Bernstein, Note, *Out of the Frying Pan and into the Fire: The Expert Witness Problem in Toxic Tort Litigation*, 10 REV. LITIG. 117, 138–42 (1990); Paul F. Rothstein & Michael Crew, *When Should the Judge Keep Expert Testimony from the Jury?*, INSIDE LITIG., Apr. 1987, at 19.

68 See FOSTER ET AL., *supra* note 3, at 433 (contending that courts must assess “the relevance of data to health and the reliability of scientific inferences” (emphasis omitted)).

69 D. Michael Risinger, *A Functional Taxonomy of Expertise*, in 1 MODERN SCIENTIFIC EVIDENCE § 2:15, at 106 (David L. Faigman et al. eds., 2005–2006 ed. 2005).

70 *In re “Agent Orange” Prod. Liab. Litig.*, 597 F. Supp. 740, 795 (E.D.N.Y. 1984), *aff’d*, 818 F.2d 145 (2d Cir. 1987); see *Lynch v. Merrell-Nat’l Labs*, 830 F.2d 1190, 1196 (1st Cir. 1987); *Viterbo v. Dow Chem. Co.*, 826 F.2d 420, 422 (5th Cir. 1987).

71 COMM. ON RULES OF PRACTICE AND PROCEDURE, JUDICIAL CONFERENCE OF THE U.S., PRELIMINARY DRAFT OF PROPOSED AMENDMENTS TO THE FEDERAL RULES OF CIVIL PROCEDURE AND THE FEDERAL RULES OF EVIDENCE 83 (1991). The Judicial Conference Advisory Committee eventually took no action, and instead referred the issue to the new Advisory Committee on the Federal Rules of Evidence. See SUMMARY OF THE REPORT OF THE JUDICIAL CONFERENCE COMM. ON RULES OF PRACTICE AND PROCEDURE 2 (Sept. 1991).

ever, did not prove a consistent barrier to junk science.⁷² A few courts, most prominently the Fifth, Sixth, and Ninth Circuits,⁷³ instead applied the *Frye* general acceptance test, which had previously been largely limited to forensic science evidence in criminal cases,⁷⁴ to exclude toxic tort evidence.

These things stood in the early 1990s, while all sides of the controversy waited for the Supreme Court to weigh in.⁷⁵ While the let-it-all-in approach was clearly dying out,⁷⁶ significant controversy remained as to both the underlying problem and the underlying solution. On one side were courts and commentators that believed that the problem was obvious quackery. Some of these jurists believed that juries could be relied upon to reject such quackery. But most acknowledged that courts should exclude experts who either rely on discredited methodologies like clinical ecology or, as in the context of Bendectin litigation, who present causation theories that conflict with a great deal of sound contrary evidence published in reputable scientific journals. However, in cases in which respectable scientists were willing to find causation based on incomplete and speculative evidence where no scientific consensus existed, the traditional battle of the experts should reign.

For other courts and commentators, the problem was far broader. The essential problem was not “junk science” in toxic tort litigation *per se*, but the problematic nature of relying on experts subject to adversarial bias to present opinions to lay jurors that relied solely on the experts’ say-so, unsupported by

72 See *DeLuca v. Merrell Dow Pharm. Inc.*, 911 F.2d 941, 959 (3d Cir. 1990) (approving, in a jurisdiction that had adopted the reliability test, the admissibility of testimony that Bendectin caused a plaintiff’s birth defects, which by this point was contrary to a vast body of epidemiological data); Susan R. Poulter, *Science and Toxic Torts: Is There a Rational Solution to the Problem of Causation?*, 7 HIGH TECH. L.J. 189, 203 (1992) (noting that the reliability standard is problematic when “used to justify such minimal scrutiny of the reliability of scientific evidence, particularly of expert opinion testimony, that it amounts to no standard at all”).

73 See *Christophersen v. Allied-Signal Corp.*, 939 F.2d 1106, 1116 (5th Cir. 1991) (en banc) (per curiam); *Daubert v. Merrell Dow Pharm., Inc.*, 951 F.2d 1128, 1129–31 (9th Cir. 1991), *vacated*, 509 U.S. 579 (1993); *Sterling v. Velsicol Chem. Corp.*, 855 F.2d 1188, 1208 (6th Cir. 1988). *Sterling* didn’t cite *Frye*, but did apply the general acceptance test. *Id.*

74 I DAVID W. LOUISELL & CHRISTOPHER B. MUELLER, FEDERAL EVIDENCE § 107, at 853 (1977) (“The *Frye* standard . . . is rarely applied in civil litigation; *Frye* itself has been cited only in a very few civil cases, principally in state courts in connection with blood tests to determine paternity.”); FAUST F. ROSSI, EXPERT WITNESSES 36 (1991) (“The *Frye* standard traditionally has been applied almost exclusively in criminal cases.”).

75 The Court had repeatedly declined to address the issue. See, e.g., *Ealy v. Richardson-Merrell, Inc.*, 897 F.2d 1159 (D.C. Cir. 1990), *cert. denied*, 498 U.S. 950 (1990); *Christophersen v. Allied-Signal Corp.*, 902 F.2d 362 (5th Cir. 1990), *aff’d*, 939 F.2d 1106 (5th Cir. 1991) (en banc) (per curiam), *cert. denied*, 503 U.S. 912 (1992); *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823 (D.C. Cir. 1988), *cert. denied*, 493 U.S. 882 (1989); *Brock v. Merrell Dow Pharm., Inc.*, 874 F.2d 307 (5th Cir. 1989), *modified*, 884 F.2d 166 (5th Cir. 1989), *cert. denied*, 494 U.S. 1046 (1990); *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529 (D.C. Cir. 1984), *cert. denied*, 469 U.S. 1062 (1984).

76 See *Eymard v. Pan Am. World Airways (In re Air Crash Disaster at New Orleans, La.)*, 795 F.2d 1230, 1234 (5th Cir. 1986) (denouncing the “let it all in” approach to expert testimony (internal quotation marks omitted)).

objective evidence such as peer-reviewed, published studies.⁷⁷ Such critics favored broadening the inquiry beyond whether an expert was relying on an accepted methodology and instead also inquiring as to whether the expert was using the methodology in a reliable way in a given case.⁷⁸ Moreover, these courts and commentators rejected the notion that an absence of strong contrary evidence dictated that they should be lax about admitting causation evidence. Additionally, this side of the debate thought *all* expert testimony should be subject to significant scrutiny for reliability, given that all experts are subject to adversarial bias.⁷⁹

II. THE DAUBERT TRILOGY AND FRE 702 (AS AMENDED)

The contours of the debate over the admissibility of expert testimony in toxic tort litigation seem a lot clearer in retrospect than they did contemporaneously, because at the time the plaintiffs' bar still held out hope that the let-it-all-in approach would be revived by the Supreme Court. Instead, in 1993, the Supreme Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁸⁰ expressly rejected the let-it-all-in standard in favor of a new reliability standard. This opinion, however, did not resolve the conflict between those who thought the problem of quackspertise in court should be resolved by minor tinkering to prevent the most egregious examples of dubious testimony in toxic torts cases from being admitted, and those who advocated a more stringent approach that broadly tackled the problem of adversarial bias.

Supporters of more lenient rules for admissibility pointed to language in *Daubert* noting "the liberal thrust of the Federal Rules [of Evidence] and their general approach of relaxing the traditional barriers to opinion testimony,"⁸¹ and emphasizing the "flexible" nature of the inquiry trial courts must engage in.⁸² The Court expressed optimism about the capabilities of the adversarial process and of the jury, and spoke of "shaky but admissible evidence."⁸³ Finally, the Court emphasized that the admissibility inquiry must be focused "solely on principles and methodology, not on the conclu-

77 See HUBER, *supra* note 3, at 204 ("The only way to tell that expertise is based on objective experience is to see whether others with similar experience favor similar methods, adopt similar procedures, embrace similar theories, and reach similar conclusions.").

78 See, e.g., FOSTER ET AL., *supra* note 3, at 433; Black, *Unified Theory*, *supra* note 67, at 599 (contending that courts should consider "the validity of the reasoning leading to a conclusion" (emphasis omitted)).

79 See HUBER, *supra* note 3 (dealing not only with toxic tort cases, but with medical evidence and engineering quackspertise); David L. Faigman, *To Have and Have Not: Assessing the Value of Social Science to the Law as Science and Policy*, 38 EMORY L.J. 1005, 1009–10 (1989) ("The legal relevance of social science findings should depend on their scientific strength, that is, on the ability of social scientists to answer validly the questions posed to them." (footnote omitted)).

80 509 U.S. 579 (1993).

81 *Id.* at 588 (internal quotation marks omitted).

82 *Id.* at 594.

83 *Id.* at 596.

sions that they generate.”⁸⁴ The latter language seemed consistent with cases like *Ferebee*. It suggested the possibility that, post-*Daubert*, an expert need only show that his very general methodology (such as, “extrapolating from animal studies”⁸⁵) could be considered reliable, regardless of how carefully or competently the expert utilized that methodology in the case at hand.⁸⁶

On the other hand, *Daubert* insisted that trial court judges adopt “a gatekeeping role”⁸⁷ to “ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.”⁸⁸ The Court listed five substantive factors—including general acceptance and whether the expert relied on peer-reviewed, published studies—as examples of how the district courts might approach this task.⁸⁹ And in direct contrast to the “methodology only” language, the Court charged trial courts with assessing “whether the reasoning or methodology underlying the testimony is scientifically valid and . . . whether that reasoning or methodology properly can be applied to the facts in issue.”⁹⁰ “Rule 702’s ‘helpfulness’ standard,” the Court added, “requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility.”⁹¹

So there was sufficient language in the opinion to allow both sides to declare victory. The Court could have clarified matters by applying its newly announced standard to the evidence rejected by the courts below. Instead, it simply remanded the case to the Ninth Circuit. The Court also could have signaled its intentions by ruling on whether the new reliability approach applied only to scientific evidence (suggesting that it only wanted to reign in the egregious misuse of causation evidence, as in the Bendectin litigation) or to all expert testimony (suggesting that it was trying to address the underlying issue of adversarial bias by adopting a broad reliability test). Instead, the Court expressly declined to address the issue.⁹²

News reports of the decision reflected divergent understandings of just what the Court had done.⁹³ Commentators were similarly divided. The

84 *Id.* at 595.

85 *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 781 n.47 (3d Cir. 1994).

86 See Kenneth J. Chesebro, *Taking Daubert’s “Focus” Seriously: The Methodology/Conclusion Distinction*, 15 CARDOZO L. REV. 1745, 1748–49 (1994); Michael H. Gottesman, *Admissibility of Expert Testimony After Daubert: The “Prestige” Factor*, 43 EMORY L.J. 867, 869–72 (1994) (arguing that under *Daubert*, courts may only assess experts’ general methodology).

87 *Daubert*, 509 U.S. at 597.

88 *Id.* at 589.

89 *Id.* at 593–94.

90 *Id.* at 592–93.

91 *Id.* at 591–92.

92 *Id.* at 590 n.8. For commentary on this omission, see Edward J. Imwinkelried, *The Next Step After Daubert: Developing a Similarly Epistemological Approach to Ensuring the Reliability of Nonscientific Expert Testimony*, 15 CARDOZO L. REV. 2271, 2291 (1994).

93 The *New York Times* reported that “[t]he 7-to-2 decision invited judges to be aggressive in screening out ill-founded or speculative scientific theories.” Linda Greenhouse, *Supreme Court Roundup: Justices Put Judges in Charge of Deciding Reliability of Scientific Testimony*, N.Y. TIMES, June 29, 1993, at A13. The *Wall Street Journal*, by contrast, suggested that the ruling favored plaintiffs seeking more liberal admissibility standards. See Paul M. Barrett,

author of this Article believed that *Daubert* required what on average would amount to significantly increased judicial scrutiny of expert testimony to ensure reliability.⁹⁴ The Court's more forgiving remarks seemed aimed primarily at a mythical version of *Frye*, understood as an "austere" rule that made it extremely difficult to present expert testimony.⁹⁵ In fact, courts rarely if ever applied *Frye* in a harsh, unforgiving way.⁹⁶ Moreover, courts usually applied *Frye* only to very narrow categories of evidence. *Daubert's* criticisms of *Frye* were therefore not especially apposite.⁹⁷ What was important, however, was *Daubert's* focus on the reliability of expert testimony, its suggestion of several pertinent and reasonably strict criteria for determining reliability, and, in contrast to *Frye's* traditional narrow scope, the Supreme Court's insistence that the new standard applied to all scientific evidence.⁹⁸

Nevertheless, as noted, not everyone agreed, and *Daubert* became something of a Rorschach test revealing judges' preexisting views about how strictly trial courts should scrutinize expert testimony. Courts that were strongly inclined before *Daubert* to adopt more forgiving understandings of admissibility standards often continued to do so after *Daubert*. Indeed, the D.C. Circuit, where *Ferebee* was conceived, favorably cited and applied *Ferebee* three years after *Daubert*.⁹⁹

Justices Rule Against Business in Evidence Case, WALL ST. J., June 29, 1993, at A3; see also Margaret A. Berger, *Supreme Court Deals Blow to Venerable 'Frye' Standard*, N.Y.L.J., July 19, 1993, at S3 ("Both sides immediately claimed victory . . ."); Paul Houston, *High Court Relaxes Curbs on Expert Witness Testimony Law: Ruling Praised by Backers of Flexibility. Business Interests Also Claim Victory in Birth-Defects Case*, L.A. TIMES (June 29, 1993), http://articles.latimes.com/1993-06-29/news/mn-8393_1_expert-testimony (quoting the attorneys' reactions).

94 See David E. Bernstein, *The Admissibility of Scientific Evidence After Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 15 CARDOZO L. REV. 2139, 2139 (1994); David E. Bernstein & Peter W. Huber, *Defense Perspective*, 1 SHEPARD'S EXPERT & SCI. EVID. Q. 59, 60 (1993) ("The trend towards stricter scrutiny of scientific evidence began in the late-1980s; in the aftermath of *Daubert* it will accelerate."); David Bernstein, *Hauling Junk Science Out of the Courtroom*, WALL ST. J., July 13, 1993, at A16 ("[A]s standards are established, [*Daubert*] means that junk science will have a far harder time making it to court.").

95 *Daubert*, 509 U.S. at 589.

96 KAYE ET AL., *supra* note 18, § 9.2.1 ("Before *Daubert*, it was clear that the elevated scrutiny reserved for scientific evidence applied to the methodology that an expert employed and not to the conclusions that the expert reached by applying that methodology to specific facts.").

97 As Michael Green notes: "To say that the Supreme Court replaced *Frye* in its *Daubert* opinion is misleading. What the Court did in *Daubert* was to adopt a test for scrutinizing an expert's methodology and reasoning that filled a previously extant void." Michael D. Green, *The Road Less Well Traveled (and Seen): Contemporary Lawmaking in Products Liability*, 49 DEPAUL L. REV. 377, 398 (1999).

98 See *Daubert*, 509 U.S. at 592 n.11 ("Although the *Frye* decision itself focused exclusively on 'novel' scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence.").

99 The court held that highly speculative expert testimony indicating that Depo Provera caused the plaintiff's birth defects was admissible because "there is no 'overwhelming body of contradictory epidemiological evidence' to [the expert's] conclusion."

Consider as well the post-*Daubert* Ninth Circuit case of *Hopkins v. Dow Corning Corp.*¹⁰⁰ *Hopkins* involved a claim that silicone breast implants caused a woman's immune system disease. This claim had no reliable scientific evidence behind it, and the notion that breast implants cause immune system disease became discredited as contrary evidence accumulated.¹⁰¹ *Hopkins* was a momentous opinion, with the fate of the multi-billion dollar breast implant litigation resting in significant part on the court's decision whether to uphold a jury verdict for the plaintiff.¹⁰² Yet the Ninth Circuit provided only the most superficial and cursory examination of the plaintiff's expert testimony. For example, here is all the court had to say about the admissibility of the testimony of a key plaintiffs' expert: "Dr. Vasey, a rheumatologist, testified that his opinion was based on medical records, his clinical experience, preliminary results of an epidemiological study[,] and medical literature. Thus, we conclude the 'reasoning or methodology underlying the testimony is scientifically valid . . .'"¹⁰³

Despite cases like *Hopkins*, the trend toward stricter scrutiny of expert testimony accelerated because of the attention the "gatekeeper" requirement received, and because the Court had suggested several relatively stringent criteria for scrutinizing expert testimony.¹⁰⁴ Indeed, in contrast to *Hopkins*, two Ninth Circuit opinions rejected the "methodologies/conclusions" distinction,¹⁰⁵ and on remand from *Daubert* itself, the court issued an opinion widely seen as adopting a strict interpretation of the Supreme Court's rul-

Ambrosini v. Labarraque, 101 F.3d 129, 138 (D.C. Cir. 1996) (quoting *Richardson v. Richardson-Merrell, Inc.*, 857 F.2d 823, 830 (D.C. Cir. 1988)) (applying and citing *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529, 1536 (D.C. Cir. 1984)); see Michael D. Green, *Relief at the Frying of Frye: Reflections on Daubert v. Merrell Dow Pharmaceuticals*, 1 SHEPARD'S EXPERT & SCI. EVID. Q. 43, 47-48 (1993) (suggesting that *Daubert* adopted *Ferebee*-like standards in cases on the frontier of medical science); see also *McCulloch v. H.B. Fuller Co.*, 61 F.3d 1038, 1043-45 (2d Cir. 1995) (upholding the admission of a treating physician's testimony that glue fumes caused the plaintiff's throat polyps, despite the absence of any scientific literature suggesting such a relationship); Alexander Morgan Capron, *Daubert and the Quest for Value-Free "Scientific Knowledge" in the Courtroom*, 30 U. RICH. L. REV. 85, 106 (1996) (predicting that "the courts [will] read *Daubert* as encouraging liberal allowance of testimony whenever there is any well credentialed scientist who supports the theory").

100 33 F.3d 1116 (9th Cir. 1994).

101 For an early post-mortem of the litigation, see Bernstein, *supra* note 41, at 472-76, 485-93.

102 See *id.* at 472-73.

103 *Hopkins*, 33 F.3d at 1125 (alteration in original) (quoting *Daubert*, 509 U.S. at 592-93). Part of the fault likely lies with the defendants' attorneys, who chose in their brief to primarily rely on a statute of limitations argument that was inconsistent with their secondary reliance on *Daubert*.

104 See MOLLY TREADWAY JOHNSON ET AL., FED. JUDICIAL CTR., EXPERT TESTIMONY IN FEDERAL CIVIL TRIALS 4 (2000) (finding that *Daubert* significantly increased judges' willingness to serve as gatekeepers).

105 See *Lust v. Merrell Dow Pharm., Inc.*, 89 F.3d 594, 598 (9th Cir. 1996) ("When a scientist claims to rely on a method practiced by most scientists, yet presents conclusions that are shared by no other scientist, the district court should be wary that the method has not been faithfully applied."); *Claar v. Burlington N.R.R.*, 29 F.3d 499, 501 (9th Cir. 1994)

ing.¹⁰⁶ Other courts also adopted an exacting interpretation of *Daubert*, sometimes specifically referencing the problems attendant to adversarial bias (albeit without using that terminology).¹⁰⁷

For several years, the Supreme Court allowed the debate over the proper interpretation of *Daubert* to simmer in the lower courts. The Court intervened, however, because two circuits engaged in open revolt against their responsibility to serve as gatekeepers ensuring the reliability of expert testimony in toxic torts cases.

First, the Third Circuit, the most lenient circuit pre-*Daubert* with regard to the admissibility of expert testimony in toxic tort cases,¹⁰⁸ announced that henceforth it would provide a “hard look,” i.e., “more stringent review” of district court rulings excluding plaintiffs’ causation evidence.¹⁰⁹ Otherwise, the court claimed, “there is a significant risk that district judges will set the threshold too high and will in fact force plaintiffs to prove their case twice. Reducing this risk is particularly important because the Federal Rules of Evidence display a preference for admissibility.”¹¹⁰

The idea that appellate courts should adopt a “hard look” perspective regarding district court decisions, and only when the district court *excluded* evidence, and only when such exclusions applied to plaintiff’s evidence in a *civil* case, had no basis in the text of *Daubert*. Nor did the court cite any precedent for the idea that district court evidentiary rulings should be reviewed differently depending on which side’s evidence was excluded. Moreover, the court failed to apply any sort of reliability test to the evidence at hand.

Similarly, in *Joiner v. General Electric Co.*, the Eleventh Circuit not only reversed a district court decision excluding dubious causation evidence, but also joined the Third Circuit in applying “a particularly stringent standard of review to the trial judge’s exclusion of expert testimony.”¹¹¹ *Joiner* involved an electrician, Robert Joiner, who developed small cell lung cancer after being exposed to poly-chlorinated biophenyls (PCBs) at his workplace. He sued several manufacturers of PCBs, relying on expert testimony regarding causation that was based on extrapolating from animal studies. The district court found that the studies on which the plaintiffs’ experts relied did not

(emphasizing that a district court is “both authorized and obligated to scrutinize carefully the reasoning and methodology underlying” the expert’s proffered testimony).

106 See *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1315–16 (9th Cir. 1995).

107 See *Braun v. Lorillard Inc.*, 84 F.3d 230, 235, 237–38 (7th Cir. 1996).

108 See *In re Paoli R.R. Yard PCB Litig.*, 916 F.2d 829, 856–59 (3d Cir. 1990); *DeLuca v. Merrell Dow Pharm., Inc.*, 911 F.2d 941, 954–57 (3d Cir. 1990); *Linkstrom v. Golden T. Farms*, 883 F.2d 269 (3d Cir. 1989). See generally Bernstein, *supra* note 67, at 152 n.208 (identifying the Third Circuit as having the most liberal admissibility standards for expert testimony in toxic tort cases of any federal circuit).

109 *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 749–50 (3d Cir. 1994).

110 *Id.* at 750.

111 *Joiner v. Gen. Elec. Co.*, 78 F.3d 524, 529 (11th Cir. 1996) (“[W]e apply a particularly stringent standard of review to the trial judge’s exclusion of expert testimony.”), *rev’d*, 522 U.S. 136 (1997).

adequately support the conclusion that PCBs can promote cancers. The court then granted summary judgment to the defendants.

On appeal, the Eleventh Circuit engaged in its “particularly stringent review” of the district court ruling. The panel concluded that the lower court erred by “assess[ing] only a portion of the studies relied upon by each of the Joiners’ experts, and then exclud[ing] the testimony because it drew different conclusions from the research than did each of the experts.”¹¹²

The gauntlet thrown down, the Supreme Court agreed to review the Eleventh Circuit holding. The Court summarily rejected the notion that a special, stricter standard of review applied to a district court’s exclusion of plaintiffs’ evidence in toxic tort cases.¹¹³ Instead, the Court held that circuit courts must universally apply an abuse of discretion standard to district court rulings on the admissibility of expert testimony.¹¹⁴

The Court then took the opportunity to weigh in on the broader controversy within the federal courts regarding whether *Daubert* permitted district courts to assess the reliability of an expert’s reasoning process, or whether courts were to strictly segregate “methodology” from “conclusion.” *Joiner* took the former position, stating that “conclusions and methodology are not entirely distinct from one another” and that nothing in “*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.”¹¹⁵ Instead, courts were free to conclude that “there is simply too great an analytical gap between the data and the opinion proffered.”¹¹⁶ The Court then carefully reviewed the plaintiff’s causation testimony, and upheld the district court’s ruling that the evidence was not admissible.¹¹⁷

Joiner sent a powerful signal to lower federal courts that the era of speculative expert testimony on causation was over.¹¹⁸ The Supreme Court had

112 *Id.* at 533.

113 *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 143 (1997).

114 *Id.*

115 *Id.* at 146.

116 *Id.*

117 The Court, for example, explained why the animal studies presented in the case were inadmissible:

Joiner was an adult human being whose alleged exposure to PCB’s was far less than the exposure in the animal studies. The PCB’s were injected into the mice in a highly concentrated form. The fluid with which Joiner had come into contact generally had a much smaller PCB concentration of between 0-to-500 parts per million. The cancer that these mice developed was alveogenic adenomas; Joiner had developed small-cell carcinomas. No study demonstrated that adult mice developed cancer after being exposed to PCB’s. One of the experts admitted that no study had demonstrated that PCB’s lead to cancer in any other species.

Id. at 144.

118 See Margaret A. Berger & Aaron D. Twerski, *Uncertainty and Informed Choice: Unmaking Daubert*, 104 MICH. L. REV. 257, 263 (2005) (reporting that “the *Joiner* Court endorsed an approach that provided trial courts with a template for excluding expert testimony on causation”). For example, the Eleventh Circuit, which had issued the “loose scru-

bluntly rejected the let-it-all-in approach in *Daubert*. Now, in *Joiner*, it also rejected the somewhat more demanding *Ferebee* approach of allowing qualified experts in cases involving scientific controversies on which no professional consensus had developed to testify to causation based on ambiguous, speculative, or preliminary data created with standard scientific methodologies.

At this point, at least one prominent advocate of more lenient scrutiny of expert testimony in toxic torts cases conceded defeat.¹¹⁹ Some courts inclined to more liberal admissibility rules, however, did not give up. The Second Circuit, for example, tried to revive *Ferebee*-like standards in *Zuchowicz v. United States*.¹²⁰ The court upheld the district court's admission of expert causation evidence that at best amounted to educated guesses.¹²¹ The court concluded that when direct studies of the association in humans between a rare disease and a drug are not possible, *Joiner* allows causation testimony based on the exclusion of other drugs as the cause and an untested, speculative theory as to how the drug might have produced the disease.¹²²

Arguably, *Zuchowicz* violated only the spirit, but not the letter, of *Joiner*. *Joiner* permitted and encouraged, but did not explicitly require, a district court to examine the reliability of an expert's reasoning processes.¹²³ In the

tiny" lower court opinion in *Joiner*, issued a much stricter ruling in *Allison v. McGhan Medical Corp.*, 184 F.3d 1300, 1314–15 & n.16 (11th Cir. 1999). After *Joiner*, courts became increasingly likely to reject anecdotal case reports as evidence of causation. See, e.g., *Hollander v. Sandoz Pharm. Corp.*, 95 F. Supp. 2d 1230, 1235–39 (W.D. Okla. 2000); *Glastetter v. Novartis Pharm. Corp.*, 107 F. Supp. 2d 1015, 1030 (E.D. Mo. 2000), *aff'd*, 252 F.3d 986 (8th Cir. 2001); *Brumbaugh v. Sandoz Pharm. Corp.*, 77 F. Supp. 2d 1153, 1157 (D. Mont. 1999); *In re Breast Implant Litig.*, 11 F. Supp. 2d 1217, 1227–28 (D. Colo. 1998) ("To the extent that there are case or anecdotal reports noting various symptoms or signs in breast implanted women, without controls, these suggest only a potential, untested hypothesis that breast implants may be their cause."); *Willert v. Ortho Pharm. Corp.*, 995 F. Supp. 979, 981 (D. Minn. 1998) (concluding that case reports are not sufficient evidence of causation because they do not exclude other alternative explanations). Other courts rejected chemical structure analysis as evidence of causation. See, e.g., *Schudel v. Gen. Elec. Co.*, 120 F.3d 991, 996–98 (9th Cir. 1997); *Brumbaugh*, 77 F. Supp. 2d at 1157; see also Daniel J. Capra, *The Daubert Puzzle*, 32 GA. L. REV. 699, 715 (1998) ("One example of improper extrapolation is an expert's use of structure analysis."). For post-*Joiner* cases rejecting reliance on government regulatory action to prove causation, see *Hollander*, 95 F. Supp. 2d at 1234 n.9; *Glastetter*, 107 F. Supp. 2d at 1036.

119 See, e.g., Michael H. Gottesman, *From Barefoot to Daubert to Joiner: Triple Play or Double Error?*, 40 ARIZ. L. REV. 753, 771 (1998). Gottesman represented the plaintiffs in *Joiner* and *Daubert* before the Supreme Court.

120 140 F.3d 381 (2d Cir. 1998).

121 See Samuel R. Gross & Jennifer L. Mnookin, *Expert Information and Expert Evidence: A Preliminary Taxonomy*, 34 SETON HALL L. REV. 141, 184 (2003) (describing the expert opinions in *Zuchowicz* as educated guesses).

122 *Zuchowicz*, 140 F.3d at 387.

123 See *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997) ("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. A court may

absence of such an explicit requirement, the Second Circuit could plausibly conclude that the district court did not abuse its discretion.¹²⁴

By contrast to *Zuchowicz*, in *Moore v. Ashland Chemical Inc.*,¹²⁵ the Fifth Circuit held that a party proffering expert testimony must demonstrate that the expert's findings and conclusions are based on the scientific method, and, therefore, are reliable. This, said the court, requires some "objective, independent validation of the expert's methodology. The expert's assurances that he has utilized generally accepted scientific methodology is insufficient."¹²⁶

Moore reflected the trend in federal courts far more than *Zuchowicz*.¹²⁷ Nevertheless, given precedents like the latter, it remained unclear as to whether the extant rule was that expert scientific testimony was only admissible if it was supported by objective validation (which would imply that adversarial bias was the underlying problem addressed by *Daubert* and *Joiner*), or whether district courts could choose between applying that standard and allowing experts to speculate based on available data (which would imply that the Court was focused solely on the "junk science" problem).

This ambiguity was addressed in the Supreme Court's final contribution to the *Daubert* trilogy, *Kumho Tire Co. v. Carmichael*.¹²⁸ Some courts had tried to evade the trend toward stricter scrutiny of expert testimony by declaring that *Daubert*'s reliability standard only applied to scientific evidence. They then defined the scope of scientific evidence narrowly.¹²⁹

conclude that there is simply too great an analytical gap between the data and the opinion proffered." (emphasis added).

124 See *Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 266 (4th Cir. 1999) (allowing causation testimony even though there were no peer-reviewed studies, no animal studies, and no laboratory data supporting the testimony); *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 155 (3d Cir. 1999) (allowing highly speculative expert testimony not supported by underlying research because otherwise the rules of evidence would "doom" claims where the relevant research was in its early stages); *Kennedy v. Collagen Corp.*, 161 F.3d 1226, 1231 (9th Cir. 1998) (reversing a district court's exclusion of testimony purported to link a consumer product to lupus, despite the absence of any human or animal studies showing such a link).

125 151 F.3d 269 (5th Cir. 1998).

126 *Id.* at 276.

127 This led one plaintiffs' lawyer, not shy about hyperbole, to conclude in 1999 that "*Daubert* is death and disaster to Plaintiffs' attorneys!" Raphael Metzger, *Dealing with Daubert in California: The Perspective of a Plaintiff's Attorney*, METZGER LAW GROUP <http://www.toxic torts.com/index.php/about-us/articles/40-dealing-with-daubert-in-california-the-perspective-of-a-plaintiffs-attorney> (last visited Oct. 22, 2013).

128 526 U.S. 137 (1999).

129 See *Iacobelli Constr., Inc. v. Cnty. of Monroe*, 32 F.3d 19, 25–26 (2d Cir. 1994); *Fanning v. Acromed Corp. (In re Orthopedic Bone Screw Prod. Liab. Litig.)*, 176 F.R.D. 158, 168–69, 173 (E.D. Pa. 1997); *Thornton v. Caterpillar, Inc.*, 951 F. Supp. 575, 577–78 (D.S.C. 1997); see also Imwinkelried, *supra* note 92, at 2273 ("To be sure, it is understandable why the *Daubert* Court limited its ruling to scientific testimony."); Linda Sandstrom Simard & William G. Young, *Daubert's Gatekeeper: The Role of the District Judge in Admitting Expert Testimony*, 68 TUL. L. REV. 1457, 1466 n.63 (1994) (noting the narrow scope of Rule 703). This continues to be an issue in state courts that follow the *Frye* rule. The Kansas

In *Kumho Tire*, however, the Court extended *Daubert*'s gatekeeping function beyond scientific evidence to encompass all expert testimony. It is difficult to overstate the significance of this ruling. As noted previously,¹³⁰ before *Daubert*, the *Frye* general acceptance test was the main tool courts had to exclude unreliable expert testimony. But *Frye* had traditionally applied only to limited categories of scientific expert testimony, with all other expert testimony subject to a liberal admissibility standard that focused primarily on the qualifications of the expert. By contrast, *Kumho Tire* expanded *Daubert*'s reliability test to the broader universe of expert testimony.

Any claims that this broadening was accompanied by a subtle liberalization of the standard for admissibility were negated a year later, when the Supreme Court noted that “[s]ince *Daubert* . . . parties relying on expert evidence have had notice of the *exacting standards of reliability* such evidence must meet.”¹³¹

A 2000 amendment to Federal Rule of Evidence 702 reinforced, indeed codified, the Supreme Court’s insistence that all adversarial expert testimony be subject to a reliability test. In 1997, legislation codifying *Daubert* was pending in the federal House of Representatives and Senate. The legislation was introduced by congressmen seeking to encourage the trend toward greater scrutiny of expert testimony. The Advisory Committee on Evidence Rules found the bills to be too narrow, as they did not address non-scientific evidence, and too stringent, as they would “impose evidentiary standards so rigorous as to render much traditionally accepted expert testimony inadmissible.”¹³² The Advisory Committee therefore decided to try to amend Rule 702 through the rule-making process.¹³³

The proposed rule had to be demanding enough to discourage congressional efforts to rewrite Rule 702. Crucially, the new rule mandated that for expert testimony to be admissible, an expert witness must not only utilize reliable principles and methods, but must have “applied the principles and methods reliably to the facts of the case.”¹³⁴ The rule therefore prohibited

Supreme Court, for example, held that a physician’s testimony claiming that ingestion of the drug Parlodel caused a woman’s death was exempt from *Frye* because it was not based on scientific evidence but was instead his “pure opinion.” *Kuhn v. Sandoz Pharm. Corp.*, 14 P.3d 1170, 1179–85 (Kan. 2000).

130 See *supra* notes 43–48 and accompanying text.

131 *Weisgram v. Marley Co.*, 528 U.S. 440, 455 (2000) (emphasis added).

132 Memorandum from Fern M. Smith, Chair, Advisory Comm. on Evidence Rules, to Alicemarie H. Stotler, Chair, Standing Comm. on Rules of Practice and Procedure 4 (Dec. 1, 1997), available at <http://www.uscourts.gov/uscourts/RulesAndPolicies/rules/Reports/EV12-1997.pdf>.

133 See *id.*

134 Memorandum from Fern M. Smith, Chair, Advisory Comm. on Evidence Rules, to Alicemarie H. Stotler, Chair, Standing Comm. on Rules of Practice and Procedure 8 (May 1, 1998), available at <http://www.uscourts.gov/uscourts/RulesAndPolicies/rules/Reports/EV5-1998.pdf>.

experts from relying on informed speculation and educated guesses as in *Zuchowicz*.¹³⁵

The Advisory Committee cut off an additional loophole used by courts seeking to evade their gatekeeping responsibilities. Some courts had simply declared that testimony that otherwise appeared to be expert testimony subject to the *Daubert* trilogy could instead be admitted as lay opinion testimony under Rule 701.¹³⁶ Rule 701 was therefore amended to clarify that it applied only to testimony “not based on scientific, technical, or other specialized knowledge within the scope of Rule 702.”¹³⁷

Thus, in a very short period of time, expert evidence law in federal courts (and states following the federal lead) underwent revolutionary changes. As of the early 1980s, with few exceptions, any qualified expert was permitted to testify on any relevant subject. By 2000, even the most qualified experts needed to prove that their testimony was based on reliable principles and methods, and those principles and methods were applied reliably to the facts of the case. Prompted by the controversy over toxic tort cases, the law had evolved very quickly to tackle the longstanding problem of adversarial bias. As discussed below, however, not all federal judges accepted such rapid and radical change.

III. THE COUNTERREVOLUTION

As we have seen, as the rules for expert testimony gradually tightened, many federal courts resisted. A few sought to retain the old let-it-all-in rules, while a larger number preferred narrow changes to deal with obvious instances of junk science. Most courts, regardless of their previous positions, eventually complied with the new order created by the *Daubert* trilogy as codified by amended Rule 702.¹³⁸ Some judges, however, have continued to apply more liberal rules. Such judges often rely on cases preceding the 2000

135 *Cf. McClain v. Metabolife Int'l, Inc.*, 401 F.3d 1233, 1255 (11th Cir. 2005) (overturning a trial court admissibility ruling and jury verdict on this basis).

136 *See, e.g., Asplundh Mfg. Div. v. Benton Harbor Eng'g*, 57 F.3d 1190, 1194 (3d Cir. 1995) (noting the district court's use of Rule 701 to admit arguably expert testimony).

137 FED. R. EVID. 701(c).

138 For example, several courts excluded causation evidence in cases alleging harm from the drug Parlodel. *See, e.g., Soldo v. Sandoz Pharm. Corp.*, 244 F. Supp. 2d 434, 572–75 (W.D. Pa. 2003); *Dunn v. Sandoz Pharm. Corp.*, 275 F. Supp. 2d 672, 676–84 (M.D.N.C. 2003); *Caraker v. Sandoz Pharm. Corp.*, 172 F. Supp. 2d 1046, 1048–53 (S.D. Ill. 2001); *Siharath v. Sandoz Pharm. Corp.*, 131 F. Supp. 2d 1347, 1351–74 (N.D. Ga. 2001), *aff'd sub nom. Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194, 1203 (11th Cir. 2002); *Glastetter v. Novartis Pharm. Corp.*, 107 F. Supp. 2d 1015, 1017–46 (E.D. Mo. 2000), *aff'd*, 252 F.3d 986 (8th Cir. 2001); *Hollander v. Sandoz Pharm. Corp.*, 95 F. Supp. 2d 1230, 1233–39 (W.D. Okla. 2000), *aff'd*, 289 F.3d 1193 (10th Cir. 2002). *But see Brasher v. Sandoz Pharm. Corp.*, 160 F. Supp. 2d 1291, 1299 (N.D. Ala. 2001) (denying motion for summary judgment on grounds that expert testimony was reliable); *Eve v. Sandoz Pharm. Corp.*, No. IP 98-1429-C-Y/S, 2001 U.S. Dist. LEXIS 4531, at *55–88 (S.D. Ind. Mar. 7, 2001); *Globetti v. Sandoz Pharm. Corp.*, 111 F. Supp. 2d 1174, 1180 (N.D. Ala. 2000). Such evidence would have been easily admissible in an earlier era.

changes to Rule 702, going back at times to pre-*Joiner*, or even pre-*Daubert* case law inconsistent with later developments in the law of expert testimony. Meanwhile, they ignore the language of Rule 702.¹³⁹

Judging from the opinions they wrote, some federal judges were either unaware that Rule 702 was amended in 2000, or intentionally ignored the amendment.¹⁴⁰ Other judges have ignored both *Joiner's* statement that district courts may reject testimony when there is an “analytical gap”¹⁴¹ between the expert’s methodology and conclusions, and amended Rule 702’s insis-

139 For discussions of this issue, see David Bernstein, *Courts Refusing to Apply Federal Rule of Evidence 702, THE VOLOKH CONSPIRACY* (May 6, 2006, 09:29 AM), http://www.volokh.com/posts/chain_1147021015.shtml; David Bernstein, *More on Daubert and Rule 702, THE VOLOKH CONSPIRACY* (Jul. 6, 2006, 3:38 PM), <http://www.volokh.com/posts/1152214719.shtml>. Perhaps the most egregious example of a federal appellate court ignoring the language of Rule 702 arose in the 2006 Federal Circuit opinion in *Liquid Dynamics Corp. v. Vaughan Co.*, 449 F.3d 1209 (Fed. Cir. 2006). In this case, the court never cited the text of Rule 702, or, for that matter, showed an awareness that Rule 702, as amended in 2000, is the governing rule for the admissibility of expert testimony. The court cited *Daubert* as the last word on the scope of Rule 702, ignoring both the text of amended Rule 702 and *Joiner*. *Id.* at 1220. To justify its ruling, the court cited a 1986(!) Eighth Circuit opinion for the proposition that inadequacies in expert testimony are a matter of weight, not admissibility. *Id.* at 1221. The court also cited an equally wrongheaded post-2000 Eleventh Circuit opinion that relied on the same 1986 precedent to state that an objection to the reliability of an expert’s testimony goes only to weight, not admissibility. *Id.* For a recent example of a court relying on pro-admissibility dicta in *Daubert* and ignoring subsequent developments, see *MBIA Ins. Corp. v. Patriarch Partners VIII, LLC*, No. 09 Civ. 3255, 2012 WL 2568972, at *15 (S.D.N.Y. July 3, 2012) (“The Federal Rules of Evidence favor the admissibility of expert testimony and are applied with a ‘liberal thrust.’” (quoting *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 588 (1993))).

As courts have noted, “Rule 702 reflects an attempt to liberalize the rules governing the admission of expert testimony.” *Lauzon v. Senco Prods., Inc.*, 270 F.3d 681, 686 (8th Cir. 2001) (quoting *Weisgram v. Marley Co.*, 169 F.3d 514, 523 (8th Cir. 1999)). It is remarkable that a federal court in 2001 could come to the conclusion that Rule 702 liberalized the admissibility of expert testimony, and even more remarkable that the court quotes for support an opinion from when a different version of the rule existed. To compound matters, it also quoted a pre-*Daubert* opinion for the proposition that Rule 702 is a rule “of admissibility rather than exclusion.” *Id.* (quoting *Arcoren v. United States*, 929 F.2d 1235, 1239 (8th Cir. 1991)).

140 At least two federal district court judges have alluded to the Supreme Court’s interpretation of Rule 702 in the *Daubert* trilogy as the current law. Of course, the trilogy interpreted the old Rule 702, and neither of the judges in question addressed the text of the current rule. See *In re Chantix (Varenicline) Prods. Liab. Litig.*, 889 F. Supp. 2d 1272, 1279 (N.D. Ala. 2012); *Ellipsis, Inc. v. The Color Works, Inc.*, 428 F. Supp. 2d 752, 757 (W.D. Tenn. 2006). In another recent case, the presiding judge invoked the Third Circuit approach to expert testimony. *In re Avandia Mktg., Sales Practices & Prods. Liab. Litig.*, No. 2007–MD–1871, 2011 WL 13576, at *1–2 (E.D. Pa. Jan. 4, 2011). While the judge did quote the language of the current rule, she added that in a 1999 case, the Third Circuit distilled this rule to two essential inquiries: “1) is the proffered expert qualified to express an expert opinion; and 2) is the expert opinion reliable?” *Id.* at *1 (quoting *In re TMI Litig.*, 193 F.3d 613, 664 (3d Cir. 1999)). The Third Circuit obviously could not have distilled a rule from statutory language that did not yet exist.

141 *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

tence that courts ensure that a witness has applied the principles and methods reliably to the facts of the case.¹⁴² Yet others have been far more lenient about admitting expert testimony than any reasonable interpretation of Rule 702 would allow.¹⁴³ Finally, some courts resurrected the ghost of *Ferebee* by holding plaintiffs' evidence to a lower standard of reliability when no scientific consensus on the issue at hand had developed.¹⁴⁴

142 For example, in 2004 the Eleventh Circuit cautioned that "a court should meticulously focus on the expert's principles and methodology, and not on the conclusions that they generate." *McDowell v. Brown*, 392 F.3d 1283, 1298 (11th Cir. 2004). In another 2004 opinion, the Eleventh Circuit quoted the three-part test established by Rule 702, but just a few paragraphs later announced that its own more forgiving test, adopted in 1998, was the law of the circuit. See *United States v. Frazier*, 387 F.3d 1244, 1260 (11th Cir. 2004) (citing *City of Tuscaloosa v. Harcros Chems., Inc.*, 158 F.3d 548, 562 (11th Cir. 1998)); cf. *Rosenfeld v. Oceania Cruises, Inc.*, 682 F.3d 1320, 1322 (11th Cir. 2012) (Tjoflat, J., dissenting from denial of rehearing en banc) (arguing that the *Frazier* test must be construed to mean the same thing as Rule 702). The Third Circuit, meanwhile, claimed that "the role of the District Court is simply to evaluate whether the methodology utilized by the expert is reliable" and added that any "application" of the methodology should be "addressed on cross-examination," not through the rules of evidence. *Walker v. Gordon*, 46 F. App'x 691, 695-96 (3d Cir. 2002); see also *Riley v. Target Corp.*, No. 4:05CV00729, 2006 WL 1028773, at *4-5 (E.D. Ark. Apr. 13, 2006) (holding that any flaws in a "differential diagnosis" go to weight, not admissibility).

143 See, e.g., *Kudabeck v. Kroger Co.*, 338 F.3d 856, 860-63 (8th Cir. 2003) (holding that chiropractor's testimony that a fall caused the plaintiff's degenerative disc disease satisfied *Daubert*); *Perkins v. Origin Medsystems, Inc.*, 299 F. Supp. 2d 45, 62 (D. Conn. 2004) (concluding that a clinician's speculation based on her experience, and not an examination of the victim, was admissible); *In re Phenylpropanolamine (PPA) Prods. Liab. Litig.*, 289 F. Supp. 2d 1230, 1248 (W.D. Wash. 2003) ("[C]ase and adverse drug reports, textbooks and treatises, and the clinical experience of several experts . . . satisfies the mandate of *Daubert*.").

144 The Eighth Circuit, in language reminiscent of *Ferebee*, has stated that

[t]he first several victims of a new toxic tort should not be barred from having their day in court simply because the medical literature, which will eventually show the connection between the victims' condition and the toxic substance [(how could a court possibly know this?)], has not yet been completed.

Bonner v. ISP Techs., Inc., 259 F.3d 924, 928 (8th Cir. 2001) (first alteration in original) (internal quotation marks omitted) (quoting *Turner v. Iowa Fire Equip. Co.*, 229 F.3d 1202, 1209 (8th Cir. 2000)). By contrast, in *Daubert*, the Supreme Court stated:

We recognize that, in practice, a gatekeeping role for the judge, no matter how flexible, inevitably on occasion will prevent the jury from learning of authentic insights and innovations. That, nevertheless, is the balance that is struck by Rules of Evidence designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes.

Daubert, 509 U.S. at 597.

The Eighth Circuit added that:

the factual basis of an expert opinion goes to the credibility of the testimony, not the admissibility, and it is up to the opposing party to examine the factual basis for the opinion in cross-examination. Only if the expert's opinion is so fundamentally unsupported that it can offer no assistance to the jury must such testimony be excluded.

The most notorious opinion rebelling against the post-*Daubert* admissibility rules for expert testimony, the First Circuit's opinion in *Milward v. Acuity Specialty Products Group, Inc.*,¹⁴⁵ makes all of these errors and more. *Milward* involved claims that Brian Milward's workplace exposure to products containing benzene caused him to develop a rare subtype of acute myeloid leukemia (AML) called acute promyelocytic leukemia (APL).¹⁴⁶ The plaintiffs' scientific expert was Martyn Smith, a well-credentialed toxicologist with much experience researching the health effects of benzene.¹⁴⁷

At defendants' request, the trial court bifurcated the trial so that the issues of general and specific causation would be presented separately. Smith first presented evidence on general causation, i.e., whether benzene exposure causes an increased risk of APL. Smith argued that causation could be inferred based on the following evidence:

- (1) a small body of epidemiological studies investigating the relationship between benzene exposure and AML;
- (2) an analogy between APL and other types of AML known to be associated with benzene exposure;
- (3) experimental research purporting to show that the various sub-types of AML have a common pathology; and
- (4) toxicological studies of the effect of benzene exposure on human chromosomes, in particular the inhibition on topoisomerase II enzyme.¹⁴⁸

Smith argued that considering this evidence as a whole, the "weight of the evidence" demonstrated that benzene could cause APL.¹⁴⁹ His testimony was supported by the testimony of a philosopher, Carl Cranor, who endorsed Smith's weight of the evidence approach as a valid and appropriate scientific methodology.¹⁵⁰

The defendants' experts acknowledged that scientific and medical evidence supports the notion that benzene can cause AML. However, the defendants' experts also noted that there are differences between various AML subtypes, and argued that it was inappropriate to surmise that benzene

Bonner, 259 F.3d at 929–30 (internal quotation marks omitted) (quoting *Hose v. Chicago Nw. Transp. Co.*, 70 F.3d 968, 974 (8th Cir. 1995)). This was not a correct statement of the law even in 1996, much less after Rule 702 was amended in 2000. See also *In re Celexa & Lexapro Prods. Liab. Litig.*, 927 F. Supp. 2d 758, 762 (E.D. Mo. 2013) ("The exclusion of an expert's opinion is proper only if it is so fundamentally unsupported that it can offer no assistance to the jury." (quoting *Wood v. Minn. Mining & Mfg. Co.*, 112 F.3d 306, 309 (8th Cir. 1997))).

145 639 F.3d 11 (1st Cir. 2011), *cert. denied sub nom.* U.S. Steel Corp. v. Milward, 132 S. Ct. 1002 (2012).

146 *Milward v. Acuity Specialty Prods. Grp., Inc.*, 664 F. Supp. 2d 137, 140 (D. Mass. 2009), *rev'd*, 639 F.3d 11 (1st Cir. 2011), *cert. denied sub nom.* U.S. Steel Corp. v. Milward, 132 S.Ct. 1002 (2012).

147 See *id.* at 142.

148 *Id.* at 142–44.

149 *Id.* at 142 (internal quotation marks omitted).

150 *Milward*, 639 F.3d at 17–18.

can cause APL just because it can cause AML.¹⁵¹ One of the defendants' experts, epidemiologist David Garabrant, pointed out numerous weaknesses and flaws in the epidemiological evidence Smith relied upon, both in the studies themselves and in the idiosyncratic ways that Smith interpreted them.¹⁵²

In a careful and detailed opinion, district court Judge George A. O'Toole, Jr. held that Milward's general causation evidence failed Rule 702, and was therefore inadmissible.¹⁵³ O'Toole found that Smith had relied on epidemiological studies that did not in fact support his conclusion. Moreover, the court noted that none of these studies were statistically significant, which O'Toole concluded rendered any reliance upon them scientifically dubious.¹⁵⁴ O'Toole was equally unimpressed with Smith's other evidence, finding that at best they constituted "plausible hypotheses," not scientific knowledge, and therefore were not reliable support for a scientific conclusion that benzene causes APL. O'Toole then granted summary judgment to the defendants.¹⁵⁵

The plaintiff appealed. The prospects did not look promising, as the First Circuit was faced with the following question: Did a district court judge abuse his discretion when (a) the judge excluded causation testimony by an expert who relied on his "judgment" in extrapolating from studies that do not themselves state that causation exists; (b) the judge, after reviewing several days of testimony from both sides along with written submissions, carefully analyzed the studies underlying the plaintiffs' experts' causation testimony and found that at most they support a working hypothesis and cannot be the basis of reliable testimony;¹⁵⁶ and (c) the appellate court acknowledges that the doubts raised by the district court were "sensible" ones?¹⁵⁷

The answer under the *Daubert* trilogy as codified in Federal Rule of Evidence 702 would seem clearly to be "no." The First Circuit nevertheless held that the district court abused its discretion, and ordered the evidence admitted on remand.¹⁵⁸ In explaining its reasoning, the appellate court engaged in many of the errors and fallacies common to judges who continue to resist the *Daubert* revolution.

151 *Milward*, 664 F. Supp. 2d at 144.

152 *Id.* at 148–49.

153 *Id.* at 140.

154 *Id.* at 149.

155 *Id.* at 145–49.

156 A supporter of the *Milward* appellate opinion notes: "It is not every day, after all, that a district judge—who wrote an opinion that cited the correct binding precedent, addressed each of the factors recited in the precedential opinion being followed, and supported it all with citations to the record—is reversed for abuse of discretion." Steve C. Gold, *A Fitting Vision of Science for the Courtroom*, 3 WAKE FOREST J.L. & POL'Y 1, 1 (2013).

157 *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 23 (1st Cir. 2011), *cert. denied sub nom.* U.S. Steel Corp. v. *Milward*, 132 S. Ct. 1002 (2012).

158 *Id.* at 26.

A. Ignoring Rule 702

As the Supreme Court pointedly emphasized in *Daubert*, the Federal Rules of Evidence are interpreted like any other statute.¹⁵⁹ The first step in interpreting any statute is to start with the statutory language.

Milward quoted the text of amended Rule 702,¹⁶⁰ but then proceeded to ignore it in analyzing the admissibility of plaintiffs' expert testimony.¹⁶¹ Instead, the court contended that "the alleged flaws identified by the court go to the weight of Dr. Smith's opinion, not its admissibility."¹⁶² The court added, "'When the factual underpinning of an expert's opinion is weak, it is a matter affecting the weight and credibility of the testimony—a question to be resolved by the jury.'"¹⁶³ This is a rather extraordinary statement given that Rule 702 not only invites but demands that district courts reject expert testimony that is not based on "sufficient facts or data," or is not the product of "reliable principles and methods," or when the witness has not "applied the principles and methods reliably to the facts of the case."¹⁶⁴ Given that the First Circuit acknowledged that the doubts raised by the district court judge about Smith's testimony were "sensible,"¹⁶⁵ the district court's ruling was not an abuse of discretion.

B. Relying on Obsolete Precedents

Instead of grappling with the text of Rule 702, *Milward* quoted a post-2000 First Circuit opinion, *United States v. Vargas*, for the proposition that "'weak'" expert testimony is for the jury alone to sort out.¹⁶⁶ While Rule 702 may not exclude all weak expert testimony, surely the rule requires at least that a court explain why such testimony is nevertheless sufficiently reliable to be admitted. *Vargas* avoided this issue by neglecting not just the text of amended Rule 702, but also *Daubert*, *Joiner*, and *Kumho Tire*. Instead, *Vargas*

159 See *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 587 (1993) (citing *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 163 (1988)).

160 *Milward*, 639 F.3d at 15.

161 See Nathan A. Schachtman, *WOE-fully Inadequate Methodology—An Ipse Dixit by Another Name*, SCHACHTMANLAW.COM (May 1, 2012, 5:03 AM), <http://schachtmanlaw.com/woe-fully-inadequate-methodology-an-ipse-dixit-by-another-name> (suggesting that *Milward* "threatens to read an Act of Congress—the Federal Rules of Evidence, and especially Rules 702 and 703—out of existence by judicial fiat").

162 *Milward*, 639 F.3d at 22.

163 *Id.* (quoting *United States v. Vargas*, 471 F.3d 255, 264 (1st Cir. 2006)).

164 FED. R. EVID. 702; cf. Joëlle Anne Moreno, *What Happens When Dirty Harry Becomes an (Expert) Witness for the Prosecution?*, 79 TUL. L. REV. 1, 11 n.48 (2004) (criticizing another federal court for redefining the "reliability of an expert's application of his methods to the facts, which should fall squarely within the judge's purview, as a question of 'persuasiveness,'" which goes only to weight).

165 *Milward*, 639 F.3d at 23.

166 *Vargas*, 471 F.3d at 264 (quoting *Int'l Adhesive Coating Co. v. Bolton Emerson Int'l, Inc.*, 851 F.2d 540, 545 (1st Cir. 1988)).

favorably quoted a case from 1988, a time when federal courts applied admissibility standards far more forgiving than Rule 702's.¹⁶⁷

Milward also suggested on two occasions that Smith's testimony was admissible because, as required by *Kumho Tire*, he used the "same level of intellectual rigor" in preparing his testimony as he and others do outside of legal proceedings.¹⁶⁸ *Kumho Tire*, however, also requires the trial judge to "determine whether the testimony has a reliable basis in the knowledge and experience of [the relevant] discipline."¹⁶⁹ The opinion also emphasizes that appellate courts must respect the district court's "discretionary authority . . . to determine reliability in light of the particular facts and circumstances of the particular case."¹⁷⁰ *Kumho Tire* therefore cannot be relied upon to justify a circuit court ruling invalidating a careful district court reliability ruling simply because the higher court decided that the same intellectual rigor standard was met.

Regardless, Rule 702, which was drafted before *Kumho Tire* was issued, does not adopt the same intellectual rigor as the test for the admissibility of expert testimony. Rule 702 ultimately requires that the expert has *reliably* applied the principles and methods to the facts of the case. So if an expert scientist, using all the intellectual rigor he can muster, relies on unreliable speculation and hypothesis, his testimony is not admissible under Rule 702.¹⁷¹

Finally, the same intellectual rigor test seems inapposite to Smith's testimony. Smith is a toxicologist with no expertise in epidemiology or biostatistics, yet he relied on his own idiosyncratic interpretation of relevant epidemiologic studies. The only epidemiologist to testify, Garabrant, explained that Smith had relied upon some studies that suggested no association and others that had flaws in their statistical analyses. Garabrant also stated that Smith improperly manipulated the data in some studies, speculating that illnesses identified in the study as AML could have been APL. Nor did Smith, who relied only on epidemiological studies that lacked statistical significance, do what a statistical expert would likely do in such circumstances: utilize advanced statistical techniques (i.e., meta-analysis) to try to tease a statistically significant result out of the aggregated data.

167 *Id.*

168 *Milward*, 639 F.3d at 15, 19, 26 (internal quotation marks omitted).

169 *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 149 (1999) (alteration in original) (internal quotation marks omitted).

170 *Id.* at 158.

171 See *Chapman v. Maytag Corp.*, 297 F.3d 682, 687 (7th Cir. 2002); *Goebel v. Denver & Rio Grande W.R.R.*, 215 F.3d 1083, 1088 (10th Cir. 2000) ("It is axiomatic that an expert, no matter how good his credentials, is not permitted to speculate."); David L. Faigman, *The Law's Scientific Revolution: Reflections and Ruminations on the Law's Use of Experts in Year Seven of the Revolution*, 57 WASH. & LEE L. REV. 661, 667 (2000) (pointing out that relying on the "same intellectual rigor" does not ensure that testimony meets the reliability test). The expert may be forced to rely on speculation because there is insufficient data to support his conclusion, or because there might be sufficient data but the expert's reasoning process is invalid. I thank David Kaye for that point.

Even if one chose not to credit Garabrand's testimony, the plaintiffs' reply brief in the First Circuit acknowledged that Smith had made an "embarrassing" mistake in analyzing the data in one of the studies he relied on.¹⁷² In such circumstances, the First Circuit erred in concluding that Smith so clearly used the same intellectual rigor as experts would outside of courtroom testimony that the district court abused its discretion by excluding Smith's testimony.

C. Ignoring Joiner

The First Circuit held that the district court abused its discretion because it failed to give adequate deference to the weight of the evidence methodology employed by Smith:

The court treated the separate evidentiary components of Dr. Smith's analysis atomistically, as though his ultimate opinion was *independently* supported by each. . . . [But in Smith's] weight of the evidence approach, no body of evidence was itself treated as justifying an inference of causation. Rather, each body of evidence was treated as grounds for the subsidiary conclusion that it would, if combined with other evidence, support a causal inference.¹⁷³

The broader theoretical problems with deferring to causation experts purporting to rely on the weight of the evidence will be discussed later.¹⁷⁴ For now, however, it is sufficient to point out that the court's holding on this issue—that a district court abuses its discretion when it (a) considers each piece of causation evidence individually rather than holistically; and (b) rejects an expert's speculative weight of the evidence testimony—is in direct conflict with *General Electric Co. v. Joiner*.¹⁷⁵

172 Reply Brief of Plaintiffs-Appellants at 24–26, *Milward*, 639 F.3d 11 (No. 09-2270).

173 *Milward*, 639 F.3d at 23.

174 See *infra* notes 200–210 and accompanying text.

175 522 U.S. 136, 146–47 (1997). By contrast, *Milward* is completely consistent with Justice Stevens's dissent in *Joiner*. Stevens wrote:

Joiner's experts used a "weight of the evidence" methodology to assess whether Joiner's exposure to transformer fluids promoted his lung cancer. They did not suggest that any one study provided adequate support for their conclusions, but instead relied on all the studies taken together (along with their interviews of Joiner and their review of his medical records). The District Court, however, examined the studies one by one and concluded that none was sufficient to show a link between PCB's and lung cancer. . . . Unlike the District Court, the Court of Appeals expressly decided that a "weight of the evidence" methodology was scientifically acceptable. To this extent, the Court of Appeals' opinion is persuasive. It is not intrinsically "unscientific" for experienced professionals to arrive at a conclusion by weighing all available scientific evidence—this is not the sort of "junk science" with which *Daubert* was concerned.

Id. at 152–53 (Stevens, J., dissenting) (footnotes omitted). Stevens concluded that the Eleventh Circuit had been correct in finding that the district court had abused its discretion in excluding this evidence. *Id.* at 155. But Stevens spoke only for himself. The rest of

The Supreme Court examined Joiner's experts' evidence in exactly the way the *Milward* court said was forbidden, that is, by "atomistically"¹⁷⁶ looking at each study relied on by the experts to see if it could support causation testimony.¹⁷⁷ Indeed, even the late Professor Margaret Berger, who wrote an introduction to the third edition of the Federal Judicial Center's *Reference Manual on Scientific Evidence* that strongly favors liberal admissibility standards in toxic torts cases,¹⁷⁸ acknowledges that under *Joiner* a "trial judge [] . . . is free to choose an atomistic approach that evaluates the available studies one by one."¹⁷⁹

Milward utterly fails to explain how its holding is consistent with *Joiner*.¹⁸⁰ *Milward*'s expert on scientific methodology, Carl Cranor, wrote after the case that *Milward* corrected the Supreme Court's "atomistic" error in *Joiner*.¹⁸¹ Needless to say, circuit court judges do not have the authority to correct Supreme Court holdings.

Even if *Milward* is correct that sound practice dictates considering the evidence a plaintiff's expert is relying on to infer causation holistically,¹⁸² and even if there were some way to evade *Joiner*, the proper remedy in *Milward* would have been to remand the case to the district court to reconsider based on the standard mandated by the circuit. The district court, after all, had not only entertained extensive briefing and heard several days of *viva voce* testimony at a hearing, but on remand could ask for supplemental brief-

the Justices disagreed that the district court was obligated to admit weight of the evidence testimony.

176 *Milward*, 639 F.3d at 23.

177 See *Kilpatrick v. Breg, Inc.*, 613 F.3d 1329, 1341 (11th Cir. 2010) ("The fact that the district court then further analyzed each article in detail and found each to be unreliable was a proper approach to the issue." (citing *Joiner*, 552 U.S. at 145–46)).

178 See Margaret A. Berger, *The Admissibility of Expert Testimony*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 11, 36 (3d ed. 2011).

179 *Id.* at 23.

180 There is some debate in academic circles as to whether Rule 702 clarifies, codifies, or supersedes *Joiner*, but no one argues that *Joiner* is more stringent than Rule 702.

181 Cranor, *supra* note 18.

182 See INST. OF MED. & NAT'L RESEARCH COUNCIL OF THE NAT'L ACADS., DIETARY SUPPLEMENTS: A FRAMEWORK FOR EVALUATING SAFETY 255–60 (2005); Susan Haack, *Proving Causation: The Holism of Warrant and the Atomism of Daubert*, 4 J. HEALTH & BIOMEDICAL L. 253 (2008); Susan Haack, *An Epistemologist in the Bramble-Bush: At the Supreme Court with Mr. Joiner*, 26 J. HEALTH POL. POL'Y & L. 217, 223–24, 237 (2001). But see *Merck & Co. v. Garza*, 347 S.W.3d 256, 268 (Tex. 2011) ("The totality of the evidence cannot prove general causation if it does not meet the standards for scientific reliability A plaintiff cannot prove causation by presenting different types of unreliable evidence."). A "holistic" approach to an expert only works if the expert is reasonably relying on the facts and data in the studies in question, an issue addressed by Federal Rule of Evidence 703. In this author's view, a "holistic" review of the evidence would rarely make a difference if courts properly apply the reliability standard.

ing on whether and why reviewing plaintiffs' expert evidence holistically should change the judgment that the testimony was not reliable.¹⁸³

D. Reducing the Burden of Persuasion When the Defendants Lack Strong Contrary Evidence

The First Circuit distinguished its *Milward* opinion from cases "in which the available epidemiological studies found that there is no causal link."¹⁸⁴ This mimics the pre-*Daubert Ferebee* standard, discussed above.¹⁸⁵ The *Ferebee* standard has no basis in the *Daubert* trilogy and Rule 702. The plaintiff under Rule 702 has the burden of showing that his expert testimony is reliable, not that the expert did the "best [he] could with the available data and the scientific literature."¹⁸⁶ Nothing in the *Daubert* trilogy or Rule 702 suggests that the plaintiff's burden is lessened simply because the issue is on the frontier of medical knowledge or because strong contrary evidence has not been presented by the defendant. Indeed, as pointed out previously,¹⁸⁷ Rule 702 and *Joiner* utterly rejected *Ferebee*-like standards.¹⁸⁸

E. Misunderstanding the Underlying Rationale for Modern Admissibility Rules

Like many courts before it, and like Justice Stevens's lone dissent in *Joiner*, the First Circuit in *Milward* seemed to think that the only purpose of federal courts' gatekeeper function is to exclude obvious junk science from the courts, while still allowing well-credentialed scientists to speculate based on incomplete data.¹⁸⁹ Relying on the testimony of Professor Cranor, the

183 "Reversal is warranted only when the case for causation is so clear that exclusion of the evidence, viewing the expert's reasoning as a whole, is an abuse of discretion—a situation that is not obvious [in *Milward*]." KAYE ET AL., *supra* note 18, § 10.5.1.

184 *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 24 (citing *Norris v. Baxter Healthcare Corp.*, 397 F.3d 878, 882 (10th Cir. 2005)); *Allen v. Pa. Eng'g Corp.*, 102 F.3d 194, 197 (5th Cir. 1996).

185 See *supra* notes 50–67 and accompanying text.

186 *Hollander v. Sandoz Pharm. Corp.*, 289 F.3d 1193, 1213 (10th Cir. 2002); see also *Siharath v. Sandoz Pharm. Corp.*, 131 F. Supp. 2d 1347, 1373 (N.D. Ga. 2001) (stating that Rule 702 does not establish a "best efforts test" (internal quotation marks omitted), *aff'd sub nom. Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194, 1203 (11th Cir. 2002).

187 See *supra* notes 175–85 and accompanying text.

188 In contrast to *Milward*, the Sixth Circuit recently quoted the language of Rule 702 in ordering the exclusion of causation testimony on the grounds that the plaintiff's experts presented only "a plausible hypothesis." *Tamraz v. Lincoln Elec. Co.*, 620 F.3d 665, 670 (6th Cir. 2010). Such a hypothesis, the court explained, "is not knowledge, nor is it based upon sufficient facts or data or the product of reliable principles and methods . . . applied . . . reliably to the facts of the case." *Id.* (alteration in original) (internal quotation marks omitted).

189 Not surprisingly, academic commentators writing in support of *Milward* make the same supposition. See Thomas O. McGarity & Sidney A. Shapiro, *Regulatory Science in Rulemaking and Tort: Unifying the Weight of the Evidence Approach*, 3 WAKE FOREST J.L. & POL'Y 65, 99 (2013) ("*Daubert* was essentially concerned with excluding expert witnesses who were charlatans—witnesses who would testify in favor of the plaintiff even though the avail-

court repeatedly emphasized that Smith properly used his “judgment” in reasoning to the conclusion that Benzene exposure causes APL. The court was correct that practicing scientists extrapolate from uncertain evidence to formulate scientific hypotheses. But the court was wrong to think that this necessarily amounts to something more than the scientists’ best guess.¹⁹⁰

In the regulatory context, where government agencies are charged with proactively protecting the public health from potential toxic threats, agencies often have no choice but to rely on scientists’ best guesses in the face of scientific uncertainty. But such best guesses are not admissible in toxic tort cases, where the law demands *reliable* expert testimony regarding causation.¹⁹¹

In part, the distinction between the standards for regulatory determinations and the standards for causation determinations in toxic tort cases rests on the differing contexts. In the former, agencies seek to protect the public from potential risks that *may* turn out to harm public health, while in the latter the plaintiff has the burden of showing that a particular risk *did* in fact cause him harm. The distinction also turns on the question of adversarial bias.¹⁹² Scientists working for regulatory agencies can be presumed to

able scientific evidence offered little or no support for their testimony.”). While, as noted previously, that was at least a plausible interpretation of *Daubert*, it was rebutted by later developments in *Joiner*, *Kumho Tire*, and amended Rule 702.

190 “Anyone who has been trained in the scientific method realizes that a hypothesis is a scientist’s educated speculation.” *Johnston v. United States*, 597 F. Supp. 374, 393 (D. Kan. 1984).

191 Many courts have acknowledged as much. *See, e.g., Rider*, 295 F.3d at 1201 (“[The] risk-utility analysis involves a much lower standard than that which is demanded by a court of law. A regulatory agency such as the FDA may choose to err on the side of caution. Courts, however, are required by the *Daubert* trilogy to engage in objective review of evidence to determine whether it has sufficient . . . basis to be considered reliable.”); *Allen v. Pa. Eng’g Corp.*, 102 F.3d 194, 198 (5th Cir. 1996) (“This [weight of the evidence] methodology results from the preventive perspective that the agencies adopt in order to reduce public exposure to harmful substances. The agencies’ threshold of proof is reasonably lower than that appropriate in tort law, which traditionally make[s] more particularized inquiries into cause and effect and requires a plaintiff to prove that it is more likely than not that another individual has caused him or her harm.” (internal quotation marks omitted)).

192 By contrast, two law professors who defend *Milward* “see no meaningful distinction between the regulatory and tort contexts.” McGarity & Shapiro, *supra* note 189, at 68. The authors acknowledge that agencies’ administrators get advice “from scientific advisory committees and from their in-house scientists” while “the jury or judge has the benefit of testimony from experts presented by the plaintiff and the defendant.” *Id.* at 98. But the authors fail to “see any differences between them that would require screening out testimony in a tort case that relies on a weight of the evidence approach.” *Id.* at 98–99. The authors seem to think that the relevant difference would be in the relative levels of competence of the respective triers of fact. But they don’t address the issue of adversarial bias, so it is not clear why they would think that experts chosen by partisans in litigation to support a partisan position would be as likely to present reliable testimony based on their purported scientific judgment as would in-house government scientists and expert advisory committees.

represent mainstream opinion in their fields, and to be trying to reach the best possible result from a public welfare perspective.¹⁹³ By contrast, given pervasive adversarial bias in the context of toxic tort litigation, one must presume that an expert was chosen precisely because the views he is willing to state in court reflect the position of the party that hired him to testify.¹⁹⁴

Federal evidence rules evolved to ultimately demand an *objective* basis for opinion testimony to deal with the problems attendant to adversarial bias.¹⁹⁵

193 Undoubtedly agencies, especially ones dealing with hot-button political issues, can be captured by scientists with an agenda. But unlike with adversarial bias and partisan experts in litigation, this is not necessarily a systemic problem and there is no reason to presume it is true in any given situation.

194 In the process of writing this article, the author came across an article by Professor Michael Green of Wake Forest Law School that makes a very similar point. He notes that given the lack of a scientific consensus on benzene and APL we will have the same dueling adversarial experts, one testifying that using the weight of the evidence methodology leads her to the conclusion that plaintiff's disease was caused by defendant's toxic agent, and the other testifying to all of the flaws in the evidence relied on by the other expert and why it is not proper scientific methodology.

Green explains that this is far different than the measured assessments that might occur among scientists at an International Agency for Research on Cancer (IARC) meeting to review the carcinogenicity of an industrial chemical, or an Advisory Committee formed by the FDA to assess evidence of adverse effects of a recently approved new drug. Not only is the selection and preparation of scientists for such proceedings dramatically different from selecting experts for litigation, the process of consensus advisory committees and the process of direct and cross examination of expert witnesses in a courtroom is also very different. See Michael D. Green, *Pessimism About Milward*, 3 WAKE FOREST J.L. & POL'Y 41, 58–59 (2013); see also Sanders, *supra* note 56, at 74 (“It is the legal system’s commitment to adversarialism in the form of party control of expert witnesses that creates substantial pressures on experts to adopt a more party-oriented point of view.”).

Meanwhile, the existence of adversarial bias provides the answer to a question posed by Professor Steve Gold in his contribution to a symposium on *Milward*: “Courts give questions to the jury if reasonable people could find for either side. Why should disagreement among scientists be the one sphere of human inquiry in which we do not let a fact-finder resolve the dispute as applied to a particular set of facts?” Gold, *supra* note 158, at 19. Adversarial bias creates special problems for expert testimony that it does not create for ordinary witness testimony. As this author has noted elsewhere:

[L]ay witnesses, unlike experts, are not paid for their testimony, which eliminates the possibility of serving as a “witness for hire.” Second, lay witnesses are only permitted to present opinion testimony based on their own rational perceptions, limiting the scope of their testimony. Third, attorneys can shop from an almost unlimited pool of expert witnesses, while generally a very limited pool of potential ordinary fact witnesses exists in any given case. Finally, jurors may be particularly likely to assume that an expert witness, particularly a scientist, is an unbiased participant in the proceedings.

Bernstein, *supra* note 35, at 455 (footnotes omitted).

195 See FED. R. EVID. 702 advisory committee’s note (2000 Amendments) (“The trial court’s gatekeeping function requires more than simply ‘taking the expert’s word for it.’”); *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1319 (9th Cir. 1995) (“We’ve been presented with only the experts’ qualifications, their conclusions and their assurances of reliability. Under *Daubert*, that’s not enough.”).

This is also why so many courts have emphasized the importance of sound epidemiological evidence, which provides statistical verification of associations between exposures and diseases, to causation testimony.¹⁹⁶ When an expert does not have such evidence, and must rely on his judgment (or “best guess”), the expert should, at the very least under a liberal interpretation of Rule 702, be able to point to evidence that his judgment is widely shared by other researchers.

In *Milward*, the district court noted that Smith’s conclusion lacked general acceptance. On appeal, the First Circuit lamely responded that although general acceptance is a factor district courts may consider when reviewing expert testimony, the district court gave this factor “undue weight.”¹⁹⁷ The appellate court, in other words, criticized the district court for looking to the only objective evidence presented to the court as to whether Smith’s conclusions were backed by more than his idiosyncratic speculation.

F. Allowing “Weight of the Evidence” Testimony in Lieu of Applying the Reliability Test

As noted above, *Milward* put great stock in the fact that the plaintiffs’ expert purported to rely on a “weight of the evidence methodology.” The court used this phrase as if it denotes a reasoning process that is both scientific and reliable. In fact, however, it is largely tautological: the act of inferring “B” from “A” while trying to reach the correct conclusion typically involves using a “weight of the evidence methodology.”¹⁹⁸ To allow an expert to testify simply because he purports to be extrapolating from the evidence in light of the weight he chooses to give to each item of evidence would be to leave the evidentiary gates wide open. Every quack and huckster claiming that he is relying on an evidentiary mosaic to invent causation with-

196 See, e.g., *Siharath v. Sandoz Pharms. Corp.*, 131 F. Supp. 2d 1347, 1358 (N.D. Ga. 2001) (“[T]he burden is on Plaintiffs to show that well-conducted epidemiology studies do show a statistically significant relationship between [the disease and the alleged agent]. It is not Defendant’s burden to show the lack of such relationship.”), *aff’d sub nom. Rider v. Sandoz Pharm. Corp.*, 295 F.3d 1194, 1203 (11th Cir. 2002); *Merck & Co. v. Garza*, 347 S.W.3d 256, 265–66 (Tex. 2011) (holding that plaintiffs seeking to prove causation with epidemiological evidence must produce two independent studies demonstrating that subjects who used the product at issue under circumstances substantially similar to those encountered by the plaintiff at least doubled their the risk of injury). Even epidemiological evidence must be treated with care. See Gary Taubes, *Epidemiology Faces Its Limits*, 269 SCI. 164, 164–69 (1995) (noting that epidemiology is subject to systematic errors, biases, and confounders).

197 *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 22 (1st Cir. 2011).

198 See FAIGMAN ET AL., *supra* note 18, § 29:6, at 782 (criticizing *Milward* for confusing inference with a scientific methodology). The same could be said of those state courts which, utilizing the *Frye* rule, admit testimony because an expert purports to be using the “extrapolation method.” See, e.g., *Donaldson v. Cent. Ill. Pub. Serv. Co.*, 767 N.E.2d 314, 327 (Ill. 2002), *abrogated by In re Commitment of Simons*, 821 N.E.2d 1184, 1190 (Ill. 2004). At least in *Donaldson*, unlike in *Milward*, the court was not obligated under governing law to consider the expert’s reasoning process.

out reference to reliable scientific evidence could claim he is utilizing a “weight of the evidence methodology.”¹⁹⁹

Weight of the evidence language is sometimes used in the risk assessment context to confer credibility on conclusions extrapolated from limited data. This has come under withering attack from critics who note that relying on the weight of the evidence is only scientifically valid when the expert provides transparent and detailed explanation of exactly how the expert weighed the evidence.²⁰⁰ As David Kaye and his co-authors write in *The New Wigmore: Expert Evidence*, “The nature of the studies in each case, the plausibility of the extrapolations from them, and the known soundness of the basic theory—in sum, the expert’s causal reasoning—must be unpacked and inspected to verify that it is sound science.”²⁰¹ Otherwise, weight of the evidence is nothing more than a metaphor, not an actual scientific methodology.²⁰²

Indeed, the phrase “weight of the evidence” is so porous and amorphous that one researcher found that it is used in the scientific literature to mean no less than thirteen different things.²⁰³ By far the most common use “is to refer to a body of scientific evidence that has been examined for some purported risk, without reference to any interpretative methodology.”²⁰⁴

Milward correctly cautions that relying on the weight of the evidence is not “inherently unreliable.”²⁰⁵ The question presented to the First Circuit,

199 See *Oxendine v. Merrell Dow Pharm., Inc.*, 506 A.2d 1100, 1110 (D.C. 1986) (discussing the “mosaic” theory while upholding a jury verdict in favor a plaintiff in a Bendectin case despite voluminous contrary scientific evidence); Green, *supra* note 194, at 62–63 (recounting the origins of the mosaic metaphor). See generally KAYE ET AL., *supra* note 18, § 10.5.1 (“In any event, the court’s comments on ‘weight of the evidence’ as a scientific ‘methodology’ must not be read to permit the phrase to become a blank check for admission. After all, plaintiffs’ experts in *General Electric Co. v. Joiner* and *Kumho Tire Co. v. Carmichael* also were using a weight-of-evidence, best-inference ‘method.’” (footnotes omitted)).

200 See Douglas L. Weed, *Weight of Evidence: A Review of Concept and Methods*, 25 RISK ANALYSIS 1545, 1546–51 (2005); see also Virginia H. Dale et al., *Enhancing the Ecological Risk Assessment Process*, 4 INTEGRATED ENVTL. ASSESSMENT & MGMT. 306, 306 (2008) (“An approach to interpreting lines of evidence and weight of evidence is critically needed for complex assessments, and it would be useful to develop case studies and/or standards of practice for interpreting lines of evidence.”); Glenn W. Suter II & Susan M. Cormier, *Why and How to Combine Evidence in Environmental Assessments: Weighing Evidence and Building Cases*, 409 SCI. TOTAL ENV’T 1406, 1406 (2011) (noting that “weight of the evidence” evaluations are prone to arbitrariness and subjectivity).

201 KAYE ET AL., *supra* note 18, § 10.5.1; see also *Magistrini v. One Hour Martinizing Dry Cleaning*, 180 F. Supp. 2d 584, 602–08 (D.N.J. 2002) (concluding that an expert’s reliance on a purported weight of the evidence methodology to find causation was unreliable because the expert did not explain the weight he gave to the different pieces of evidence), *aff’d*, 68 F. App’x 356 (3d Cir. 2003); *Estate of George v. Vt. League of Cities & Towns*, 993 A.2d 367, 379 (Vt. 2010) (affirming the exclusion of testimony where the expert did not specify the weight he had given to each study).

202 Weed, *supra* note 200, at 1546–47.

203 See *id.* at 1547.

204 *Id.* at 1546.

205 *Milward v. Acuity Specialty Prods. Grp., Inc.*, 639 F.3d 11, 19 (1st Cir. 2011).

however, was not whether extrapolation from existing data is sometimes valid. Rather, it was whether Smith's testimony met Rule 702's reliability test, and whether the district court abused its discretion in finding that it did not.

Milward claims that Smith's "weight of the evidence" methodology involved following "the guidelines articulated by world-renowned epidemiologist Sir Arthur [sic] Bradford Hill in his seminal methodological article on inferences of causality."²⁰⁶ But as Hill himself specified, these guidelines only come into play once scientists have found an "association between two variables, perfectly clear-cut and beyond what we would care to attribute to the play of chance."²⁰⁷ Such evidence will normally come from epidemiological studies.²⁰⁸

The defendants' experts persuaded the district court that the plaintiff's expert presented no reliable evidence of even an *association* between Benzene exposure and APL. In particular, the district court rejected the epidemiological evidence presented by the plaintiff's expert. Certainly, there was nothing "perfectly clear cut" about the purported association.

Milward tried to justify its decision by analogizing weight of the evidence methodology to differential diagnosis.²⁰⁹ But differential diagnosis, as the case cited in *Milward* explains, involves "a determination of which of two or more diseases, presenting with similar symptoms had caused a patient's ailments."²¹⁰ What Smith did is analogous instead to differential etiology, that is, trying to determine which of several known causes of a disease caused the subject's disease.²¹¹ A differential etiology, however, "cannot possibly determine that substance A caused disease B in the absence of prior, reliable independent evidence that substance A can cause disease B."²¹² Translated into legal jargon, differential etiologies are only probative of specific causation, not general causation.²¹³ Just as courts typically exclude differential etiologies when the expert has not provided sufficient independent evidence that

206 *Id.* at 17 (citing Austin Bradford Hill, *The Environment and Disease: Association or Causation?*, 58 PROC. ROYAL SOC'Y MED. 295 (1965)).

207 Hill, *supra* note 206, at 295; see *Dunn v. Sandoz Pharm. Corp.*, 275 F. Supp. 2d 672, 680–81 (M.D.N.C. 2003) (elaborating on this point).

208 Michael D. Green et al., *Reference Guide on Epidemiology*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE, *supra* note 178, at 549, 599 n.141 ("In a number of cases, experts attempted to use these guidelines to support the existence of causation in the absence of any epidemiologic studies finding an association. . . . There may be some logic to that effort, but it does not reflect accepted epidemiologic methodology." (citations omitted)).

209 See *Milward*, 639 F.3d at 18.

210 *Granfield v. CSX Transp., Inc.*, 597 F.3d 474, 486 (1st Cir. 2010).

211 See Hill, *supra* note 206, at 296.

212 David E. Bernstein, *Getting to Causation in Toxic Tort Cases*, 74 BROOK. L. REV. 51, 64 (2008).

213 Cf. Edward J. Imwinkelried, *The Admissibility and Legal Sufficiency of Testimony About Differential Diagnosis (Etiology): Of Under—and Over—Estimations*, 56 BAYLOR L. REV. 391, 406 (2004) (stating that with regard to general causation, "an opinion [based on differential etiology] seems to be at most an educated guess").

the substance at issue can cause the disease at issue,²¹⁴ the court should not have admitted Smith's evidence here.

The *Milward* court seems to have been led astray in part by the plaintiff's expert on scientific methodology, philosophy professor Carl Cranor.²¹⁵ Why the court thought Cranor's testimony—which the district court studiously ignored in its opinion—so valuable is not obvious. Cranor is not a scientist, and he has been criticized for exhibiting confusion regarding basic scientific concepts and their relationship to legal burdens of proof.²¹⁶ Nor could Cranor be expected to present a balanced view of how scientists approach causation; rather, Cranor is a long-time partisan of liberal admissibility rules for plaintiffs' evidence in toxic tort litigation, and an opponent of the stricter rules that have come into place since *Daubert*.²¹⁷ In his books, Cranor consistently ignores the fundamental problem of adversarial bias addressed by Rule 702 and the *Daubert* trilogy.

The value of Cranor's testimony, if any, would be in helping the court understand how scientists would approach the reliability test established by amended Rule 702. Yet in his deposition Cranor refused to opine on reliability, claiming, "I don't know what the word 'reliability' is" and "I don't like the word 'reliable,' because I don't understand what it means."²¹⁸

Exactly how influential *Milward* will be remains to be seen. When the case reached the First Circuit, it had the unusual procedural posture of general causation only being at issue. The case is now back in the district court,

214 See Craig T. Smith, *Peering into the Microscope: The Rise of Judicial Gatekeeping After Daubert and Its Effect on Federal Toxic Tort Litigation*, 13 B.U. J. SCI. & TECH. L. 218, 225 (2007).

215 Cf. Schachtman, *supra* note 161 ("The [p]anel appeared to have been misled by Carl F. Cranor, who described 'inference to the best explanation' as requiring a scientist to 'consider all of the relevant evidence' and 'integrate the evidence using professional judgment to come to a conclusion about the best explanation. The available explanations are then weighed, and a would-be expert witness is free to embrace the one he feels offers the 'best' explanation. The appellate court's opinion takes WOE, combined with Cranor's 'inference to the best explanation,' to hold that an expert witness need only opine that he has considered the range of plausible explanations for the association, and that he believes that the causal explanation is the best or 'most plausible.' What is missing of course is the realization that plausible does not mean established, reasonably certain, or even more likely than not. The Circuit's invocation of plausibility also obscures the indeterminacy of the available data for supporting a reliable conclusion of causation in many cases." (citations omitted)).

216 See Michael D. Green, *Science Is to Law as the Burden of Proof Is to Significance Testing*, 37 JURIMETRICS 205, 221 (1997) (reviewing CRANOR, REGULATING, *supra* note 3) (noting Cranor's "confusion of statistical significance and legal burdens of proof" and calling it "a fundamental error").

217 See, e.g., CRANOR, REGULATING, *supra* note 3, at 81–82; CRANOR, TOXIC TORTS, *supra* note 3, at 367; Carl F. Cranor et al., *Judicial Boundary Drawing and the Need for Context-Sensitive Science in Toxic Torts After Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 16 VA. ENVTL. L.J. 1, 5–6 (1996).

218 Deposition of Carl F. Cranor, *Milward v. Acuity Special Prods. Grp., Inc.*, 639 F.3d 11, 19 (1st Cir. 2011) (on file with author).

where the parties are battling over the admissibility of specific causation testimony, i.e., whether there is reliable evidence that Milward's exposure to benzene caused his disease, as opposed to whether benzene generally increases the risk.²¹⁹ It would hardly be surprising if the district court, which found even the general causation testimony unreliable, were to exclude the even more speculative specific causation evidence. If the First Circuit were to uphold such a ruling, the original *Milward* opinion would no longer seem so significant. If the First Circuit were to reverse such a ruling, it might very well invite Supreme Court intervention.²²⁰

CONCLUSION

By academic convention, the author is expected at this point to propose a grand theory. In this instance, the author might provide a theory of why and when judges are inclined to defy statutes and Supreme Court precedent.²²¹ And yet, no grand theory is needed to explain the reaction of judges to *Daubert* and its progeny. The factors leading to judicial noncompliance are straightforward.

First, the modern reliability test represents a radical change in the law of expert testimony, and judges, a conservative lot,²²² tend to be hostile to radical legal change. Rule 702 not only codifies revolutionary changes in the substantive law, but also places substantial new demands on judges by requiring a far more managerial role for judges than they are used to assuming in the American adversarial system.²²³ Judicial conservatism is enabled in part by the conservatism of defense attorneys, who often themselves ignore the

219 See generally Bernstein, *supra* note 212 (explaining the difference between general and specific causation).

220 An important common element of the three cases in the *Daubert* trilogy is that in each case, the plaintiff's expert causation evidence was notably weak. The Court seems to have chosen to take these particular cases because it was so easy in each of them to discern the need for stricter rules than the lower courts had been willing to apply. See Faigman, *supra* note 16, at 134.

221 Perhaps judges' willingness or unwillingness to strictly scrutinize expert testimony tracks their general view of judge/jury responsibilities. If so, a judge who, for example, is more willing to grant motions for judgment as a matter of law based on the insufficiency of the evidence will also be more likely to grant *Daubert* motions. This seems like an empirically testable hypothesis worth pursuing. The author thanks Prof. Michael Green of Wake Forest Law School for the suggestion.

222 See Michael F. Duggan, *The Law as Justification: A Critical Rationalist Analysis*, 86 N.D. L. REV. 149, 160 n.28 (2010) ("The judiciary is temperamentally the most conservative branch of government . . .").

223 See Faigman, *supra* note 16, at 129 (suggesting that the managerial aspect of *Daubert* is perhaps its most radical feature); Edward J. Imwinkelried, *Trial Judges—Gatekeepers or Usurpers? Can the Trial Judge Critically Assess the Admissibility of Expert Testimony Without Invading the Jury's Province to Evaluate the Credibility and Weight of the Testimony?*, 84 MARQ. L. REV. 1, 5 (2000) (discussing judges' case management responsibilities under *Daubert*).

text of Rule 702 in their briefs in favor of reliance on old circuit precedents, which invite judges to do the same.²²⁴

Moreover, judges and lawyers have been subject to a vast amount of literature on *Daubert*, which, as noted earlier in this Article,²²⁵ had significant ambiguities. The stricter *Joiner* and *Kumho Tire* opinions received substantially less attention. The especially forthright amended Rule 702, which as the governing statute should be the focus of judicial attention when considering the admissibility of expert testimony, has received even less publicity.²²⁶

Because of these disparities, some judges seem not to realize that Rule 702 was amended in 2000.²²⁷ Even among the majority who are cognizant of the amendment, many judges seem to believe that Rule 702 simply codified prior case law, without recognizing (a) that the language of Rule 702 precludes certain lenient interpretations of the *Daubert* trilogy, especially the “methodologies only” and “the rules have a bias favoring admissibility of expert testimony” interpretations of the *Daubert* opinion; and (b) that the trilogy and the language of Rule 702 implicitly overruled a great deal of prior case law, including, for example, any cases that applied *Ferebee*-like standards to admissibility rulings.

Meanwhile, the organized plaintiffs’ bar has undertaken a well-funded campaign to undermine the *Daubert* revolution by encouraging courts to apply liberal standards to the admissibility of expert testimony. Much of this campaign was funded by the Project on Scientific Knowledge and Public Policy (SKAPP), which sponsored conferences,²²⁸ policy papers,²²⁹ and law review articles.²³⁰ SKAPP’s funding, ironically, came from money paid by defendants into the Common Benefit Trust, part of the breast implant litiga-

224 For example, one main brief and three amicus briefs were filed in the Supreme Court in support of the Court granting certiorari in *Milward*. Only one of those briefs discussed whether *Milward* was consistent with the language of Rule 702. This author has read many briefs asking judges to exclude expert testimony, and has noted that they often neglect the text of Rule 702.

225 See *supra* notes 94–109 and accompanying text.

226 Note that the title of this Article references *Daubert*, not Rule 702, because most attorneys, judges, and law professors still think of the changes to expert evidence law as being a result of *Daubert*. This is despite two subsequent major Supreme Court rulings and the amendment to Rule 702.

227 See *supra* note 138 and accompanying text.

228 See David Michaels & Neil Vidmar, *Foreword*, LAW & CONTEMP. PROBS., Winter 2009, at iii, iv (“SKAPP has convened four Coronado Conferences. At each one a group of distinguished scientists, philosophers of science, judges, and policy experts presented papers and discussed issues at the intersection of science, law, and public policy.”).

229 See, e.g., DAVID M. FLORES ET. AL., EFFECTS OF *Daubert* on Expert Evidence Practices in Federal District Court of South Carolina 2 (2008); Scientific Knowledge & Pub. Policy, *Daubert: The Most Influential Supreme Court Ruling you’ve Never Heard of* (2003).

230 See, e.g., David S. Caudill & Donald E. Curley, *Strategic Idealizations of Science to Oppose Environmental Regulation: A Case Study of Five TMDL Controversies*, 57 U. KAN. L. REV. 251, 251–54 (2009), David Michaels, *Foreword: Sarbanes-Oxley for Science*, LAW & CONTEMP. PROBS., Summer 2006, at 1, 3 (noting this issue includes papers presented at *Sequestered Science: The Consequences of Undisclosed Knowledge*, a symposium convened by SKAPP).

tion settlement, which was itself the product of highly speculative, unreliable expert testimony enabled by lenient judges.²³¹ More recently, the Robert L. Habush Foundation, affiliated with the plaintiffs' lawyers' group the American Association for Justice, provided funding to the Center for Public Representation to sponsor a conference on *Milward*.²³²

The plaintiffs' lawyers' campaign has benefited from a number of intellectual allies. A particularly important one was the late Professor Margaret Berger, author of the section of the influential Federal Judicial Center *Reference Manual on Scientific Evidence* dealing with the admissibility of expert testimony. Professor Berger expressed her increasing discomfort with the effects of *Daubert* and its progeny on toxic tort litigation in several articles.²³³ Her introductory essay in the third edition of the *Reference Manual* neglects Rule 702 without explanation, and claims, as if *Joiner* never existed, that *Daubert* expresses a preference for admissibility.²³⁴

Finally, at least since Vice President Dan Quayle's Council on Competitiveness's adoption of courtroom "junk science" as a pet issue,²³⁵ there has been an undercurrent of concern among some judges that stricter standards for the admissibility of expert testimony reflect a "right-wing" agenda that they don't share. Yet concern that courts should ensure that expert testimony relied upon by courts is reliable has long transcended ideological boundaries.

Some of the earliest calls for a crackdown on dubious expert testimony in toxic torts cases came from publications that typically take a liberal editorial line, such as the *New York Times* and the *New England Journal of Medicine*.²³⁶ Moreover, the Supreme Court's opinions on expert testimony

231 See Bernstein, *supra* note 41; *supra* notes 102–05 and accompanying text.

232 See 2012 Spring Symposium, WAKE FOREST J.L. & POL'Y, <http://lawpolicyjournal.law.wfu.edu/symposium/previousevent/2012-spring-symposium> (last accessed Oct. 22, 2013). Of course, defense interests have meanwhile been advocating for strict standards for the admissibility of expert testimony. However, my strong impression, as someone who has been actively involved in these issues for many years, is that after their victories in the *Daubert* trilogy and the amendment to Rule 702, defense interests that had been concerned about expert testimony have mostly declared victory and went on to other things, while the plaintiffs' bar has been much more active in trying to encourage courts to apply liberal rules.

233 See Berger & Twerski, *supra* note 118, at 287; Margaret A. Berger, *What Has a Decade of Daubert Wrought?*, 95 AM. J. PUB. HEALTH (SUPPLEMENT I) S59, S59–61 (2005); Margaret A. Berger, *Upsetting the Balance Between Adverse Interests: The Impact of the Supreme Court's Trilogy on Expert Testimony in Toxic Tort Litigation*, 64 LAW & CONTEMP. PROBS. 289, 325–26 (2001).

234 See Berger, *supra* note 180, at 18. As we have seen, *Daubert* itself is highly ambiguous on the matter, see *supra* notes 81–92 and accompanying text, but after *Joiner* this claim is clearly false.

235 See PRESIDENT'S COUNCIL ON COMPETITIVENESS, AGENDA FOR CIVIL JUSTICE REFORM IN AMERICA (1991), as reprinted in 60 U. CIN. L. REV. 979 (1992).

236 See *supra* notes 63, 95.

have been notably bipartisan and transideological,²³⁷ even while the Court has been bitterly divided on other issues. The Advisory Committee on federal rules that enacted the 2000 amendments to Rule 702 was a mainstream body with no hint of a right-wing ideological agenda. Finally, the political left has traditionally had a great interest in protecting the rights of criminal defendants from prosecutorial overreach, and the post-*Daubert* upheaval in expert evidence law has helped prompt a broad reconsideration of dubious forensic testimony used by prosecutors.²³⁸

The Supreme Court could step in at any time to reign in wayward circuits. But for unknown reasons, the Court has allowed lower court judges significant latitude to ignore Rule 702.²³⁹ The Court should intervene, not just because lower courts are defying Rule 702, but because Rule 702 is substantively correct.

The use of adversarial expert testimony inherently invites adversarial bias, which leads to experts testifying for each side presenting diametrically opposing views to lay jurors. Jurors have at least a fighting chance to reach an accurate result when an expert is peddling obvious junk science that can be rebutted with references to the extant contrary scientific literature.

The greater problem arises in a context where judges, since at least *Ferebee*, have been most reluctant to exercise their gatekeeping responsibilities: when a case involves issues on the frontier of scientific knowledge. When confronted with a “battle of the experts” with each expert claiming that his scientific judgment either does or does not support a finding of causation, lay jurors have no means by which they can determine whose judgment is superior. The most effective solution to this conundrum would be the appointment of nonpartisan experts who are not subject to adversarial bias,²⁴⁰ but this reform has been proposed for well over one hundred years and has yet to make meaningful headway.²⁴¹ The best alternative is to exclude expert

237 Only Chief Justice Rehnquist and Justice Stevens declined to join the full *Daubert* opinion, and only Justice Stevens dissented in *Joiner* and *Kumho Tire*.

238 See, e.g., COMM. ON IDENTIFYING THE NEEDS OF THE FORENSIC SCI. CMTY., NAT’L RESEARCH COUNCIL, STRENGTHENING FORENSIC SCIENCE IN THE UNITED STATES (2009); D. Michael Risinger, *Whose Fault?—Daubert, the NAS Report, and the Notion of Error in Forensic Science*, 38 FORDHAM URB. L.J. 519, 519–20, 527 (2010); Michael J. Saks & Jonathan J. Koehler, *The Coming Paradigm Shift in Forensic Identification Science*, 309 SCI. 892 (2005).

239 Indeed, the Supreme Court has inadvertently provided dicta in another context that lower courts are using to evade their gatekeeping responsibilities. See Nathan A. Schachtman, *Matrixx Unloaded*, SCHACHTMANLAW.COM (Mar. 29, 2011, 5:39 AM), <http://schachtmanlaw.com/matrixx-unloaded>.

240 See Bernstein, *supra* note 35, at 459.

241 See Sanders, *supra* note 56, at 77 (“[P]roposals [for greater use of nonpartisan experts] are resisted [by the legal establishment because] adversarial proce[sses constitute] far more than a legal technique and instead encompass an entire political image of justice. In light of this ideology, substantial movements away from party-witness experts seems unlikely.” (footnote omitted)).

testimony when experts cannot point to objective support for their conclusions, and instead intend to ask the trier of fact to trust their unconfirmed judgment. And that is precisely what Rule 702 accomplishes.